Developing Human, Social and Financial Capital in Rural Collaborative Organizations: An Evaluation of Eight Rural Landfill Development Projects

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With the majority of high tech and service jobs locating in 'hip' or 'cool' urban locations, combined with shrinking manufacturing and farming sectors, finding niches that can support economic growth in rural areas has become increasing problematic. The people, who have lost their jobs and wish to remain in these areas, face tighter budgets and longer work commutes. For their government representatives, smaller tax bases make it harder for them to deliver even basic services let alone invest in projects that may or may not bring positive economic development. The nasty dilemma for these rural areas is that, 1) they don't have a resource or comparative advantage that can attract economic investment and, 2) they don't have the financial resources to attempt to develop one.

In recent years, some rural communities have discovered that there may be a way to solve both problems almost simultaneously. A number of landfill gas development projects, many of which are located in rural areas have become job incubators and revenue stream makers. Communities can either permit new landfill sites or then can attempt to find a way to develop an existing site. Selling and permitting sites for new landfills can provide financial windfalls to communities, as these sites become hosts for trash from other communities. If a community has an existing undeveloped landfill, they can capture the landfill gas and convert it to electricity, creating a revenue stream that can include carbon credits, renewable energy credits, and income from the sale of the power itself to end users.

In Blountville, Tennessee, Sullivan County could make as much as $120 million dollars from a deal to cap and develop an existing landfill and building an additional 300 acre landfill that could take in trash from communities more than a hundred miles away (Tri-Cities.com, 2010). In Gilliam County, Oregon, landfill development has been credited as being the county's most successful economic development achievement, creating the county's largest source of revenue and being largely responsible for an unemployment rate that trails the state rate by more than 4 percent (OregonBusiness, 2010). A new landfill in Gilliam County provides $3 million in annual host fees, while providing the community with 84 full-time jobs (OregonBusiness, 2010). And in Catawba County, North Carolina, a public-private partnership called the EcoComplex has brought more than 150 jobs to the county as a result of a comprehensive landfill development project that includes a methane recovery facility, greenhouses, a biofuel facility and multiple business end users (sogweb.sog.unc.edu, 2010).

Despite such positive examples, the job of selling a community on accepting a new landfill is problematic because of environmental concerns and raising the revenue to develop an existing landfill can be particularly difficult in rural communities that have little revenue being generated from other sources. If a county owns a relatively large landfill, commercial developers will typically come knocking on the county's door and pay for both the right to develop the landfill and for the costs involved in developing the site. But for counties that have landfills that fall beneath that measure, the chore of developing the site and creating a positive revenue stream falls on the county. Despite the desire to control

environmental damage from methane emissions and the knowledge that development can lead to positive revenue streams, the ability for these counties to raise the necessary financial capital to develop an undeveloped landfill is quite constrained and the smaller the landfill, the larger the risk that the project won't be profitable.

This paper will report on an evaluation of collaborative community organizations in eight economically distressed counties in rural North Carolina, where these organizations were formed and facilitated with the idea that they could network with their own community and find ways to attract business partners and the financial capital necessary to develop their county landfills. The success of these community groups, rested largely in their ability to develop social capital in the form of effective networks and human capital in the form of relevant technical information. Individual participants in these groups also had to extend their own time and energy on activities associated with information gathering and making and negotiating agreements that would further their groups efforts. These transaction costs associated with information gathering and negotiating agreements, probably had to be offset by perceived possible benefits for themselves or their communities.

Community organizations were formed from community leaders, with the express purpose of developing a group that had particularly high initial stocks of social and human capital. The hope was that a group with well-developed social networks in the community could efficiently grow more social capital and eventually use that capital stock to attract financial capital. While there has been much research done associating certain social outcomes with levels of community social capital (Alesina and La Ferrara, 2000; Azzi and Ehrenberg, 1975; Goetz and Rupasingha, 2006; Rupasingha and Goetz, 2007; Putnam, 2007,) there has not been much reported on the specific formation of a social network with a goal of taking a group of individuals with high social capital and trying to solve a societal problem. What makes this example even more intriguing was that the eight rural counties have been reported to have very low amounts of community level social capital.

In the first section of the paper, human capital theory, social capital theory and transaction cost theory will be discussed and linked to the literature on collaborative public management. The second section will detail a case study of a landfill, which was developed successfully in large part because of the efforts of a collaborative community group. This section will explore the template logic model that emerged from the successful development of that site and from which provided the basis for the facilitation of collaborative community groups in the eight rural counties. The third section of the paper will report specifically on the eight-county evaluation that included interviews and surveys of facilitators and the community participants. The final section will relate the results of the surveys to the theoretical constructs developed earlier in the paper, as well as evaluate the outputs and outcomes realized by the county groups.

Developing a Theoretical Framework

Human and Social Capital

The OECD defined human capital (1998, p.9) as "the knowledge, skills, competences and other attributes embodied in individuals that are relevant to economic activity." Accumulation of schooling or training and the attainment of qualifications are standard measures. The basic premise is that the more training, skills or knowledge that an individual possesses, the more that individual will be enabled to increase their productivity or their earnings and thereby contribute to the collective wealth of the region and society for which they are a member.

Social capital is a bit more complicated than human capital. Jacobs (1961) identified the concept of social capital as a norm of social responsibility that incorporated social trust. Nahapiet & Ghoshal (1998, p. 243) defined social capital as, "the sum of the actual and potential resources embedded within, available through, and derived from the network of relationships possessed by an individual or social unit. Social thus comprises both the network and the assets that may be mobilized through that network." Putnam (1993) used the idea of social capital to explain the differences in economic and government performance in different regions in Italy. To Putnam (1993, 1995), social networks, norms and trust were the determinants of social capital. These networks, norms and trust contribute to form a stronger community, which can spawn other useful activities as by-products that were made possible by the increased sharing of information, increased trust and increased inter-personal solidarity (Coleman, 1990, Roseland, 2000).

