

VISIONS

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VISIONS MAGAZINE is dedicated to the world we live in and the world we hope to create. *Visions* is a non-partisan, peer-reviewed publication that contains articles from disciplines associated with environmental studies. Just a few of these disciplines include communications, political science, economics, philosophy, religion, art, and English. *Visions Magazine* is a faculty-student organized and operated publication that features the works of Elon University students and student-faculty collaborations. The ultimate goal of *Visions* is to allow students to explore scholarly research, writing, and review in a professional setting. In addition, *Visions* provides the opportunity to publish for students with interests in the environment and sustainable development.

Contributing to *Visions Magazine*: *Visions Magazine* seeks compelling, interesting, well-written, creative contributions on environmentally related topics. Major contributions to the magazine should be grounded in scholarly literature and/or reflect the conventions of research and writing associated with a specific academic field of study. All submissions must receive positive blind peer reviews before consideration for publication. We discourage submissions that are political or purely editorial in nature. For the next issue of *Visions*, we are especially interested in fiction, poetry, and photographic submissions.

Submissions for the Spring 2011 volume of *Visions Magazine* are being accepted! Please e-mail visionsmagazine@elon.edu or go to <http://org.elon.edu/sustainability/ac-visionsMag.html> for more information about the criteria for submissions and information about the magazine.

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Development in EGYPT

By: Todd Ruffner

Above: Dirt road lined by trash en route to the pyramids at Giza, marred by everything from plastic bags to dead horses; many people resort to dumping trash outside city walls because organized trash pick-up is rarely consistent. Where facilities exist throughout Cairo, trash collection is irregular at best, and it is often difficult to simply find a trashcan on the streets.



Left: The world-famous pyramids at Giza stand in the distance, the view blighted by a mixture of desert dust and thick pollution. Cairo has well-documented transportation and pollution issues, with millions of automobiles causing constant traffic jams and choking the air with toxic fumes. Unfortunately, the suffocating air is among the most memorable aspects of the city.

Egypt is often viewed as the powerhouse of the Middle East,

with a booming tourist industry, a rich history, and generally good relationships with most of the Western powers. However, reputation aside, Egypt faces numerous challenges due to underdevelopment and problems with infrastructure. These issues are numerous and large-scale, but there seems to be little hope of ameliorating them. At more than \$443 billion, Egypt has the 27th largest GDP in the world, yet approximately 20 percent of the population lives below the poverty line. Additionally, massive public debt prevents any serious efforts toward improving development and infrastructure within the country.

Underdevelopment has left Egypt with a host of problems including horrific pollution, unmanageable garbage and waste, and a struggling educational system among other things. While tourism presents the best opportunity to boost the economy and development, this industry also has its share of problems. Even a short visit to Egypt will often leave tourists angered by the deficient tourist infrastructure and disenchanted by the potentially beautiful landscapes marred by garbage. In spite of this, Egypt is certainly one of the most stable countries in Africa and the Middle East, though further development would greatly benefit the more than 80 million people living in the country.

Egypt certainly has its share of problems, though it plays an important role in a region plagued by underdevelopment. Undoubtedly, the Arab Republic



Above: The Muhammad Ali Mosque and numerous unfinished buildings overshadow the immense (and admittedly gorgeous) Al-Azhar Park, which consumes valuable water resources and money that may otherwise improve Cairo's infrastructure. The city desperately needs improved infrastructure to support the burgeoning population as well as the booming tourist industry that supports much of the population.



