

An Exploration of Emerging Collaborative Conservation Strategies to Support Sustainable Development in the United States

Courtney Elizabeth Kimmel

Dissertation submitted to the faculty of the
Virginia Polytechnic Institute and State University
in partial fulfillment of the requirements for the degree of

Doctor of Philosophy
In
Forest Resources and Environmental Conservation

R. Bruce Hull, Chair
David P. Robertson
Max Stephenson, Jr.
Nancy G. McGehee
John Provo

March 22, 2011
Blacksburg, Virginia

Keywords: integrated conservation and development; sustainable development; landcare;
ecological entrepreneurship

An Exploration of Emerging Collaborative Conservation Strategies to Support Sustainable Development in the United States

Courtney Elizabeth Kimmel

ABSTRACT

Completed as a series of manuscripts, this dissertation reflects four aspects of my research and exploration of the intersection of conservation and sustainable development as practiced by conservation land trusts and community landcare groups, as well as by faculty and staff at land grant universities interested in furthering such efforts. The first paper included in this dissertation explores “Conservation 2.0” strategies being developed and employed by land trust across the US to integrate social and economic development goals into their conservation missions. The second paper explores one of these Conservation 2.0 strategies, the support of ecological entrepreneurship by land trusts, in greater detail. The third piece emerged out of five years of engaged research with one community landcare group in the region, Catawba Landcare, in the form of a dynamic content management system (CMS)-based website which was built to capture the development path and history of the organization, as well as to facilitate its path forward. The fourth and final piece of this dissertation is a collaboratively written piece that examines the relationship between Catawba Landcare and Virginia Tech using four theoretical lenses for community capacity building and a model for engagement for land grant universities to build and strengthen social infrastructure in their neighboring communities. In total, this collection of works chronicles a larger endeavor to explore place-based sustainability and the role of institutions and civil society in constructing a more sustainable future for themselves.

Acknowledgements

There are several people who deserve a great deal of thanks for their help and support in this effort. First and foremost, I would like to thank the wonderful people who have worked with Catawba Landcare over the years and who have so warmly and generously welcomed me into their community and lives. The time I have spent in southwestern Virginia is all the more dear to me for the time I have spent with you.

Each member of my committee brought a unique and valuable perspective to this decidedly interdisciplinary research venture. David Robertson first introduced me to the concept of landcare through his course in Public Ecology, which forced me to rethink my entire perspective on ecology and the human-environment relationship. The economic development studio course taught by John Provo provided me with a practical perspective and set of skills for more realistically considering economic development in the context of community sustainability. Nancy McGehee's background in rural sociology applied to the impacts of tourism for communities was critical in exploring the concept of social capital and its implications for rural community development. I first sought the guidance of Max Stephenson based on his expertise with the role of nonprofit organizations, but he brought a whole range of other important theoretical perspectives to this research which has challenged me to think even deeper about the topics and concepts included in this dissertation. Finally, none of this would have been even remotely possible without the guidance and support of Bruce Hull, whose encouragement to think beyond the obvious and to forget about what is "normal" has shaped not only this product, but the thinker I have become.

I would also like to thank Christy Gabbard, whose work on behalf of the people living in the Catawba Valley, and whose dedication to transitioning an abandoned and derelict farm into the Catawba Sustainability Center to serve the greater needs of the region and of society, has inspired so much of this project and me personally.

Table of Contents

CHAPTER 1 – Introduction	1
CHAPTER 2 – Conservation 2.0 practiced by land trusts in the US; <i>Kimmel & Hull</i>	
Introduction	5
Methods	7
Results	9
Discussion	16
Conclusion	20
References	22
CHAPTER 3 – Ecological Entrepreneurship Support Networks: Roles and Functions for Conservation Organizations; <i>Kimmel and Hull</i>	
Introduction	24
Literature Review	26
Methods	33
Case Studies	35
Discussion	42
Conclusion	48
References	50
CHAPTER 4 – Catawba Landcare CMS-Based Website (www.catawbalandcare.org)	
Introduction	56
Background	56
Purpose	58
Website Evaluation	59
Conclusion	64
CHAPTER 5 – Building Community Capacity and Social Infrastructure through Landcare: A Case Study of Land Grant Engagement; C.E. <i>Kimmel</i> , R.B. <i>Hull</i> , K.H. <i>Cowgill</i> , M. <i>Stephenson</i> , D. P. <i>Robertson</i>	
Introduction	67
Literature Review	68
Methods	73
Discussion	74
Conclusion	82

References	84
CHAPTER 6 – Conclusions	87
APPENDIX A – Annotated List of Figures	89
APPENDIX B – Survey questions and results collected by Center for Whole Communities	90
APPENDIX C – Select screenshots from www.catawbalandcare.org	96

List of Figures

Chapter 2 – <i>Figure 1</i>: Typology of Conservation 2.0 strategies being developed by land trusts in the US.	8
Chapter 4 – <i>Figure 1</i>: Original conceptual navigation map for www.catawbalandcare.org	64
Chapter 4 – <i>Figure 2</i>: Revised actual navigation map for www.catawbalandcare.org	65

List of Tables

Chapter 3 – <i>Table 1:</i> Roles and functions within ecological entrepreneurship support networks.	33
---	----

Chapter 1

Introduction

The research described in this dissertation began as part of my master's thesis to capture and describe the emergent landcare movement in the eastern United States as a developing form of collaborative conservation. What has become evident over the course of the last five years, and what has inspired the other research paths of this dissertation, is that landcare is but one of many emerging strategies to address the sustainable development of communities. Sustainable management of land and natural resources remains a critical challenge, but there appears to be increasing recognition among individuals, organizations, and institutions that environmental concerns cannot be addressed in isolation from the social and economic systems in which the environment exists. Landcare emerged in Australia in the 1980s as an effort to galvanize Australian communities around the care and management of their shared resources, yet it has been empirically linked to its capacity to build social capital in communities, resulting in greater adoption rates of best management practices among farmers (Cary, Webb et al. 2000; Sobels, Curtis et al. 2001). Three of the four landcare groups which have emerged in the Appalachian region over the last several years have rallied around the concept of landcare as a means to explore sustainable economic development options for their communities and for landowners. Landcare, it became apparent, is about more than caring for land – it is about people working together to care for the shared places where they live and work, now and for the future. It is about identifying the issues most pertinent to the area and developing locally relevant strategies and solutions for addressing them.

Using the concept of landcare as a touchstone, I expanded the scope of my research to explore how other organizations and institutions that had traditionally maintained a focus on environmental issues were integrating social and economic development objectives and initiatives into their programs and missions. Because my interest in the issue had stemmed from landcare and its roots in land management and natural resource conservation, conservation land trusts seemed a suitable type of organization to examine more closely. Indeed, I found that several land trusts across the US were employing tools and strategies that integrate principles of

sustainable development into their conservation work. This line of inquiry led to the two papers which comprise Chapters 2 and 3 of this dissertation.

In order to examine the activities and programs of land trusts at a national scale, I worked with the Vermont based Center for Whole Communities in order to conduct a secondary analysis of data they collected through a nationwide land trust survey in 2007. Based on this analysis, I developed a typology of strategies and programs land trusts are developing in order to achieve integrated outcomes – to conserve land and resources while also strengthening local economies, revitalizing communities, ensuring access and political voice for residents, and facilitating more cooperative and long-lasting approaches to regional development. This typology of what I refer to as “Conservation 2.0” strategies serves as the basis for a series of case studies featured in a paper presented in Chapter 2 entitled, “Conservation 2.0 practiced by land trusts in the US.” This paper is co-authored by my committee chair and advisor, Dr. R. Bruce Hull.

Chapter 3 presents a paper which digs deeper into one aspect of Conservation 2.0 in particular, to explore the role of conservation land trusts in supporting economic development initiatives which maintain environmental goals – or what we specify as supporting “ecological entrepreneurship” (Marsden and Smith 2005). In this study, I identify and examine conservation land trusts that were actively involved in supporting ecological entrepreneurs through various roles in what I termed “ecological entrepreneurship support networks.” This paper is also co-authored by my committee chair and advisor, Dr. R. Bruce Hull.

Chapters 4 and 5 return to the origins of my interest in the subject of integrated conservation and development by examining more closely one landcare group in particular and the role that Virginia Tech has played in building the capacity of this group and community. For the majority of my tenure as a graduate student at Virginia Tech, first as a master’s student in the Department of Political Science and then as a doctorate student in the Department of Forest Resource and Environmental Conservation, I have been engaged with Catawba Landcare as both a student and an advocate of the concept. Since 2006 when I first got involved with the landcare initiative at Virginia Tech, I have been involved to varying degrees with Catawba Landcare, a group of neighbors and landowners located in the Catawba Valley. The duration of my

involvement has allowed me to observe and partake in the development of the group and several of the accomplishments they have achieved. In the interest of capturing that institutional memory and providing a dynamic tool that will continue to serve the interest of the group and movement, I developed a content management system (CMS) based website for the organization, which is presented and discussed in Chapter 4.

Chapter 5 presents a case study of this engagement with Catawba Landcare from the perspective of a land grant university's role in building social capacity in surrounding communities. Drawing from Flora and Flora's (1995) assertion that a strong and "entrepreneurial" social infrastructure is a critical component for facilitating lasting change and development in communities (particularly rural communities), this study explores the case of Virginia Tech's involvement in facilitating and supporting Catawba Landcare using three theoretical frames – Heifetz's (1994) concept of "holding environments" as a safe and facilitated space where social learning can occur; Marsden and Smith's (2005) concept of "ecological entrepreneurship," which also incorporates and builds upon ideas from Chapter 4; and the concept of Learning Action Networks (Clarke and Roome 1999; Stephenson 2011) in which otherwise disparate goals and partners are linked under common goals and collectively learn how to manage the situation at hand. Using these three theoretical frames, this paper posits landcare as a model of engagement for land grant universities thus contributing to the construction of social infrastructure.

This paper was collaboratively written by a team of researchers who were all involved in varying capacities with VT's work with Catawba Landcare, and whose perspectives were all integral to forming the case and the paper. Dr. David Robertson served as the director of VT's Landcare Center since its inception, having visited Australia and worked with the USDA to secure the initial resources to support the emergence of the landcare groups in the region. Dr. R. Bruce Hull served in an advisory role to the groups, to VT's relationship with landcare, and to my engagement with the groups. Dr. Max Stephenson brought a deep theoretical understanding of the relationship between institutions and civil society, both to VT's landcare initiative as well as to my research with the landcare group. Finally, one of my fellow doctoral students, Kim Cowgill, who is pursuing similar research interests was involved in helping to develop the theoretical frameworks for this case.

The four pieces which comprise this dissertation are artifacts of a much larger intellectual challenge that I have faced over the course of this degree program. Wrestling with broader theoretical concepts such as sustainability, place, social capital, networks, collaborative governance, community and economic development, and the role of civil society have informed much more than these articles – it has fundamentally altered my worldview and has inspired my goals for the future.

References

- Cary, J., T. Webb, et al. (2000). Community Landcare, the National Landcare Program and the Landcare Movement: The Social Dimensions of Landcare, Bureau of Rural Science.
- Clarke, S. and N. Roome (1999). "Sustainable business: learning-action networks as organizational assets." Business Strategy and the Environment **8**(5): 296-310.
- Heifetz, R. A. (1994). Leadership without easy answers, Belknap Press.
- Marsden, T. and E. Smith (2005). "Ecological entrepreneurship: sustainable development in local communities through quality food production and local branding." Geoforum **36**(4): 440-451.
- Sobels, J., A. Curtis, et al. (2001). "The role of Landcare group networks in rural Australia: exploring the contribution of social capital." Journal of Rural Studies **17**(3): 265-276.
- Stephenson, M. (2011). "Conceiving land grant university community engagement as adaptive leadership." Higher Education **61**(1): 95-108.

Chapter 2

Conservation 2.0 practiced by land trusts in the US

C.E. Kimmel and R. B. Hull

(as of March 2011, under review with Landscape & Urban Planning)

Abstract

Legal and technical tools for land conservation at the single parcel scale often fail to address broader underlying issues driving land and resource use, conversion, and exploitation more broadly. This study examines four conservation land trusts in the United States which are taking an expanded and integrated approach to their conservation missions, what Peter Forbes calls Conservation 2.0 in his 2008 manifesto to land trusts entitled “Building a New Movement.” Using a multi-case study design, we describe the strategies and practices developed by these organizations, examine their motivations, and document the lessons they have learned and which other institutions may find beneficial as they consider adopting similar approaches.

Introduction

Increasing emphasis on sustainability and balanced consideration of economic, social, and ecological costs and benefits presents a challenge for organizations traditionally focused on protecting the environment by insulating it from market pressures seeking to develop it, and defending against human impacts. Familiar strategies employed by land conservation organizations include placing land in public ownership (i.e., as a park or preserve), and purchasing, transferring, or dissolving development rights on a parcel of land (see Bengston et al. 2004 for a review of public sector policies and strategies). This study speaks specifically to the dissolution of development rights particularly through conservation easements, a tool commonly used by conservation land trusts. While conservation easements provide an effective means of protecting land from development, we argue that unless they are employed as part of an integrated strategy, easements alone do little to address the broader social and economic drivers that determine land use. Addressing the US land trust community, Forbes (CWC 2008) critiques the limited and limiting impacts of such legal and technical tools as the conservation easement,

advocating instead for more inclusive strategies that build support for stewardship and reconnect people to their environment. Concerns about long-term and large-scale impacts of conservation easements secured by land trusts have raised other concerns, including questions about future regional infrastructure and development needs (Mahoney, 2001), accessibility to land and resources by people in different socio-economic groups (Cashin, 1999; Knaap and Frece, 2006), the ability to manage land for ecological health (Richardson, 2010), and the continued economic viability of working landscapes (Kimmel & Hull in review).

In his appeal to land trusts, Forbes (CWC 2008) employs an analogy to computer system upgrades — a 1.0 system to a 2.0 system — to distinguish between the narrow technical strategies of Conservation 1.0, and the more holistic and integrative strategies of Conservation 2.0 (C2.0) which aim to have broader spatial and social impact. The purpose of this study is three-fold: 1) to describe some C2.0 practices being developed by respected land trusts; 2) to examine motivations for land trusts that adopt C2.0 practices; and 3) to document what lessons they have learned, and what other institutions might glean from their experiences. Using a multi-case study design, we examine select land trusts that have defined or redefined their mission and activities based on an expanded interpretation of the goals of conservation and the broader role land trusts can play in constructing sustainability for communities where they operate.

Land Trusts

Land trusts are a category of organization established in the US to facilitate private land conservation and stewardship. Following funding cuts for public land acquisition during the early 1980s, land trusts and their associated market-based tools rose to prominence as a means of conserving land while keeping it in private ownership (Fairfax et al., 2005). There are two types of land trusts – community land trusts focus primarily on reserving land for community commons and affordable housing, while conservation land trusts conserve land for its ecological and productive value (Campbell and Salus, 2003). This study examines the latter, particularly those land trusts working at the local and regional scale. These organizations are loosely networked through an umbrella organization, the Land Trust Alliance (LTA), which defines land trusts as “a nonprofit organization that, as all or part of its mission, actively works to conserve

land by undertaking or assisting in land or conservation easement acquisition, or by its stewardship of such land or easements,” (LTA website). This definition makes explicit the purpose of land trusts as a function of the tools involved, namely the conservation easement, which poses concerns as discussed in the introduction. The conservation easement allows landowners to voluntarily agree to permanently dissolve the development rights for a particular property, often in exchange for monetary returns such as tax credits (Gustanski and Squires, 2000; Pidot, 2005). Other tools used by land trusts include fee-simple acquisition and the purchase (Buckland, 1987) or transfer (McDonald et al., 2007) of development rights (PDR and TDR).

We focus on land trusts in this study on innovative conservation strategies for several reasons. First, they maintain an explicit commitment to environmental concerns, a dimension of sustainable *development* sometimes under-addressed. Second, they are autonomous organizations – the only standardization among them is voluntary compliance with LTA accreditation standards (standards which rely heavily on conservation easements). This autonomy affords them flexibility to innovate in response to the contexts in which they operate. Two other reasons we focus on land trusts are because they are distributed across the US, and because they are a well respected institution that can provide reputable insights for other conservation organizations interested in pursuing similar goals and strategies.

Methods

This study describes four cases where land trusts have expanded the scope of their programs and activities beyond the traditional focus of pursuing conservation easements into what we refer to as Conservation 2.0. We do not contend that these cases are representative of the larger land trust community, but instead provide unique and compelling examples of how such conservation organizations can extend the reach of their efforts both spatially and socially. As such, we employed a methodology that allowed us to identify and develop four descriptive critical instance case studies (Morra and Friedlander, 1999; Yin, 2003). These cases are used to illustrate each of the four strategies and then are discussed in aggregate to provide insights for other organizations.

To identify land trusts employing C2.0 strategies that could serve as the foci of our case studies, we began by conducting a secondary analysis of land trust survey data collected by the Center for Whole Communities (CWC) in 2007 (see CWC 2008 for their report using these data). We reviewed these data to identify activities distinct from conservation easements or land acquisition. The survey had been distributed electronically to senior staff and board members affiliated with the approximately 1,700 land trusts represented by the LTA. As the survey was distributed to multiple contacts within each organization, 361 individual responses were returned, representing 286 unique organizations, mostly clustered along the coasts.

We use open axial coding (Corbin and Strauss, 2008) to code and sort open-ended responses to the CWC survey into four broad categories of emphasis and associated activity beyond pursuing easements (Figure 1). These four focal areas included: 1) directing and influencing physical regional development; 2) addressing social and community concerns; 3) improving economic viability of working landscapes and strengthening local economies; and 4) providing/ facilitating political representation of community-voiced concerns regarding place-based decisions.

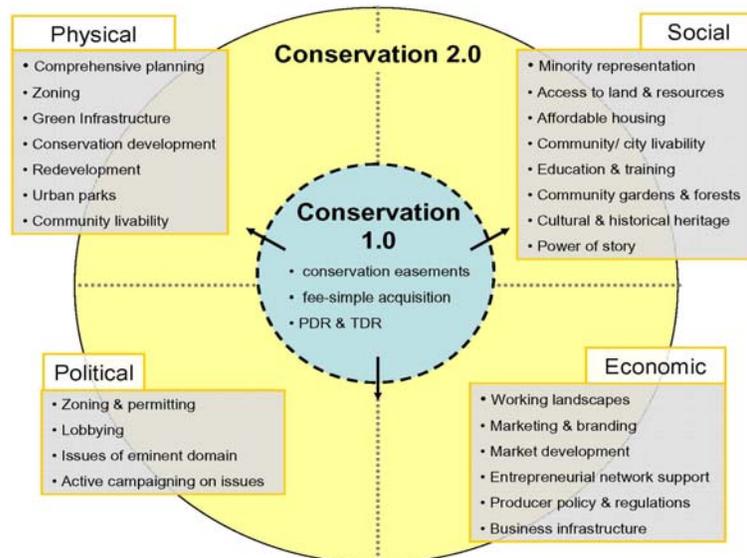


Figure 1. Programs and activities of land trusts indicated in the survey which fell outside of the realm of legal and technical conservation of land were categorized into four broad categories – 1) influencing physical regional development, 2) addressing social and community concerns, 3) improving economic conditions, and 4) providing and facilitating political representation of community voices.

Of the 286 land trusts surveyed, 91 appeared to be engaging in one or more of these activities. We researched these organizations further, examining websites and available literature to determine the extent to which these activities comprised a core component of the organizations' efforts. Thirteen organizations indicated a strong commitment to goals broader than land protection alone. From this narrowed sample, we returned to the typology presented in Figure 1 as an organizing framework, sorting organizations based on what appeared to be their most significant emphasis. Organizations were compared within categories to identify the strongest example of each, based on the scale of projects and explicit statement of broader priorities in the organization's mission and values. The four organizations selected as case studies were the Brentwood Agricultural Land Trust in the Bay Area of California, the Big Sur Land Trust in Central California, Cascade Land Conservancy in Washington, and the Piedmont Environmental Council in Virginia, all of which graciously agreed to be included in this analysis and presentation.

Multiple sources of data were utilized to develop the cases. In addition to the public façade presented on the organizations' websites and responses to the CWC survey, we conducted semi-structured telephone interviews with Executive Directors and senior staff members of these organizations in 2010. The interviews were recorded with pertinent sections transcribed for accuracy. Documents provided by the organizations, including public and internal publications and reports were also read, coded, and analyzed. After developing the case studies and extracting themes and lessons we shared preliminary drafts of our ideas with informants to solicit additional information and perform a member check of the accuracy and validity of findings.

Results

Brentwood Agricultural Land Trust – sustaining both farming and land to farm

The Brentwood Agricultural Land Trust was established in 2002 to implement the agricultural land mitigation program of the City of Brentwood in Contra Costa County, east of the San Francisco Bay area. At the time, Brentwood was growing rapidly, with a 158% population

increase between 1990 and 2000, and urban expansion that had claimed close to 20% of prime agricultural land in the surrounding county since 1984. The local environmental community was concerned about the rate of development and loss of working lands in an area renown for its orchards and vineyards. In 2002, the Brentwood City Council approved an agricultural mitigation program, in which a fee was levied when developers converted agricultural land to residential use. The mitigation fees went towards supporting the land trust [BALT] to pursue and acquire conservation easements on farmland (City of Brentwood, 2002).

As the organization had formed out of a politically motivated land preservation ordinance, BALT's Executive Director Kathryn Lyddan was faced with the dilemma that there was little demand for conservation easements from farmers. The combination of restrictive top-down policies enacted to protect agricultural land and spiking property values in the region, compounded by global market competition and high input costs, meant that agricultural production in the region had become cost-prohibitive. Though farmers recognized the threat development presented to the future of their farms, they also saw that development offered the potential of large financial returns. A response Lyddan frequently heard when talking to farmers about conservation easements was,

We can't imagine why we would put an agricultural conservation easements on our land and promise to keep our land as farmland forever when we don't think we will be able to continue making a living farming here (recounted by Lyddan).

The board members of BALT, mostly farmers in the region, "took the position that it was important to create economic sustainability for local farmers, otherwise we were just conserving open space that would not remain as farmland," explained Lyddan. Based on this identification of priorities, BALT pursued two strategies to increase farm profitability: 1) revise restrictive zoning and permitting that had been established to limit development but were also limiting business options for farm operations, and 2) build and expand local markets and supply chains for locally grown products. BALT took an active role in reforming permitting and zoning regulations in the region which allowed farmers to increase the scope of their on-farm activities. Previously, producers were not permitted to sell products not grown or processed directly on premise, and were limited to very small farm-stand size retail spaces. Loosening these

restrictions has allowed farmers to expand into agri-tourism, production and sale of value-added products, and other activities that keep their farms profitable. Additionally, BALT has become a key stakeholder in building and strengthening local food networks for the region. They administer the local “Buy Fresh Buy Local” campaign, and connect producers and consumers through community-supported agricultural (CSA) programs and institutional buyer networks.

Through its work supporting the business of farming, BALT has earned the trust of many area producers who were initially skeptical about the land trust. As a result, BALT has begun attracting more interest in easements. Lyddan explained that when she started this work,

Local farmers were skeptical about the land trust and the easement program. Working with farmers on zoning and permitting reform and agricultural marketing has built trust in the community. Six years later everyone knows about BALT and they’ve worked with the BALT Board and me. You build trust on the stuff that everyone can agree on (Lyddan).

The organization now holds six easements with four more underway.

Big Sur Land Trust – shifting focus from the 5% to the 95%

Working in Monterey County, California, the Big Sur Land Trust formed in 1978 with the mission “to conserve the significant lands and waters of California’s Central Coast for all generations.” For the majority of its 30 years in operation, this has meant working with wealthy landowners to preserve the coastline for which Big Sur is widely celebrated. As BSLT Executive Director Bill Leahy explained,

We have done such a good job protecting the coastal lands that we have ignored and forgotten about the interior. And when we look to the interior, we see some of the poorest communities – communities that don’t have access to open space or parks in their cities and because of that, have no interest or no real connection to land trust work... I like to say that we served 5% of the population in our old construct, and we need to figure out how to serve the 95% -- because it’s the 95% are who are ultimately going to be responsible for taking care of all of these places (Leahy).

Shifting the focus of BSLT from “5% to the 95%” is reflected in the new vision and strategies implemented by the organization since Leahy assumed leadership in 2003. The communities which are part of ‘the interior’ are largely Latino agricultural communities along the Salinas River Valley, termed the “salad bowl of the world” because of its ideal growing conditions for cool season crops. The cultural divide that exists between interior agricultural and affluent coastal communities is locally referred to as the “lettuce curtain” (see Leadership Monterey Peninsula project website). In 2004, the BSLT agreed to their first major land acquisition project on the other side of the “lettuce curtain,” an 816-acre ranch 3.6 miles southwest of the City of Salinas,

We weren’t thinking about justice and fairness when we did it. We were probably thinking more in a tactical sense - this is a way to expand the membership base of the organization. As we got into it, we started to understand that there were deeper issues that could be affected and there was an opportunity to really rethink the land trust and its role in the community (Leahy).

Thus began BSLT’s shift towards projects focused on reconnecting people to the land. At a 2006 retreat facilitated by the CWC, board members and members of the community discussed the “future direction of the land trust, its role in the community, and the many forces of change affecting our land and water conservation mission” (BSLT 2007). A new vision and set of guiding values resulted that “expands the notion of who benefits from our work” (ibid):

We see a future for our communities in which rich natural resources, working landscapes, prospering human communities and the unique character of place are conserved and cared for through collaborative partnerships and mutual support (ibid).

The new vision was followed by a “set of values that flow from it,” which states,

our projects and programs will promote, rather than detract from: ecological well-being; community vitality; stewardship; inspiring stories; healthy people; service; fairness; and community resilience/ vitality (ibid).

BSLT’s primary strategy for pursuing their new vision is building partnerships – with constituents in underserved communities, new funding sources, local organizations and government, and between people and their place. Leahy acknowledged that with high property

values in the region, the land trust “has no prayer of buying enough land to, in effect, preserve it. So we HAVE to figure out a way to get the community to embrace stewardship,” (emphasis in statement). Fostering this sense of stewardship across the region, regardless of cultural divides, and engaging other partners in the process, has become the primary challenge of BLST,

Morally, and from a social perspective, the loss of relationship to the landscape, whether it’s a privileged or underprivileged person, is something that is threatening the very values that our communities used to hold, in terms of understanding the relationship to the landscape and the importance of that landscape to their well-being, whether its economic or health-wise or spiritually. That loss of connection is probably most severe and most problematic in communities where there are no resources to address it. We have begun to really explore that idea of how a land trust can engage in a community where we have not historically engaged, and how we can do it in a way where we are inspiring others to join with us (Leahy).

Leahy acknowledges that some of their traditional conservation programs have suffered while BSLT has “been ramping up these larger expressions of our work.” At the same time, the organization has come to realize that traditional conservation tools such as conservation easements are not “the dominant tools in our toolbox any longer. They are very important – they haven’t diminished in importance – but there are other tools now that are as important,” (Leahy).

Cascade Land Conservancy – guiding long-range and large-scale vision of place

The Cascade Land Conservancy, established in 1989 and based in Seattle, Washington, serves one of the fastest growing metropolitan areas in the US. In 2005, the Cascade Land Conservancy (CLC) announced the launch of The Cascade Agenda, a 100-year vision and strategic plan for the Central Cascades region. The vision and strategies contained in The Cascade Agenda is based on two years worth of town hall style “Cascade Dialogue” meetings. The Cascade Agenda was endorsed by close to 850 civic organizations, leaders, and citizens in the region, evidence that the “big tent” approach taken to develop the regional-scale and long-range development plan has benefits for a wide-range of stakeholders in the region.

As Nicholas Bratton, a Policy Project Manager for the organization explained,

Quality of life is one of the drivers bringing people to the region and is ... one of the first things affected by growth. If quality of life is important to the identity and character of the region, it is of broad interest to protect the lands which define that quality: farms, forests, and open spaces. CLC assembled a wide range of stakeholders to discuss a 100-year vision, and the long time scale maximized common interests and concerns. It became clear that the goals over this temporal scale were interdependent (Bratton).

Two overarching goals drive The Cascade Agenda: 1) protect one million acres of working forests and farms, and 265,000 acres of shoreline, natural areas, and parks; and 2) maintain rural economies and way of life, and enhance the vibrancy and livability of cities and towns (2007).