Social capital is created when a relationship is formed and trust between those individuals in that relationship allows them to make certain agreements based on reciprocity and credible commitments (Roseland, 2000). These relationships can then be thought of as a resource for the individual (Coleman , 1990; Loury, 1977). Analysis has typically focused on some network unit that begins with minimally two individuals forming a relationship, although the most common approach is to evaluated social capital at a community level. However, Glaser et al (2002) offered up an alternative theory, putting emphasis on the investment decisions of the individual actors and their accumulated social capital rather the societal level institutions, norms, conventions. Taking this perspective Glaser et al (2002), thought would be more comfortable and workable for economists.

When applying social capital theory to collaborative settings, Sabatier (2005) suggests that we must be concerned with two things, first, we are concerned with collective action among public officials and representatives of stakeholder organizations and second the collective outcomes that need to be explained are negotiated agreements and their implementation, rather than civic engagement at the community level. If trust and reciprocity norms are shared amongst a group, cooperative behavior will flourish because few members of the group will behave opportunistically Sabatier (2005).

Transaction Costs

Coase (1937) introduced the idea of transaction costs in his article, 'The nature of the firm', as an explanation for 'why organizations exist.' The revelation of his analysis was that organizations exist because the cost of managing economic exchanges in markets is sometimes greater then managing costs within a firm or organization. Williamson (1975, 1989) is given much credit for making the theory more operational. Williamson suggested that markets and hierarchies are two different alternative

instruments for completing a set of transactions. Markets use prices, competition and contracts, while hierarchies bring parties to an exchange under the direct control of a third party ('the boss') (Clegg and Hardy, 1999). Williamson (1975) described these transaction costs as the "comparative costs of planning, adapting, and monitoring task completion under alternative governance structures." Transaction costs can be thought of as the time, effort, and cash outlays involved in locating someone to trade with, negotiating terms of trade, drawing contracts, and assuming risks associated with the contracts.

TCE or transaction cost theory TCT sees economic actors (individuals or firms) as bounded rational and opportunistic. Bounded rational meaning they are 'intendedly rational, but limitedly so' (Simon, 1947) (Clegg and Hardy, 1999). The implication of the former is that with greater uncertainty, transaction costs will increase, whereas without uncertainty, contracts could handle unlimited complexities and could account for all contingencies in an economic exchange. And the implication of the ladder is that TCT will assume that economic actors will behave out of self-interest and guile and might lie, steal, cheat, mislead, distort or obfuscate. The existence of opportunism requires safeguarding and monitoring devices that a non-opportunistic world would not require because a simple pledge would suffice to guarantee a fair exchange. TCT then simplifies the governance decision as a choice between the lower fixed costs of the market or the minimization of the effects of bounded rationality and opportunism by hierarchal structures (Clegg and Hardy, 1999). If a collaborative group has a lot of social capital, then the risk of opportunism should be reduced and the activities of the group should favor market rather than hierarchal features.

Collaborations are a type of 'hybrid' intermediate organization. Hybrids in general and collaborations in particular have aspects that are neither hierarchal nor market (Clegg and Hardy, 1999). For example the network decision-making and bargaining is certainly not hierarchal and the rule making and monitoring strategies that emerge to control opportunism and or bounded rationality are certainly not analogous to market activity. Governance structures can be thought of as representing a continuum of forms that range from pure market to pure hierarchy, the nature of the hybrid or towards which standard structure the hybrid leans, might be difficult to judge, but it theoretically should be at the particular intersection that minimizes costs. Research on the nature of collaborative institutions is modest. However, collaborative settings can be conceptualized as institutions that require many transactions that accumulate information and forge agreements, but that also have inherent mechanisms that reduce the transactions costs associated with such collaborative policy making and implementation operating at the collective choice level (Ostrom, 1999) (Krueger and McGuire, 2005). Increased levels of trust and reciprocity within a collaborative group, reduces transaction costs associated with social exchange (Sabatier, 2005).

Collaborative Public Management

The bulk of the literature on collaboration or collaborative public management is associated with watershed management. That collaborative public management is also referred to in the literature as watershed management, ecosystems management or integrated environmental management, is probably because the bulk of the literature on collaboration or collaborative public management is

associated with watershed or ecosystems concerns. This study represents a significant departure from those areas and should represent an interesting test for prior findings from those examples. This section will briefly review what findings have emerged from watershed and ecosystems management studies so that they might be compared with the findings from this study.

Leach and Pelkey summarized the results of 37 watershed studies and identified 210 "lessons learned" which they group into 28 thematic categories. 21 of the themes affirm their significance for success, while 7 themes are contradictory and imply deterrence for success. The themes are represented in strength by the number of studies (n=37) that cite them as affirming or contradictory.

The most frequently identified themes for success were funding (23 studies), effective leader or facilitator (22 studies), limited scope of activities (16 studies), broad membership (16 studies), cooperative and committed participants (16 studies) and trust (16 studies) (Table. 1.). The most frequently identified themes contradicting success were broad membership (8 studies), limited scope of activities (6 studies implying the importance for a broad scope of activities) and local bottom-up leadership (7 studies implying that leadership needed to be more balanced) (Table 1.).

Table 1. Collaborative Management Themes

Affirm Success

1. **Funding (23)**
2. **Effective leader or facilitator (22)**
3. **Limited or focused activities (16)**
4. **Broad membership (16)**
5. **Cooperative and committed participants (16)**
6. **Trust (16)**
7. **Low or medium levels of conflict (14)**
8. **Agency staff support and participation (13)**
9. **Well defined decision rules (12)**
10. **Adequate scientific and technical information (11)**
11. **Consensus decision-making (10)**
12. **Adequate time (9)**
13. **Effective communication and data sharing (9)**
14. **Legislature aids agency participation (9)**
15. **Appropriate geographic scope (9)**
16. **Monitoring or adaptive management (8)**
17. **Local bottom-up management (8)**
18. **Training in collaborative processes (6)**
19. **Agencies encourage staff participation (6)**
20. **Community resources (6)**
21. **Formal enforcement mechanisms (3)**

Contradict Success

1. **Broad or inclusive membership, implying that large membership can create serious problems. (8)**
2. **Local bottom-up leadership, implying the need for balanced leadership (7)**