Commenting on the intent and scope of The Agenda, CLC President Gene Duvernoy elaborated,

If we have any hope of preserving our region's quality of life, we must find new approaches to conservation and community building. CLC has charted a bold course to shape a future that will serve our children and grandchildren over the next century. The Cascade Agenda is a roadmap for a sustainable future that encourages collaboration across all sectors and balances environmental, social, and economic needs.

While land conservation remains a critical focus for CLC, it now equally emphasizes policies concentrating population growth in urban centers in order to reduce development pressures in conservation priority areas. The land trust operates two urban initiatives, the Cascade Agenda Cities program, in which cities voluntarily commit to “improve the livability of neighborhoods—making them complete, compact and connected—and spectacular enough that people choose to live there,” and the Green City Partnership in which the CLC helps forge public-private partnerships with municipalities to manage green spaces (CLC website). With cities such as Seattle and Tacoma participating, CLC's scope of concern spans the entire region.

Piedmont Environmental Council – doing work for the community

Established in 1972 with the mission of “safeguarding the landscapes, communities, and heritage of the Piedmont by involving citizens in public policy and land conservation,” the Piedmont Environmental Council is a regional organization focused on conservation of land and strengthening of communities in the Northern Piedmont Region of Virginia. Though land

conservation is a primary goal, PEC operates under the philosophy that conservation is only meaningful and lasting if it is supported by the values of the people who live in the region. “We are doing work FOR the community,” explains Heather Richards, Director of Land Conservation for PEC (emphasis in statement).

Many of the projects and initiatives undertaken by PEC are brought to them by citizens or community groups concerned about the future of the region, and PEC decides how it can best provide assistance. The structure of PEC is unique in that it maintains a land trust as one element of the organization designed to respond to community needs within the region, so in many ways, PEC’s land trust emerged as a C2.0 approach to conservation. The organization emphasizes connectivity, relevance within a larger context, and commitment to place,

We make the connections between issues, working effectively in an interconnected world, with strategies that take into account the links between air, land, and water, between city and country, between nature and people. We make the connections between local issues and the bigger picture — advocating for local, state, and national policies that can help people in the Piedmont achieve their best vision for their communities. Most importantly, we make the connections between people and what’s happening in the world around them—so they can take part as active citizens, rather than passive by-standers to change (PEC 2009).

The PEC presents their strategy for conserving the Piedmont as a comprehensive four-pronged approach of helping citizens to 1) **envision** the future Piedmont, 2) **protect** the land, 3) **confront** challenges, and 4) **build** better communities. In 2010, the organization’s priority list included clean air and water, conserving land, energy solutions, historic and scenic landscapes, thriving communities, transportation solutions, and wildlife and fish habitat (PEC website). While it seems an ambitious list for a single organization, the emphasis on helping and enabling citizens to do this work is critical to their success.

Staff members work fluidly across programs and initiatives to provide necessary functions, enabling the organization to tackle a broad set community concerns. When asked about the organizational structure’s effectiveness in delivering conservation outcomes, Richards explained

that “the multiple components of PEC enable us to address areas and concerns that one tool alone can’t address,” and that while conservation is a key component to their strategy, she added, “conservation is a means to an end, not the end in itself.”

Discussion

In comparison to a traditional “1.0” approach that focuses on deploying technical tools to protect the environment from the impacts of people, organizations practicing C2.0 embed their environmental conservation goals within a broader regional and community context, determining success not just as a reflection of acres conserved, but in terms of the landscape-scale and community-wide impact. One reason we elected to focus on land trusts as a unit of analysis for this project is they are embedded in a local context and are able to respond to local issues, which seems to be a significant motivation for them developing and implementing C2.0 strategies.

Each of the four organizations have developed strategies appropriate to the conditions and drivers underlying land use and land stewardship in their communities, targeting specific factors hindering long-term commitments to conservation. BALT was hindered in their conservation success by the economic viability of working lands, so their C2.0 approach drew on economic development tools to create a hospitable environment for farmland conservation. BSLT recognized they were catering to a small minority of the population in their region and drew from community building and social justice strategies to begin broadening their base of support. CLC was faced with the reality that urban and regional growth was threatening undeveloped areas in the Cascades regions, and committed themselves to large-scale regional planning and urban renewal to redirect growth into high-density areas to preserve outlying areas. On the east coast, PEC is using smart growth and conservation advocacy work to promote lasting results and an active and supportive citizenry. Each of these C2.0 strategies is designed to address the overlapping areas between conservation and the most pertinent economic, social, and political limitations.

These land trusts are not committing to this integrated conservation work independently, but have taken deliberate steps to engage partners to help them achieve these goals. Some of the

partners listed by these four land trusts, including arts organizations, adjudicated youth programs, urban municipalities, development and investment firms, and energy companies, are not what we think of as natural allies of the conservation community. However, by broadening their mission and looking holistically at regional conservation and sustainability, these land trusts have found common ground to enlist new partners in the work of creating more sustainable places.

Another important characteristic of these four land trusts is their deliberate inclusion and promotion of community voice in developing their priorities and strategies. BSLT and CLC each hosted town hall style meetings to gauge community interest and concerns, which guided the development of their strategies. BALT had little choice but to respond to the concerns of the farming community in their region, and PEC was created with the very purpose of promoting community activism. Rather than advocating *a priori* solutions to land use conversion (i.e. conservation easements) or responding only to a narrow slice of their population, these land trusts have opened up their process to the broader community. As Leahy of BLST explains:

The community is way ahead of us – don't underestimate the community support you are going to get. Don't be afraid to invite the community in to help you think about what a land trust should be for the 21st century. That scares even some of my board members, and it can be a scary thing, but I think the community will race to support any land trust who is interested in going in this direction.

The motivations and challenges faced by these land trusts provide lessons for other organizations and institutions interested in pursuing these goals. Insofar as motivations, each organization that made a deliberate shift from a C1.0 to C2.0 approach (all except PEC, which began with a C2.0 philosophy) reported a distinct point at which they were forced to question the long-term efficacy of their traditional approach to land conservation. For BALT it occurred in the beginning, when the reality of low demand for conservation easements became evident; for BSLT, it was with the introduction of new leadership who brought different values and perspectives to the organization; and with CLC it was at their fifteen year anniversary, reflecting on the long-term impacts they could realistically anticipate going forward.

Though precipitating circumstances were different for each organization, the decision to adopt C2.0 strategies emerged from concerns about both long-term commitments to land conservation and stewardship, as well as the continued viability and relevance of land trusts themselves. BSLT's emphasis on shifting from the "5% to the 95%" is an example of the first motivation, where the organization recognized that to ensure long-term support for conservation and stewardship in a socio-economically diverse region, they would need to expand their constituency beyond the affluent coastal communities. Maintaining and improving organizational relevance seems another motivation, though it is better described as strategic planning for the organizations. Leahy of BSLT described the difference between their old and new approach in these terms, "I think our old story was pretty boring, quite honestly, to most people – and irrelevant." Richards of PEC similarly explained that PEC exists to "do work *for* the people" and that any conservation results (and efforts) are "determined by the values within the community – the PEC is trying to ensure those values are maintained."

Despite best intentions, there are real and perceived risks, tensions, and challenges when adopting new strategies. BSLT and BALT reported a tension between what is conventionally understood to be the role of a land trust—pursuing conservation easements—and the C2.0 roles they are assuming. Executive directors for both of these organizations indicated a struggle to reconcile their emerging C2.0 missions with the traditional C1.0 tools and strategies that have come to define land trusts, particularly under LTA accreditation standards. CLC, which publicizes its ambitious conservation goals in *The Cascade Agenda* and its continued use of easements, as well as its expanded approach to stewardship and innovative market-based conservation strategies, did not report such a tension. Neither did PEC, which added a land trust program to its available services after it had established a reputation with its other programs. Richards of PEC expressed that this has actually made them a leader among land trusts, providing guidance on how to address emerging sustainability issues such as where to site smart grid infrastructure.

Another challenge faced by these organizations is effectively reaching and building trust with new, often underserved, constituents. Executive directors for BSLT and BALT were emphatic that this is "slow work" requiring patience, a different metric for measuring success, and a

willingness to “fail forward” and learn from their mistakes. Both were also explicit about the importance of building trust within the community before their conservation work can begin. In the Center for Whole Communities report, Leahy stated, “Just because we say we’re going to do this doesn’t mean that we have folks rushing over to join us. There are huge trust, language, and skin color barriers,” (2008) – barriers these organizations’ feel are surmountable over time.

One likely concern for institutions looking at the prospect of expanding the scope of operations is finding new donors and resources, or worse, alienating existing ones. None of the organizations reported any overt conflict with board members or donors as a result of adopting C2.0 goals and strategies. Indeed, the three organizations that made a deliberate change from C1.0 to C2.0—BSLT, BALT, CLC—reported attracting more diverse forms of support than their previous missions had allowed, largely from foundations and corporate sponsorship. Leahy of BSLT reported that incorporating a social agenda into their conservation work has created projects with “multi-dimensional public benefit outcomes.” As such, they have attracted significant foundation support, and have engaged private donors not otherwise interested in strictly conservation oriented projects. Likewise, The Cascade Agenda, with its “big tent” approach and broad appeal to regional stakeholders, has attracted the support of large corporate sponsors in the region including aerospace corporation Boeing and finance giant HSBC.

BALT did face a loss of support when the City of Brentwood withdrew public funding for the organization in 2007, reporting it was an inefficient use of public resources (Sherbert, 2007). Recall, however, that BALT is an unusual arrangement, established not as a membership organization, but through a local ordinance designed to mitigate the development of agricultural land. Defined and financed under such a narrowly prescribed mandate, the C2.0 activities which BALT found necessary to gain support among the farmers did not align with politically identified and motivated goals identified for the land trust. Despite the loss of city funding, BALT has attracted other municipal and foundation support to continue their work.

Conclusion

We began this article describing an increasingly complex set of challenges the environmental and conservation community must address if they are to contribute to global sustainability. We argued that the legal and technical tools designed to protect the environment from people are insufficient as they do little to address broader social, economic, and political drivers of environmental degradation and land use conversion. These concerns are familiar to readers of *Conservation Biology* (i.e., Berkes 2004). We specifically examined alternative strategies that integrate conservation and development goals practiced by land trusts in the United States. In identifying and examining organizations that are expanding their mission and activities beyond legal and technical conservation of land, and assuming a broader role in shaping the future of their communities and regions, we hoped to highlight the opportunity to better ensure long-term commitments to conservation available to all land trusts and related conservation organizations.

The strategies presented here are hardly new, but it is the adoption of a holistic perspective which is different and deserving of the C2.0 label. By situating their organizations as actors improving the overall well-being of their communities and regions, these land trusts strive to make their missions and programs relevant to a larger audience with landscape-scale impacts. The outcome is a more integrated approach to conservation, not only preserving and protecting land, but also addressing social, economic, and political drivers influencing land use decisions. Such strategies enable land trusts to do more than build sand castles on the beach, likely to be washed away by the rising tide of development and global climate change. Such strategies build capacity for conservation and communities to weather the storms ahead.

We appreciate that legal tools such as conservation easements are seen by many as the only permanent way to conserve land, but we ask whether that is enough to ensure the future vitality and sustainability of a place. Each organization included in this study continues to use and promote conservation through purchase or trading of easements and restricting development, but their conservation objectives and tools are framed within a broader regional and social context, with an explicit acknowledgement that long-term and large-scale sustainability requires strengthening connections and relationships between people and their environment. The same

features that help us understand Conservation 2.0 as an alternative form of conservation set within a social context also helps us identify the roles and functions other organizations and institutions can play to promote sustainable development. Most organizations can adjust their existing goals and strategies slightly and build meaningful partnerships to better address the challenges we face.

References

- Bengston, D. N., Fletcher, J. O., Nelson, K. C., 2004. Public policies for managing urban growth and protecting open space: policy instruments and lessons learned in the United States. *Landsc Urban Plann* **69**(2-3):271-286.
- Berkes, F., 2004. Rethinking Community-Based Conservation. *Conserv Biol* **18**(3):621-630.
- BSLT (Big Sur Land Trust), 2007. Vision and Values Conclusion (unpublished report). BSLT, Carmel, CA.
- Buckland, J. G., 1987. The history and use of purchase of development rights in the United States. *Landsc Urban Plann* **14**:237-252.
- Campbell, M. C., Salus, D. A., 2003. Community and conservation land trusts as unlikely partners? The case of Troy Gardens, Madison, Wisconsin. *Land Use Policy* **20**(2):169-180.
- Cashin, S., 1999. Localism, Self-Interest, and the Tyranny of the Favored Quarter: Addressing the Barriers to New Regionalism. *Georgetown Law Journal* **88**:1985.
- Center for Whole Communities (CWC), 2008. Building a New Movement: Land conservation and community, CWC, Fayston, VT.
- City of Brentwood, 2002. Ordinance No. 722. Brentwood, CA. Available from <http://www.ci.brentwood.ca.us/boards/aarg/enterprise/> (Accessed 11-10-2010).
- CLC (Cascade Land Conservancy), CLC, Seattle, WA. Available from <http://www.cascadeland.org/> (Accessed 11-01-10).
- CLC (Cascade Land Conservancy), 2007. The Cascade Agenda. CLC, Seattle, WA. Available from <http://cascadeagenda.com/ourstory> (Accessed 10-15-10).
- Corbin, J., Strauss, A., 2008. Basics of qualitative research: Techniques and procedures for developing grounded theory. Sage Publications, Inc,
- Fairfax, S., Gwin, L., King, M., Raymond, L., Watt, L., 2005. Buying Nature: The Limits of Land Acquisition as a Conservation Strategy, MIT Press, Cambridge, MA.
- Gustanski, J., Squires, R., 2000. Protecting the land: conservation easements past, present, and future. Island Pr,
- Knaap, G., Frece, J., 2006. Smart Growth in Maryland: Looking forward and Looking Back. *Idaho Law Review* **43**:445.

- Land Trust Alliance, Available from <http://www.landtrustalliance.org/land-trusts> (Accessed 10-20-10).
- Leadership Monterey Peninsula, 2008. Bringing Down the Lettuce Curtain: The Lettuce Talk Steinbeck Student Video Exchange Project. Monterey, CA. Available from http://www.leadershipmonterey.org/file_depot/0-10000000/20000-30000/24393/conman/Lettuce+Curtain.pdf (Accessed 11-30-2010).
- Mahoney, J. D., 2001. Perpetual Restrictions on Land and the Problem of the Future. Available from <http://ssrn.com/paper=291537> (Accessed 9-20-10).
- McDonald, R. I., Yuan-Farrell, C., Fievet, C., Moeller, M., Kareiva, P., Foster, D., Gragson, T., Kinzig, A., Kuby, L., Redman, C., 2007. Estimating the effect of protected lands on the development and conservation of their surroundings. *Conserv Biol* **21**(6):1526-1536.
- Morra, L., Friedlander, A., 1999. Case study evaluations. World Bank, Washington, DC.
- PEC (Piedmont Environmental Council), PEC, Warrenton, VA. Available from <http://www.pecva.org> (Accessed 11-10-10).
- PEC (Piedmont Environmental Council), 2009. 2009 Annual Report. PEC, Warrenton, VA. Available from <http://www.pecva.org/anx/index.cfm/0,505,html> (Accessed 11-10-10).
- Pidot, J., 2005. Reinventing conservation easements: a critical examination and ideas for reform, Lincoln Institute, Cambridge, Massachusetts.
- Richardson, J. J., 2010. Conservation easements and adaptive management. *Sea Grant Law and Policy Journal* **3**(1):31-58.
- Sherbert, E., 04/12/2007. Brentwood yanks funds from conservation group. *Contra Costa Times*, Brentwood, CA
- Yin, R., 2003. Case study research: Design and methods. Sage, London

Chapter 3

Ecological Entrepreneurship Support Networks: Roles and Functions for Conservation Organizations

C.E. Kimmel and R.B. Hull

(as of March 2011, under review with Geoforum)

Abstract

Changing social and economic drivers of land use require a more integrated approach to land conservation that addresses both the land and the socio-economic context of land use. Technical and legal conservation focused at the single-parcel scale is insufficient. This research examines ecological entrepreneurship, discussed by Marsden and Smith (2005), as an integrated conservation strategy that targets environmental as well as economic goals. Specifically, we explore the roles and functions that must be provided by Ecological Entrepreneurship Support Networks (EESNs). In particular, we look at land trusts engaging in these efforts. Through a series of case studies, we examine the roles and functions, as well as motivations and challenges faced by land trusts involved in EESNs. The lessons learned through these case studies are intended to inform broader sustainable development efforts.

Keywords: ecological entrepreneurship; integrated conservation; land trusts; landcare

1.0 INTRODUCTION

Sustaining the capacity to profitably maintain and manage agricultural, forest, and open landscapes is a challenge societies must solve because these landscapes are multifunctional: in addition to economic and social benefits generated by merchantable natural resource products, these lands sustain cultural amenities, traditional lifestyles, food and energy security, and a vast array of ecosystem services (Brandt and Vejre 2004; McCarthy 2005). Sustaining this capacity in the United States means reconciling competing forces acting on privately owned land and resources, land owners and managers, and the local social and economic infrastructure. Trends towards globalization, industrialization, and urbanization have profound and widely discussed implications for land, communities, and economies (Marsden, Banks et al. 2002; Marsden and

Smith 2005; Marini and Mooney 2006), particularly as they apply to resource and land-based industries (Porter, Ketels et al. 2004). Keeping land-based production both sustainable and profitable is challenging in the face of declining returns on investment for producers (NCSSF 2005; Hart and Lawrence 2009), increasing input and labor costs (Taylor and Koo 2008), and the ensuing ‘race to the bottom’ for resource-based economies (Marsden, Banks et al. 2002).

This research focuses on the concept of ecological entrepreneurship, or entrepreneurship in which “key actors are committed to preserving cultural, ecological, and environmental integrity yet find new pragmatic ways to create economic benefits” (Marsden and Smith 2005, p. 442). In their introduction to the concept, Marsden and Smith examined two farming-centered producer networks in the EU to demonstrate “how local innovation and non-conventional thinking can foster sustainable economic, environmental, and social development,” (p. 441). These authors use the term ‘ecological,’ as do we, to refer to the inclusion of ecological considerations in decision-making processes, not necessarily measurable environmental impacts.

We are interested in sustainability outcomes similar to Marsden and Smith (2005), but here focus specifically on land conservation strategies in which market-based activities promote the dual goals of profitability and land conservation. Because ecological values are insufficiently captured in market prices (Gutman 2007; Kroeger and Casey 2007), we support the argument that such entrepreneurship requires support from external partners, including those with an explicit interest in conservation outcomes (Ginn 2005). So whereas Marsden and Smith looked at the dynamics of networks comprised of entrepreneurs themselves, we are interested in the regional support networks formed around these efforts – Ecological Entrepreneurship Support Networks (EESNs) – and the roles and functions which must occur within these networks. In particular, we are interested in the roles and functions, as well as motivations and challenges, for conservation organizations to participate in EESNs. We focus specifically on conservation land trusts in the US engaging in this work because they work at a local and/or regional scale, they bring an explicit ecological interest to the work, and because their approach to conservation through private landowners seems compatible with market-based entrepreneurial tools.

Contributing to resolution of the longstanding tension between the ideological goals of preservation and conservation is a secondary purpose of this paper (i.e., the infamous rift between John Muir and Gifford Pinchot (Norton 1991), the controversies over the “wilderness critique” (Cronon 1995), and the “death of environmentalism” charge (Nordhaus and Shellenberger 2004). Preservation-oriented strategies that restrict development using easements and public ownership have been effective for the last century, but are they sufficient to ensure sustainable development over the long-term? A growing chorus of critics, including Marsden and Smith (2005), have been arguing for more comprehensive conservation strategies that address land and resources issues alongside of the social and economic dimensions of communities, all of which must be addressed if land, and the benefits that flow from them, are to be conserved in the face of changing and challenging economic and social context (Minteer and Manning 2003; Nordhaus and Shellenberger 2004; Freyfogle 2006; Berkes 2007). We see the support of ecological entrepreneurship as one pragmatic strategy for achieving these broader sustainability goals.

2.0 LITERATURE REVIEW

2.1 Non-sustainable land use trends in the US

In the face of a growing population, urban decentralization, and economic globalization, land use in rural areas of the US is changing, raising concerns about ecological and community resilience. Many areas in the US which traditionally relied on agricultural production and natural resource management face growing development pressure and increasing property values from exurban expansion (Barnard, Wiebe et al. 2003) and decreasing profit-margins in the ‘race to the bottom’ triggered by an industrial production regime and global competition (Daniels 2000; Marsden, Banks et al. 2002). As a result, the ecosystem services provided by the open spaces, forests, and farmland in these areas, such as water filtration, pollination, habitat, carbon sequestration, and cultural amenities are also at risk (Maestas, Knight et al. 2001; Hansen, Knight et al. 2005; Grimm, Foster et al. 2008). As the political economy of production and development changes, we see four non-sustainable (ecologically and economically) land use trends emerge: 1) consolidation and intensification of production into agro-industrial models to increase yields and

profitability in a global economy; 2) low-density residential development of previously continuous forest, agricultural land, and open space; 3) permanent preservation or easements that restrict management and development options; and 4) neglect or abandonment of land with out-migration of people, industry, and wealth, leaving little hope for active management of land. None of these four scenarios meet the goal of sustainable development and management of land, defined here as maximizing environmental and ecological health while supporting the economic and social well-being of communities that live and depend on that land.

The trajectory of land use leading to consolidation and intensification of production into industrial models, both for agricultural and forest products, is one that seeks to maximize yield and minimize costs to create the highest possible profit differential in a global marketplace (Marsden 1998; Marsden, Banks et al. 2002; Marsden 2003). This production scheme frequently marginalizes small-scale operations and operators (Bliss and Kelly 2008), and demands higher levels of mechanization and chemical inputs, which can have devastating effects on local ecosystems (Matson, Parton et al. 1997) and economies (Friedmann 1982; Atkins and Bowler 2001; Johnson 2006). The globalization of supply chains often entails the separation of production from value-added processing, reducing value-capture within communities (Ilbery and Bowler 1998; Atkins and Bowler 2001; Clark 2005). As a result, the most productive lands are intensely cultivated and marginal lands are converted to the next best use.

The second trajectory moves land previously in production into residential use because the amenity value of the land exceeds its value for commodity production, particularly in high amenity and exurban areas (Brown, Johnson et al. 2005). Broadly referred to as a post-productivist or ‘consumption landscape’ (Ilbery and Bowler 1998; Evans, Morris et al. 2002; Marsden 2003), this trend is often characterized by low-density development driven by exurbanization (Brown, Johnson et al. 2005; Berube, Singer et al. 2006), the fragmenting of previously contiguous fields and forests by new and more frequent property boundaries (Radeloff, Hammer et al. 2005a; Irwin and Bockstael 2007), and a greater plurality of landowner values imbued on the landscape (Egan and Luloff 2000). While some new rural residents may bring with them a strong conservation ethic, the physical, cultural, and ecological impact of

increased and dispersed development affects ecosystem service provision and concerns conservationists (Hansen, Knight et al. 2005; Radeloff, Hammer et al. 2005b).

The third trajectory of land use change is permanent preservation of undeveloped and working lands including farms and forests. Limiting economic development through the transfer, sale, or donation of development rights or the creation of a legally designated preserve is an effective method of protecting land and resources. However, unless it is implemented as part of a strategic vision for the region, it may merely displace land use change and have little total effect on regional livability or sustainability (Daniels and Lapping 2005; Korngold 2007). In addition, preservation alone cannot assure the land will remain ecologically productive as many forest and farmland degraded over time may require active management to improve the integrity of the land and resources (DellaSala, Martin et al. 2003; Foster, Swanson et al. 2003). While management is not frequently prohibited on preserved land, that is the case in some instances, raising concerns about the ecological conservation efficacy of such tools (Mortimer, Richardson et al. 2007; Richardson 2010).

A fourth trajectory of non-sustainable land use change is the abandonment and neglect of land. Abandonment generally results when the cost of property taxes and production inputs exceed the value of the outputs and a buyer cannot be found, then the cost of abandonment is less than the continued cost of ownership and maintenance (Freshwater 2001; Gellrich, Baur et al. 2007). Alternatively neglect or, worse, abuse, becomes a possible outcome without opportunities to afford and reward stewardship and professional management (Nyland 1992). Both scenarios can result in land that goes unmanaged, which can be ecologically beneficial or detrimental, depending on genetic stock, migration patterns, climate change, and invasive species (Bürgi and Turner 2002). Regardless, it does little to contribute to the viability of the surrounding economy or community.

2.2 Land trusts

Land trusts are a type of organization formed in the US to address land and resources conservation issues. Land conservation began in the US in the mid-19th century mostly through

public land acquisition, but when public financing and support for such programs started to wane in the 1970s, one response of the nonprofit sector was to form land trusts (Brewer 2003; Fairfax, Gwin et al. 2005). Reagan-era neoliberal emphasis on privatization and small government spurred the growth of market incentives for conservation practices on private land. In the space left by shrinking government, conservation land trusts rose to prominence, providing legal and technical expertise to facilitate conservation programs and tools with private land owners (Fairfax, Gwin et al. 2005). Between 1981 and 2005, the number of land trusts operating in the US grew from 370 to 1,667 – a 315% increase –with organizations operating in each of the 50 states (LTA 2005).

Land trusts are a broad category of organizations that preserve and protect land and resources through various mostly market-based tools and strategies. There is no legal definition nor a single organizational form or mission; instead land trusts are highly reflective of the biophysical and political landscapes in which they operate (Fairfax and Guenzler 2001; Brewer 2003). There are two main types of land trust in the US, a community land trust focusing primarily on land for community resources and housing, and conservation land trusts, which focus on land protection for ecological, aesthetic, and production objectives (Campbell and Salus 2003). Our focus in this research is the latter, specifically those which operate at the local or regional scale. Local conservation land trusts are only loosely networked through a national umbrella organization, the Land Trust Alliance (LTA), so there is little reliable data on their actual numbers or conservation outcomes (Merenlender, Huntsinger et al. 2004; Richardson 2010), though it is estimated that these organization have conserved over 37 million acres of land in the US (LTA 2005).

The definition provided for land trusts on the LTA website is organizations which “conserve land by undertaking or assisting in land or conservation easement acquisition, or by its stewardship of such land or easements.” This definition points to land trusts’ heavy reliance on technical and market-based tools, namely conservation easements that control property rights to achieve conservation outcomes. The conservation easement keeps land under private ownership, but permanently dissolves the development rights, with the value of that right sold or donated by the landowner for either cash or tax incentives (Gustanski and Squires 2000). Such easements are an effective tool for protecting land from development. They can keep a modest percentage of a

region's productive land open for traditional land management practices that produce desirable multifunctional benefits, but they do little to address underlying forces driving land use change or to avoid three of the four non-sustainable land use trends mentioned above. They generally do not address the infrastructure necessary to manage land under easement (Richardson 2010), nor do they promote conservation or management of the greater percentage of lands in the region not under easement (McDonald, Yuan-Farrell et al. 2007). Conservation easements, on their own, do not promote sustainable market conditions for sustainable production of timber, livestock, or other products to keep working lands economically viable, nor do they incentivize management for market or ecological services.

The conservation easement has been characterized with some trepidation as a neoliberal tool for environmental governance and the commoditization and privatization of nature (Logan and Wekerle 2008; Morris 2008). It has also been characterized as a legal and technical tool more suitable for defending land from people than for fostering long-term commitments to environmental stewardship and sustainable development (Forbes 2008). Among scholars, there is a growing call for conservation organizations to adopt more integrated and holistic conservation strategies which extend beyond property lines, and which seek to reconnect people with land (Minteer and Manning 2003; Berkes 2004; Freyfogle 2006). Given the goals and preferences of land trusts to protect private property rights, to employ market-based tools to achieve conservation outcomes, and to define their work according to the contexts of the communities and landscapes in which they operate, we envision land trusts as ideal partners in EESNs, supporting ecological entrepreneurship as a complimentary activity to their work of keep farms and forests economically and ecologically viable, and of connecting communities to land through market goods and services. Further, we propose that such efforts may have broader impacts for sustainability across the landscape than protection at the parcel scale.

2.3 Ecological entrepreneurship and economies of scope as conservation strategies

Proposed by Terry Marsden and Everard Smith (2005) as a strategy for sustainable rural development, ecological entrepreneurship exists where “key actors are committed to preserving cultural, ecological, and environmental integrity yet find new pragmatic ways to create economic

benefits (e.g. employment in the local community)” (442).¹ Marsden and Smith emphasize networks as a critical dimension for facilitating ecological entrepreneurship, specifically “how networks function and evolve to shape knowledge and create a collective willingness to innovate to achieve mutually beneficial goals” (441). With support from external partners through EESNs, ecological entrepreneurship networks work to develop specialized scope economies in a region. Economies of scope can best be described in contrast to economies of scale, in which rather than intensively producing high volumes of a single good, multiple products or services are produced using similar inputs (Van der Ploeg, Renting et al. 2000).

The virtues of economies of scope are reflected in discussions of “multifunctional” landscapes, where land and resources are recognized as producing and providing a range of functions consistent with local conditions and valued accordingly (Antrop 2004; Brandt and Vejre 2004; McCarthy 2005). Besides the relief and flexibility realized in decoupling production from the pressures of the global commodity market, producing a range of goods and services with an eye towards quality over quantity generally yields a higher premium for producers (Clark 2005; Marsden and Smith 2005; Brasier, Goetz et al. 2007). The ability of scope economies to translate into practical value for this range of goods and services requires developing both supply and demand, an undertaking necessitating cooperation from a range of actors and agencies, or the development of ‘economies of synergy’ (Van der Ploeg, Renting et al. 2000; Marsden, Banks et al. 2002; Clark 2005; Marini and Mooney 2006; Clark 2009).

Economies of scope utilize associative market arrangements, which emphasize collaboration and interdependencies of businesses, including networks, industrial clusters, and associations traditionally based on value chain dynamics with enhancing economic outcomes as the sole motivation (Rosenfeld 2005). The ‘new associationalism’ that pursues more sustainable outcomes (Marsden, Banks et al. 2002; Clark 2005) means bringing a new set of stakeholders and motivations into the network, requiring business managers and producers to “create and maintain new associations with a whole range of external actors and institutions” (Clark 2005, 812). As it relates to sustainable land and resource management, the goal of these networks is to

¹ Ecological entrepreneurship in this sense is distinct from ‘ecopreneurship’ a term often used to describe environmentally friendly businesses (Volery 2002)

re-order the value-chain of locally produced goods and services, and valorize local capital and resources (Marsden, Banks et al. 2002; Marini and Mooney 2006; Brasier, Goetz et al. 2007). In turn, networks enable sustainable forms of localized wealth creation, support more equitable methods of value distribution among local producers and processors, and encourage balancing conservation and development goals (Marsden and Smith 2005). Despite the triple bottom line rhetoric of such sustainable development initiatives, unless social and conservation outcomes are explicitly included as part of the network goals, even new associative arrangements will focus primarily on economic performance (Rosenfeld 2002; Rosenfeld 2009).

As a means of illustrating tangible forms of ‘new associationalism’, Marsden and Smith (2005) profiled two farming-centered networks. In that study, organic and other sustainable production methods served as proxies for enhanced ‘ecological’ considerations (i.e., it was assumed organic and sustainable agriculture produced better environmental outcomes than alternative agricultural practices). In this research, we examine roles and functions of external stakeholders, namely land trusts, to support these efforts. We use the conservation mission of these organizations as a proxy for explicit ecological consideration, as measurement of ecological outcomes through such activities is outside the scope of this paper.

2.4 Roles and functions in Ecological Entrepreneurship Support Networks

Networks and social infrastructure are critical to the support and success of any form of entrepreneurship in a region (Flora and Flora 1993; Van de Ven 1993; Holley 2005). We conducted a review of economic, business, and community development literatures on entrepreneurship and their supporting networks to determine the range of roles and functions necessary to support entrepreneurship. A stakeholder plays a ‘role’ if they build or maintain the network. A stakeholder provides a ‘function’ if they directly assist entrepreneurs working within the network. An overview of these roles and functions are presented in Table 1.

ROLES	Network Broker		Regional Catalyst		Entrepreneurial Support Organization (ESO)
	Serve as scout and connector for network and external resources		Facilitates intra-network coordination and builds support system for entrepreneurs		Provides direct support and services to entrepreneurs and business climate
FUNCTIONS	<i>Largely provided by ESOs</i>				
	Access to education/knowledge	Access to capital	Developing networking opportunities	Access to support services & infrastructure	Developing entrepreneurial culture

Table 1. Roles and functions within ecological entrepreneurship support networks.

A single network partner can fill multiple roles, but each must be filled. At least three critical roles exist: network brokers, regional catalysts, and entrepreneurial support organizations (ESOs). *Network brokers* are stakeholders that serve as identifiers and connectors for entrepreneurs and other network participants, primarily connecting entrepreneurs to resources and expertise external to the network (Huggins 2000; Rosenfeld 2001; Hanna and Walsh 2002; Holley 2005). *Regional catalysts* are individuals or organizations that facilitate the coordination among network stakeholders and who can help build the support system for entrepreneurs (CAN 2005; Holley 2005). *Entrepreneurial support organizations (ESOs)* perform functions to support entrepreneurs. They are “organizations, entities and individuals that **directly** affect entrepreneurs and/or the culture and infrastructure in which they do business” (Lowe 2010). Five broad categories of functions exist (based on synthesis of (Allen and Rahman 1985; Dabson 2001; Holley 2005; Rosenfeld 2005; Brasier, Goetz et al. 2007; Kauffman 2008): 1) providing access to knowledge, innovation, and training; 2) providing access to capital; 3) development of networking opportunities; 4) providing access to cost effective support services and infrastructure; and 5) developing or supporting a local/ regional entrepreneurial culture.

3.0 METHODS

To explore the roles and functions provided by land trusts supporting ecological entrepreneurship, we used a comparative case study approach that includes descriptive, exploratory, and explanatory dimensions (Eisenhardt 1989; Yin 2003). Data collection and analysis occurred iteratively, with triangulation of data, coding and recoding, periodic member checks across the research team and with informants to ensure accuracy and reliability. We included data from a variety of sources including secondary analysis of survey data, archival

review of published and unpublished literature, key informant interviews, and direct observation and participant-observation. Direct observations were conducted at the Land Trust Alliance Annual Meeting in October 2009 and participant observations were conducted namely with the New River Land Trust as participants in the discussion surrounding landcare.

Identifying and selecting cases to demonstrate the roles and functions provided by land trusts in EESNs required first identifying land trusts involved in supporting entrepreneurial activities. We began by establishing a sampling frame of land trusts believed to be using conservation strategies related to economic development, which we assembled through a secondary analysis of survey data collected by the Center for Whole Communities (CWC) in 2007, augmented with cases identified through a review of LTA's quarterly publication *Saving Land*. The CWC survey included 286 unique land trusts (see Forbes 2008). We focused only on the 208 survey respondents which included the organizations' name.

The secondary analysis of CWC survey data focused on one particularly relevant question—"Which larger communities is your land trust a part of?" 45% of responding land trusts identified their organization as a contributing member of their local business community, 57% identified themselves as part of the agricultural community, 37% felt they contributed to a development community, and 10 land trusts identified with other relevant efforts in open-ended responses to the question (not mutually exclusive categories).² From this analysis, we identified 23 land trusts which appeared to actively support some form of ecological entrepreneurship. Using organizations' websites and supplemental literature, we researched these 23 organizations further to develop a deeper understanding of their activities. Based on this step, we narrowed the sample frame to 16 organizations.

We contacted executive directors for each of the 16 land trusts, inviting them to participate in a semi-structured phone interview about the nature of their organization's activities. Non-respondents were sent a follow-up email two weeks later. Executive directors and program managers from nine land trusts were interviewed during the fall of 2009. From these interviews,

² Other response categories included the environmental community (94%), public governance community (57%), real estate community (37%), and smart growth community (52%).

we selected three cases that illustrate a variety of roles and functions land trust provide in ecological entrepreneurial networks. Though the three cases profiled here are similar in that they describe support of mostly food-based enterprises, this should not be interpreted as the limit of entrepreneurial activities. Other land trusts that support community forest operations, aquaculture facilities, and artisan markets were also identified, but with less developed markets and strategies to support these efforts, they did not provide a well-defined case to demonstrate network roles and functions.

4.0 CASE STUDIES

4.1 Brentwood Agricultural Land Trust – California

Brentwood Agricultural Land Trust (BALT) operates in California to preserve farmland in Contra Costa County outside of San Francisco. The land trust was established as a response to public concerns about the rate of conversion of farmland to residential use in the region, in which developers are levied a conservation fee that is applied to securing conservation easements on working farms. The land trust was formed in 2002 to identify and secure the conservation easements and attorney Kathryn Lyddan was hired as the organization's executive director in 2003. Immediately, Lyddan was faced with the problem of little motivation for farmers and growers in the region to place their land under permanent conservation, as well as significant distrust of an organization that would restrict land use. Value of real estate for development was high and profitability in growing commodity agriculture was relatively low, leaving BALT in a conundrum. Explained Lyddan, "To go in and say, 'hey, do you want to sell me the most valuable part of your land rights for under fair market value?' was not a good opening statement...and everyone would say 'why would I do that when I can't make a living farming?'" Lyddan recognized that before BALT could get into the business of conservation easements, it would need to get in the business of making agriculture work for the region and the landowners, and in doing so, earn the trust of local farmers and landowners.

Since 2003, with a board of directors comprised largely of farmers in the region, the organization has pursued a dual mission of working to conserve farmland while promoting and strengthening

the markets that keeps land working. A significant barrier to diversifying the agriculture industry in the immediate area and developing value-added opportunities were zoning restrictions prohibiting commercial activity on farmland beyond growing food and establishing small roadside stands. In an area known for olives, grapes, fruits, and vegetables, the possibilities for agritourism and value-added processing as a profitable enterprise for farmers were good, so BALT identified broadening this policy as one of its first priorities. In the last two years, they have been successful in gaining the permitting of olive oil production facilities and wineries, with allowances for commercial kitchens next in line.

BALT has also served as a key partner in the development and promotion of local food and producer networks in the region. As the Contra Costa County coordinators of the *Buy Fresh Buy Local* campaign for the region, they work with the statewide Community Alliance with Family Farmers to produce local food guide for the nine Bay Area counties. They also collaborate with Harvest Time in Brentwood, another local *Buy Fresh Buy Local* affiliate representing the U-Pick operations in the area to develop promotional materials and advertise on behalf of local producers. The organization works with local growers to find direct market opportunities through networking events and brainstorming sessions. At the state level, BALT is involved with Roots of Change, a statewide campaign to reform the entire food system by 2030, as an advocate for family farmers in the promotion of regional food systems.

In the years since the organization was formed to pursue conservation of working farmland, BALT has had success in creating a reputation for working on behalf of farmers to keep working land profitable. In turn, the land trust is beginning to see greater interest in conservation easements among its constituents and less suspicion of BALT's motives. "Six years later," Lyddan reports, "everyone knows me, they have dealt with me...it was a matter of building trust on the stuff that everyone can agree on." Going from zero conservation easements for the first few years of operation, BALT now holds five significant easements with three more in process.

As a community actor with an explicit mandate to pursue conservation goals that were not attainable under existing market circumstances, BALT was quickly forced to operate in the area that intersects conservation and economic development by supporting ecological

entrepreneurship. The ecological and aesthetic services provided by working lands were clearly valued by the surrounding region, but keeping them working meant making them viable. Operating as both a network broker and regional catalyst, BALT works to identify the barriers to success, assemble the partners and stakeholders who can work together to negotiate these barriers, and support farmers and growers in creating a vibrant local food network. Through their work with campaigns such as *Buy Fresh Buy Local*, BALT has provided market access and visibility for growers, as well as creating networking opportunities for growers, producers, and customers to develop mutually beneficial relationships. Their work in revising zoning and permitting policy has created opportunities for greater entrepreneurship among producers and in turn, a more entrepreneur-friendly culture.

4.2 New River Land Trust – Virginia

Serving eight rural counties in the New River region of Virginia, the New River Land Trust (NRLT) works to protect and conserve the farms, forests, open spaces, and historical places in the area that covers most of the Virginia portion of the New River watershed. Typical of much of the Blue Ridge and Appalachian region, the area is mountainous and heavily forested, with small farms largely situated on steep and rocky hillsides. Virginia is unique with its legislatively created quasi-governmental agency, the Virginia Outdoors Foundation (VOF), which functions as a state land trust to hold conservation easements generated by land trusts and other organizations. With VOF assuming the responsibility of holding easements, land trusts such as NRLT can focus primarily on outreach and education, cultivating relationships with landowners and other stakeholders, and raising funds necessary to achieve conservation outcomes. Through its work with landowners, NRLT has played a critical role in the formation of a series of local landcare groups in the region. Fashioned loosely after community landcare groups in Australia (Cary, Webb et al. 2000), these landcare groups have organized to develop locally-relevant sustainable solutions for their land use challenges. In 2005, a group of cattle producers and large parcel landowners in Grayson County, one of the southwestern most counties in the land trust's region, took the first steps to address their conservation predicament by applying for a National Fish & Wildlife Foundation (NFWF) grant to investigate alternative production options, with the land trust serving as the fiscal agent pro bono. Without a land use taxation

program for agriculture in their county and with increasing pressure by the second-home market on property values and subsequently on property taxes, the current rate of return for conventional cattle production was leaving many producers with few options but to sell their land. Grant monies were used to fund Jerry Moles, a long-time community organizer and board member of the land trust, to help the community explore and organize around a rotational grass-fed beef operation. As part of his grassroots work with local farmers and residents, Moles introduced a version of the successful landcare model from Australia. Out of this effort evolved Grayson LandCare, a locally-based group of landowners committed to developing sustainable solutions to the challenges they face.

Two other groups have since formed in the NRLT operating region, though with less direct involvement by the land trust. Catawba Landcare is a group focused more on aesthetic and water quality issues in the Catawba Valley. It has been raising awareness among landowners about sustainable land management practices, has engaged in considerable stream restoration work, and has recently spun-off a local incubator focusing on land-based business development. SustainFloyd is another group, focused more on sustainable community economic development for their town and county as a means of creating economic opportunities for their citizens without imposing negative impacts on their environment. NRLT has been involved with these groups as more of a tacit supporter and partner for organizational activities and programs, recognizing the conservation goals of these efforts as complementary to their own.

The ecological entrepreneurial impact of Grayson LandCare is an outstanding example of the contribution a land trust can make to the support of conservation and economic development goals in a community. NRLT's initial support of the self-organized effort was on the basis of helping provide opportunities for landowners to increase their profitability with the intent of keeping land working and ecologically viable through means other than conservation easements. As a result of the brokering and catalyzing services provided by the coordinator supported by the land trust through the NFWF grant, Grayson LandCare was able to promote and disseminate best management practices that increase ecological and economic benefits, and created a for-profit private enterprise that is bringing a higher rate of return to participants than less-sustainable methods. Beyond the injection of increased wealth into the community, it has also increased the

enthusiasm for locally produced foods and goods, and brought a broader awareness of land conservation benefits. Grayson Natural Foods is now expanding beyond beef to include lamb, pork, and poultry, and is currently exploring the possibilities for a local certified slaughter and processing facility to enable a fully-localized production process.

Taking an unconventional approach to land conservation through community economic development activities is not without risks. There are potential liabilities associated with affecting the economic fortunes of landowners and businesses, as well as administrative burdens that can be challenging for small nonprofits, particularly in tight economic times. In late 2009, after the NFWF grant had been exhausted, NLRT was forced to make tough decisions. In the interest of preserving their original and core mission of permanently conserving land, the board of NRLT decided the organization did not have the capacity or resources to continue the direct support of Grayson LandCare, though it continues to serve as a supporter and partner in many of the region's landcare activities.

4.3 Taos Land Trust – New Mexico

As the only land trust based north of Santa Fe in New Mexico, the Taos Land Trust (TLT) deals with land and landowners throughout the northern area of the state. Like many areas in the country, arable land and access to water is valued at a premium for both farming and development, creating a tension between the two, but in northern New Mexico, these features are in even scarcer supply. Add to this tension a rich cultural history with traditional growing methods still being practiced by multi-generational landowners, and the land trust is forced to deal with a unique set of challenges to achieving their land conservation goals.

Ernie Atencio was hired as the TLT's executive director in 2003 and brought to the position a perspective that blended an education in cultural anthropology and experience in social justice, and his own multi-generational roots to the region. He quickly realized the land and resources his organization was charged with conserving were inextricably tied to the culture of the region and the people who had lived on and worked the land for centuries. Conservation easements would be of limited appeal unless people could maintain their traditions and livelihoods on the

land, and TLT would be ineffective unless its programs were relevant to the diverse constituency the programs were meant to serve. Taos County has significant Indo-Hispanic and American Indian populations, many of whom are farmers that are older and of a mid to lower income class. In an area that caters to a large tourism industry, this population tends to be marginalized and difficult to reach.

In an effort to engage these landowners and producers, and make the work of the land trust relevant to them, TLT partnered with the Taos County Economic Development Corporation (TCEDC) and the Taos Valley Acequia Association (TVAA) in 2006 to form *De la Tierra a la Cosecha* (From Earth to Harvest), with the mission of “Sustaining the land, water, food, and culture of Northern New Mexico.” The three organizations were a strategic partnership, bringing complementary skills and expertise to their goal, as well as an ability to engage different portions of the population of interest. The TCEDC is a community institution with 18 years experience assisting in the development and promotion of small food businesses in the region. The TVAA is a regional organization that provides technical, legal, and managerial support for the network of acequias (traditional irrigation ditches) that weave across the landscape. Land that is irrigated from an acequia is deeded water rights and most acequias in the area are members of the TVAA, meaning the organization has access to growers who use the acequias to irrigate their crops. Finally, the Taos Land Trust brings an interest in conserving the land from development and sustaining the land-based cultural heritage of the area through conservation easements and other legal tools, which can provide additional funding to landowners over time.

Through *De la Tierra a la Cosecha*, the coalition has developed a multi-faceted approach to supporting producers of agricultural products and to strengthening the land-community connection in the broader community. They began by conducting an asset inventory and needs assessment of the agricultural community to direct their work. Out of this assessment, the partnership has hosted a number of public workshops and forums, as well as a comprehensive series of training sessions for producers on topics ranging from business planning to regulatory issues. A kitchen incubator is available as part of the project, providing services to more than forty locally based value-added food processing operations. They have also created a local brand, *Oso Good Foods*, which incubator affiliates can use to market their products.

Incidentally, one *Oso Good Foods* salsa producer was approached by Whole Foods to provide products for distribution to the region's stores, but declined because they did not want to add the required preservatives to their product.

Another service developed in response to the needs inventory is the Mobile Matanza, a mobile USDA and organic certified slaughtering unit that travels to farms and is equipped to slaughter livestock on-site. With this arrangement, the carcass is brought straight to a butcher for direct commercial market access rather than selling the live animal to the market or transporting great distance to a slaughter facility. This innovation has reportedly increased producer profitability two to three times over their previous methods.

While TCEDC serves as the main ESO in the network by providing direct services to entrepreneurs, the land trust serves more as the network broker, reaching and connecting the network and landowners with external resources and support. *De la Tierra a la Cosecha* has received grant funding from major foundations and has received nationwide attention for their efforts. TLT has worked at the state level with other land trusts to achieve a transferable conservation tax credit, and to establish a credit cooperative for landowners. This has provided an additional incentive for landowners involved in the coalition to consider placing their land under permanent conservation while also meeting their financial needs. In addition, Atencio serves on the Board of Directors of Quivira Coalition, a statewide organization dedicated to working in the 'radical center' to find and promote sustainable and profitable practices for ranchers.

With each partner bringing their expertise, services, and connections to bear, *De la Tierra a la Cosecha* is an ecological entrepreneurial network. They have developed a strategy for reaching out to stakeholders directly involved in working and caring for the land and resources in the region, and developing opportunities and tools to keep them profitable and on the land.

5.0 DISCUSSION

5.1 Roles & functions of land trusts in Ecological Entrepreneurship Support Networks

Entrepreneurship literature suggests three roles must be present to build a successful entrepreneur support network: 1) network brokers, 2) regional catalysts, and 3) entrepreneur support organizations. We found that land trusts could effectively provide all three roles. The land trusts we studied worked as *network brokers* by building connections between entrepreneurs and resources, by creating market opportunities, and by advocating for the value of non-market ecological outcomes of these activities. BALT, in their efforts to support local growers, capitalized on growing interest in ‘local’ and, through their role as regional coordinator for the *Buy Fresh Buy Local* campaign, drew external support and visibility for entrepreneurs. NRLT, particularly through the efforts of Jerry Moles as the Grayson LandCare coordinator, was successful in drawing the interest and support of a number of regional partners including Virginia Tech, state agencies, and district Congressmen. TLT was successful at garnering grant funding for the development of their network. Based on these findings, organizations wanting to act as brokers for EESNs should pursue funding, advocate for their constituents, and engage in policy work to incentivize (or as in the case of BALT, to permit) sustainable land-based enterprises.

Land trusts worked as *regional catalysts* to provide leadership and coordination within EESNs by bringing the environmental imperative to the network. They facilitated the collaboration, strategic planning, and communications needed to build the network to support ecological entrepreneurs. BALT, for example, served as a catalyst by helping growers and producers organize to maximize their cooperation and outcomes. Their work with *Harvest Time in Brentwood* supported U-Pick farmers with comprehensive marketing and advertising. NRLT’s support of landcare groups and TLT’s involvement in the creation of *De la Tierra a la Cosecha* as a formal collaborative network both demonstrate possible roles for a land trust as a catalyst. Acting as a regional catalyst requires a land trust to think strategically about their goals and the goals of the entrepreneurs they are working to support, and to draw in stakeholders and partners who can help achieve these goals.

Land trusts also worked as *entrepreneur support organizations (ESO)*, providing direct assistance to entrepreneurs. The five functions we identified may be performed by a variety of stakeholders or there may be a main ESO that provides the bulk of the services (Holley 2005). The land trusts we studied varied in the functions they could provide and the level at which they could to provide them. What emerged as important was not the ability of land trusts to perform these functions directly, but ensuring that appropriate partners and stakeholders were brought into the network to provide these services. From this perspective, we begin to identify opportunities and roles for other potential partners in regional EESNs.

One important support function is connecting entrepreneurs to information services, including innovative research, education, and training. Two land trusts performed this function, but did not provide the service directly. In the case of NRLT, the land trust and landcare groups maintain a relationship with neighboring Virginia Tech, a land grant university with strong agriculture and natural resource programs. Through this partnership, producers and entrepreneurs accessed research findings, organizational strategies, and business planning. EarthWorks is a land-based business incubator sponsored by Virginia Tech that emerged from interest in the landcare groups. It provides access training and infrastructure for emerging ecological entrepreneurs. Within the *De la Tierra a la Cosecha*, the TCEDC serves this function, organizing and hosting a comprehensive training program for growers and for food enterprises using the kitchen incubator. Information services are an especially important function for ecological entrepreneurship because producers and landowners in scope economies must add value to their traditional production processes, which often requires innovative information, technology, and support. Partners such as local universities, cooperative extension offices, incubator programs, soil and water conservation districts, and other knowledge-based providers can fill this need for EESNs.

A second support function is providing entrepreneurs access to capital, a function that land trusts are not always able to provide. The organizations we studied provided general support to the network through staffing and administrative costs in the case of NRLT and grant writing for BALT and TLT, but were not directly involved in accessing capital for entrepreneurs. Each

network seems to include connections to outside financial institutions for this purpose however, and some of these connections were brokered by land trusts. An example is TLT's relationship with the Permaculture Credit Union (PCU) located in Santa Fe, established as a lending agency for growers who support the principles of permaculture. Explaining why they partner with independent financial institutions, Atencio of TLT explained that the addition of financial interest clouds already complicated relationships between trusts and their landowner partners. In terms of financing the completion of conservation easements, both Virginia and New Mexico have a system of transferrable tax credits, which have created greater incentives for landowners to participate. Both TLT and NRLT have established partnerships with organizations to help landowner finance the transaction costs for completing these easements and provide brokerage services to sell the credits. PCU is an exceptional example of a successful financing partner; other possible partners include local Farm Bureaus, community development corporations, or government programs with rotating loan funds for community development.

A third support function is facilitating opportunities for landowners, entrepreneurs, and other stakeholders to share ideas and resources with each other, as well as to make connections with potential customers or collaborators. Each of the land trusts we studied were directly involved in providing this function. BALT organized producer forums and meetings to connect producers with area chefs and distributors. NRLT created a forum for landowners and producers to collaborate and increase their scale of production, as well as providing a shared platform for discussions with landowners about their conservation options. TLT directly sponsored and hosted a number of community and regional events to connect producers, community members, and agencies, as well as provided multiple networking opportunities through the efforts of *De la Tierra a la Cosecha*. Land trusts are particularly well positioned to support this type of networking because of their connection to the communities they serve and their outreach mission. Organizations interested in providing this function should consider expanding the scope of their public meetings and information sessions to invite diverse partners and address topics that speak to ecological entrepreneurship opportunities.

Another common function is providing low-cost support services and infrastructure for entrepreneurs, which all of the land trusts we examined provided to varying extents. BALT,

through their involvement with *Buy Fresh Buy Local*, provided branding and marketing services for producers. Both BALT and NRLT assisted in the production and distribution of a local food directory to connect producers with consumers. TLT, particularly through *De la Tierra a la Cosecha* and the services of an economic development corporation, offered entrepreneurs access to low-cost production facilities and equipment. NRLT, in their pro bono administration of grants for the funding of Grayson LandCare and subsequent support of its facilitator, provided administrative services, as well as basic office assistance such as producing, copying, and distributing materials. This category of support will be broad depending on the market, and will likely require contributions from a wide range of EESN partners beyond land trusts themselves.

Finally, a fifth support function is the maintenance and strengthening of the local entrepreneurial culture. Again, the land trusts we studied provided this function to varying degrees. BALT worked with local politicians and governments to change the zoning and permitting legislation to allow value-added processing to occur on-farm. They actively supported *Roots of Change*, a statewide initiative to restructure and localize the food system of California by 2030, which ideally will create incentives for small-scale and ecologically sound production methods. NRLT, through Grayson LandCare, worked with the local officials to host workshops and meetings on growing and strengthening the local foods systems through the support of local producers. TLT and *De la Tierra a la Cosecha* received a lot of attention for their work, evidenced by the newspaper articles and online references to the project, thus keeping local entrepreneurs in the public eye and creating a culture and market for locally produced goods. This may be the easiest support function for land trusts because they typically champion local culture, people, and places already.

5.2 Ecological entrepreneurship as an integrated conservation strategy: Lessons for land trusts

The political momentum behind sustainable development efforts that blend economic, social, and ecological outcomes raises challenges for land trusts. Their emphasis on legal and technical tools to preserve land and protect it from human activity does not address broader economic or social concerns that may dominate local politics. It also does little to address necessary land

management responses to changing environmental concerns such as climate change, clean energy, and biodiversity loss. But with a broader mission, land trusts can promote strategies that integrate people, economies, and communities with land conservation. Ecological entrepreneurship is one such strategy. Through participation in EESNs, land trusts are increasing or stabilizing the profitability of open land, connecting consumers to producers and thus building stronger relationships to the land, making careful land management a more viable endeavor, and are protecting the ecological values and benefits of that land.

The ecological entrepreneurship efforts we studied were small operations focused on developing value-added market options for producers as a strategy for responding to the four land use conversion trends identified in the beginning of this paper. Though the enterprises supported through the EESNs in these cases here were mostly food-based, this is most likely because there are modest markets already established for locally-produced food. Other opportunities will develop as markets mature for local forest or aquacultural products, and in secondary markets such as the arts, recreation, and tourism. By providing additional revenues from land ownership and rewarding ecological stewardship, EESNs create opportunities for land uses other than industrialization and development, they incentivize careful management of land, and they create capacity to manage land that might otherwise be abandoned or neglected.

As with any new business venture, there is risk of failure with ecological entrepreneurship, which has the potential to reflect on the network partners supporting them. Failure can cost landowners and investors money, and damage hard-won trust built by network brokers and catalysts. Ecological entrepreneurial is not a silver bullet, just one tool among many, with its own set of different risks and rewards.

The land trusts profiled here are atypical, as they have elected to take different risks and expanded their conservation strategies beyond exclusively conservation easements. It is too early to determine whether these organizations are anomalies or pioneers, but it is clear that they are pushing the envelope on the conventional mission of land trusts, and for that reason, their motivations are of interest. For BALT, the expanded mission was deemed necessary to address challenges associated with agricultural lands:

I think that the traditional environmental community has been focused on open space and habitat for the last 40 years, and incredibly successfully so. That focus on habitat and open space has allowed the environmental community to have a very bright line so that things are black and white...On one side of it, there is human activity and on the other side of it, things are “saved” ... I can go so far as saying that the success of that environmental movement has come at the expense of agricultural land.... When you start to talk to these folks about trying to do this kind of work, it becomes very uncomfortable for them because when landscape and human environments are one and the same, it becomes a breathable skin... and you can't draw those lines. Then you have to start talking about things that are shades of gray and in fact, they are slippery slopes... You can't just draw that line and then abandon people on the other side of the line – you have a responsibility to those people that you have set on the other side of that line (*Lyddan, BALT*).