3. **Limited or focused scope of activities, implying the importance of a broad or ambitious scope of activity. (6)**
4. **Well-defined decision rules, implying that more flexible rules would be better (3)**
5. **Formal enforcement mechanisms, implying looser enforcement mechanisms would enhance the process (3)**
6. **Low or medium levels of conflict, implying that collaboration would be easier with greater conflict (2)**
7. **Consensus decision making, implying that the requirement of consensus might hinder the ability to achieve successes might hinder the ability to achieve successes (2)**

Note: Table is drawn from results listed in the publication

Wondolleck and Yaffee (2000) developed a list of 'key factors' that explained success in collaborative efforts. They found that building a sense of community, mutual goals, or a shared vision was the most important factor, followed by the creation of new opportunities for social networking amongst diverse groups. They also listed as key factors, 3) conducting meaningful collaborative processes, 4) taking holistic perspectives, 5) taking ownership of the problem, 6) recognizing that partnerships are made up of people not institutions, 7) take entrepreneurial actions, and finally 8) mobilized support from numerous sources.

Margerum (1993) conducted eight case studies in the United States where he interviewed more than 100 case participants. Importantly, these case studies were chosen because some identifiable level of implementation success had been achieved. From this research Margerum found a set of common elements that seemed necessary for implementation. Margerum then in 1995 used these common elements to evaluate results from Australian experiences in 15 case studies. Unlike the United States studies however, these were chosen at random, rather than on a level of implementation success. And finally, Margerum surveyed 550 Australian catchment committee participants to examine specific issues. The survey used a Likert-type scale to measure responses about accomplishments, processes and outcomes. The results of the two sets of case studies and survey produced a list of 20 critical elements that lead to IEM success (Table 2.), or for the purposes of this paper, success in implementing a collaborative strategy.

Five of the elements are related to the successful initiation of collaboration. 1. Laws and policies support or do not prevent an integrated approach. 2. There are resources to support the collaborative planning process. 3. Major Stakeholders are willing to participate in a collaborative effort. 4. Stakeholder committee membership and selection processes are deemed legitimate. 5. There are people with the skills and time to lead the effort (Table .2).

Four of the elements are related to the success of the operation itself. 6. Stakeholders develop clear and effective processes for communicating. 7. Stakeholders use clear decision rules. 8. Stakeholders effectively identify and manage conflicts. 9. Stakeholders consult with the general public. 10. Stakeholders base management decisions on sound system understandings (Table 2.).

And ten of the elements are related to positive outputs and outcomes. 11. Stakeholders foster familiarity, common goals and mutual understanding. 12. Stakeholders develop a strategic and flexible

strategy to guide implementation. 13. Stakeholders identify management actions that address a full range of factors. 14. Stakeholders support implementation actions. 15. Stakeholders identify a model for intervention to achieve management goals. 16. Stakeholder committees assert their role in management activities. 17. Stakeholders create structures and mechanisms for coordinating decision-making. 18. Stakeholders support implementations with information and education programs. 19. There are resources to support or induce implementation. 20. Stakeholders implement immediate actions to build confidence and momentum (Table 2.).

Table 2. Critical elements of IEM (or collaborative management) success

Initiation.

1. **Laws and policies support or do not prevent an integrated approach.**
2. **There are resources to support the collaborative planning process.**
3. **Major Stakeholders are willing to participate in a collaborative effort.**
4. **Stakeholder committee membership and selection processes are deemed legitimate.**
5. **There are people with the skills and time to lead the effort.**

Operation.

6. **Stakeholders develop clear and effective processes for communicating.**
7. **Stakeholders use clear decision rules.**
8. **Stakeholders effectively identify and manage conflicts**
9. **Stakeholders consult with the general public.**
10. **Stakeholders base management decisions on sound system understanding**

Outputs and Outcomes.

11. **Stakeholders foster familiarity, common goals and mutual understanding.**
12. **Stakeholders develop a strategic and flexible strategy to guide implementation.**
13. **Stakeholders identify management actions that address a full range of factors.**
14. **Stakeholders support implementation actions.**
15. **Stakeholders identify a model for intervention to achieve management goals.**
16. **Stakeholder committees assert their role in management activities.**
17. **Stakeholders create structures and mechanisms for coordinating decision- making.**
18. **Stakeholders support implementations with information and education programs.**
19. **There are resources to support or induce implementation**
20. **Stakeholders implement immediate actions to build confidence and momentum.**

Note: Table is a duplication of a table used in the publication.

Keough and Blahna reviewed the ecosystem management literature and based on their review they identified eight factors that they felt were important for achieving successful integrative, collaborative ecosystem management. They then examined four controversial cases of resource management situations in which environmental protection increased and no appeals or litigation followed. Finally they analyze these situations by illustrating how the eight factors were or were not incorporated.

Their analysis was based on interviews conducted with key informants, planning documents and published media and academic accounts. Each case had to be a successful example of both conflict

management and natural resource protection. The topics of the cases ranged from endangered species protection, grazing, vegetation management and recreation. All of the cases as previously mentioned involved controversial issues, which over time were managed by agreement with environmental protection increasing and no litigation or appeals made.

Six of the eight factors were found to be important in all four of the cases, while two of the eight factors failed in at least two of the four cases. The six factors important in all cases included- 1. Integrated and balanced goals. 3. Stakeholder influence: Is stakeholder input actually used and does it have real impact on the final decisions. 4. Consensus group approach: Do stakeholders meet as a group and use a consensus-based process for providing input. 5. Collaborative stewardship: Do stakeholders develop a sense of ownership for and become personally invested in the plan or decision. 6. Monitoring and adaptive management: Do stakeholders agree to include monitoring in implementation plan and support of other goals including environmental and social goals. 7. Multidisciplinary data: Are ecological, social and economic variables included during data collection, analysis and monitoring.

The two factors that failed in at least two of the four cases were- 2. Inclusive public involvement: Does the process include all potential stakeholders. 8. Economic incentives: Do economic incentives exist for stakeholders.

The Importance of Leadership and Facilitation

Margerum (1999) includes on his list of, 'critical elements of IEM (or collaborative management) success (Table 2.), that "there are people with the skills and time to lead the effort." Leach and Pelkey (2001), reported that an, 'effective leader or facilitator' was identified as a theme affirming success in a collaborative management setting in 22 out of 37 studies, the second highest identified theme (Table 1.).

With all the difficulties in managing collaboration, the importance of leaders and facilitators is obvious. Good leaders and facilitors can mollify disagreement and conflict as well as provide entrepreneurial innovation (Wondolleck and Yaffe, 2000). By reducing conflict, leaders and facilitators can reduce transaction costs directly by lowering the cost of negotiation and bargaining as well as perhaps indirectly by helping to foster trust. An innovative leader may discover strategies that can create greater benefit creating and cost reducing outcomes. Emison (2006) provided an example of the ladder, in the case study involving the city of Atlanta, Atlantic Steel Co. and an EPA bureaucrat. In this case, the EPA bureaucrat, Stan Meiburg, saw an opportunity to transform two transaction cost-increasing problems (the blocked construction of a major bridge and a conflict between transportation and air quality plans) into a benefit increasing single improvement. Meiburg managed to get a freeze lifted on new highway projects by arguing innovatively that a single large construction plan for a 'mini-city' should qualify as a project that improved air quality, when such measures had only been approved on single construction projects.

In practice, good leadership or facilitation can be seen as balancing the benefits and transaction costs of the collaborative and the other individual economic actors. The leader's own balancing of benefits and transaction costs will depend on the capacity in which they are serving. If they are representing a government agency, they may not have the same stake in the direct benefits of the collaboration, but they should expect to receive employee benefits (reputation, promotion, raise, etc.), from a job well done. If the leader instead is a private citizen they will receive direct benefits when the collaborative goals are met and if they are representing an interested organization they may receive both direct and indirect benefits. Because collaborations seek win-win solutions, leaders can be expected to assist all participants in some way. This implies that social capital developed from networking will be transaction cost reducing.

EnergyXchange Case Study

Introduction

The EnergyXchange, in Burnsville, North Carolina, is a 501(c) 3 organization created on the site of the Yancey-Mitchell County Landfill, which was capped in 1994. The project serves as an environmentally conscious effort to promote energy efficiency and economic development. At EnergyXchange, methane gas from the decomposing trash powers ovens for glass blowers, a pottery kiln, and supplies radiant heat for the artist studios and greenhouses. Landfill gas is complemented by solar thermal and photovoltaic installations. The EnergyXchange is a multi-faceted operation that focuses on "3 E's" – education, economic development, and the environment. Acting as a business incubator, the site houses clay and glass studios as well as aquaponics and four greenhouses. EnergyXchange also provides educational opportunities for students, individuals, citizen groups, government, and the project managers.

The History and Foundation of EnergyXchange

The underpinning of the collaborative development responsible for ventures such as the EnergyXchange is the Soil Conservation Service (SCS), a federal agency under the United States Department of Agriculture (USDA). Founded in April 1935 with the signing of the Soil Conservation Act the SCS was formed for the primary purpose of controlling wind and water erosion. Water conservation districts formed in each county, with "the first recognized conservation district, bounded by the Brown Creek watershed in North Carolina, on August 4, 1937 (NRCS)." This action provided a method for the Service to assist farmers in the conservation districts. Locally elected citizens established priorities and plans for their respective districts, in accordance with the following tenets:

- "Assess the resources on the land, the conservation problems and opportunities.
- Draw on various sciences and disciplines and integrate all their contributions into a plan for the whole property.

- Work closely with land users so that the plans for conservation mesh with their objectives.
- Through implementing conservation on individual properties, contribute to the overall quality of the life in the watershed or region" (NRCS).

As attention was drawn to other areas in terms of the economic impact of regional policies, the USDA renamed the SCS the Resource Conservation and Development (RC&D) with its purpose of supporting multi-county cohorts of typically three or four counties. In the early 1990's,Stan Steury, who was the Director of the Blue Ridge RC&D was contacted by then-Yancey County Commissioner, Leon Taylor, who was also an engineer with AT&T. Taylor had read an article in the paper about a landfill development gas project in Florida at a time when many landfills were closing. Taylor proposed collecting the remaining gas in the Yancy-Mitchell landfill and using it for energy in the community.

The EPA had just initiated the Landfill Methane Outreach Program (LMOP) in 1994 making funds available for landfill development projects, when Stan Steury asked a colleague, Shelly Cohen, to assist with a grant proposal. Prior to serving at the RC&D, Ms. Cohen worked in the Office of Sustainability for President Clinton and her expertise and possibly connections, helped land not only a LMOP grant, but also a number of smaller grants.

The group determined that the Executive Director would serve as a coordinator of the non-profit, and that the agenda would be driven from the bottom-up (Steury, 2010). A brainstorming session on possible uses for the gas occurred in which the primary question was, "How to support the local economy?" The area was a natural choice for artists, including glass blowers. Over coffee and doughnuts at a local diner, a drawing was rendered on a napkin depicting the landfill with multiple local businesses benefiting as end-users enjoying energy at cost savings that would benefit both the county and the businesses. During the two years between the doughnut napkin conversation and the initial operation, the collaborative team of up to 140 people, led by community leaders and business owners had managed to raise $1.3 million dollars (Steury, 2010).

Before long, local stakeholders, including the artist and horticulture communities, County Commissioners, and others who might not have combined historically, became allies for the greater good of the local community. May 1, 1997 was the first meeting, and the flare was lit on April 22, Earth Day, 1999 (Steury, 2010). Funding kept rolling in from the State Energy Office, Golden Leaf, the Cannon Foundation, Wal-Mart Foundation, Spruce Pine, Z. Smith Reynolds, and others. The nonprofit corporation, EnergyXchange, was formed September 13, 1999 and received its tax-exempt status in 2000. The unassuming 6-acre site soon became a bastion of economic ingenuity. The methane yield was predicted to endure for 15 years at 50 standard cubic feet per minute.

Environmental Impact

According to the EPA's feasibility study, the environmental impact of the Yancey-Mitchell County landfill Reuse Project is equivalent to planting 14,000 acres of trees or taking 21,000 cars off the road in North Carolina each year.