Jerry Moles of Grayson LandCare makes a similar argument when he asked: “Is Conservation Enough?” (Moles 2009). Likewise, Atencio of the TLT points to a quote by Wendell Berry when asked about his motivation – “You cannot save the land apart from the people or the people apart from the land. To save either, you must save both”.

When BALT advocated relaxing zoning restrictions limiting entrepreneurial activities, they came face to face with tension that exists between traditional and innovative conservation ideologies. Zoning restrictions in their community had been put in place by well meaning conservationists as a strategy to preserve and protect land from development. BALT's efforts to loosen these restrictions created gray areas about the land trust as an ENGO and raised questions in the community about the land trust's purpose. Land trusts promoting ecological entrepreneurship will likely encounter similar challenges and will need to clearly articulate their rationale for adopting different and broader conservation strategies, less they lose trust in the community.

Land trusts might also be motivated to support ecological entrepreneurship because it provides the means to influence land use on properties that will likely never be put under easement, to

increase trust and legitimacy within local communities, and to develop relationships with future easement grantees. We are not suggesting land trusts change their mission and focus solely on supporting ecological entrepreneurship. Rather, we are suggesting that land trusts—or other conservation-minded organizations—look for ecological entrepreneurial efforts in their region and consider ways to support them in ways consistent with the organizations’ strengths, capacity, and mission. Ultimately, enterprises will need to be self-sustaining to achieve their goals, but the creation of new ventures will require support of a network of community partners. These case studies should illustrate how organizations such as land trusts might be able to contribute to and serve a role in these efforts. Further research into the biophysical and economic impacts of these activities, as well as the contributions of other regional partners, would be beneficial substantiate or amend these recommendations.

6.0 CONCLUSION

This study examined innovative partnerships and strategies developed by Brentwood Agricultural Land Trust, New River Land Trust, and Taos Land Trust. It provides insights into the roles and functions of partners in ecological entrepreneurship support networks, as well as insights into how conservation organizations, particularly land trusts, can support ecological entrepreneurship in their region as a means to achieve conservation goals. We have not assessed the on-the-ground impacts of these innovative practices nor their long term efficacy – these tasks are left to future study. Nonetheless, it appears that ecological entrepreneurship may provide a strategy for pursuing conservation goals in regions affected by urbanization and globalization, for redirecting land use away from fragmentation and neglect, and for engaging the broader community in the practice and dialog of conservation.

Ecological entrepreneurship supports communities, land owners, local economies, as well as the environment – in other words, it promotes sustainable development. Through the development of scope economies for sustainably produced land-based goods and services, ecological entrepreneurship encourages and incentivizes conservation practices and the stewardship of landscapes while contributing to the economic vitality of communities. As one example of integrated conservation, the support of ecological entrepreneurship provides a real option for

land trusts and other organizations to engage with the communities they serve and have a significant impact on the lives and livelihoods of the landowners they work with.

Resources

- Allen, D. and S. Rahman (1985). "Small Business Incubators: A Positive Environment for Entrepreneurship." Journal of Small Business Management **23**.
- Antrop, M. (2004). Assessing multi-scale values and multifunctionality in landscapes. Multifunctional Landscapes: Theory, values, and history. Southampton, WIT Press. **1**: 165-180.
- Atkins, P. and I. Bowler (2001). "Food in Society: Economy, Culture." Geography. London/New York, Arnold.
- Barnard, C., K. Wiebe, et al. (2003). "Urban influence: effects on US farmland markets and value." Government policy and farmland markets: the maintenance of farmer wealth: 319.
- Berkes, F. (2007). "Community-based conservation in a globalized world." Proceedings of the National Academy of Sciences **104**(39): 15188.
- Berube, A., A. Singer, et al. (2006). Finding exurbia: America's fast-growing communities at the metropolitan fringe. Living Cities Census Series. Washington, DC, Brookings Institute.
- Bliss, J. and E. Kelly (2008). "Comparative advantages of small-scale forestry among emerging forest tenures." Small-Scale Forestry **7**(1): 95-104.
- Brandt, J. and H. Vejre (2004). Multifunctional Landscapes–Theory, Values and History, Vol. I,(Southampton: WIT Press).
- Brasier, K., S. Goetz, et al. (2007). "Small Farm Clusters and Pathways to Rural Community Sustainability." Journal of Community Development Society **38**(3): 8.
- Brewer, R. (2003). Conservancy : the land trust movement in America. Lebanon, NH :, Dartmouth College ; Published by University Press of New England.
- Brown, D. G., K. M. Johnson, et al. (2005). "Rural land-use trends in the conterminous United States, 1950-2000." Ecological Applications **15**(6): 1851-1863.
- Bürgi, M. and M. Turner (2002). "Factors and processes shaping land cover and land cover changes along the Wisconsin River." Ecosystems **5**(2): 184-201.
- Campbell, M. C. and D. A. Salus (2003). "Community and conservation land trusts as unlikely partners? The case of Troy Gardens, Madison, Wisconsin." Land Use Policy **20**(2): 169-180.

- CAN (2005). Strategies for Sustainable Entrepreneurship. C. A. Roundtable, Central Appalachian Network.
- Cary, J., T. Webb, et al. (2000). Community Landcare, the National Landcare Program and the Landcare Movement: The Social Dimensions of Landcare, Bureau of Rural Science.
- Clark, J. (2005). "The 'New Associationalism' in agriculture: agro-food diversification and multifunctional production logics." Journal of Economic Geography 5(4): 475-498.
- Clark, J. (2009). "Entrepreneurship and diversification on English farms: Identifying business enterprise characteristics and change processes." Entrepreneurship & Regional Development 21(2): 213-236.
- Cronon, W., Ed. (1995). Uncommon Ground: toward reinventing nature. New York, W. W. Norton & Company.
- Dabson, B. (2001). "Supporting rural entrepreneurship." Exploring Policy Options for a New Rural America, from <http://search.newyorkfed.org/search/frbkc.jsp>.
- Daniels, T. (2000). "Integrated Working Landscape Protection: The Case of Lancaster County, Pennsylvania." Society & Natural Resources 13(3): 261-271.
- Daniels, T. and M. Lapping (2005). "Land preservation: An essential ingredient in smart growth." Journal of Planning Literature 19(3): 316.
- DellaSala, D., A. Martin, et al. (2003). "A citizen's call for ecological forest restoration: Forest restoration principles and criteria." Ecological Restoration 21(1): 15.
- Egan, A. and A. Luloff (2000). "The exurbanization of America's forests: research in rural social science." Journal of Forestry 98(3): 26-30.
- Eisenhardt, K. (1989). "Building theories from case study research." Academy of management review 14(4): 532-550.
- Evans, N., C. Morris, et al. (2002). "Conceptualizing agriculture: a critique of post-productivism as the new orthodoxy." Progress in Human Geography 26(3): 313-332.
- Fairfax, S. and D. Guenzler (2001). Conservation trusts, Univ Pr of Kansas.
- Fairfax, S., L. Gwin, et al., Eds. (2005). Buying Nature: The Limits of Land Acquisition as a Conservation Strategy. Cambridge, MA, MIT Press.
- Flora, C. and J. Flora (1993). "Entrepreneurial Social Infrastructure: A Necessary Ingredient." Annals of American Academy of Political and Social Science: 48-48.

- Forbes, P. (2008). Conservation 2.0: The case for "Whole Communities" conservation. Building a new movement: Land conservation and community. C. f. W. Communities". Fayston, Vermont.
- Foster, D., F. Swanson, et al. (2003). "The importance of land-use legacies to ecology and conservation." Bioscience **53**(1): 77-88.
- Freshwater, D. (2001). A US Perspective on Multifunctionality. 2002 International Congress - European Association of Agricultural Economists. Zaragoza, Spain.
- Freyfogle, E. (2006). Why conservation is failing and how it can regain ground, Yale Univ Pr.
- Friedmann, H. (1982). "The political economy of food: the rise and fall of the postwar international food order." American Journal of Sociology **88**: 248-286.
- Gellrich, M., P. Baur, et al. (2007). "Agricultural land abandonment and natural forest re-growth in the Swiss mountains: A spatially explicit economic analysis." Agriculture, Ecosystems and Environment **118**(1-4): 93-108.
- Ginn, W. (2005). Investing in nature: case studies of land conservation in collaboration with business. Washington DC, Island Pr.
- Grimm, N., D. Foster, et al. (2008). "The changing landscape: ecosystem responses to urbanization and pollution across climatic and societal gradients." Frontiers in Ecology and the Environment **6**(5): 264-272.
- Gustanski, J. and R. Squires (2000). Protecting the land: conservation easements past, present, and future, Island Pr.
- Gutman, P. (2007). "Ecosystem services: Foundations for a new rural-urban compact." Ecological Economics **62**(3-4): 383-387.
- Hanna, V. and K. Walsh (2002). "Small Firm Networks: A Successful Approach to Innovation?" SSRN eLibrary.
- Hansen, A., R. Knight, et al. (2005). "Effects of exurban development on biodiversity: patterns, mechanisms, and research needs." Ecological Applications **15**(6): 1893-1905.
- Hart, C. and J. Lawrence (2009). Factors that Determine the Cost of Food - Iowa State Extension
- Holley, J. (2005). Building a Regional Entrepreneurship Network: A guide to action. Athens, OH, ACEnet Institute.

- Huggins, R. (2000). "The success and failure of policy-implemented inter-firm network initiatives: motivations, processes and structure." Entrepreneurship and Regional Development **12**(2): 111-135.
- Ilbery, B. and I. Bowler (1998). The geography of rural change. London, Longman Press.
- Irwin, E. and N. Bockstael (2007). "The evolution of urban sprawl: evidence of spatial heterogeneity and increasing land fragmentation." Proceedings of the National Academy of Sciences **104**(52): 20672.
- Johnson, K. (2006). "Demographic trends in rural and small town America." Reports on Rural America **1**(1): 2-40.
- Kauffman, F. (2008). Entrepreneurship Summit Executive Summary, Kauffman Foundation & International Economic Development Council.
- Korngold, G. (2007). Solving the Contentious Issues of Private Conservation Easements: Promoting Flexibility for the Future and Engaging the Public Land Use Process, SSRN.
- Kroeger, T. and F. Casey (2007). "An assessment of market-based approaches to providing ecosystem services on agricultural lands." Ecological Economics **64**(2): 321-332.
- Logan, S. and G. Wekerle (2008). "Neoliberalizing environmental governance? Land trusts, private conservation and nature on the Oak Ridges Moraine." Geoforum **39**(6): 2097-2108.
- Lowe, F. (2010). "Building Entrepreneurial Communities." from <http://www.edwardlowe.org/index.elf?page=wwd&function=strategy>.
- LTA (2005). The Land Trust Census. Washington, DC, Land Trust Alliance.
- Maestas, J., R. Knight, et al. (2001). "Biodiversity and land-use change in the American Mountain West." Geographical Review **91**(3): 509-524.
- Marini, M. and P. Mooney (2006). "Rural economies." Cloke, P., Marsden, T. and Mooney, P., Handbook of Rural Studies. London, Sage: 91-103.
- Marsden, T. (1998). "Agriculture beyond the treadmill? Issues for policy, theory and research practice." Progress in Human Geography **22**(2): 265.
- Marsden, T. (2003). The condition of rural sustainability, Van Gorcum Ltd.
- Marsden, T., J. Banks, et al. (2002). "The social management of rural nature: understanding agrarian-based rural development." Environment and Planning A **34**(5): 809-826.

- Marsden, T. and E. Smith (2005). "Ecological entrepreneurship: sustainable development in local communities through quality food production and local branding." Geoforum **36**(4): 440-451.
- Matson, P., W. Parton, et al. (1997). "Agricultural intensification and ecosystem properties." Science **277**(5325): 504.
- McCarthy, J. (2005). "Rural geography: multifunctional rural geographies-reactionary or radical?" Progress in Human Geography **29**(6): 773.
- McDonald, R. I., C. Yuan-Farrell, et al. (2007). "Estimating the effect of protected lands on the development and conservation of their surroundings." Conservation Biology **21**(6): 1526-1536.
- Merenlender, A. M., L. Huntsinger, et al. (2004). "Land Trusts and Conservation Easements: Who Is Conserving What for Whom?" Conservation Biology **18**(1): 65-76.
- Minteer, B. and R. Manning (2003). Reconstructing conservation: Finding common ground. Washington D.C. , Island Press.
- Moles, J. (2009). Is Conservation Enough? Saving Land. Washington, DC, Land Trust Alliance. **28**: 18-23.
- Morris, A. (2008). "Easing conservation? Conservation easements, public accountability and neoliberalism." Geoforum **39**(3): 1215-1227.
- Mortimer, M., J. Richardson, et al. (2007). "A Survey of Forestland Conservation Easements in the United States: Implications for Forestland Owners and Managers." Small-Scale Forestry **6**(1): 35-47.
- NCSSF (2005). Global Markets Forum Summary Report of the National Commission on Science for Sustainable Forestry. Washington DC, National Commission on Science for Sustainable Forestry.
- Nordhaus, T. and M. Shellenberger (2004). The Death of Environmentalism: Global warming politics in a post-environmental world.
- Norton, B. (1991). Toward Unity Among Environmentalists. New York, Oxford University Press.
- Nyland, R. (1992). "Exploitation and greed in eastern hardwood forests." Journal of Forestry (USA).

- Porter, M., C. Ketels, et al. (2004). "Competitiveness in rural US regions: Learning and research agenda." Institute for Strategy and Competitiveness, Harvard Business School.
- Radeloff, V., R. Hammer, et al. (2005a). "Rural and suburban sprawl in the US Midwest from 1940 to 2000 and its relation to forest fragmentation." Conservation Biology **19**(3): 793-805.
- Radeloff, V., R. Hammer, et al. (2005b). "The wildland-urban interface in the United States." Ecological Applications **15**(3): 799-805.
- Richardson, J. J. (2010). "Conservation easements and adaptive management." Sea Grant Law and Policy Journal **3**(1): 31-58.
- Rosenfeld, S. (2001). "Networks and clusters: The yin and yang of rural development." Exploring Policy Options for a New Rural America: 103-120.
- Rosenfeld, S. (2002). "Just Clusters: Economic development strategies that reach more people and places." Carrboro, NC: Regional Technology Strategies, Inc.
- Rosenfeld, S. (2005). Beyond Clusters: Current Practices & Future Strategies Industry Clusters: Business Choice, Policy Outcome, or Branding Strategy? University of Ballarat, Victoria, Australia Regional Technology Strategies.
- Rosenfeld, S. (2009). "Generating Local Wealth, Opportunity, and Sustainability through Rural Clusters." Regional Technology Strategies, Inc.
- Taylor, R. and W. Koo (2008). "Changes in Agricultural Input Costs and Their Impact on Net Farm Income." Agribusiness & Applied Economics Report.
- Van de Ven, H. (1993). "The development of an infrastructure for entrepreneurship." Journal of Business Venturing **8**(3): 211-230.
- Van der Ploeg, J., H. Renting, et al. (2000). "Rural development: from practices and policies towards theory." Sociologia Ruralis **40**(4): 391-408.
- Yin, R. (2003). Case study research: Design and methods. London, Sage.

Chapter 4

Catawba Landcare CMS-Based Website

www.catawbalandcare.org

Introduction

For the majority of my graduate student tenure at Virginia Tech, I have been involved with the development of landcare in the US, specifically in the southern Appalachian region. As an emergent type of community-based organization highly reflective of community context and individuals involved, I opted to study this concept from a participatory role, working closely with one group in particular over the course of five years. My work with Catawba Landcare over this time period has entailed several projects, partnerships, and initiatives that were not being archived in any systematic fashion. It is this institutional memory which is critical in telling the story of Catawba Landcare, demonstrating to others and themselves the impact of group in the community, and for sharing the idea of landcare with other communities around the country and world. It is for these reasons that, as part of my dissertation project, I constructed a comprehensive CMS-based website for the group which captures the story of the group to date, and which will allow for the story to continue into the future. This section is intended to reflect on the process of constructing that site and next steps for ensuring it remains of value to the community.

Background

A significant portion of my time as a graduate student at Virginia Tech has been spent working with efforts to support the development of landcare in the United States. As a grassroots-driven approach to collaborative conservation and community development which relies on external partnerships, there were several angles from which to examine the emergence, formation, and implications of landcare in the US – there are international models to use for comparative studies; there are various policy frameworks which could be used to explore how landcare could be supported from the state and/ or federal level; there are several sociological, economic, and community development theories under which landcare concepts and practices can be analyzed.

When I began my work with landcare in 2006, it was from a decidedly macro perspective. I was interested in describing landcare and how it fit into the larger picture of community-based conservation and sustainable development in the US. The challenge I faced however was that the landcare groups which Virginia Tech was involved with were quite young and each was developing differently, responding to the unique circumstances of their communities and members. I soon recognized that an a priori description of what defines landcare was counterintuitive; that it is an emergent concept that will take the form most appropriate to the context in which it develops. Given this realization, what seemed more informative and beneficial given the formative stages of the groups and my interest in exploring their development paths was to engage directly with community members involved in building these organizations and to conduct participatory action research.

There are four landcare groups in the southern Appalachian region which VT has been involved with since 2005 – Grayson Landcare in Grayson County, Virginia; Montreat Landcare in Montreat, North Carolina; Catawba Landcare in the Catawba Valley, Virginia; and most recently, SustainFloyd in Floyd, Virginia. Each of these groups have developed out of different core interests and concerns, maintain different governance structures, are engaged in different activities with different goals, and have developed different types of partnerships to support their work. What they each have in common is what I believe to be the foundation for landcare in the US – a community-based approach to developing strategies and finding resources for sustaining and improving the environment while creating economic and community-empowering opportunities.

My colleagues and I have been involved with each of these groups to varying degrees, but because of proximity and close ties with several faculty and staff members in the College of Natural Resources and Environment (CNRE), I have been most involved with Catawba Landcare. Interest in starting a landcare group in the Catawba Valley began when an article written by David Robertson, one of my committee members from the CNRE, was published in the Virginia Forest Landowner Update. Ned Yost, a valley landowner with particular interest in land conservation and restoring water quality in the valley, contacted Robertson about the

concept. Yost felt that landcare offered a more neutral platform to bring neighbors of differing backgrounds and perspectives together under the common interest of “caring” for their valley. Christy Gabbard, a wildlife ecologist with the Conservation Management Institute at VT, was hired in 2006 to serve as the group’s initial coordinator and facilitator.

My involvement with the group began in the summer 2006 as a Service Training for Environmental Progress (STEP) Intern with the Virginia Water Resources Research Center, where I conducted a survey and GIS mapping project for Catawba Landcare, illustrating erosion levels along the banks of the creeks and streams that run through the Catawba Valley. I remained engaged with the group following the completion of this project, both observing their development and helping to facilitate workshops and projects where it was appropriate. In 2009, Gabbard became the director of the Catawba Landcare inspired Catawba Sustainability Center on the site of the old Catawba Hospital dairy farm, and consequently stepped down as the coordinator for the group. Seeing it as an opportunity to really engage with the members to build the capacity of the group, I agreed to serve as the coordinator for a year.

Purpose

My graduate studies at Virginia Tech and, specifically, my involvement in the Catawba Valley community, are an example of engaged scholarship at a land grant university trying to affect civic sustainability through local and collaborative conservation. The challenge I faced was how to synthesize, illustrate, and learn from these multiple lines of inquiry and engagement with landcare that I have been involved with over the last five years. While a research paper alone would satisfy the expectations of my academic program, it would fall short of capturing the potential and momentum built by the events that have unfolded over this time period. Instead, I have completed a two-part project to capture and reflect on this engaged scholarship: 1) the construction of a CMS-based website for Catawba Landcare, which reflects the group’s accomplishments, partnerships, and future directions; and 2) a paper written for an academic outlet, which explores landcare as a method for engaged scholarship and community capacity building from a land grant university perspective, using Catawba Landcare as a case study.

While my initial intent was to achieve the objectives of both projects with a single website, and then as two separate websites, it became evident that a high quality website requires an enormous amount of thought about how it will be used by its audience, as well as time refining what seem minor issues but which make the difference between a good and poor site. As I was uncertain of the target audience and their needs for a website containing mostly theoretical content, I judged it more sensible to focus on producing a high quality website for the purposes of Catawba Landcare, and to follow a more conventional method of academic writing to demonstrate the theoretical implications of my work with the group. As such, the remainder of this chapter will reflect on the construction of the website, while the following chapter contains the engagement paper.

Website Evaluation

(See Appendix X for screenshots of site – available at www.catawbalandcare.org)

The usability of a website is highly dependent on the practicality of the information and the ease with which users can find what they are looking for – a more difficult challenge than I had initially anticipated. As it turns out, web design is about choosing pieces from countless possible options and bringing them together to form a coherent and dynamic system. While it was certainly helpful to have an initial plan for the design of the site, it became a much more iterative process, trying different options, seeking input, rethinking how it could work, and exploring more options. The end product is much different originally envisioned, but I hope it is more useful to the community as a result.

From the outset, I had established a series of goals for this project, though some of the goals were no longer applicable after I decided to write an academic paper for the more theoretical components. This section walks through the goals which still applied, addressing how they were met, challenges that I faced in meeting these goals, and any next steps.

Goal #1: to build an accessible and useful site to help people in the Catawba Valley to practice landcare in their community.

Objectives:

- create a system which would build and capture institutional memory for the group
- provide a source of identity for Catawba Landcare both within and external to the community
- foster pride in community and accomplishments by telling their story
- clearly identify partners & resources in order to demonstrate opportunities for other partners and to point to gaps in information and support
- provide a dynamic yet user-friendly & low-maintenance system.

Structurally, there were a few initial decisions which had significant implications to this primary goal. The very first decision which had to be made was the type of system to use. In building the site using desktop based software which would afford me more design flexibility, it would by default be on my computer and therefore inaccessible to others to add to and change without going through me. It became clear that an even more basic objective than those initially posed was to create an accessible site which could be updated and added to by members of the community. Based on this criterion, I opted to use Wordpress as a content management system (CMS) because of the open-source blogging and CMS platforms I looked at, Wordpress offered the most user friendly interface. Once the structure was in place, it would be relatively easy to show others how to submit updates and posts.

The next decision was regarding what combination of pages and blog posts to use in order to organize and display the content in a useful manner. The way I came to conceptualize it was that web pages were pages in a book – they don't change unless they are updated; blog posts are like newspaper articles – they are timely and can be archived to look back on as part of a historical record. Both were relevant to the goals of the site, so I used pages to display more static information and content that users would need to find quickly, and I established categories for posts that would allow information to be archived and readily found.

Determining an intuitive navigational scheme for the site that was true to the primary goal was among the most challenging aspects and one which required the greatest amount of feedback. As you can see in comparing the two conceptual maps for the project (Figure 1 and Figure 2), this is

the greatest difference between the initial plan and the actual product. My impression at the beginning was that three categories of information was ideal, but in fact, I found that forcing content into one of three categories resulted in burying information deeper than it should be. Instead, after several discussions with users from Catawba Landcare and others, I ended up elevating five categories of information to the top navigational tier so they could be easily found and accessed.

Insofar as accessibility by members of Catawba Landcare and the broader community to add information, it became clear that the most dynamic aspect of the site, and the one which would need the most regular updating, was the events calendar. The idea is to have landcare events, as well as any other sort of community event, displayed on the site, both through the calendar page and in the sidebar of many other pages. Rather than hosting the events calendar within the Wordpress system and requiring users to log in to the site, I opted to create a calendar through the more familiar Google application, which is embedded and synced within the website. Now, anyone with a Google account can add events, which will be displayed both on the calendar page as well as in the sidebar of many of the other pages.

As a next step, I am working with Christy Gabbard to hold a short workshop with the members of the community and the landcare group interested in learning how to use this site, to teach them to access and update these applications. In addition, I have produced very basic how-to guides which will be distributed to interested users. For the interim, I will continue to serve as the webmaster until the comfort level of other users increase.

Goal #2 - To explore and demonstrate engaged scholarship as practiced by a land grant university and the opportunities community landcare provides for engagement

Objectives:

- Build network of linkages to on-ground projects and supporting research & engagement at VT
- Illustrated connections and feedback loops between community issues & university
- Highlight gaps and opportunities for further research

- Create forum for community-solicited questions and problems?

The main mechanism for linking research and scholarship at Virginia Tech and the work in the Catawba Valley has been through the Catawba Sustainability Center (CSC), which was established in 2008 on the site of a Virginia Tech owned farm in the valley as an “experiential showcase... with research plus demonstration projects from multiple Virginia Tech colleges” to demonstrate innovative sustainable and profitable land management practices. While it is discussed in greater detail in the next chapter, it is worth noting that the CSC is related to the activities of Catawba Landcare in that the very genesis of the center was in response to concerns of the member of the landcare group over the future of the then abandoned VT owned farm. The farm, which was previously operated by the Catawba Hospital as their dairy, has a lot of meaning to many residents of the valley, both as a symbol of their past as well as their future. The members of Catawba Landcare have been very active in shaping the mission and vision for the CSC, and a concerted effort has been put forth by Gabbard and others associated with VT to ensure that the CSC continues to serve the needs of the community.

That said, the CSC and its associated land-based business acceleration program VT EarthWorks, do not currently have a strong web presence. While elevating these programs within the Catawba Landcare website may create some confusion as to the distinction between Virginia Tech programs and the community-based group, I believe it also demonstrates the relationship that has been forged through this partnership. It also provides visibility and access to projects happening at the CSC which are of benefit to both the university and the community.

The first few objectives under the broader goal of illustrating engaged scholarship through landcare were to build a network of linkages between projects and supporting research and engagement at VT, and to illustrate feedback loops that inform both the research and practice. While there are numerous linkages created between projects, external websites and papers, and press releases written about projects, there are not yet enough tangible research findings to consider it a robust network. A major limitation I found was that while there are many projects going on, both at the CSC and more broadly in the community, there are not yet enough products that can be linked to this site. I approached a few students and faculty doing research at the CSC

and elsewhere about creating very basic websites to describe their projects and post photos and findings, but have not had much luck going that route. What would be useful moving forward would be to incorporate an agreement for such websites into projects at the CSC and with Catawba Landcare so that these linkages can be made. This would also contribute to the third objective of illustrating gaps in the research. That said, there are several posts included in the site that capture and describe many of the VT projects taking place in the valley, they are just not as robust as they could be.

Another feature of the site that was discussed initially was the inclusion of a discussion forum that would provide the opportunity for the community to provide questions and feedback on research projects and undertaking, which would help identify the gaps in research and the overlooked aspects of applying the research findings. While this technology exists and is compatible with the Wordpress system, it is somewhat complicated to both access from a user standpoint, and maintain from an administrator standpoint. It is certainly a feature which can be added to the site at a later time should the demand arise, but in the meantime, I decided it would be best to roll-out the site as is and let people determine what is and is not useful.

Goal #3 - To design the website and CMS with replicability and scalability in mind

Objectives:

- Design a replicable template for other communities to modify and use
- Construct the site to be easily embedded within a larger framework as well as linked across scales into a larger landcare network – open system

The beauty of Wordpress is that it is an open source platform, which means it is free to use and relatively easy to learn. The problem I faced early on was that none of the “themes”, or pre-designed organizational structures available for Wordpress sites, were configured to accommodate my original navigational scheme of three main categories. After many hours of searching, I found a premium site available for purchase which met my criteria. It was only after constructing an initial site that it became evident that the 3-pronged navigational scheme was not practical, thus opening up several other options for themes. So while this exact site is not freely

replicable, with more time, it would be rather simple to create a similar format using a free theme which could be used by any community group. Likewise, with the how-to manuals and workshop I am developing for the community, it would be relatively easy to make these materials available more broadly. I have included in the footer of the site a link describing the general idea behind the site and contact information for myself if viewers are interested in pursuing something similar.

With regards to scalability, it is worth noting the number of external linkages which can be found throughout the website. This situates Catawba Landcare in the midst of a large network of partners, both in the eyes of the user, from a partner's perspective, as well as from a web crawler perspective. This elevates the visibility of the site through internet searches. It also allows partner pages to link back. In terms of situating the site as part of a larger network of sites, both within the landcare network as well as others, this is as simple as announcing its presence, which Catawba Landcare will be doing this spring. I have installed Google Analytics in the site, which will allow administrators to monitor how the site is being accessed and where visitors are coming from, which will also help to improve the site.