Economic Development

In addition to the nearly one and a half million dollars in grant 'start-up' money, the local economy has benefited in multiple ways. One estimate of the economic value of the EnergyXchange is its $1 million offset of energy costs over the landfill's 20-year reuse cycle (EnergyXchange). Furthermore, the individual artists have saved $1,000-$2,000 per month on energy used on glass and clay kilns. Apart from providing fuel to the kilns and the studio space to six fortunate clay and glass artists for three-year increments, its four greenhouses provide a seedling business to local growers. A direct affect of this low cost "business incubator" is the opportunity it provides to entrepreneurs and the jobs it provides for the community. An indirect effect is the stimulus that savings provides in its potential as a direct investment when the artist buys equipment. These entrepreneurial opportunities are important because Yancey and Mitchell counties are both rural areas with struggling economies. In addition to providing space for art and seedling businesses, the EnergyXchange has attracted 3,000-5,000 visitors per year.

The scope of the project at the Yancey-Mitchell Landfill was quite limited as the EnergyXchange closed with just 360,000 tons of waste in place (Moorefield, 2006). A large landfill has at least three million tons). The fact that the landfill was so small and yet the project succeeded is a testament to the strength of the community group that spearheaded the project. However, the project did reap benefits from being a 'pilot' project and certainly it would have been much less likely to have attracted as much grant money that it did, had the project not been a pilot (Steury, 2010).

Early on, the EnergyXchange was faced with some difficult decisions, which led to innovative solutions. The expense of purchasing and replacing scrubbers to clean the gas (to prevent fouling or corrosion to the equipment) was prohibitive. The energy was not sold to the grid because of the $60,000 it would have cost to convert to the three-phase required. Direct use of the landfill gas made for lower overhead, and in this case, provided the best solution for a community-based approach to methane recovery.

There is no storage capacity in a landfill gas to energy system, primarily because the gas is not 100% combustible. A blower on site runs constantly at 1.5 psi. Large landfills often lose about 30% of their gas due to the multiple wells, which, must be installed as part of the collection system. Landfills generally employ one well per acre at 100 feet depth, whereas the EnergyXchange, which has ten shorter wells on three acres (six acres total), better maximizes its energy potential.

EnergyXchange Today

The legacy of the community methane model relies on its continued ability to foster key stakeholder relationships and financial resources. Dan Asher, the new Director as of January 2010, serves as the point person for the many people involved in the planning, developmental, and educational aspects of EnergyXchange. In a May 9, 2010 interview with National Public Radio, Asher stated, "It is a big part of our mission to use renewable sources for the purposes of education and economic development in the fields of art and horticulture." With only six years of methane left, key stakeholders, most notably the Board, comprised of County Commissioners, County Planners, engineers, artists, and business and non-

profit owners and managers are still working hard to get reap additional benefits.

Current installations include the following:

- Landfill Gas: Boilers fire the clay and glass kilns; radiant heating for the floors
- Photovoltaic Array (tracking): 22 kW *(equal to daily energy needs of the kilns)*
- Solar Thermal: Ten 4x10 flat plate solar thermal collectors
- Sustainable Building Design: Foam is in the Quonset hut with a metal roof
- Plans are in progress to renew and improve existing infrastructure, which, may include using wood, more solar thermal, vegetable oil and/or biodiesel

Ten years since its inception, both the Craft Studios and Project Branch Out are staples of the Campus. As Project Branch Out continues in its mission "to propagate rare and native flora of Western North Carolina and provide educational opportunities for local students, growers, and plant enthusiasts" it is open to new approaches (EnergyXchange). Due to the similarities between the Chinese and Western North Carolinian terrain, Project Branch Out, aided by Mayland Community College students, has the potential to spur a Chinese medicinals market in Western North Carolina. The plan is to be able "to propagate medicinal plants to be sold wholesale to those interested in the natural health industry" (EnergyXchange). Other partners include Asheville-Buncombe Technical Community College, the North Carolina Cooperative Extension, The Golden Needle, The Bio Network, and the Natural Products Laboratory.

Wood to Energy

With only six years of methane left, key stakeholders, most notably the Board, comprised of County Commissioners, County Planners, engineers, artists, and business and non-profit owners and managers must work to find alternative ways to help the project to continue to be viable. The lack of long-term methane reserves means that the EnergyXchange has to divert resources such as time and money into finding viable alternatives. One of those alternatives could be using wood for energy. According to Asher, gasification using' pyrolisis' of wood would cost $900,000, but it could be exactly what is needed to keep the Campus' educational, environmental, and economic mission on target (Herrin). The process may also involve the drying and pelletizing of municipal waste. The wood and yard scraps when deprived of oxygen, which incinerates the material into energy, leaves behind biochar. The biochar byproduct could serve agricultural purposes, or be used as an activated carbon media for landfill gas to energy conversion systems. The pyrolisis undertaking may involve nearby counties that are still shipping out waste, and this could mean a surge in profits generated by the EnergyXchange. The educational mission will be strengthened due to the current public fascination with gasification.

While the future for the EnergyXchange is still somewhat unknown and possibly limited, the benefits have been substantial and the fact that the community group first formed in 1997 is still thriving is a testament to what can be accomplished through community networking.

A Template Model Emerges

The success enjoyed by the EnergyXchange, particularly in terms of providing energy savings and economic development to the Yancy-Mitchell region, spurred the Director of the Blue Ridge RC&D, Stan Steury to think about how to apply the community model template for landfill development to other rural distressed counties. The template that emerged from the EnergyXchange, relied on the formation of a community organization made up of people who were leaders in their community, whether primarily in business, government or education (Steury, 2010). Additionally, the importance of facilitation by someone or some organization was substantial. By one account, a member of the EnergyXchange board felt that the facilitation provided by Steury and the Blue Ridge RC&D was deemed the most important asset to the EnergyXchange. Although Steury countered-

"In my many years working with communities, I have never seen a community group work so hard to further a project and make it successful. Without doubt, the social capital developed at the outset of this project (EnergyXchange) was instrumental to achieving the success that was enjoyed later on."