Goal #4 - To develop personal skill set in information architecture and web/ CMS design and construction

This project certainly provided me with the opportunity to develop new skill sets. Beyond web design and HTML coding, it also forced me to think about how to organize information for different audiences and about the importance of language for reaching different readers and achieving different goals.

Conclusion

Designing and creating a dynamic content website is not a typical dissertation product, but it was nonetheless challenging. A website is really a network of small papers which share a common thread tying back to a home page. It is never really finished and there are an enormous number of considerations and decisions which have to be made at each step – each of which make it a

different product. I found it difficult to go from a paper writing mindset where you know what the paper should look like, to facing technical limitations that force you to make compromises and adjustments to the original plan. Finally, when you are creating a website on behalf of others, it has to be theirs, and that can be difficult to remember and honor. It was a very worthwhile experience and I sincerely hope the community which so generously welcomed me as one of their own finds it useful in the long run.

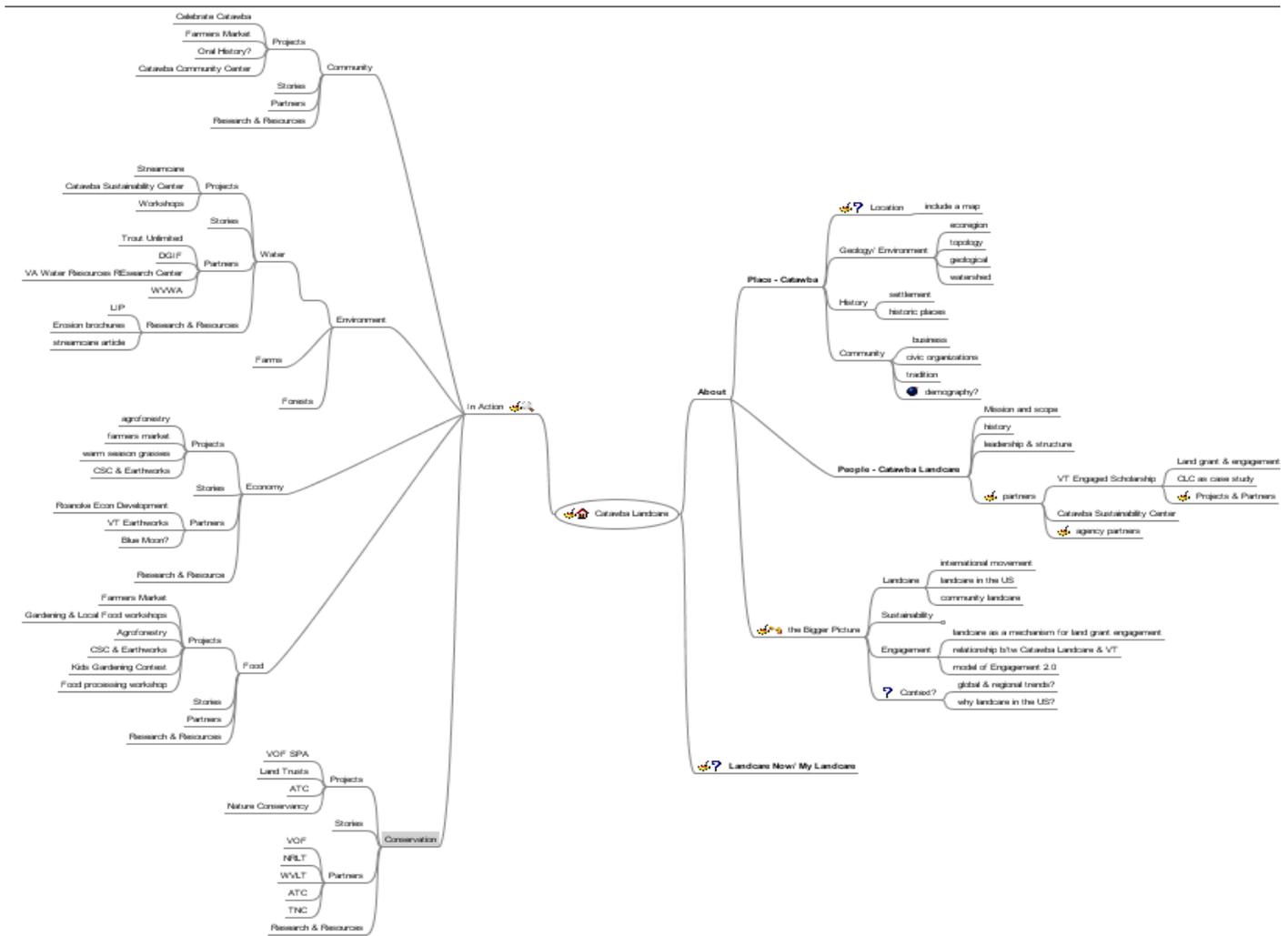


Figure 1. Original conceptual navigation map for www.catawbalandcare.org

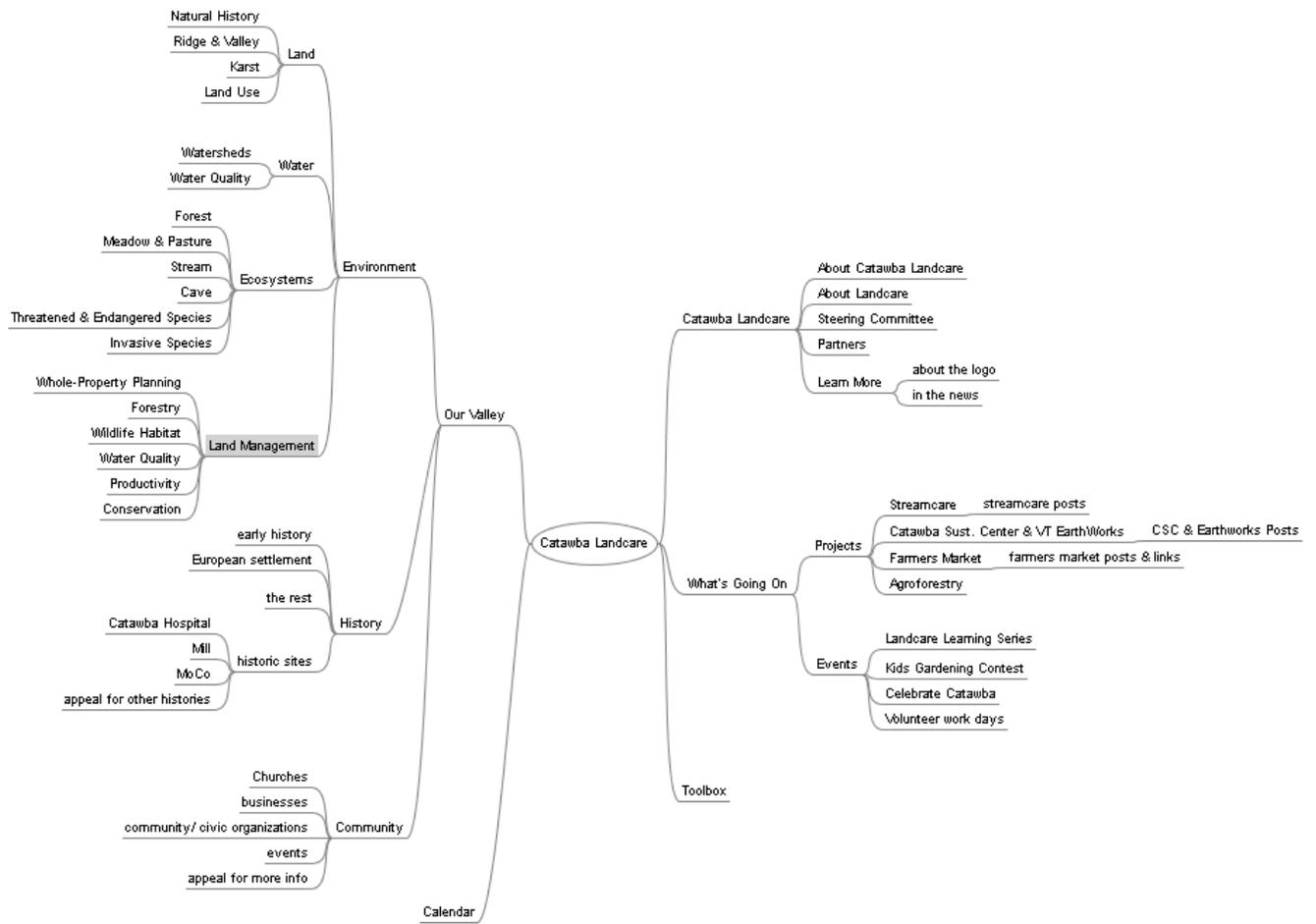


Figure 2. Revised actual navigation map for www.catawbalandcare.org

Chapter 5

Building Community Capacity and Social Infrastructure through Landcare: A Case Study of Land Grant Engagement

C.E. Kimmel, R.B. Hull, K.H. Cowgill, M. Stephenson, D. P. Robertson

(Being formatted for submission to Higher Education)

Introduction

Land grant universities were established in the United States by the 1862 Morrill Act to promote prosperity, educate citizens, and support communities—in short, to build America. At that time, most of the country was agricultural and industrializing, so land grants focused on building agricultural and mechanical capacities in the communities they served. Land grant universities' current emphasis on disciplinary research, external funding, and peer-reviewed journal publications emerged mostly after World War II (Roper and Hirth 2005). Today, many of these institutions are re-visiting their missions with calls to “return to our roots” (Kellogg Commission on the Future of State and Land-Grant Universities 1999), fulfill the “civic purposes of higher education” (Cress, Burack et al. 2010), practice the “scholarship of engagement” (Boyer 1996), and to “step forward as stewards of place” (American Association of State Colleges and Universities 2002).

Virginia Tech, the institutional host for the projects described here, is typical of a US land grant university seeking to reconcile its 20th century engagement efforts with a 21st century world, responding not only to calls for mission revision but also reduced budget allocations. Like many of its peers, Virginia Tech has commissioned internal studies and institutional reorganizations in response to changing politics, budgets, and demographics. In 2005, it introduced “Community Viability” agents into its statewide Cooperative Extension framework, and charged them with the task of strengthening local communities and their economic viability.³ In 2009, Virginia Tech commissioned a self-study of the university's engagement mission using Holland's keys to institutional support.⁴ And in 2010, the university presented a controversial “blueprint” for restructuring the state Extension service in response to declining state budgets and the changing

³ (<http://www.cv.ext.vt.edu/index.html>).

⁴ Holland, B. (1997). Analyzing Institutional Commitment to Service: A Model of Key Organizational Factors. *Michigan Journal of Community Service Learning*, 4, Fall, pp. 30-41.

needs of Virginia's communities.⁵ As has happened elsewhere, "engagement" has become the watchword, and that term now serves to encompass the mission previously associated with service, outreach, and extension.

This article seeks to contribute to the re-visioning and re-organization of land grant university engagement efforts by focusing attention on a critical but oft neglected function of engagement: building social capacity. We will be describing lessons learned from a multi-year effort of community engagement organized around sociological theories for building social capacity, promoting social learning, and enabling adaptive management within communities, which others have argued are critical capacities needed to engage and shape a sustainable future (Keen, Brown et al. 2005). In particular, we examine how landcare, an international strategy that employs community building as a means to promote sustainable development, may provide a mechanism for some land grant university engagement efforts in the US.

The lessons we learned have implications that extend beyond the land-based sustainability orientation of our case study. They are applicable to a diversity of engagement missions of institutions of higher education. That is, our conceptualization of engagement, applied here in the context of sustainability, applies equally well to other higher education engagement missions promoting business development, health, safety and human welfare. In fact, the landcare method we study strives to address all these outcomes and more.

Literature Review

Communities around the country are working to remain viable in the face of globalizing markets, rapid urbanization, and degrading water, soil, energy, and other resources (citations?). Public agencies and universities with engagement missions are meanwhile struggling to provide these communities the assistance they need. Campbell (1995) summarizes the reasons for alternative and innovative engagement strategies:

- Changing demographics are increasing both the number and diversity of clients that cannot be reached by the traditional one-on-one extension approach, particularly with shrinking budgets.

⁵ www.ext.vt.edu/restructuring/index.html

- One-size-fits-all solutions are rare, so communities must tailor development strategies and tactics to their local advantages and constraints.
- Communities that recognize their problems and build their own solutions will produce more sustainable results.
- The capacities of nongovernmental organizations, voluntary conservation and localism groups, and other forms of civil society are growing, and can be harnessed to support community-based sustainable development.

These trends point to the importance of building capacity for social learning and adaptive management at the community level to support sustainable development efforts (Keen, Brown et al. 2005). In their review of rural community development practice, Flora and Flora (1993) identified three essential components of strong, sustainable communities: (1) robust physical infrastructure (i.e., roads, schools, healthcare facilities, sanitation systems); (2) human capital (i.e., individual leaders, access to education, entrepreneurship); and (3) a strong social infrastructure to facilitate the process of community building and development (i.e., social capital, trust building, networks).

Flora and Flora argued the first two components – physical infrastructure and human capital – have often served as the chief goals for community development initiatives, but that such initiatives will have little lasting impact without the presence of the third component, a strong and “entrepreneurial” social infrastructure. They suggested that because social infrastructure exists at the group level and is constructed through complex and dynamic interactions, it can be difficult to measure and therefore receives less emphasis and attention in many development initiatives. (We would add that the increased emphasis on accountability has privileged programs with outcomes that can be counted, hence we strive to identify potential indicators of social capacity.) These social linkages create the infrastructure through which information and knowledge is perpetuated within the community, resources are mobilized, and problems are

solved.⁶ Social capacity enables leaders and entrepreneurs to maintain and utilize the local physical infrastructure to meet local challenges. Social capacity builds acceptance and expectation for action. It underpins a community's capacity to adapt and to respond to changing conditions.

Based on decades of work in rural community development, Flora and Flora (1993) identified three essential features for strong community social infrastructure:

- The capacity to engage in constructive controversy and devise workable solutions that balance people, place, and economy rather than divide, exclude, or privilege one portion of the community over others.
- The ability to mobilize local capital to invest in regional entrepreneurial activities that benefit the larger community.
- The capacity to attract, disseminate, and direct resources, particularly information, into and throughout the community.

We elaborate on each of these social infrastructure capacities below, suggest how each can be enhanced through land grant university engagement programs, and then illustrate them through a case study.

Holding Environments: Flora and Flora (1993) suggest communities need a social space in which they can engage in constructive controversy. Heifetz (1994) has described this space as a holding environment. It is frequently determined by relationships and exchange of information and is often facilitated by an external actor (p. 105). In the context of land grant civic engagement, the holding environment provides a space where community members share ideas and think about their future, bring together disparate positions, accept that there are no easy solutions to their collective problems, and hold community members' "feet to the hard work of reconciling and compromising among competing values claims and perspectives" (Stephenson, 2011, p.100; see also Weber and Khademian's (2008) discussion of Collaborative Capacity Builders). Social learning requires that communities clarify and test shared assumptions and

⁶ Though these linkages tend to be elusive, there have been empirical studies conducted which seek to quantify community capacity as a function of social capital and determine its correlation with positive community development outcomes. See Krishna & Uphoff (2002)

values, and do so on an evolving basis as learning occurs and circumstances change. Such processes often reveal conflicting perspectives and values claims, which are innately stressful and often avoided unless a trusted process is in place for people to openly share, listen, and learn. A holding environment creates a safe space where the sharing, testing, and reconciling of competing claims, concerns, and values can occur.

It can be difficult for communities to mediate conflict from within, in which case an external partner can be invited to create and maintain the holding environment. Universities, with their legitimacy and resources, have successfully created holding environments (Stephenson 2011). Heifetz (1994) identifies five functions these holding environments perform:

- They direct attention to the problems, issues, or controversies that need to be resolved and the opportunities for collaboration.
- They gather, test, and manage information that helps community members understand their problems and opportunities, evaluate whether the risks of inaction merit the risk of change, and build confidence that a development scenario is possible and worth the risk.
- They help frame issues, presenting them as constructive solutions worth considering rather than threats to be avoided.
- They provide a safe forum for conflicting perspectives to be voiced, recognized, and respected, rather than ignored and suppressed.
- They facilitate a decision-making or planning process that leads towards a solution and identifies actionable steps. A holding environment can function as an important forum and space in which the groundwork is laid for building long-lasting and self-sustaining social infrastructure.

Entrepreneurship: Supporting entrepreneurs to function within and respond to opportunities and challenges identified in the holding environment is another role higher education engagement efforts can play. Marsden and Smith (2005), as elaborated by Kimmel and Hull (forthcoming), examine entrepreneurship and entrepreneurial enterprises that explicitly maintain a focus on ecological and social well-being in addition to profitability—or the triple bottom line of economics, ecology, and ethics. University engagement programs can support entrepreneurship of this type by serving in one or more of three identifiable roles:

- Regional catalysts promote entrepreneurship by identifying opportunities, individuals, and institutions and engaging them in a broader support network, either as a contributing partner or in creating profitable opportunities market enterprises that support broader community and environmental goals (Central Appalachian Network 2005; Holley 2005).
- Network brokers work more directly with entrepreneurs themselves, connecting them with resources and expertise internal and external to the network (Rosenfeld 2001; Hanna and Walsh 2002; Holley 2005).
- Entrepreneurial support organizations (ESOs) directly assist entrepreneurs and networks in ways that provide access to information, capital, support services, training, as well as promote a local entrepreneurial culture (based on synthesis of Allen and Rahman 1985; Dabson 2001; Kauffman Foundation 2008;

Learning Action Networks: Another way to think about empowering communities to utilize the holding environment to engage in social learning and adaptive management (Clarke and Roome 1999). These networks encourage community members to develop, share, and test means of cooperation. They function as catalysts that promote assessment, reflection, learning, and action. Stephenson (2011) argues that universities can help these networks form, help establish trust and shared vision among stakeholders, and build local organizational capacity to assess current conditions, devise possible strategies of response, and mobilize action.

Landcare: Landcare provides a framework for organizing these types of engagement practices. It is a locally-led, community-based, public agency facilitated strategy to build social capacity to respond to challenges of sustainability in a dynamic world (Wilson 2004; Catacutan, Nealy et al. 2009). It engages landowners, businesses, nongovernmental organizations (NGOs), local governments, resource professionals, scientists, consumers and concerned citizens -- “*everyone, everywhere*” as they say in Australia, where the strategy originated in the mutual work of ‘caring’ for their environment and community. For the most part, landcare has been employed as an organizing concept to focus on land stewardship tasks such as sustainable farming and forestry, stream restoration, landscaping, and related activities, but with attention also given to landowner and community economic viability. It is applicable to any place-based efforts to improve economic, social, and environmental conditions: the triple bottom line.

Landcare has operated in Australia for more than 20 years, involving almost one-half of that nation's farming community and recognized by about 80% of its citizens (Youl, Marriott et al. 2006). The approach has been introduced and adapted to local conditions in 15 countries to date, including the Philippines, Sri Lanka, Germany, and Iceland (Secretariat for International Landcare website). In Australia, landcare emerged as a state-supported mode of government outreach and university extension, but one which relies on local initiative. Neighbors form groups, identify problems, propose locally appropriate solutions, and solicit resources, including funding and training to implement their proposed strategies (Youl 2006). Efforts to establish a landcare movement in the US are still nascent (see www.landcarecentral.org), but several groups have formed, among them Catawba Landcare near Virginia Tech. The relationship between Catawba Landcare and Virginia Tech is the case study developed below.

Methods

We developed a case study (Yin 2003) of Catawba Landcare to explore the university's role in fostering and facilitating the landcare group and its implications for community capacity building within the organizational framework provided by the three theoretical components discussed above—holding environments, social and ecological entrepreneurship, and learning action networks. This research draws on six years of university faculty, staff, and graduate student work with Catawba Landcare, including participant observations by members of the research team. Semi-structured interviews with key informants and analysis of documents and project reports were conducted throughout this time period. Members of the community were aware of our university affiliations and research interest and were asked to provide feedback and member checks of our interpretations (Cassell and Symon 2004). These multiple data streams enabled triangulation and corroboration of findings (Weber 1996).

The case is presented in two parts: the first provides a brief overview of the project and the second examines the specific community capacity building strategies and outcomes discussed in the literature review. The conclusion provides reflections concerning how other land grant universities may be able to engage in similar efforts.

Discussion

Catawba Landcare

Faculty and staff in the College of Natural Resources and Environment at Virginia Tech (VT) became involved with the international landcare movement in 2005 when Jim Johnson, a former associate dean to the college, returned from a tour of Australia where he had learned about landcare and had become aware of interest at the USDA in developing a similar strategy for community-based conservation in the US. Around the same time, a local community organizer in nearby Grayson County, Virginia approached the college for assistance with an integrated conservation and economic development initiative in their community (Grayson Landcare 2007).⁷ Many faculty from throughout the college had been seeking such an opportunity to engage with a community initiative in the region and the timing was right for the ensuing “engagement”. The initial project that spurred this collaboration was a farmer-led effort to improve the marketability of sustainably raised beef cattle, an initiative that grew into a community group, Grayson Landcare, and business, Grayson Natural Foods. As VT became more engaged in supporting landcare, both as funding became available and as interest grew, faculty began integrating landcare language and ideas into proposals and community engagement publications. A “virtual” Landcare Center formed to help build capacity within the university and beyond.

In 2006, Ned Yost, a resident of the Catawba Valley just east of the Virginia Tech campus, read about the Landcare Center in the Virginia Forest Landowner Update (Robertson 2006) and inquired about starting a landcare group in his community. Yost is a local champion of land conservation and saw landcare as a non-polarizing way to bring neighbors together around a common interest in land management. Faculty members meanwhile pursued internal and external funding to advance landcare in the region and secured some support from the US Department of Agriculture. Some of this money was used to hire Christy Gabbard, an ecologist at VT’s Conservation Management Institute, to serve as the group’s facilitator while the Catawba group organized, identified priorities, and began sponsoring events.

⁷ Grayson Landcare Newsletter. Feb 2007. Vol. 1 Issue 1

The first meetings of Catawba Landcare were informal, attended mostly by Mr. Yost's neighbors. These people invited their friends and neighbors and the group expanded and contracted over several months as participants self-selected based on their interest. Several "open house" meetings were held at different venues, featuring experts Ms. Gabbard had secured to discuss topics the group identified as relevant to enhancing the triple bottom line of the community. Topics for these gatherings included forest and riparian area management, local food processing and marketing opportunities, and possibilities for local tourism. Beyond educating landowners, these meetings provided opportunities for interaction among neighbors and the relationships that merged from these began indirectly enriching the members' sense of community. Each meeting's agenda deliberately included ample time for socializing.

The landcare group undertook on-the-ground projects, including a concerted effort to secure riparian buffers along one major tributary running through the valley. With the cooperation of the local agents of the Virginia Department of Game and Inland Fisheries, "streamcare" became a major focus for the group, which embraced a neighbor-to-neighbor approach to encouraging stream restoration work (Kimmel 2010).

As a consequence of numerous discussions, the loose-knit landcare group discovered a common interest in the fate of a state-owned but neglected historic farm located at the entrance of their valley. Many area residents view the farm as iconic of the community and its addition to the state's "surplus list" of properties raised great concern among community members. As a result, some of the group's efforts were redirected towards organizing university interest in the property on behalf of the community. Funding from private foundations and government programs were solicited. Within a year, Virginia Tech formed the Catawba Sustainability Center (CSC): "An Experiential Showcase for Green Ideas – a place to practice, demonstrate, learn, and teach about issues that affect the world today and into the future." Gabbard became the first Director. The CSC embraced two primary goals: 1) Support projects that showcase innovative land-management practices; and 2) support new and expanding agriculture and natural-resource businesses through VT EarthWorks⁸, a business incubator and training program that promotes sustainable land-based businesses in the region.

⁸ <http://www.vt.edu/spotlight/innovation/2010-11-01-growers-academy/growers-academy.html>

Courtney Kimmel, an author of this paper, followed Gabbard as the community facilitator for Catawba Landcare. She has worked with landcare members to develop community festivals and farmers markets as regular events. She has also helped to foster community- organized workshops on an array of topics including gardening, bee and honey business opportunities, maintaining wildlife habitat on private land, and developing local food markets. An informal steering committee oversees these efforts and meets almost monthly, sharing dessert or potluck dinner. External (university) facilitation is now phasing out as internal capacity has developed to sustain the group without continued VT engagement. A member of the community now serves as the group's facilitator, although the university's project teams still provides some technical assistance when it is requested.

Holding Environments

As noted above, holding environments are safe spaces in which individuals may share ideas and thoughts freely, in which adaptive learning can occur, and which frequently rely on facilitation by external partners. A key function of these environments is to direct attention to the problems participants share and to collaborative opportunities for their resolution. Catawba Landcare was established to provide a safe and welcoming forum for community members to discuss sustaining the land, economy, and community in the Catawba Valley. Federal, state, and local conservation programs had become somewhat polarizing among landowners and skepticism about the role of government in private land management had created a barrier to cooperation around conservation. Yost and others thought landcare's emphasis on locally developed agendas and on integrated conservation and community economic development would help to overcome such concerns of Catawba's residents.

The first step in establishing a holding environment was to create the expectation of a safe and neutral venue for discussion. This required making several distinctions clear to the broader community through word-of-mouth, emails, community meetings, and coverage by local newspapers:

- Catawba Landcare was locally-directed and not a university or government program.

- Catawba Landcare was not a land trust, which might constrain the agenda to conservation easements
- Catawba Landcare was as much about developing opportunities for community and economic development as it was about as sustainable land management practices and natural resource conservation.

Gabbard, as the Virginia Tech representative, facilitated a core group of landowners to begin drawing these distinctions. The nascent landcare group hosted meetings at the farms and homes of different residents in the valley as well as churches and the local community center, with the idea of keeping action local to the valley and emphasizing a neighbor-to-neighbor mode of learning and sharing. Meeting agendas were designed by the informal steering group. Gabbard's affiliation with VT provided a level of credibility to the endeavor, both from the landowner and external presenter perspective. An effective holding environment began to take shape.

In this holding environment, community residents identified several common concerns and controversies, including concerns about the impacts of grazing, stream channeling, and minimal riparian buffers on water quality. Residents discussed tensions caused by conversion of rural lands to residential development, which has roots in the struggling economic viability of working farms and forests, the effect of increasing property taxes, and the influx of new residents and money from the urban areas that bookend the valley. Many landcare members also voiced a sense of political alienation and distrust of county governance, as well as skepticism about federal government conservation programs. In part because the valley has two active land trusts, many landowners have very strong opinions about conservation easements, which had created another source of conflict over sustainability efforts more generally. Some residents shared concerns about the scarcity of services from such traditional providers as the Cooperative Extension Service, which has steadily scaled-back its programming over the years as its budget has been reduced, with a six-month waiting list for assistance not uncommon. In addition, the valley had historically maintained a very closely-knit social structure through churches and local institutions, and this sense of community seemed in jeopardy as transportation options improved opportunities to worship, work and shop elsewhere, and as new neighbors have moved in.

Allowing these issues to rise to the surface, to be recognized and respected, and then to find ways to help a community work towards a solution proved an essential step in building Catawba's capacity, and became the next role in VT's involvement with the landcare group. Virginia Tech did not wish to, nor could it, resolve these issues. Instead, Gabbard served as the group's facilitator to help identify and implement strategies that would address these concerns. Recall that one function of a holding environment is to provide a forum where issues can be framed as opportunities for change rather than as threats to be defended against or avoided. Reframing concerns as opportunities, Catawba Landcare and Gabbard were able to obtain support from external funders, engage multiple departments at VT and public agencies and partners, mobilize volunteers, and excite community members about new possibilities for the valley. Outcomes of discussions in the holding environment were the formation of the Catawba Sustainability Center and VT EarthWorks, discussed in more detail in the next section.

A final illustration of a holding environment function is the facilitation of a decision-making or planning process that identifies actionable steps. Catawba Landcare launched several planning efforts and initially, Gabbard served as the primary coordinator for all of these activities. It was clear after about a year that this was an unsustainable model and did not foster sufficient levels of local ownership in the outcomes. Beginning in 2009, when Kimmel assumed the VT coordination role for the group, a new strategy was developed in which the steering committee developed a list of topics its members perceived as appropriate and of interest to members of the community, and then each member assumed responsibility for organizing an effort to address it. In distributing responsibility for planning the workshops and meetings to members of Catawba Landcare, Kimmel (and therefore VT), took a step back from responsibility for maintaining the holding environment while community members assumed increased responsibility.

Social and Ecological Entrepreneurship

Land grant universities can contribute to building community capacity by supporting entrepreneurship that complements community-identified goals. The Catawba Sustainability Center (CSC) and its spin-off program VT EarthWorks illustrate how a university can support these efforts. These programs were responses to resident concerns about lack of economic

opportunities in the valley, the narrowing profit margins for land-based enterprises, and concerns about the abandonment of an iconic farm.

The CSC is administrated by the VT Office of Outreach and International Affairs and led by Gabbard. To build this university center, Gabbard assembled advisory panels, planning teams, and working groups populated by members of Catawba Landcare, representatives from local and state government, regional organizations, the full range of colleges and offices at Virginia Tech, as well as private businesses in the region. In engaging these partners, VT acted as the catalyst to building partnerships and developing opportunities to support entrepreneurship within the region. Examples of projects that have resulted at the CSC include the establishment of research plots for native warm-season grasses for forage and biofuel that supports local agricultural and alternative energy industries, honey bee research for raising resilient queen bees and supporting a pollination and honey-based product industry in the region, soil sensors to monitor nutrient and carbon levels to provide real time information to farmers and gardeners about moisture and fertility needs, a retail farmers market held weekly during the growing season, and meet-and-greet networking opportunities bringing together wholesale producers and consumers.

VT EarthWorks is a program that explicitly seeks to promote entrepreneurial activities that support social and environmental goals in the region. Defined as a “business-acceleration program for land-based businesses” (e.g., producers of local food, biomass for energy, and sustainable wood products), VT EarthWorks was actually developed in the model of and as a companion program to VT KnowledgeWorks, which is a business-acceleration program focused specifically on technology-based enterprises. Geared towards helping beginning growers and producers to plan for their physical and financial operations, the program is open to anyone and offers its members access to low-rent land at the CSC, to networking opportunities to connect with buyers, to market access through the Catawba Farmer’s Market and local publications, and to education and training through the Growers Academy. In 2011, VT EarthWorks is hosting its second series of the Growers Academy in cooperation with the Virginia Cooperative Extension and the VT Business Technology Center to help entrepreneurs think through not only aspects of physical production, but also business and marketing planning. An unexpected partnership which has developed as a result of this program is that between VT and a group of Somali Bantu

farmer refugees living in the Roanoke Valley, who are now working with EarthWorks to establish local plots to grow crops indigenous to their homeland both for their families and for market. A VT doctoral student is working with the group as part of her dissertation research on ethnic diversity and local food systems.

Learning Action Networks

Higher education engagement efforts can be instrumental in forming a Learning Action Network (LAN) that builds community capacity. LANs are comprised of relationships and linkages between what might otherwise be disparate stakeholder groups and individuals, enabling opportunities for collaboration, mechanisms for exchange and learning, and pathways for shared understanding and mutual benefit (Stephenson 2011; p. 104). Stephenson (2011) points to Booher's (2008) concept of collaborative complex adaptive networks as similar to LANs, specifying their need to include institutions, government officials, nonprofit organizations, business leaders, as well as families and community members to catalyze effective community change.

For each of the projects and initiatives undertaken by Catawba Landcare and the CSC, a host of partners from the for-profit, nonprofit, and public sectors have been drawn into the network, with each contributing and deriving lessons and resources of mutual benefit. The advisory committee formed to guide and support the CSC provides an example a LAN comprised of inter-sectoral and inter-organizational linkages. Committee representation comes from Virginia Tech, administrators from the Catawba Hospital adjacent to the property, the director of conservation from the Appalachian Trail Conservancy which also is adjacent to the property, a local county administrator, a representative of the US Department of Agriculture National Agroforestry Center, a regional manager from the Virginia Department of Conservation and Recreation, the director of the Virginia Water Resources Research Center, and a member of the Catawba Landcare steering committee. This group has been meeting on a regular basis to develop a vision and plan for the CSC, which requires a tremendous amount of communication, exchange of ideas, and negotiations of priorities by stakeholders that previously have not cooperated. One result has been to build access to even more partners, such as the Chesapeake Bay Foundation, the regional water authority, and a local cement company, the latter two motivated by secure

water quality and sustainable energy production. These and other institutions, agencies, businesses, and organizations have been drawn into the LAN in varying degrees of formality, but all are establishing themselves as stakeholders of the CSC and of the community's vitality more generally. In doing so, they are creating linkages among a diverse array of members of the community and to each other in unique ways that increase capacity for action and for change. VT has played a critical role in catalyzing the formation of this LAN.

An important function of a LAN is to provide a platform from which to gather, test, and manage information that helps the community understand its problems and opportunities, evaluate whether the costs of inaction merit the risk of change, and build confidence that a development scenario is possible and worth pursuing. Catawba Landcare excelled at this function, perhaps in part because of access to the resources of a land grant university. One example is the Streamcare initiative.

The valley's Streamcare efforts began, in part, as a response to residents receiving information about stream quality issues. Water has always been a defining characteristic of the valley. Residents know that their streams and springs form the headwaters of several national watersheds. Even the word "Catawba" is of a Sioun dialect, and has been thought to translate roughly to "river people" (Moore 2002). Building on this awareness, a project was sponsored by the Virginia Water Resources Research Center (VWRRC) affiliated with VT, in which researchers conducted a parcel-scale survey to create a map of the valley that illustrated erosion levels along the streambanks. Among the final products of this project were a series of informational brochures with maps that were distributed among valley landowners. The maps identified the locations of problematic sections of the creeks. The brochures also included information about various opportunities and programs available to help landowners care for their sections of streams. Catawba Landcare subsequently sponsored several workshops, meetings, and field trips focused on stream restoration possibilities and cost-share programs. These gatherings provided information, allowed questions and concerns to be addressed by residents and experts, and encouraged neighbors to share experiences. Tensions over this issue became evident in some of these meetings, with conflicting views expressed concerning government

conservation programs and over the exclusion of cattle from streams. But workshops have continued and action has resulted. As of this writing, more than two miles riparian areas along the North Fork of the Roanoke River within the valley have been restored. The local chapter of Virginia Save Our Streams and the VWRRC have each established water monitoring sites and Trout Unlimited has helped organize volunteer labor. Biologists from the Virginia Department of Fish and Wildlife have also expressed great enthusiasm for this effort because it magnifies the impacts of their time and investment.

Conclusions

Many communities are struggling to adapt to rapid urbanization and globalization amidst resource-scarce conditions. Land grant universities are struggling to assist these communities with 20th Century engagement tools and declining budgets. Programs such as landcare provide an alternative model for land grant engagement, one that targets social capacity; rather than focusing merely on individual and physical development. Many 20th Century engagement efforts base their measures of success on the number of people who attend workshops, the number of brochures requested, schools built, acres treated, meals served, or income generated. Engagement that seeks instead to build social capacity is building self-sustaining institutions for social learning and adaptive management. We argue just such capacities are increasingly necessary if communities are to direct their development trajectories towards a sustainable future.

Building the social infrastructure in communities is the linchpin of this form of engagement and critical to securing lasting change. It enables leaders and entrepreneurs to search for solutions. It perpetuates know-how in the community and directs it where it is needed. It connects resources to solutions. It builds acceptance and expectation for action. It builds capacity for social learning such that adaptations continue in response to changing conditions. Communities without these capacities are less likely to be sustainable.

Efforts and programs to increase community capacity are difficult to promote and measure, as their success resides not in individuals or objects, but in social interactions and networks. As a

result, such efforts are often overlooked and neglected. We argue that holding environments, social and environmental entrepreneurship, and learning area networks are three strategies and outcomes that can be constructed, supported, and counted by institutions of higher education as a means to engage communities in directing their own futures.

References

- American Association of State Colleges and Universities (2002). *Stepping forward as stewards of place: A guide for leading public engagement at state colleges and universities*. Washington, DC.
- Booher, D. E. (2008). Civic engagement as collaborative complex adaptive networks. Civic engagement in a network society. K. Yang and E. Bergrud. Charlotte, Information Age Publishing: 111-148.
- Boyer, E. L. (1996). "The scholarship of engagement." Bulletin of the American Academy of Arts and Sciences **49**(7): 18-33.
- Campbell, A. (1995). "Facilitating Landcare: conceptual and practical dilemmas." Rural Society **5**(2-3): 13-19.
- Cassell, C. and G. Symon (2004). Essential guide to qualitative methods in organizational research, Sage Publications Ltd.
- Catacutan, D., C. Nealy, et al. (2009). Landcare: Local action - global process. Nairobi, Kenya, World Agroforestry Centre.
- Central Appalachian Network (2005). *Strategies for Sustainable Entrepreneurship*. C. A. Roundtable.
- Clarke, S. and N. Roome (1999). "Sustainable business: learning-action networks as organizational assets." Business Strategy and the Environment **8**(5): 296-310.
- Cress, C. M., C. Burack, et al. (2010). *A promising connection: Increasing college access and success through civic engagement*. Boston, Campus Compact.
- Flora, C. and J. Flora (1993). "Entrepreneurial Social Infrastructure: A Necessary Ingredient." Annals of American Academy of Political and Social Science: 48-48.
- Hanna, V. and K. Walsh (2002). "Small Firm Networks: A Successful Approach to Innovation?" SSRN eLibrary.
- Heifetz, R. A. (1994). Leadership without easy answers, Belknap Press.
- Holley, J. (2005). Building a Regional Entrepreneurship Network: A guide to action. Athens, OH, ACEnet Institute.
- Keen, M., V. Brown, et al. (2005). Social learning in environmental management: towards a sustainable future. London, Earthscan/ James & James.

- Kellogg Commission on the Future of State and Land-Grant Universities (1999). *Returning to our roots: The engaged institution*. Washington DC, National Association of State Universities and Land-Grant Colleges.
- Kimmel, C. E. (2010). *Streamcare in Action*. Engagement Matters. Blacksburg, Virginia Tech Cooperative Extension. **2**: 2-3.
- Krishna, A. and N. Uphoff (2002). Mapping and measuring social capital through assessment of collective action to conserve and develop watersheds in Rajasthan, India. The role of social capital in development: An empirical assessment. C. Grootaert and T. Van Bastelaer. Cambridge, Cambridge University Press: 85–124.
- Marsden, T. and E. Smith (2005). "Ecological entrepreneurship: sustainable development in local communities through quality food production and local branding." Geoforum **36**(4): 440-451.
- Moore, D. (2002). Catawba Valley Mississippian: Ceramics, Chronology, and Catawba Indians, University Alabama Press.
- Robertson, D. P. (2006). Landcare is Coming to a Forest Near You. Virginia Forest Landowner Update. Blacksburg, Virginia Forest Landowner Education Program. **20**: 5-6.
- Roper, C. and M. Hirth (2005). "A history of change in the third mission of higher education: The evolution of one-way service to interactive engagement." Journal of Higher Education Outreach and Engagement **10**(3): 3–21.
- Rosenfeld, S. (2001). "Networks and clusters: The yin and yang of rural development." Exploring Policy Options for a New Rural America: 103-120.
- Secretariat for International Landcare. Retrieved 2/27/2011, from <http://www.silc.com.au/>.
- Stephenson, M. (2011). "Conceiving land grant university community engagement as adaptive leadership." Higher Education **61**(1): 95-108.
- Weber, E. P. and A. M. Khademian (2008). "Wicked problems, knowledge challenges, and collaborative capacity builders in network settings." Public Administration Review **68**(2): 334-349.
- Weber, R. P. (1996). Basic content analysis, Sage Publications, Inc.
- Wilson, G. A. (2004). "The Australian Landcare movement: towards 'post-productivist' rural governance?" Journal of Rural Studies **20**(4): 461-484.
- Yin, R. (2003). Case study research: Design and methods. London, Sage.

Youl, R., Ed. (2006). Landcare in Victoria. Melbourne, Adams Print.

Youl, R., S. Marriott, et al. (2006). Landcare in Australia: Founded on Local Action, Published by SILC and Rob Youl Consulting Pty. Ltd.

Chapter 6

Conclusions

The four pieces presented in this manuscript-style dissertation serve as cairns marking the path I have taken through my doctoral program, the research areas I have explored, theoretical and methodological challenges and vistas I have crossed, the directional changes I have taken, and the general direction in which I am continuing down this path. The challenge with this presentation style for a dissertation is that, particularly when the pieces examine somewhat different aspects of an issue or concept, a significant part of the journey including the linkages between projects and the broader theoretical connections and implications which have emerged through the inquiry are not always explicitly stated or obvious to the reader.

The format for my preliminary exam was different than traditional doctoral programs, but appropriate for my research interests, which are intensely interdisciplinary, and for the composition of my doctoral committee, who represent a range of disciplines, perspectives, and areas of expertise. As part of my preliminary exam, each committee member compiled an extensive reading list of papers, books, and reports which would provide the theoretical and methodological grist to meaningfully dissect, explore, and apply the concepts of landcare, community and social capital, sustainability, place, networks, collaborative governance, community and economic development, the role of civil society, and many other topics which have been addressed (or not) in this dissertation. The outcome of the preliminary exam was a comprehensive literature review and synthesis, resulting in a theoretical paper on what I propose as *civic sustainability* – a broad theoretical framework in which to situate, organize, and map out all of the activities reported in the four pieces presented in this dissertation.

The idea behind civic sustainability, based on the synthesis of the more than 100 articles and book chapters identified through the prelim process, is that sustainability is an iterative and adaptive concept which is unique to a place, is informed by the values of people living in that place, and which requires the active participation of all actors in that place to work towards a common vision of a more sustainable future for that place. The larger theoretical framework for civic sustainability is not discussed in this dissertation because it is a work in progress.

However, it has become the conceptual blueprint which has helped me to link and organize the findings presented in the manuscripts included here, and to begin exploring possible next steps and opportunities.

The research projects represented in this dissertation has permitted me to explore key intersections for understanding and facilitating the construction of a more sustainable future. Intersections and relationships between people and the places where they live, between communities and the environment in which they exist, between conservation and development, between protecting the environment and ensuring social justice, between the missions of organizations and institutions and their responsibility to the people whose lives they impact. These are a few of the critical relationships and ‘gray areas’ that this research has allowed me to probe and which I believe require more careful consideration and communication if we as a society are to move towards greater civic sustainability. This research has provided me with a theoretical framework in which I am approaching the next phase of my career, as part of a research team examining green infrastructure planning and design processes in the United States, and in developing opportunities to train leaders for civic sustainability.

Appendix A

List of Annotated Figures

Chapter 2 – *Figure 1*: Typology of Conservation 2.0 strategies being developed by land trusts in the US. **8**

- This typology, represented graphically, is based on a secondary evaluation of survey data collected by the Center for Whole Communities as part of a nationwide evaluation of conservation land trusts and their engagement with communities. The survey results included in Appendix B does not include the open-ended responses, which was the primary source for this typology. Programs and activities of land trusts indicated in the survey which fell outside of the realm of legal and technical conservation of land were categorized into four broad categories – 1) influencing physical regional development, 2) addressing social and community concerns, 3) improving economic conditions, and 4) providing and facilitating political representation of community voices. My selection of case studies was guided by this typology.

Chapter 4 – *Figure 1*: Original conceptual navigation map for www.catawbalandcare.org **64**

- In the initial proposal for this website, I developed this navigational map to guide the design and construction of the site. The idea was to organize the vast array of initiatives, activities, and programs being developed by the organization, and embed it within a broader theoretical framework. However, as the site progressed, I found that technological and usability barriers would limit what was possible and what was practical for the site. As a result, this navigational map evolved into what is presented in Figure 2.

Chapter 4 – *Figure 2*: Revised actual navigation map for www.catawbalandcare.org **65**

- As the development of the Catawba Landcare CMS-based site evolved, I found that the organization of information was critical. As a result, I changed the basic navigational categories, branching the website wider versus deeper. This is the navigational map which resulted and which can be found on the site today.

Appendix B

Survey questions and results collected by Center for Whole Communities

Land Trust Community Engagement Survey

1. Are you a land trust:		
	Response Percent	Response Count
Member 	14.9%	53
Staff member 	51.0%	181
Board member 	40.0%	142
Community member 	4.5%	16
Other (please specify)		27
<i>answered question</i>		355
<i>skipped question</i>		8

2. If staff member, what is your job title?	
	Response Count
	198
<i>answered question</i>	198
<i>skipped question</i>	165

3. What is the name of your land trust? (Or if you are a community member, the land trust you are writing about.)	
	Response Count
	356
<i>answered question</i>	356
<i>skipped question</i>	7

4. What state is your land trust located in?		
	Response Percent	Response Count
AL 	0.6%	2
AK 	0.3%	1
AS	0.0%	0
AZ 	2.8%	10
AR	0.0%	0
CA 	6.7%	24
CO 	3.1%	11
CT 	5.6%	20
DE	0.0%	0
DC	0.0%	0
FM	0.0%	0
FL 	1.4%	5
GA 	0.6%	2
GU	0.0%	0
HI 	0.6%	2
ID 	0.8%	3
IL 	1.1%	4
IN 	2.2%	8
IA 	3.9%	14
KS 	0.3%	1
KY 	0.3%	1
LA	0.0%	0
ME 	6.7%	24
MH	0.0%	0
MD 	4.8%	17

MA	5.9%	21
MI	5.6%	20
MN	0.3%	1
MS	0.0%	0
MO	0.3%	1
MT	0.3%	1
NE	0.0%	0
NV	0.0%	0
NH	3.9%	14
NJ	2.8%	10
NM	0.6%	2
NY	9.2%	33
NC	3.1%	11
ND	0.0%	0
MP	0.0%	0
OH	2.5%	9
OK	0.0%	0
OR	1.7%	6
PW	0.0%	0
PA	5.6%	20
PR	0.0%	0
RI	2.0%	7
SC	1.7%	6
SD	0.0%	0
TN	2.2%	8
TX	1.7%	6
UT	0.0%	0
VT	2.2%	8

VI	0.3%	1
VA	0.6%	2
WA	1.7%	6
WV	0.8%	3
WI	2.5%	9
WY	1.1%	4
<i>answered question</i>		357
<i>skipped question</i>		6

5. What community (ies) does your land trust serve?

	Response Percent	Response Count
Who are the people of the community (residents, farmers, second-home owners, etc)?	99.4%	359
What is the location of the community (town, watershed, county, state, etc)?	99.7%	360
<i>answered question</i>		361
<i>skipped question</i>		2

6. How would you define the level of economic and racial diversity within the community (ies) you serve? (check one in each category)

	very diverse	diverse	somewhat diverse	not diverse	Response Count
Economic diversity?	30.9% (110)	30.9% (110)	31.7% (113)	6.5% (23)	356
Racial diversity?	10.5% (37)	11.0% (39)	28.0% (99)	50.6% (179)	354
<i>answered question</i>					358
<i>skipped question</i>					5

7. How would you define the level of economic and racial diversity in the community-at-large?					
	very diverse	diverse	somewhat diverse	not diverse	Response Count
Economic diversity?	38.5% (137)	35.7% (127)	23.6% (84)	2.2% (8)	356
Racial diversity?	14.8% (52)	21.3% (75)	31.0% (109)	33.0% (116)	352
<i>answered question</i>					358
<i>skipped question</i>					5

8. How would you rank the priority of community engagement in terms of your organization's (check one in each category):					
	among the top two or three priorities	important, but not among the top two or three priorities	not a priority	Response Count	
Values and philosophy:	57.5% (207)	38.3% (138)	4.2% (15)	360	
Budget and staff allocation:	34.7% (123)	46.6% (165)	18.6% (66)	354	
<i>answered question</i>					360
<i>skipped question</i>					3

9. Does your land trust partner with the community (ies) it serves to (check all that apply):				
		Response Percent	Response Count	
Identify projects		89.9%	294	
Design projects		60.6%	198	
Define outcomes		53.5%	175	
Ensure stewardship		78.6%	257	
Other (please specify)			110	
<i>answered question</i>				327
<i>skipped question</i>				36

10. How involved is your land trust in conversations in the community-at-large about fairness and equal access to land and other resources (across history, culture, social class, race, ethnicity, gender, and other)? (check one)		
	Response Percent	Response Count
very involved		10.8% 39
involved		21.9% 79
somewhat involved		35.2% 127
not very involved		32.4% 117
<i>answered question</i>		361
<i>skipped question</i>		2

11. What role does your land trust play in the above conversations? (check all that apply)		
	Response Percent	Response Count
Convene		29.2% 84
Facilitate		40.3% 116
Participate		81.3% 234
Provide feedback		51.7% 149
Other (please specify)		56
<i>answered question</i>		288
<i>skipped question</i>		75

12. Has community engagement led your land trust to become involved in other issues in the community-at-large (for example, affordable housing, public health, economic development, public education, public recreation, local sustainable food production and access, human rights, or other)?		
	Response Percent	Response Count
Yes		63.5% 226
No		36.8% 131
<i>answered question</i>		356
<i>skipped question</i>		7

13. If yes, how?		Response Count
		225
	<i>answered question</i>	225
	<i>skipped question</i>	138

14. What avenues exist for the community-at-large to provide feedback to and inform your land trust's actions? (check all that apply)			
		Response Percent	Response Count
land trust membership		84.7%	293
board membership		74.9%	259
community meetings and/or outreach by staff		76.6%	265
community-wide surveys		19.7%	68
	Other (please specify)		100
	<i>answered question</i>		346
	<i>skipped question</i>		17

15. Does your land trust post land it protects with "no trespassing" or "no entry" signs?			
		Response Percent	Response Count
Yes		15.5%	54
No		84.8%	295
	<i>answered question</i>		348
	<i>skipped question</i>		15

16. If yes, roughly what percentage of the land protected by your land trust is posted with "no trespassing" or "no entry" signs?			
		Response Percent	Response Count
Less than 10%		51.5%	35
25%		14.7%	10
50%		13.2%	9
More than 50%		20.6%	14
	<i>answered question</i>		68
	<i>skipped question</i>		295

17. Is the community you serve the same as the membership that supports your land trust?			
		Response Percent	Response Count
Yes		58.2%	206
No		42.1%	149
	<i>answered question</i>		354
	<i>skipped question</i>		9

18. If different, how would you define the level of economic and racial diversity within your land trust's membership? (check one in each category)					
	very diverse	diverse	somewhat diverse	not diverse	Response Count
Economic diversity?	16.1% (31)	25.5% (49)	46.4% (89)	12.0% (23)	192
Racial diversity?	3.2% (6)	0.5% (1)	27.5% (52)	68.8% (130)	189
				<i>answered question</i>	191
				<i>skipped question</i>	172

19. How would you define the level of economic and racial diversity on your land trust's board?					
	very diverse	diverse	somewhat diverse	not diverse	Response Count
Economic diversity?	11.4% (41)	26.1% (94)	44.4% (160)	18.1% (65)	360
Racial diversity?	1.1% (4)	2.5% (9)	15.9% (56)	80.5% (284)	353
<i>answered question</i>					360
<i>skipped question</i>					3

20. In external communications (e.g. newsletters and annual appeals) how does your land trust describe its successes? (check all that apply)			
		Response Percent	Response Count
Fundraised revenue		59.3%	208
Acres conserved		93.4%	328
Number of education programs		50.1%	176
Visitors to properties		23.1%	81
Collaborative efforts with other organizations in the community		84.6%	297
Other (please specify)			105
<i>answered question</i>			351
<i>skipped question</i>			12

21. Do you use qualitative tools to help you measure your success?			
		Response Percent	Response Count
Yes		42.3%	140
No		58.0%	192
<i>answered question</i>			331
<i>skipped question</i>			32

22. If yes, please list them here.		Response Count
		146
<i>answered question</i>		146
<i>skipped question</i>		217

23. Are you familiar with the Whole Measures (formerly "Measures of Health") evaluation and planning tool?			
		Response Percent	Response Count
Yes		20.2%	72
No		80.1%	285
<i>answered question</i>			356
<i>skipped question</i>			7

24. If so, please describe briefly the basic concept behind it:		Response Count
		61
<i>answered question</i>		61
<i>skipped question</i>		302

25. Which larger communities is your land trust a part of? (check all that apply)

	Response Percent	Response Count
Environmental community 	96.1%	341
Agricultural community 	57.5%	204
Public governance community 	56.1%	199
Business community 	43.1%	153
Real estate community 	36.9%	131
Community development community 	34.4%	122
Smart growth community 	51.3%	182
Other (please specify)		71
<i>answered question</i>		355
<i>skipped question</i>		8

26. Would you say your land trust is part of a larger movement?

	Response Percent	Response Count
Yes 	87.1%	310
No 	13.2%	47
<i>answered question</i>		356
<i>skipped question</i>		7

27. If yes, can you describe what the larger movement is?

	Response Count
	289
<i>answered question</i>	289
<i>skipped question</i>	74

Appendix C

Select screenshots from www.catawbalandcare.org

Home page:

(www.catawbalandcare.org)

The screenshot shows the home page of the Catawba Landcare website. At the top left is the logo, which includes a small image of a landscape and the text "Catawba Landcare". To the right of the logo is the main title "Catawba Landcare" in a large green font, with the tagline "NEIGHBORS IMPROVING OUR VALLEYS" underneath in a smaller, all-caps font. Below the title is a horizontal navigation menu with the following items: "CATAWBA LANDCARE »", "OUR VALLEY »", "WHAT'S GOING ON »", "CALENDAR", and "LANDCARE TOOLBOX".

The main content area features a large background image of a rural landscape with trees and a person in a hat. Overlaid on this image is a white box containing the text "Catawba Landcare" and a paragraph: "Catawba Landcare is about neighbors working together to enhance the quality of our valley -- the land, our community, and economy." Below this text is a "READ MORE" button. To the right of the main text box are three smaller, square images: a person working in a field, a landscape view, and a close-up of red fruit.

Below the main content area is a grey banner with the text "Neighbors working together to enhance the quality of our valley". Underneath this banner are three columns of content, each with an icon and a "read more" button:

- Catawba Landcare**: Accompanied by a green hand icon. The text reads: "Catawba Landcare is about neighbors working together to enhance the quality of our valley — the land, our community, and economy." Below the text is a "read more" button.
- Our Valley**: Accompanied by a green leaf icon. The text reads: "The Catawba Valley is a very special place in southwestern Virginia with beautiful landscapes and a rich history of hard-working, generous people. It's no wonder we want to care for this valley." Below the text is a "read more" button.
- What's Going On**: Accompanied by a brown shovel icon. The text reads: "Catawba Landcare is about neighbors working together to care for the land, to enhance our community, and strengthen the economy in the valley. There are lots of projects and events to get involved with." Below the text is a "read more" button.

Catawba Landcare:

(www.catawbalandcare.org/catawba-landcare/)

The screenshot shows the Catawba Landcare website homepage. At the top left is the logo, which includes a small landscape image and the text "Catawba Landcare". To the right of the logo is the main title "Catawba Landcare" in a large, green, serif font, with the tagline "NEIGHBORS IMPROVING OUR VALLEYS" in a smaller, green, sans-serif font below it. A navigation menu is located below the title, containing links for "CATAWBA LANDCARE", "OUR VALLEY", "WHAT'S GOING ON", "CALENDAR", and "LANDCARE TOOLBOX". Below the navigation menu is a search bar with a "Search" button. The main content area is divided into several sections: "About Catawba Landcare", "History", "Who is Involved", "How to Get Involved", and "Learn more". Each section contains text and a small image. The "History" section features a photograph of a group of people sitting around a table in a meeting. The right sidebar contains sections for "Upcoming Events", "Receive Updates" (with a form for Name, Email, Subject, and Message), "Recent Posts", and "Projects & Initiatives". The footer of the page contains the text "About this site | Contact the webmaster | Powered by Wordpress".

Catawba Landcare

Catawba Landcare is about neighbors working together to enhance the quality of our valley — the land, our community, and economy.

About Catawba Landcare

Catawba Landcare was formed in 2005 with the goal of providing educational opportunities and building cooperation among residents of the Catawba Valley to ensure a healthy environment, to strengthen the sense of community, and to increase economic opportunities in the valley. A group of neighbors organized into a steering committee to plan events and workshops for the entire community (and beyond), specifically about land management options and opportunities. All of the events planned by Catawba Landcare open to everyone and most of them are free. The steering committee is always looking for new people and ideas, so please get involved by contacting one of the current members!