___ Stan Steury, Blue Ridge RC&D

By 2007, Steury was employed by the Appalachian State University Energy Center, and it was from here that he applied for a grant from the Z. Smith Reynolds Foundation, to help him begin the facilitation of community groups at eight new county undeveloped landfills, chosen in large part because they were located in rural economically distressed counties. The program was referred to as the Community TIES project with TIES being an acronym for Trash Into Energy Savings.

The project was designed to help the eight counties put together collaborative community groups made up of community business, government, education and civic leaders. These groups were organized with leaders who were interested in economic development for their community and in the possibilities presented by their county landfill(s). With eight counties instead of just one, the need to recruit people who were not only interested, but also willing to push the project themselves was necessary. Because leadership had been vital to the EnergyXchange, Steury used much of his time and grant money to making sure there was effective leadership in each of the counties. Steury and the Appalachian State University Energy Center also provided a place where meetings and training could take place. The outputs to set the course for the outcomes, included things like workshops, carbon credit analysis, well testing, grant applications, and landfill development plans. The desired outcomes were economic development and landfill gas collection and development. Because of the desire and ability to capture a greenhouse gas, large government grants could be applied for and if received would probably be thought of as an outcome under the rubric of economic development.

Between Steury and another research analyst Jason Hoyle, they provided as much support as they could, but they also knew that it would be up to the community groups to really end up taking the lead and pushing the project hard in their own communities (Hoyle, 2006). And the more the communities did push their projects the more Steury and Hoyle could assist with things like financial analysis or the development of grant proposals.

Table 3. LOGIC MODEL

INPUTS	OUTPUTS	OUTCOMES
Facilitation > Time	Workshops	Large grants
➢ Money	Testing	Contracts for development
➢ Facilities	Financial and policy analysis	County Landfill Development
➢ Locating partners	Grant proposals	
➢ Technical support	Landfill Development Plans	
➢ Group formation	Small Grants	

The Community TIES Project

On March 12th 1996, the Environmental Protection Agency (EPA) created regulations that required gas collection and control systems for new and modified landfills designed to hold 2.5 million megagrams (2.755 million tons) and 2.5 million cubic meters (3.27 million cubic yards) or more over the landfills lifetime and that could emit greater than or equal to 50 megagrams per year of non-methane organic compounds (NMOCs). Of the more than 7000 landfills that existed at the time, less than 5 percent of the landfills were subject to these regulations. For the larger of the remaining landfills, commercial developers would be able to see a clear profit potential and step in and make substantial financial offers to develop them. But for landfills a bit smaller, the line between making a profit and taking a loss became narrower and with the potential for high investment and transaction costs commercial developers were much less interested.

Having been successful in promoting the development of a very small 6 acre landfill at the EnergyXchange, the former Director of the Blue Ridge RC&D, and now a research analyst at the Appalachian State University Energy Center, Stan Steury, focused his efforts on additional rural distressed North Carolina Counties. Steury began searching out interested counties. The eight counties that emerged with community members who were curious included Bertie, Cleveland, Columbus, Edgecombe, McDowell, Robeson, Rockingham and Scotland.

There was little doubt that these counties were not well endowed with physical and financial capital. None of these counties are even within $12,000 of the national median household income (Table 4.) or within $7000 of the median household income in North Carolina (Table 4.). The percentage of high school graduates over the age of 25, also trailed the national average in every county, with a low of 63.8 percent in Bertie County and a high of 72.2 percent in Cleveland County, still more than eight percent below the national average and about six percent below the North Carolina Average (Table 4.). But the worst number perhaps was the percentage of persons living below the poverty level. Every county exceeded the national average of 13.2 percent, with Robeson having 30.4 percent of its citizens below the poverty level and Scotland having 27.6 percent (Table 4.). McDowell County did match the North Carolina average of 14.6 percent (Table 4.).

Penn State University Researchers (nercrd.psu/Social_Capital/Production,) accumulate census data according to certain social capital measures periodically to measure social capital levels in U.S. counties. In the last dataset, which was 2005, the same eight North Carolina counties were measured as having particularly low levels of social capital. The social capital was measured in a composite index that was created using principal components analysis, which recalculates the mean to zero. The variables used included: total associations per 10,000 people, the number of not-for-profit organizations per 10,000 people, the census mail response rate, and votes casted for President divided by total population of age 18 and over. The associations broke down into categories that included golf clubs, religious organizations, bowling centers, physical fitness facilities, public golf courses, political organizations, recreation club memberships, business associations, labor associations and non-classified associations. The indexes were broken out into five levels from low to high, with the lowest level range being -3.804 to -1.257, the second lowest being -1.257 to - .662, the middle range being - .662 to .041, the second highest being .041 to 1.037, and the highest range being 1.037 to 15.222 (Table 5.). Robeson and Scotland counties were both in the lowest range with -2.06 and -1.59 respectively (Table 5.). Rockingham (-.733), Columbus (-.977), McDowell (-1.15), and Edgecombe (-.943) were all in the second lowest grouping (Table 5.). Cleveland, barely escaped the second lowest category and finished in the middle range with - .596 and Bertie landed in the second highest range with .197 (Table 5.).

Table 4. Eight County, North Carolina and USA Demographics

Counties	Population, 2009, est.	Median Household Income, 2008	High School Graduates, percent age 25+, 2000	Persons per square mile, 2000	Persons below poverty level, percent, 2008
Robeson	129,559	31,499	64.9	130	30.4
Rockingham	92,252	38,267	68.9	162.4	16.2
Columbus	54,221	33,329	68.6	58.4	21.9
McDowell	43,988	37,394	70.2	95.4	14.6
Edgecombe	51,853	33,346	65.6	110.1	22.6
Bertie	19,345	31,375	63.8	28.3	23.3
Scotland	36,292	33,364	71.4	112.8	27.6
Cleveland	99,274	39,049	72.2	207.1	17.5
North Carolina	**9,380,884**	**46,574**	**78.1**	**165.2**	**14.6**
United States	**307,006,550**	52,029	80.4	79.6	13.2

Source: U.S. Census, (retrieved at www.census.gov/)

Table. 5. Eight County Social Capital

Counties	Social Capital Index
Robeson	-2.061328055
Rockingham	-0.732502897

Columbus	-0.976676484
McDowell	-1.148730937
Edgecombe	-0.943359891
Bertie	0.196884718
Scotland	-1.589630391
Cleveland	-0.596019026

Scale- Low to High, lowest-(-3.804 to -1.257), the second lowest being (-1.257 to - .662), the middle range being (- .662 to .041), the second highest being (.041 to 1.037), and the highest range being (1.037 to 15.222).