History

The idea of "Landcare" as an approach to sustainable land management and economic development actually started in Australia in the mid-1980s. In 2005, people from the US including from Virginia Tech went to Australia to learn more about it and when they came back, they shared what they learned with people in the region. A few landowners in the Catawba Valley heard about it and thought it sounded like something that could work in the valley. It wasn't just about conservation or about the environment, it was about caring for the land and for the community. Catawba Landcare was born!

Who is Involved

Catawba Landcare is an open organization. There is no official "membership". It is really just neighbors working together to care for the valley. There is a steering committee that is made up of volunteers from the community who organize events and projects. See who is on the steering committee right now! If you want to get involved in organizing an event or if you have ideas for a project, contact one of these people and they will get you going! To learn more about upcoming events and projects, see the calendar of events.

How to Get Involved

There are several ways you can get involved with Catawba Landcare:

- Attend workshops and events to learn more about caring for your land and to be part of the discussion
- Volunteer at a work day to help your neighbors care for the valley
- Join the steering committee to help plan and organize events
- Sign-up for the email list to receive updates about opportunities and events in the valley
- Support our local farmers and artists at the Catawba Farmers Market during the season

Learn more

- To learn about the logo for Catawba Landcare, click [here](#)
- To learn more about landcare and how we are part of an international movement, click [here](#)
- To learn more about Catawba Landcare in the news, click [here](#)

Search

Search for:

Upcoming Events

Mar 19
1:00 PM - LLS - Growing veggies with frost on the ground

Apr 30
9:00 AM - LLS - Wildflower Tour at Mill Creek

May 21
9:00 AM - LLS - Streamside Management: merging conservation and production

Receive Updates

Name:

Email:

Subject: Your

Message:

Recent Posts

- CSC & Catawba Landcare profiled by the Valley Business Front (Oct. 09)
- EarthWorks welcomes Somali Bantu farmers to the valley
- Value-Added Riparian Zone Planting at CSC

Projects & Initiatives

- Agroforestry
- Streamcare
- Catawba Sustainability Center & VT EarthWorks
 - Catawba Sustainability Center
 - EarthWorks
- Catawba Farmers Market
- Press
- Events
- VT Engagement

About this site | Contact the webmaster | Powered by Wordpress

Catawba Landcare → Partners:

(www.catawbalandcare.org/catawba-landcare/partners/)

Catawba Landcare
KATAWBA VALLEY • WHITNEY GORGE • CALDWAY • LAUREL TOURIST

Catawba Landcare Partners

Catawba Landcare is very proud to have worked closely with many other organizations, agencies, and institutions in the region. Learn about some of our partners here.

Organizations | Businesses | Institutions | Public Agencies

Organizations

- **Catawba Civic League** - An association of residents committed to addressing for historic, aesthetic, efficiency, and openness in local communities.
- **Catawba Community Club** - What began as the Women's Club of the valley has continued to exist and thrive as a women's group that is very active in community events.

The New River Valley chapter of the Virginia Master Gardener program has offered several workshops and a public tour of local projects in the valley.

Both the New River Valley and Roanoke Valley chapters of the Virginia Master Gardener program have worked with Catawba Landcare in providing speakers for the Landcare Learning Series and in assisting with the local Landcare Council.

Catawba Valley Nurseries Club have provided technical support to Catawba Landcare through the sponsorship of the 10th Landcare Council, the Landcare Learning Series, and Catawba Landcare.

Both the New River Valley and Roanoke Valley chapters of Trout Unlimited have worked with Catawba Landcare to support our streamside habitat through providing education and organizing volunteer teams to help plant trees along the streambanks in the valley.

The Appalachian Trail Conservancy has been working with members of Catawba Landcare to establish a Greenway Trail off the Appalachian Trail down through the property of the Catawba Community Center, as a way to provide ideas an alternative to walking down 211 to reach town.

The New River Land Trust has worked with Catawba Landcare since the beginning, helping to seed and manage, providing speakers at workshops, and working with members to address special exceptions for land in the Catawba Valley to become special conservation, requiring minimum general state for conservation easements.

The Modern Virginia Land Trust has provided support to Catawba Landcare in the form of assistance with meetings, speakers at workshops, and working with members to address special exceptions for land in the Catawba Valley to become special conservation, requiring minimum general state for conservation easements.

Local volunteers from Virginia State Our Stream have worked with members of Catawba Landcare to collect water quality data and to plant trees and vegetation along local streambanks.

The Roanoke League of Artists has supported Catawba Landcare by holding art events in the valley, allowing artists to explore the beauty of the valley on canvas and through a variety of mediums.

Businesses

The Catawba Valley Sewer Works has been very supportive of Catawba Landcare, providing space for the newly formed office and providing access to utilities. The office recently changed ownership and we are excited to work with the new proprietor to continue the great partnership.

Alison Williams is a local food & beverage which has provided meeting space and generally holding a collection of events and guests in the valley.

Local Roanoke is a restaurant in Roanoke committed to providing the highest and most local foods to their guests. The local food bank has been a great support of Catawba Landcare by providing farmers and growers with information about how they can reach source like themselves.

Health Care

The three Catawba County Medical Clinics in the valley - Shiloh, McDowell Hill, and Catawba Valley - are valuable supporters of the work of Catawba Landcare by providing space to meet and to host outdoor health, helping their patients understand about what is going on with the group, frequently holding workshops, and providing feedback for the Catawba Sustainability Center.

The Catawba Hospital has worked closely with Catawba Landcare and the Catawba Sustainability Center to provide assistance with events, in helping to clean up and reduce waste at the hospital at the CDC, and in working with members of the CDC to explore the option of using medicinal plants in the valley to the best of their ability.

Several agricultural, offices, and projects of Virginia Tech worked with Catawba Landcare over the years, providing input and resources to the group, as well as working with members to improve invasive plant species management, soil and water quality projects. These partners have ranged from across the university and have included:

- Department of Forest Resources and Environmental Conservation
- Office of Outreach and International Affairs - Roanoke Center
- Forest Science School of Forestry
- Conservation Management Institute

The Catawba Sustainability Center is a 501(c)(3) non-profit organization for researching, experimenting, and implementing sustainable living innovation. In partnership with 100+ individuals, and at the CDC, we are exploring how to grow vegetables in shifting their own growing businesses. For more information, contact Claudi Landcare.

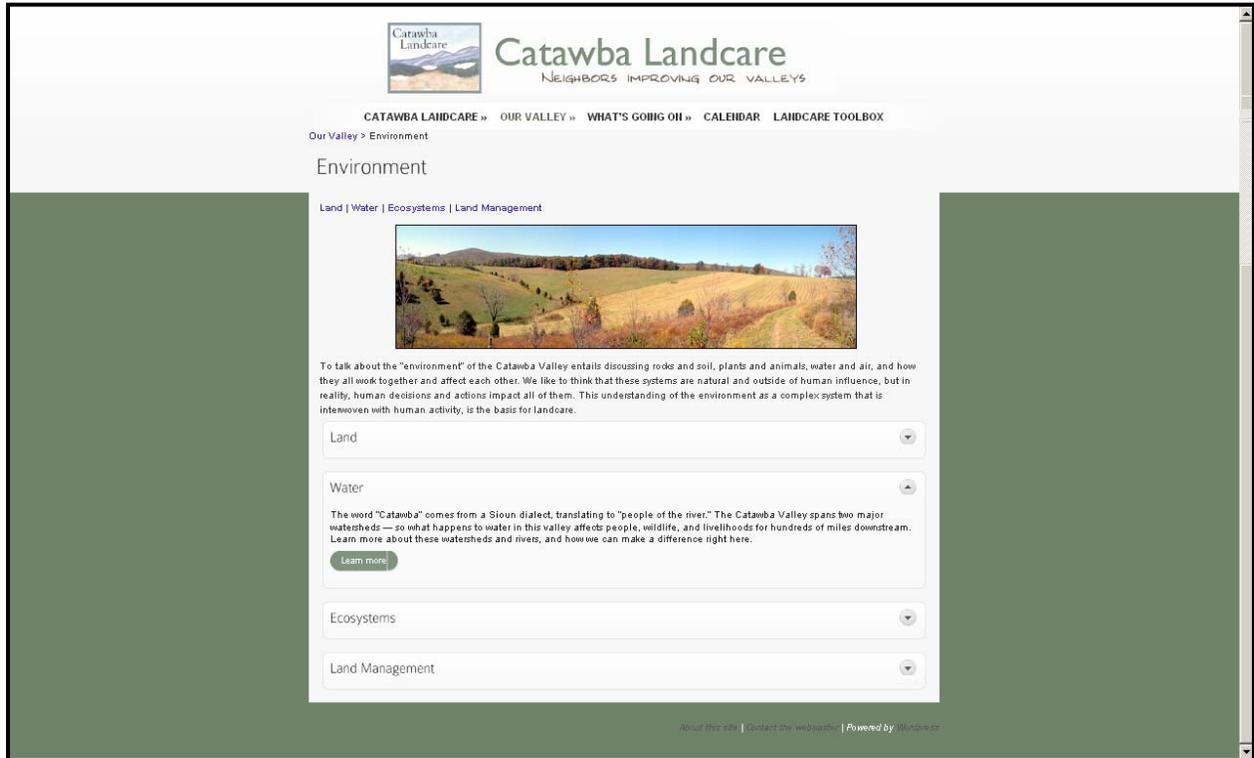
Virginia Tech Swarthmore is a land-based business incubation program based at the Catawba Sustainability Center, which provides landowners and aspiring entrepreneurs with the training, income, access, and support to launch successful, local-based businesses in.

Public Agencies

- **Virginia Soil and Water Conservation District** has regularly provided speakers, resources, and project support for Catawba Landcare in creek and stream.
- **Local Nurseries** like Catawba Nurseries is a group representing several growers and programs concerned with the water quality of the Roanoke River. This group helps get Catawba Landcare started.
- **The US Department of Agriculture** were among the first agencies to support landcare in the US. They provided funding that helps Catawba Landcare get started.
- **The National Agricultural Center**, with an office in Blacksburg, has worked extensively with members of Catawba Landcare and with the Catawba Sustainability Center to explore ways to improve the value of local farms by reducing insecticide and herbicide use.
- **The Virginia Water Resources Research Center**, located at Virginia Tech, has worked with Catawba Landcare in providing water quality monitoring expertise, and in supporting a stream stream mapping project needed in the river and headwaters available in the New River - Upper section.
- **The Virginia Department of Game & Inland Fisheries** has been very supportive of the work of Catawba Landcare, working with landowners to reduce streambank, providing speakers at workshops, and guiding field trips to explore habitat options for landowners.
- **The Virginia Department of Forestry** has worked with Catawba Landcare to provide speakers and resources for meetings and projects.
- **The Modern Virginia Water Authority** headquarters both the North Fork of the Roanoke River and Catawba Creek to provide water for the cities of Roanoke and Salem and Roanoke County. Water from the Roanoke River is provided via WPA's Spring Hill Reservoir, under the Catawba Creek in another WPA's Spring Hill Reservoir. WPA has a big stake in how things are done in the valley. They have worked with Catawba Landcare to support our streamside initiatives.
- **The Virginia Outdoors Foundation**, in the state agency which holds and maintains conservation easements, worked with members of Catawba Landcare to explore conservation options for the valley.
- **Virginia Cooperative Extension** - The local office of the Virginia Cooperative Extension has been very supportive of the work of Catawba Landcare, providing speakers at workshops, sponsoring the Catawba Sustainability Council, and working extensively with the Catawba Sustainability Center and 84th Annual program.
- **The Virginia Tourism Corporation** has provided at several Catawba Landcare functions on the recruitment and benefits of providing tourism options in the region.
- **Roanoke County** has worked with Catawba Landcare, providing facilities and access to support events and workshops held in the region. The county also worked as part of the team to explore making special conservation easements in the valley.

Our Valley → Environment:

(www.catawbalandcare.org/our-valley/environment/)



The screenshot shows the 'Environment' page on the Catawba Landcare website. At the top, the logo for Catawba Landcare is displayed with the tagline 'NEIGHBORS IMPROVING OUR VALLEYS'. A navigation menu includes 'CATAWBA LANDCARE', 'OUR VALLEY', 'WHAT'S GOING ON', 'CALENDAR', and 'LANDCARE TOOLBOX'. Below the navigation, the breadcrumb 'Our Valley > Environment' is shown, followed by the main heading 'Environment'. A sub-menu offers 'Land | Water | Ecosystems | Land Management'. A central image depicts a scenic view of rolling hills with trees and a path. Below the image, a paragraph explains that the 'environment' of the Catawba Valley involves rocks, soil, plants, animals, water, and air, and that human actions impact these systems. A 'Learn more' button is provided. Below this, there are four expandable sections: 'Land', 'Water', 'Ecosystems', and 'Land Management'. The 'Water' section is currently expanded, showing text about the word 'Catawba' and the valley's watersheds, with another 'Learn more' button. At the bottom of the page, there are links for 'About the site', 'Contact the webmaster', and 'Powered by WordPress'.

Our Valley → Environment → Water:

(www.catawbalandcare.org/our-valley/environment/water/)



Catawba Landcare

IMPROVING OUR VALLEYS

CATAWBA LANDCARE
OUR VALLEY
WHAT'S GOING ON
CALIBAR
LANDCARE TOOLBOX

Our Valley → Environment → Water

Water

Water Quality

Water plays a significant role in the Catawba Valley. It played a huge role in forming the valley and it continues to connect land and trees up and down the valley. Paying attention to the river and streams in the valley is particularly important because if you're the headwaters region for two major river basins in the region — Catawba Creek which flows into the James River and ultimately the Chesapeake Bay, and the North Fork of the Roanoke River which joins the Roanoke River and flows into the Albemarle Sound.

Watersheds

A watershed is the area of land that drains into a particular body of water. Imagine a bathtub — when the shower is turned on, water comes down at every hole in the tub and anything else that is in the tub. All of that water eventually runs beneath a single drain. High hills outside of the tub represent mountains or — outside of the tub's watershed. We know what defines the boundaries of that tub's watershed — the highest points on the ridge.

Watersheds on the ground are a little more complicated, but not much. When we look at the top of the pipe, we get a general idea of how water will flow. If you pour a cup of water on the ground at the north fork of Catawba Mountain, it will eventually flow down into the valley. What is particularly interesting in the Catawba Valley is that it's situated East to West on overlapping watersheds. During a single storm, water falling in the Catawba Valley will flow into both the Roanoke River and the James River, depending on what side of the valley the raindrop hits the ground.

Headwaters Region

The map on the left provides a more detailed look of the valley. Of a little water to see why this area is so important to water quality in the broader region. The soil that the water makes the boundaries for two sub-basins, which in reality are parts of two watersheds. The southern side of the divide flows into the Upper James River and the northern side flows into the North Fork of the Roanoke River. Both of these watersheds are situated on forested landscapes, which contribute to their water supply and flow.

Upper Roanoke River & Albemarle Sound

The Roanoke River watershed comprises roughly 6,000 square miles of Virginia and North Carolina, with over 400 miles of river and tributaries flowing into the Albemarle Sound. The Albemarle Sound is considered the country's largest urban system (meaning it handles both wastewater and salt water consistently). The North Fork of the Roanoke River flows through the Catawba Valley specifically in the Upper Roanoke sub-basin, shown right.

Upper James River & Chesapeake Bay

The James River watershed covers about 60,000 square miles of Virginia — roughly a quarter of the state. While the majority of the river extends 340 miles from the West Virginia border to the Chesapeake Bay, there are hundreds of additional miles of small creeks and streams that feed into the river. Catawba Creek is a tributary in the Upper James River watershed.

The water flowing in Catawba Creek is made up of drinking water for the majority of the City of Roanoke and northern Roanoke County. A tunnel located at the base of Tiger Mountain draws a portion of the water from Catawba Creek into the city's water treatment plant. Water treatment plants are designed when clean water comes into the treatment, so caring for our streams and land is also a long-run water supply. Read more about protecting the Catawba Creek watershed in a general urban watershed produced by the National Virginia Land Trust and Roanoke County.

Not sure what watershed you're in? Check EPA's Surf Your Watershed page and find out.



Virginia's Major Watersheds

The colored dots on this map indicate the location of watersheds in the state. Catawba Creek is highlighted in red. The map is courtesy of the National Virginia Land Trust and Roanoke County.



Upper Roanoke River Watershed

The Roanoke River watershed comprises roughly 6,000 square miles of Virginia and North Carolina, with over 400 miles of river and tributaries flowing into the Albemarle Sound. The Albemarle Sound is considered the country's largest urban system (meaning it handles both wastewater and salt water consistently). The North Fork of the Roanoke River flows through the Catawba Valley specifically in the Upper Roanoke sub-basin, shown right.



Upper James River Watershed

The James River watershed covers about 60,000 square miles of Virginia — roughly a quarter of the state. While the majority of the river extends 340 miles from the West Virginia border to the Chesapeake Bay, there are hundreds of additional miles of small creeks and streams that feed into the river. Catawba Creek is a tributary in the Upper James River watershed.

Water Quality

Obviously, there is not really a difference between a river, creek, and a stream, but most people would say that a river is larger. To make things simple here, we will refer to the main sections of Catawba Creek and the North Fork which run through the valley as rivers, and the smaller tributaries which feed into them as streams. Catawba Creek flows into larger rivers, the river section of a creek and stream is going to vary in terms of width, size, and the amount of water passing through it (in flow), depending on the terrain and the surrounding land cover. Creek and stream flow rates are also going to be very different than those measuring slowly across that grassy field. One is not better or worse than the other — just reflects the physical surroundings. But there are two big ways that these rivers can be affected by human management the land they run through. Through careful management of the land surrounding these rivers and streams, we can reduce the amount of erosion and pollution that affecting the quality of the water.

Erosion

Erosion is the process of breaking down and displacing rock and soil through the alternate effects of water and wind. In a creek or stream, the flow erodes the banks and bed of the water. Erosion is a naturally occurring process that isn't necessarily good or bad — it happens all the time in the water. The problem is that when we increase the surface area of ground and asphalt that doesn't allow water to absorb into the ground, the speed of water flowing off of surfaces and into the water increases. This fast flow can erode the banks and bed of the stream before it enters the stream. If that soil ends up in the water, it can be a problem. In places, we have soil that erodes into the water, and that streambank has been damaged by erosion, we speed up and intensify the erosion process even more.

Stream Erosion - Meandering Stream



In 2007, a study was completed with high school and Virginia Tech students to measure streambank erosion on the North Fork of the Roanoke River and along Catawba Creek. This study looked at erosion levels in different areas, and indicated that roughly 50% of all stream bank erosion along the valley has some degree of streambank erosion, though the estimate was based on the flow. The data and findings produced containing the parcel maps and data for each reach below.

Watershed Erosion Along Catawba Creek

Watershed Erosion Along the North Fork River



Streambank erosion is the process of breaking down and displacing rock and soil through the alternate effects of water and wind. In a creek or stream, the flow erodes the banks and bed of the water. Erosion is a naturally occurring process that isn't necessarily good or bad — it happens all the time in the water. The problem is that when we increase the surface area of ground and asphalt that doesn't allow water to absorb into the ground, the speed of water flowing off of surfaces and into the water increases. This fast flow can erode the banks and bed of the stream before it enters the stream. If that soil ends up in the water, it can be a problem. In places, we have soil that erodes into the water, and that streambank has been damaged by erosion, we speed up and intensify the erosion process even more.

Pollution

Just like how we define on land can affect the rate of streambank erosion, it can also impact the quality of the water. Remember the bathtub analogy — everything in the tub gets mixed up and the dirty water gets washed down the drain. In a watershed that includes things like farms, lawns, fields, roads, parking lots, and anything else we put on the ground like a good amount of ending up in the creek and stream which provide drinking water and habitat for lots of people and wildlife.

There are three main forms of pollution affecting the health of the Roanoke & James River — organic nutrients, toxic substances such as herbicides and heavy metals, and too much dirt at sediment suspended in the water. These pollutants come from all over the watershed, including from the Catawba Valley. Like anything, any of these pollutants are they in streambank, but when we have too much in the water, it can cause big problems for fish and wildlife, as well as for humans living on and along the water, both here and downstream.

Nutrient pollution includes things like nitrogen and phosphorus, which come from animal manure, fertilizer, and sewage. These nutrients are important for plants, but when too much ends up in the water, it can trigger an algae bloom. The algae bloom can get to the bottom of the stream and create a redox potential that can be harmful to fish and wildlife. It can also cause a lot of oxygen in the water, causing "dead zones" where there isn't enough oxygen to support life. The Roanoke & James River are considered "impaired" because of high levels of nutrient pollution, mostly from nonpoint source pollution and agricultural operations not using Best Management Practices (BMPs). You will see more about BMPs that can be implemented to prevent nutrient pollution in the Land Management section.

We generally associate toxic and chemical pollutants with factories and labs, but they also come from common products, used car oil, and an oil spill. These contaminants in the water can be harmful to fish and humans. Water from both the James and the Roanoke River show that both of these rivers have harmful levels of mercury and PCBs. We can keep these levels out of the water by making sure we apply water doses of toxic and hazardous chemicals properly, and reducing our consumption of treated electricity.

Sediment gets into the water from streambank erosion as well as from dirt washing off the land into creeks and streams. While we typically don't think of dirt as a type of pollution, when there is too much dirt suspended in the water, it can cause harmful effects on water quality and stream health. Dirt in the water decreases the clarity of the water, making it difficult for sunlight to reach the bottom and provide plants with necessary nutrients. In addition, when the dirt settles, it can smother a river bed bottom-dwelling creatures may rely on for habitat.

Another problem pollution affecting water quality in the Catawba and North Fork Virginia is high levels of bacteria, specifically E. coli, in the water. This bacteria typically comes from animal waste, including wildlife, human, and livestock and can create health hazards to humans. Both Catawba Creek and the North Fork in these areas are listed as impaired waters by Virginia's Dept. of Environmental Quality's high bacteria levels.

Learn More

- For resources and tools on managing your stream, go to the Landcare Toolbox
- To learn about the conditions reported by our creeks and streams, go to the Environmental section
- To learn about managing creeks, streams, and the land around them, go to the Land Management section
- To learn more about the environment of the Catawba Valley, go back to Our Valley - Environment
- To learn more about Catawba Landcare's projects to improve the water and stream health in the valley, and to get involved, go to the What's Going On section



1. Roanoke River Basin Watershed - Roanoke River (1)

2. Roanoke River Basin Watershed - Roanoke River (2)

3. Roanoke River Basin Watershed - Roanoke River (3)

4. Roanoke River Basin Watershed - Roanoke River (4)

5. Roanoke River Basin Watershed - Roanoke River (5)

6. Roanoke River Basin Watershed - Roanoke River (6)

7. Roanoke River Basin Watershed - Roanoke River (7)

8. Roanoke River Basin Watershed - Roanoke River (8)

9. Roanoke River Basin Watershed - Roanoke River (9)

10. Roanoke River Basin Watershed - Roanoke River (10)

Our Valley → History:

(www.catawbalandcare.org/our-valley/history)



Catawba Landcare

NEIGHBORS IMPROVING OUR VALLEYS

CATAWBA LANDCARE • OUR VALLEY • WHAT'S GOING ON • CALENDAR • LANDCARE TOOLBOX

Our Valley > History

History

Author Pearl Buck once said "If you want to understand today, you have to search yesterday." As you hike or bike or drive over the ridges and into the Catawba Valley and look at the old home and mill sites and cemeteries, it is obvious that there is a rich history behind the land, lives, and livelihoods in these valleys. The natural history of the valley is discussed in the Environment — Land section, but here we will discuss some of the human history that defines the valley today.

Native American History

Specific details about Native American history in the Catawba Valley has not been officially documented, but we can draw some logical connections from what we know. The Catawba Nation was and continues to exist in the Catawba River watershed between North and South Carolina around the area now known as Charlotte. The Catawba were a part of the Siouan Tribes, which was of the Mississippian culture (typical of most of the southeast). Catawba is thought to be a Siouan dialect term which roughly translates to "people of the river."

Though the majority of the Catawba nation was located in southern North Carolina, there is evidence that the Catawba people were involved in trading with Europeans to the north. A major trading route, which later became a significant route for European expansion, runs right along what is now Rt. 61. It is possible that some of the Catawba people migrated north and established settlements in the valley, though this has not been confirmed.

European Settlement



The Great Wagon Road crossed the Appalachian Mountains (highlighted in red). The Roanoke River (red line) to the west flows generally at right angles to the mountain range. The main intersection is at a place called Roanoke in the Catawba valley (marked with a triangle on the map) where the road crossed the mountain range crossing the whole province of Maryland with part of Pennsylvania, New Jersey and North Carolina. Source: John Jay & Peter J. Schuchman, 1978, published by Westport, Conn.: 1978. Map shows the original route and another route proposed by the US Army in 1781.

Records of the first Europeans to visit the Roanoke area date back to the 1670s when trading routes leading into the interior of the county were being explored and established.¹ It wasn't until about 70 years later that Europeans began settling in the area, when James McAfee claimed land in the Catawba Valley in the 1741 (yes, the same McAfee for whom McAfee's Knob was named).

Telling the story of European settlement in the Catawba Valley is almost as easy as looking at an early map drawn by settlers and explorers. The map above was drawn based on the reports of settlers in 1751 and depicts all of Virginia and parts of Pennsylvania, Maryland, North Carolina, and what is now Washington D.C. The Great Wagon Road, highlighted in red, stretched from Philadelphia all the way into Georgia and served as a major route south and west for settlers following the end of the French and Indian War. This road was hardly a road — it really began as Native American footpaths referred to as the Wapiti's Path.

A major hub along the Great Wagon Road was Big Lick,² or what is now known as Roanoke. Though there is some dispute as to where the Wapiti's Road began, there is no doubt that Roanoke served as a major crossroad for the western occupation of the United States. From Big Lick, people could head in a number of directions to continue their journey — some of them just crossed the mountains to the north and found their home in the Catawba Valley!

The first Europeans to establish homesteads in the Catawba Valley were Scots Irish, mostly Presbyterians, who were migrating out of Pennsylvania in search of cheap land and great opportunity. For the most part, these people were middle class farmers and craftsmen who had a knack for working in tough conditions and a reputation for independence. As they pressed further westward, a wave of second generation German emigrants who were largely Protestant followed closely behind, establishing neat homesteads along the rocky hillsides. There are still families living in the valley today who can trace their properties and family lines back to these original settlers.

Life in the Valley

The rocky hillside farms established when the Scots Irish and Germans settled in the valley provided the background on which on which several generations of residents worked and lived in the Catawba Valley. With transportation limited by the steep slopes, the Catawba Valley was largely self-reliant. Many people living in the valley still tell stories of their parents hauling eggs for sugar at the Catawba General Store or about their fathers meeting cattle on foot over the ridges where Rt. 311 runs today. The old cheese factory located on the corner of Luster's Gate Road in Montgomery County used to source their milk from many of the dairy farms up and down the valley. The old mills which are still standing today were used to grind wheat to provide flour for the valley residents. With huge advances in transportation and communication, the Catawba Valley, like most places, has changed. (But there are still many reminders of the history of the valley. In fact, Montgomery County has designated its portion of the Catawba Valley as the North Fork Valley Rural Historic District to help preserve many of the historic sites and honor the valley's heritage.)

Historic Sites

³ *Know some history about other sites in the Catawba Valley? Send it to us and we will post it.*

McDonald's Mill — At least three mills were operated by five generations of the McDonald family at this site from the 1700s into the 20th century. When the mill was a center of business activity, big wagons, pulled by eight horses, hauled 2000-pound barrels of flour, beef, hams, chickens and cheese to a Lynchburg market and returned with many supplies. A neighborhood dinner honoring young men leaving for service in the Civil War was held on the mill's second floor. Today, the mill is owned and maintained by Ned & Janet Yost, members of Catawba Landcare. The property has been placed under conservation easement to ensure it remains undeveloped into the future.



Catawba Hospital - The Catawba Hospital was first established as the Roanoke Red Sulphur Springs Resort in 1957, attracting people with the healing qualities of the mountain areas and the sulphur and limestone springs on site. A later owner, Joe Chapman, advertised the spring water as being capable of treating lung diseases and soon, the resort was attracting many people suffering from tuberculosis. In 1959, the Chapman family sold the hospital to the Commonwealth of Virginia to establish the first Tuberculosis Sanatorium in the region.

The Homestead — The Homestead was originally built by the John Morgan family in 1907. (Set on 800 acres, the family raised punched horses, beef cattle, and later ran a dairy. The house sat unoccupied for several years before going up for auction in Oct. 1978, when 63 acres including the homestead and dairy barn were purchased by Harold Wingate. Renovation of the structure began in 1981 and the restaurant was opened in Sept. 1982. Today, the Homestead Restaurant serves as a landmark for people hiking the Appalachian Trail and those living in the region.)

Falls Ridge Preserve (owned by The Nature Conservancy) — Located on the North Fork of the Roanoke River in the Elliott Valley, the Falls Ridge Preserve is a nature preserve owned and maintained by The Nature Conservancy. They preserved this particular place for both its natural and historical value. Besides its spectacular karst formations and waterfall, the site is thought to be just downstream from a large Indian settlement, though only a few white flint arrowheads have been found on site. In 1822, the Governor of Virginia initially granted this property to the Binfield family. Later, the Dudleys, a local family, acquired the land and used it to operate several enterprises including a wool carding mill, general store, post office, lumber mill gram mill, and a livery. In 1839, a kiln to produce burnt lime was installed at the falls by Harry Dudley. Calcium carbonate cliffs (tuffaceous) deposited by the stream were blasted loose, crushed and carted by mule to the top of the kiln. Traces of this operation can be seen near the falls.

1. Blount, B. 2002. Catawba Valley. (Richmond: Colonial, Chesapeake, and Carolina History. Website: www.colonial.com)
2. www.roanoke.com. Retrieved 10/10/08. (Retrieved 10/10/08.)
3. For more on this site, visit us on Facebook at www.facebook.com/catawba or on our website at www.catawbalandcare.org

4. History published by the New Virginia Land Trust (December 2010) www.nvlt.org [C]
5. Retrieved from the Catawba Riverline website [C]
6. Retrieved from the Roanoke Riverline website [C]
7. History from the Falls Ridge Preserve website, provided by The Nature Conservancy [C]

© 2010 Catawba Landcare. All rights reserved. | www.catawbalandcare.org | info@catawbalandcare.org

Our Valley – Community:

(www.catawbalandcare.org/our-valley/community)

 **Catawba Landcare**
Neighbors Improving Our Valleys

[CATAWBA LANDCARE](#) » [OUR VALLEY](#) » [WHAT'S GOING ON](#) » [CALENDAR](#) [LANDCARE TOOLBOX](#)

Our Valley > Community

Community

[Businesses](#) | [Artists and Craftspeople](#) | [Organizations](#) | [Churches](#) | [Institutions](#) | [Landmarks](#)

The landscape is beautiful, but it is the people that make the Catawba Valley special. Learn about some of the organizations, businesses, churches, institutions, people, and landmarks in the valley that keep our community strong.

Have other contacts or information you would like to add to this list? Contact us and we will post it.

Businesses

- Big Pine Trout Farm – offering trout fishing, lodging, and a full range of trout products in New Castle
- Bowers Custom Barns – specializing in construction of high quality barns and outbuildings
- Catawba Meadow – produce and herbs grown by Betty Bailey
- Catawba Sound Studio – state-of-the-art multi-track recording studio
- Catawba Valley Farms – fruits, vegetables, and honey produced by Leighton Hodges
- Catawba Valley General Store – 4905 Catawba Valley Dr (transitioning owners)
- Circle M Alpacos – alpaca farm at 6164 Newport Road
- Full Circle Farm -located off of Little Catawba Creek Rd., offering naturally raised meats, eggs, and fresh baked breads
- Hillbilly Heaven – full range of baked and pickled goods produced by Toni Weaver
- Little Catawba Creek Farm – alpaca farm at 1651 Little Catawba Creek Road
- Maison Bellevue – a local bed & breakfast located on Gallion Ridge Road
- RunnerBean.com – online farmers' market operated by Kathy O'Hara out of the Catawba Sustainability Center
- Tamales & More – Rita Burge creates a wide variety of international cuisine
- The Homeplace Restaurant – 4968 Catawba Valley Drive

Artists & Craftspeople

- Cathy Light Studios
- Cherry Hill Crafts – Jack & Connie Shaler
- Creekside Creations – Note Cards & Photographic prints by Ann Harrell
- Ellen Braaten – ceramics & pottery
- Sculpture by Sue - Sue Brozovsky
- The Woodshed Carving Shop – John Stakey

Organizations

- Catawba Civic League – An association of residents committed to advocating for transparency, effectiveness, and openness in local government.
- Catawba Community Club – What began as the Homemakers' Club of the valley has continued to exist and thrive as a women's group that is very active in community events.
- Catawba Valley Ruritans Club – part of Ruritans National, the group is very active in civic life throughout the valley
- Tri-County Forestry & Wildlife Association – organization formed to promote stewardship of forestry and wildlife resources through education, communication, and membership assistance. The membership is comprised of landowners and interested individuals in Botetourt, Craig, and Roanoke Counties, and the immediate surrounding areas

Churches

- The three Catawba Union Methodist Churches in the valley – Shiloh, McDonald's Mill, and Catawba Valley
- Mountain View Baptist Church – Mountain View, 5714 Catawba Creek Rd
- Grace Assembly of God – 6530 Catawba Valley Drive

Institutions

- Catawba Hospital - Part of the Commonwealth of Virginia public mental health system, Catawba Hospital specializes in serving adults including geriatric individuals who are in need of mental health care.
- Catawba Sustainability Center – as part of Virginia Tech, the Catawba Sustainability Center is a research center and experiential showcase to develop and share sustainable practices and innovations

Landmarks

- Appalachian Trail – the 2,191 mile trail which runs from Maine to Georgia runs right through the valley
- McRee's Knob and Dragon's Tooth – two well-known hiking destinations in the area
- McDonald' Mill – a restored grist mill built in the early 1800s along the North Fork of the Roanoke River
- TransAmerica Bike Trail – bike route reaching from Oregon to the coast of Virginia, runs through the Catawba Valley

[About this site](#) | [Contact the webmaster](#) | [Powered by WordPress](#)

What's Going On:

(www.catawbalandcare.org/going-on/)

The screenshot shows the website for Catawba Landcare, with the tagline "NEIGHBORS IMPROVING OUR VALLEYS". The navigation menu includes "CATAWBA LANDCARE", "OUR VALLEY", "WHAT'S GOING ON", "CALENDAR", and "LANDCARE TOOLBOX". The main heading is "What's Going On".

What's Going On

Catawba Landcare is about neighbors working together to care for the land, to enhance our community, and strengthen the economy in the valley. There are lots of projects and events to get involved with.



Projects

Catawba Landcare is involved with several ongoing projects and initiatives to improve land management and economic opportunities in the valley.

- **Streamcare** - Caring for the creeks and streams in the valley
- **Catawba Sustainability Center & Vt EarthWorks** - Site of the old Catawba Dairy farm, the Catawba Sustainability Center is operated by Virginia Tech as a landcare laboratory to explore innovative and profitable ways to sustainably manage land.
- **Catawba Valley Farmers Market** - Sponsored by EarthWorks and Roanoke County, the farmers market was started in 2010 to provide Catawba Valley growers with a direct connection to the buyers (and sales) in the valley.
- **Agroforestry** - Combining agricultural crops with forestry creates additional value-added opportunities for maintaining forests and riparian buffers.

Events:

Catawba Landcare is involved with a number of events open to the entire community (and beyond).

- **Landcare Learning Series** - Workshop series held throughout the year to share knowledge and ideas about sustainable land management and economic opportunities
- **Celebrate Catawba** - Annual celebration of the land and lives of the Catawba Valley - usually held in August
- **Volunteer Work Days** - Caring for the valley means neighbors working together. We frequently hold volunteer work days to help each other do things like plant trees, clean up stream banks and forests, and other jobs that improve our valley.
- **Catawba Kids Gardening Contest** - Contest for young growers in the valley.

Search

Search for:

Upcoming Events

Mar 19
1:00 PM - LLS - Growing veggies with frost on the ground

Apr 30
9:00 AM - LLS - Wildflower Tour at Mill Creek

May 21
9:00 AM - LLS - Streamside Management: merging conservation and production

Receive Updates

Name:
Email:
Subject:
Message: Your

Recent Posts

- CSC & Catawba Landcare profiled by the Valley Business Front (Oct. 09)
- EarthWorks welcomes Somali Bantu farmers to the valley
- Value-Added Riparian Zone Planting at CSC

Projects & Initiatives

- Agroforestry
- Streamcare
- Catawba Sustainability Center & Vt EarthWorks
 - Catawba Sustainability Center
 - EarthWorks
- Catawba Farmers Market
- Press
- Events
- VT Engagement

About this site | Contact the webmaster | Powered by Wordpress

What's Going On → Projects → Catawba Sustainability Center & Earthworks:

(www.catawbalandcare.org/going-on/csc-earthworks/)



Catawba Landcare

NEIGHBORS IMPROVING OUR VALLEYS

CATAWBA LANDCARE » OUR VALLEY » WHAT'S GOING ON » CALENDAR LANDCARE TOOLBOX

What's Going On > Catawba Sustainability Center & VT EarthWorks

Catawba Sustainability Center & VT EarthWorks

Catawba Sustainability Center | VT EarthWorks



Catawba Sustainability Center

On the site of the old Catawba Hospital dairy farm, the **Catawba Sustainability Center** is a showcase for researchers and students from Virginia Tech to engage with the local community – a place to practice, demonstrate, learn, and teach about sustainability issues (from green building and construction to low-input agricultural production to water quality to onsite energy production to community-based business development) that affect our world today and into the future.

On the Ground at the CSC

- **Soil Sensors** – a grant from the VT Institute for Critical Technology and Applied Science has allowed researchers to develop soil sensors that will transmit information directly to hand-held devices like an iPhone. It will allow land managers to know what is going on with the soil right below their feet! The sensors have been installed in the fields at the CSC and will be used by Roanoke County Public Schools to teach about science and soils.
- **Medicinal and Edible Plants in Riparian Areas** – A partnership between the CSC and the USDA National Agroforestry Center has allowed several really exciting projects to take place on site. Several riparian areas, or the vegetated areas around streams that help prevent erosion, have been planted with plants that have merchantable value. Read more about the projects here.
- **Ropes Challenge Course** - Virginia Tech's University Unions & Student Activities is building a ropes challenge course to offer leadership training for students at Virginia Tech. The course will also be made available to businesses and organizations in the community.
- **Appalachian Trail Connection** - The Catawba Sustainability Center has partnered with Roanoke County, the Appalachian Trail Conservancy, and the U.S. National Park Service to establish a blue-blazed (marked in blue) connector trail to the adjacent Appalachian Trail. This trail will be available for recreational use by the community.
- **Tree plantings** - The Chesapeake Bay Foundation, alongwith Goodman & Company, planted more than 300 trees along a tributary feeding Catawba Creek in celebration of Earth Day 2009. Catawba Creek runs for 2.5 miles through the property. This project reminds people that even in southwest Virginia, changes to the land impact water quality in the Chesapeake.
- **Hoop House** – VT EarthWorks member and owner of RunnerBean.com and Greens to Go, has built a hoop house on site, and is growing gourmet salad greens for restaurants and other customers around the Roanoke area.

Updates

- To learn about what's new at the **Catawba Sustainability Center**, [click here](#)

VT EarthWorks

VT EarthWorks is a business-acceleration program for land-based businesses (e.g., producers of local food, biomass for energy, and sustainable wood products). Developed with support from the Blue Moon Fund, VT EarthWorks offers programming focused on support services for local food providers. Among the services provided by EarthWorks to its members is space at the Catawba Farmers Market, access to land for low rent at the Catawba Sustainability Center, opportunities to meet with customers and other growers through various networking events, and the opportunity to participate in the Growers Academy, specifically designed to help new and transitioning vegetable and cut-flower businesses succeed.

VT EarthWorks Members

Check back to see who are members of VT EarthWorks for the 2011 growing season!

Updates

- To learn about what is going on with **VT EarthWorks**, [click here](#)



As part of an agroforestry planting day, a wind break of white pines was planted at the CSC.



VT EarthWorks member and owner of Greens to Go Kathy O'Hara has leased land and constructed a beautiful hoop house at the Catawba Sustainability Center, where she is now growing gourmet greens for a variety of customers

About this site | Contact the webmaster | Powered by WordPress

What's Going On → Events → Landcare Learning Series: (www.catawbalandcare.org/going-on/landcare-learning-series/)



Catawba Landcare

NEIGHBORS IMPROVING OUR VALLEYS

CATAWBA LANDCARE » OUR VALLEY » WHAT'S GOING ON » CALENDAR LANDCARE TOOLBOX

What's Going On > Landcare Learning Series

Landcare Learning Series

2011 Workshops

Co-sponsored by Va. Tech Catawba Sustainability Center and the Catawba Valley Ruritans

Garden Envy – Growing more and better in small spaces
February 19 from 1-3pm; Catawba Community Center

Garden Envy – Growing more and better in small spaces, 1-3pm Learn some tips and tricks from some of the best gardeners in the valleys. Bring your questions, your seed catalogs, and let's start planning your best garden ever.

For more information, email [Judy Fielder](mailto:Judy.Fielder@catawbalandcare.org) or call Louise Garman at (540) 384-6129

Growing Veggies – Even when there's frost on the ground
March 19 from 1-4pm; starts at Catawba Community Center

Extend the growing season using high and low tunnels: grow crops in cold weather and protect crops during the summer. Learn about high tunnel construction and season extension techniques, then get hands-on experience constructing a low tunnel.

For more information, email [Betty Bailey](mailto:Betty.Bailey@catawbalandcare.org)

Wildflower Tour at Mill Creek
April 30th from 9am-1pm; meeting location TBA

In 2010 The Nature Conservancy was given a 222-acre nature preserve in the Catawba Valley. The type of forest protected on the Blake Preserve is rare in Virginia, largely because of fertile soil. The preserve is home to many wildflowers and animals as well as the pristine headwaters of Mill Creek, which flows into the North Fork River.

For more information, email [Butch Kelly](mailto:Butch.Kelly@catawbalandcare.org)

Streamside Management – Merging conservation & production
May 21st from 9am-12pm; Catawba Sustainability Center

Protect your stream banks using potentially profitable native plants that produce edible fruit and woody florals. Tour Catawba Sustainability Center's edible landscape plantings, hear from the USDA National Agroforestry Center staff, and participate in a hands-on woody floral planting.

For more information, email [Christy Gabbard](mailto:Christy.Gabbard@catawbalandcare.org)

So You'd Like to Have a Pond
June 4th from 9am-12pm; starts at Catawba Community Center

A pond can be a multi-valued asset for your property, and as Thoreau said, if you fill a big hole with water nature will come swimming. This onsite workshop covers site selection, construction, cost, resources, fish stocking and maintenance with pond expert Michelle Klopfer. **"Bring fishing equipment!"**

For more information, email [Bill and Katherine Cochran](mailto:Bill.Cochran@catawbalandcare.org)

Streamcare in Action on Catawba Creek
July 16 from 1-4:30pm; starts at Catawba Community Center

The streams and creeks of the valley are critical for the water quality for millions of people. Hear about streamcare options and funding sources and visit sites along Catawba Creek.

For more information, email [Ned Yost](mailto:Ned.Yost@catawbalandcare.org)

Quail Restoration
September 24th from 10am to noon; starts at Catawba Community Center

Virginia's new Quail Management Plan (QMP) aims to restore quail populations to the levels that existed in the 1970s. Quail Biologist Andy Rosenberger will lead a workshop at the Catawba Community Center, followed by a tour of the Native Warm Season Grass plantings on the grounds of the Sustainability Center.

For more information, email [Paul Hinlicky](mailto:Paul.Hinlicky@catawbalandcare.org)

Search

Search for:

Upcoming Events

Mar 19
1:00 PM - LLS - Growing veggies with frost on the ground

Apr 30
9:00 AM - LLS - Wildflower Tour at Mill Creek

May 21
9:00 AM - LLS - Streamside Management - merging conservation and production

Receive Updates

Name:

Email:

Subject: Your

Message:

Recent Posts

- CSC & Catawba Landcare profiled by the Valley Business Front (Oct. 09)
- EarthWorks welcomes Somali Bantu farmers to the valley
- Value-Added Riparian Zone Planting at CSC

Projects & Initiatives

- Agroforestry
- Streamcare
- Catawba Sustainability Center & VT EarthWorks
 - Catawba Sustainability Center
 - EarthWorks
- Catawba Farmers Market
- Press
- Events
- VT Engagement

About this site | [Contact the webmaster](#) | Powered by [WordPress](#)

Calendar:

(www.catawbalandcare.org/landcare-now/) – interfaced through Google Calendars to allow for ready updating by many users

Catawba Landcare
NEIGHBORS IMPROVING OUR VALLEYS

CATAWBA LANDCARE » OUR VALLEY » WHAT'S GOING ON » CALENDAR LANDCARE TOOLBOX

Calendar

Calendar

Catawba Landcare Calendar
Today March 2011 Print Week Month Agenda

Sun	Mon	Tue	Wed	Thu	Fri	Sat
27	28	Mar 1	2	3	4	5
6	7	8	9	10	11	12
13	14	15	16	17	18	19 1pm LLS - Grow
20	21	22	23	24	25	26
27	28	29	30	31	Apr 1	2

Events shown in time zone: Eastern Time

Search

Search for:

Search

Upcoming Events

Mar 19
1:00 PM - LLS - Growing veggies with frost on the ground

Apr 30
9:00 AM - LLS - Wildflower Tour at Mill Creek

May 21
9:00 AM - LLS - Streamside Management - merging conservation and production

Receive Updates

Name:

Email:

Subject: Your

Message:

Send

Landcare Toolbox:

(www.catawbalandcare.org/landcare-toolbox/) – ongoing list of resources & links

Catawba Landcare
NEIGHBORS IMPROVING OUR VALLEYS

CATAWBA LANDCARE » OUR VALLEY » WHAT'S GOING ON » CALENDAR LANDCARE TOOLBOX

Landcare Toolbox

Landcare Toolbox

Karst | Soil | Streams | Riparian Buffers | Habitat | Landcare Farming | Forest Landcare | Whole Property Planning & Agroforestry | Cost Share Programs

Karst

- Virginia Natural Heritage Karst Program (VA Dept of Conservation & Recreation — VA DCR)
- Virginia Speleological Survey
- Karst Water Institute

Cave Conservation & Ecology

- Virginia Cave Protection Act
- Bats of Virginia
- Bat Disease — White-Nose Syndrome Factsheet (US Fish & Wildlife) (PDF)
- Bat Disease — White-Nose Syndrome Updates & Alerts (US Fish & Wildlife)
- Bat Disease — White-Nose Syndrome in Virginia (VA Dept of Game & Inland Fisheries — VA DGIIF)

Cave & Sinkhole Management

- Karst & Sinkhole Terrain (VA Dept. of Mines Minerals & Energy — VA DMME)
- Living with Sinkholes (Cave Conservancy of the Virginias)
- Cave Owners Survival Guide (VA DCR)

Soil

- Blue Ridge Soil & Water Conservation District (SWCD)
- Overview of Virginia Soils (VA Dept. of Environmental Quality — VA DEQ)

Soil Data

- Web Soil Survey (USDA Natural Resource Conservation Service — NRCS)

Soil Testing & Management

- Virginia Tech Soil Testing Laboratory (VT)
- Explanation of Soil Tests (Virginia Cooperative Extension — VCE)
- Soil Sampling for the Home Gardener (VCE)
- Compost — What is it and What's it To You (VCE)

Managing Soil Erosion

- Reducing Erosion & Runoff (VCE)

Creeks & Streams

Stream Management

- Landowner's Guide to Managing Streams in the Eastern US (VCE) (PDF)
- The Virginia Stream Restoration & Stabilization: Best Management Practices Guide (VA DCR; VA DEQ; NOAA) (PDF)

Livestock Exclusion

- Streamside Livestock Exclusion: A tool for increasing farm income and improving water quality (VCE) (PDF)

Riparian Buffers

- Science Behind Forest Buffers (series by Klapproth & Johnson — VCE)
- Riparian Buffer Systems — tons of information and links (University of Maryland)
- Virginia's Forest Buffers (VA Dept. of Forestry)
- Buffer Strips — Common Sense Conservation (USDA Natural Resource Conservation Service (NRCS))

Wildlife Habitat

Habitat Management

- Native Warm Season Grass management (VA DGIIF)
- Managing for specific species — VA DGIIF guide to managing land for various wildlife or plant species.
- Wildlife Habitat Incentive Program (WHIP) — cost-share program offered by VA Dept. of Forestry

Pollinators

- Selecting Plants for Pollinators (Pollinator Partnership/ North American Pollinator Protection Campaign)
- Pollination Partners — an overview of pollinators in Virginia (Carol Heiser, VA DGIIF)
- Agroforestry and Pollinators (ISDA National Agroforestry Center)

Wildlife

- Living with the Coyote in Virginia (VA DGIIF)

Landcare Farming

- What is Sustainable Agriculture? (USDA Sustainable Agriculture Research and Education (SARE))

Forest Landcare

- State of Chesapeake Forests (US Forest Service)
- Tree Planting Guide — Digging a \$10 hole for a \$1 tree — produced by VT graduate student Katie Trozzo (download)

Forest Management

- Prescribed Fire and Smoke Management (VA DDF)

Whole Property Planning & Agroforestry

- Guide to Native and Edible Trees and Shrubs of Virginia — guide to those planted at the Catawba Sustainability Center produced by VT graduate student Katie Trozzo (download)
- Whole Farm Planning Guide — produced by the Land Conservancy of British Columbia (PDF)
- Whole Farm Planning Model: Building for the Successful Transition of Your Agricultural Business — produced by Ohio Extension (PDF)
- Holistic Management: A whole-farm decision making framework — produced by AATRA (Appropriate Technology Transfer for Rural Areas) (download)
- Holistic Management International — site provides lots of information and tools to implement whole farm planning.
- Healthy Profits: Holistic Management® Financial Planning Manual — produced by Holistic Management International (big file — download)

Cost Share Programs

- Forest Stewardship Program — offered by VA Dept. of Forestry to help landowners manage their forests
- Wildlife Habitat Incentive Program (WHIP) — offered by VA Dept. of Forestry to conserve wildlife habitat
- Landowner Incentive Program - offered by VA Dept. of Game & Inland Fisheries to conserve aquatic habitat
- Environmental Quality Incentive Program (EQIP)

About this site | Contact the webmaster | Powered by Wordpress

Projects & Initiatives → Categories: Agroforestry; Catawba Sustainability Center; Farming; VT Engagement; Streamcare
www.catawbalandcare.org/2011/02/16/edible-riparian-zone-planting-at-csc/
 Blog post reporting on student-led tree planting at the Catawba Sustainability Center



Catawba Landcare

NEIGHBORS IMPROVING OUR VALLEYS

CATAWBA LANDCARE »
OUR VALLEY »
WHAT'S GOING ON »
CALENDAR »
LANDCARE TOOLBOX

Agroforestry > Value-Added Riparian Zone Planting at CSC

Value-Added Riparian Zone Planting at CSC

Posted by [adam](#) on Feb 16, 2011 in [Agroforestry](#), [Catawba Sustainability Center](#), [Farming](#), [Streamcare](#), [VT Engagement](#)

In November 2010, over 200 native perennial trees and shrubs that provide edible or marketable products were planted along the farm lane and the northern bank of Catawba Creek at the Catawba Sustainability Center. The idea is to include plants that provide merchantable value to traditional buffer zones, both for their ecological as well as economic benefits. These plantings are part of Katie Trozzo's graduate research project in Virginia Tech's Dept. of Forest Resources and Environmental Conservation and is also being sponsored by the USDA National Agroforestry Center.

To learn more about the planning process for this project, [click here \(PDF\)](#).

Read more about the plants that were selected for this project, see the list below.

- **Persimmon (*Diospyros virginiana*)**: a small tree with a crown width around 35 feet and typical height of around 50 feet. The tree has handsome dark green foliage and dark bloody bark. It produces an orange colored fruit about the size of a cherry tomato that ripens in late autumn. The fruit can be used in breads, puddings, cakes, cookies, and butters. A rule of thumb is to wait until the first frost to harvest the fruit. If it is eaten before it is ripe the fruit tastes very bitter. When the fruit is ripe it is typically very soft and falls from the tree.
- **American Plum (*Prunus Americana*)**: a small tree that often has multiple stems. It gets around 20 feet in height and 20 feet wide. The tree does well in poor soils. It produces a plum-like fruit that is about the same size as a persimmon, and varies from shades of orange, red, and purple. The fruit is tart and fantastic for jams, jellies, syrups, and combined with sweet cherries or apples in pies.
- **Hickory (*Carya* spp.)**: large trees getting around 75 feet tall and 40 feet wide. Pecans are a type of hickory, but are not native to this region. There are three different native species that produce quality nuts, shagbark (*ovata*), mockernut (*tomentosa*), and pignut (*glabra*). The nut is sweet tasting and can be used in any recipe for walnuts or pecans.
- **Black Walnut (*Juglans nigra*)**: a large tree that typically grows 80 feet tall and around 50 feet wide. It has thick chocolate brown bark and leaves that give lovely shade. This species emits juglin through the decomposing leaves, fruits and nuts, which can stunt the growth of some surrounding plants. This is only an issue for species that are sensitive to this chemical; blueberry is one of these species. This tree produces a nut about the size of a tennis ball that starts out green and turns to brown after it falls. The inside part of the nut looks very similar to the English walnut, but tastes a bit stronger. The nut can be used in cookies, cakes, brownies, and ice cream.
- **Servicberry, Juneberry (*Aamelanochier canadensis*)**: a small tree that gets around 35 feet tall and 35 feet wide. This species can be pruned to be more shrub-like if desired. It has smooth dark bark with delicate leaves. It has small white flowers in the spring and produces a fruit that looks very similar to a blueberry. The fruit can be used in pies, jams, and scones.
- **Elderberry (*Sambucus canadensis*)**: A shrub that gets around 5-10 feet tall and 3-8 feet wide. It can tolerate wet soils and dry soils. It has large clumps of beautiful tiny flowers, which are edible and can be used to make wine. It also produces large clumps of bb-like dark round berries that can be used to make jellies, syrups, and wine. The fruit is said to have anti-viral qualities. Important note: all other parts of the plant are toxic (stem, leaves, bark).
- **American Hazelnut (*Corylus americana*)**: A shrub that can handle dryness, but does not like wet feet. Gets 5-12 feet tall and 4-8 feet wide. It produces a small nut that is covered by a leafy-fringed sheath. The nut is very similar to the commercially sold filbert (hazelnut) and can be used in any general hazelnut recipe. They are especially good for baking and granola.
- **Pawpaw (*Asimina triloba*)**: a small tree that gets around 20 feet tall and around 20 feet wide. It is sensitive and must be in moist rich soils. It has a beautiful dark burgundy flower and produces a 3-5 inch greenish yellow fruit that has the consistency of a banana. The fruit can be used in puddings, pies, and breads.
- **Red Mulberry (*Morus rubra*)**: A medium tree that gets around 40 feet tall and 40 feet wide. It produces a fruit that looks similar to a blackberry. The fruits are good for jams, scones, breads, and pies.
- **Highbush Blueberry (*Vaccinium corymbosum*)**: a shrub that gets 3-10 feet tall and 3-10 feet wide. It needs very acidic soils (ph 4.8-5.5). It produces a tasty dark berry.
- **Black raspberry (*Rubus occidentalis*)**: a bramble that gets 3-6 feet tall and 4-8 feet wide. The canes are purple colored. The fruit looks similar to a blackberry and can be used in pies, cobbles, breads, jams, and jellies.
- **Allegheny blackberry (*Rubus alleghensis*)**: a bramble that gets 3-6 feet tall and 4-8 feet wide. It prefers moist soils and produces a flavorful fruit that can be used in pies, jellies, jams, and cobbles.

Search

Search for:

Upcoming Events

Mar 19
1:00 PM - LLS - Growing veggies with frost on the ground

Apr 30
9:00 AM - LLS - Wildflower Tour at Mill Creek

May 21
9:00 AM - LLS - Streamside Management- merging conservation and production

Receive Updates

Name:

Email:

Subject:

Message:

Recent Posts

- [CSC & Catawba Landcare profiled by the Valley Business Front \(Oct. 09\)](#)
- [EarthWorks welcomes Somali Bantu farmers to the valley](#)
- [Value-Added Riparian Zone Planting at CSC](#)

Projects & Initiatives

- [Agroforestry](#)
- [Streamcare](#)
- [Catawba Sustainability Center & VT EarthWorks](#)
 - [Catawba Sustainability Center](#)
 - [EarthWorks](#)
- [Catawba Farmers Market](#)
- [Press](#)
- [Events](#)
- [VT Engagement](#)

[About this site](#) | [Contact the webmaster](#) | [Powered by Wordpress](#)