Source: http://nercrd.psu.edu/Social_Capital/ProductionOfSocialCapital.pdf

Results and Analysis

Community group members were asked numerous questions with respect to human capital, social capital, group trust, group leadership, group effectiveness and the facilitation efforts. Questions included background or demographic questions, polar yes and no questions, Likert scale questions, and rank ordering questions. Many respondents skipped questions that they felt they were not in a position to be able to make a good choice. In those cases, the not applicable response was noted but not calculated into the selection choice rates or averages.

We know that for the most part and by at least one estimate (NERCRD, 2005), the eight counties have a low stock of social capital. Community group-building was probably the most important input of the Community TIES model. Facilitators sought out members in the eight county communities with good connections within their communities and regions, with the hope that they would be well-suited to not only find other key people in the community to recruit, but also to be able to have the respect and trust necessary to provide important leadership. One part of the survey attempted to get an idea of what the human and social capital resources the groups had to draw upon from its membership.

Human Capital

The typical measure for human capital is educational attainment, and community members were asked what was their highest educational level completed. The highest level recorded was Masters Degree, with fifty-seven percent of respondents completing a Masters Degree. Twenty-nine percent completed high school but not a college degree and fourteen percent completed a Bachelors Degree. About one-half of those completing a Masters Degree, got their degree in Business Administration or Public Administration.

Q1-What is your most advanced educational degree attained?

Social Capital

Community group members resided in their counties for an average of 28 years per person and belonged to just over 4 civic organizations per person. One-third of the group members owned a business in the community. One-third of the group members were engaged in public service, while none were or had ever been an elected official. Membership in religious organizations is cited often as a measure of social capital and eighty-three percent of the group members reported they were currently a church member. Facilitators also attempted to recruit group members from colleges and technical schools, with the idea that they might be able to provide contacts with entrepreneurs or researchers. Those efforts were successful. More than one-third of the group members had employment at an educational unit.

Q2-How many years have you lived in the county you presently reside? ___

Q3-How many volunteer civic organizations are you a member? ___

Q4-Do you currently own a business in the county you presently reside? yes___ no___

Q5-Do you currently serve as a public official? yes___ no___

Q6-Do you belong to a church that is located within the county you reside? yes___ no___

Q7-Does your regular employment involve any kind of educational unit? yes___ no___

Group Activity

Success in collaborative groups typically requires high levels of trust along with effective leadership and facilitation. Several questions were asked to measure these variables.

Trust

Three specific questions were asked to measure trust. Eighty percent of the members felt their groups were successful in recruiting key members of their community to participate. Sixty-five percent felt that group members had the time and skills necessary to be effective. In a direct Likert scale question asking members to rate the level of trust, one-half of the members

answered that their group had an excellent level of trust, while one-third of the group answered above average and one-sixth rated it as average.

Q8-Do you feel that your community group was successful at recruiting key members of your community to participate? yes___ no___

Q9-How would you rate the trust between members of your community group? Extremely Poor ___ Below Average ___ Average ___ Above Average ___ Excellent ___

Leadership

Two Likert scale questions were asked to measure perceptions of group leadership. Fifty-seven percent of the members felt that the decision making in their group was above average, while forty-three percent felt the decision-making was average. A slightly higher two-thirds felt that their leadership was above average, with one-third saying it was just average.

Q10-Overall, how would you rate the decision making of your community group? Extremely Poor ___ Below Average ___ Average ____ Above Average ____ Excellent ___

OQ11-verall, how effective was the leadership exhibited in your community group? Extremely Poor ___ Below Average ___ Average ___ Above Average ___ Excellent ___

Facilitation

Five Likert scale questions were asked to measure the effectiveness of the facilitation. Seventy percent rated the importance of the facilitation provided as very important, while thirty percent responded that it was important. Fifty percent felt the facilitation was very important in for developing an effective community task force and fifty percent felt the facilitation was important. Fifty percent of respondents felt that the facilitation efforts to assist with grant finding and applying were very important with fifty percent reporting the efforts as important. Fifty-seven percent of respondents felt the efforts of the facilitators to provide technical assistance was very important with forty-three percent rating the efforts as important. Fifty percent of respondents felt that the facilitation provided excellent useful and accurate information, thirty percent felt it was above average and twenty percent said it was just average.

Q12- How important for your community group was the facilitation provided by Stan Steury and Jason Hoyle of the Appalachian State University Energy Center? Very Important ___ Important___ Moderately Important ___ Of little importance ___ Unimportant ___

Q13- How important was the facilitation provided by the Energy Center for developing an effective county community task force? Very Important ___ Important___ Moderately Important ___ Of little importance ___ Unimportant ___

Q14-How important was the facilitation provided by the Energy Center in assisting your community task force with finding and applying for grant(s)? Very Important ___ Important___ Moderately Important ___ Of little importance ___ Unimportant ___

Q15- How important was the facilitation provided by the Energy Center for providing technical assistance? Very Important ___ Important___ Moderately Important ___ Of little importance ___ Unimportant ___

Q16- How effective was the facilitation provided by the Energy Center in providing your community group with useful and accurate information? Extremely Poor ___ Below Average ___ Average ___ Above Average ___ Excellent ___

Performance

One Likert scale question was asked with respect to the performance activities of the group. Fifty percent of respondents felt that their groups were average in achieving short-term goals, thirty percent felt that their group was above average, and twenty percent felt their group was excellent.

Q17-Once your group was organized, how effective was the group in achieving short-term objectives or goals? Extremely Poor ___ Below Average ___ Average ___ Above Average ___ Excellent ___

Two questions regarding the variables that both fostered success and hindered success for the group. The variable cited most often for fostering success was facilitation, followed by generation of knowledge and information, leadership and trust (Table 6.). The variable cited most often for hindering success was limited physical capital, followed by political opposition and limited financial capital, decision making, and the limited ability to translate technical information.

Table 6. Variables that Fostered Success

FOSTERED SUCCESS
1. Facilitation
2. Accumulation of knowledge and information
3. Leadership
4. Trust
5. Decision Making
6. Community Support
7. Carbon Market
8. Ability to understand technical information

Table 7. Variables that Hindered Success

HINDERED SUCCESS
1. Limited physical capital
2. Political opposition
3. Limited financial capital
4. Decision making
5. Limited ability to translate technical information

Analysis and Discussion

With nearly sixty percent of the group members having a masters degree and seventy-one percent having a bachelors degree or better, the facilitation efforts to help create groups with high human capital does appear to be successful. In addition, these members appeared to have high social capital in areas that would seem to indicate a relevance to the task asked of them. In particular the high levels of church membership along with civic organization membership and average years living the county are indicative of having significant social networks available for the groups to leverage. They were able to leverage those networks to attract additional key members to their group who have the skills necessary to be effective. Furthermore, nearly eighty-five percent of respondents said their groups had above average or excellent trust between members.

Supporting the literature, group members felt that leadership was important. They rated leadership as the third most important variable for fostering their success, and the related decision making of the group as being the fifth most important variable. Directly, 100% of the members felt their leadership and decision making was average or above.

If leadership was important to group success, the facilitation effort provided by the Appalachian State University Energy Center was vitally important. Not only did respondents rate it the most important variable for fostering success, but responses to the Likert questions on facilitation consistently scored their efforts very well. In addition, it was pointed out in interviews that one of the facilitators literally talked them through a large grant application, for which they ended up receiving nearly $700,000. The only negative point regarding the facilitation efforts was that a couple of people commented that they weren't able to fully understand the information that was being provided by facilitators at one juncture.

The ability of the collaborative community groups to function at a high level is required but not sufficient, in order for the Community TIES program to view itself as a success. If a county was able to successfully develop a landfill, without the community group functioning particularly well, it would follow that the collaborative effort was unnecessary to achieving the desired

goals and that the high transaction costs associated with collaboration were unnecessarily absorbed.

Additionally, if a county was unable to develop a landfill or attain other successful outcomes, despite the community group functioning at a high level, it would follow that the Community TIES program was unsuccessful because the high transaction costs associated with collaboration were still unnecessarily absorbed.

Finally, even if a community group functioned particularly well, and the county was able to successfully develop a landfill and perhaps accomplish other goals, it may still be impossible to state absolutely that the program was successful. It may very well be impossible to determine if the desired goals could have been achieved without the higher cost collaborative activities.

The above points indicate why the choice to collaborate is a tough one and why it is often said that as a policy option, you must "fail into" collaboration (Roberts,2000). The idea being that only after all other strategies are employed and have failed to achieve some goal, do you attempt the higher cost collaborative management.

That conclusion may not fully take into account that the aggregate costs of all the other policy options could far exceed the costs incurred from collaboration. It does seem clear that the Community TIES program never would have been initiated, had it not been for the successful EnergyXchange pilot project. In this respect, it seems that there was a good indication of success associated with the strategy. Additionally, it could also be possible to compare the outputs and outcomes achieved in the Community TIES counties with what has or has not occurred in other counties that have undeveloped landfills.

The model employed by the Community TIES program, like any logic model, identifies outputs, for which it is hoped if achieved, will be associated with broader success in achieving desired outcomes. The aggregated outputs for the eight counties included- completed training workshops in all eight counties, completed landfill development plans in all eight counties, at least five counties have received small grants (under $50k), landfills were tested in four counties, financial and policy analysis was provided to all eight counties and 6 large grant applications were completed. The aggregated outcomes for the eight counties included- one large grant received ($690,000), two contracts completed to provide the necessary funding for development (volunteer carbon credits), and one county community group was able to arrange for the development of a small animal processing plant.

Table 8. Outputs and Outcomes Identified

OUTPUTS	OUTCOMES
Workshops (all 8 counties)	Large Grant Received (one county- $690,000)
Completed Landfill Development plans (all 8 counties	Contracts for development completed (2 counties-carbon credits)
Received small grants	Other forms of economic development (small animal processing plant- one county)
Landfills were tested	
Financial and policy analysis	
Large grant applications	

The county group that developed the small animal processing plant was actually the one county out of the eight that had to pretty much abandon efforts at landfill development, because it was determined during testing that the landfill was flooded. Despite that bad news about the landfill, there was so much social capital built up through the networks formed in the community group, that they were able to achieve a totally unrelated goal. The development of that plant, returned for the county, the economic development that they were organized and formed to achieve in the first place.

Being unaware of any similar counties with undeveloped landfills achieving similar outcomes or even outputs, without some form of collaboration, combined with the effective level of performance of the collaborative community groups indicated from the surveys and interviews, it would seem that even at this juncture it would be possible to judge the Community TIES program as successful. However, there was one additional measure that was identified.

As part of the recent stimulus funding that was handed down to the states for implementation, a 2.5 million dollar landfill development request for proposals (RFP) was offered. Included in the outputs, were five large grant proposals that were submitted for this RFP. While the grants from this fund have not been announced, it has been determined that there were just eight grant proposals that were submitted. Of those eight, five of them were from these 8 Community TIES county groups. Additionally, because of the relative success that the Community TIES program was enjoying, the facilitators had extended the model to additional counties. As it turns out, the only other 3 submissions also came from counties that have had the Community TIES model extended to them. Remarkably, despite there being nearly 100 other landfills that possibly could have had grant applications submitted for development, of the 8 applications that were submitted, all eight emerged from Community TIES County Groups. Although the exact nature of the awards could vary, there is no denying the significance of the

application measure. The Community TIES program has achieved a level of success that hasn't been duplicated in any other manner.

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