Above: Apartment buildings rarely go above six stories in greater Cairo, often left unfinished (almost as if they are still under construction, though closer inspection reveals that they clearly are not). Additionally, dozens of satellite dishes dot each rooftop because Cairo receives satellite signal from Turkey, Israel, and much of Europe. Many of the buildings are typically inhabited well beyond capacity.

serves as a leader in the region, being one of the few Middle Eastern countries with a formal peace treaty with Israel. Yet, Egypt's faux-Democracy is plagued by corruption and regularly suppresses political participation (see: The Muslim Brotherhood) in spite of the presence of universal suffrage. Additionally, Egypt must deal

with an influx of refugees from Iraq, Palestine, and Sudan, as well as rising unemployment. All these issues make the prospect for development in the North African state seemingly more difficult. 🙄

(All stats and info taken from CIA World Factbook: Egypt)

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www.elon.edu/studyabroad*



Above: Beautifully modeled mosque sits amongst unkempt, often unfinished apartment buildings in Cairo, a familiar scene throughout the metropolis. Egyptian bureaucracy is notoriously cumbersome and corrupt, encouraging many building companies to forgo the legitimate building process.

Author Bio

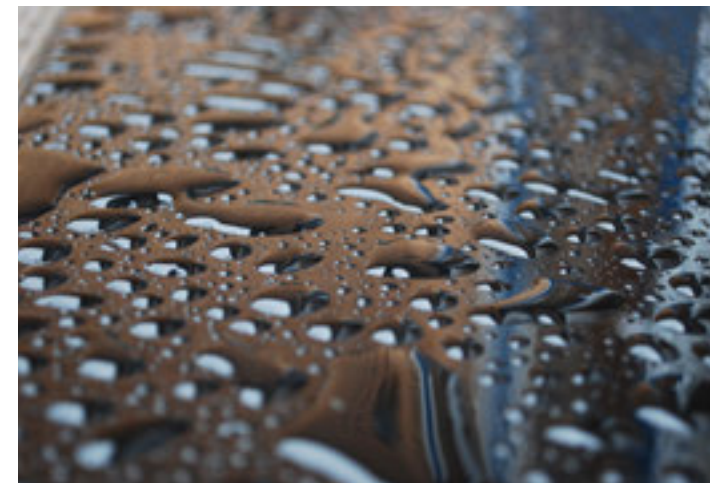
The author of this essay, Todd Ruffner (Elon class of '08), grew up in the suburbs of Northeastern Ohio. At Elon, Ruffner earned a B.A. in International Studies with a concentration on the Middle East, and a minor in History and Political Science. He spent the spring semester of his junior year studying Arabic in Cairo, Egypt and traveling throughout much of the Middle East. While at Elon, Ruffner was an active member of Students for Peace and Justice, as well as an employee for Elon's Club Sports program. Currently he is living in Columbus, Ohio pursuing his Master's degree in Arabic and Persian languages at The Ohio State University.

Abstract Self-Portrait in the Rain

Mixed Elements

I spread my arms as if to hang
this painting from them.
Untitled. One. In chalks and bloods
and presses of ink on paper.
In oil smear and pulse of torso trailing
a canvass of oak trees blackened
and slicked wet as ink by rain.
Ink-blown branches. Sky of ground
graphite and spit on the fingers.
Nick in the papered belly of a cloud,
birthing a black bird.
In the heavy sweat of rain,
my body, crushed-shell washed and mixed
with dirt and sucked gums for color,
feathers its borders. Marries
the oak and the bird and the sky,
as all things drip down
into earth.
All things slip
lasciviously into a pleased,
forgotten shade
of brown.

-Molly Dickinson



Walking Cold

Walking cold
and wind-bent
under tremorous oaks,
I thought of you.

Not as I think of you
often, or always,
with the same trembling –
branches bared and open,

quivering
like the skin
of a bell rung by the wind,
or as an echo feels,

treasured and curled
in its deepest,
secret knowledge
of the shell –

But as my own
hands sheltering
in the dens of my pockets;
as my own breath,

beading a veil
on the white air.
And so, together,
we walked.

Our shoes leaving
no marks on the earth,
Our mouths opening
to the same thought,

the way a peppering of birds
lifts itself with one wing,
one heart,
into a parted curtain of sky.

-Molly Dickinson

Guns of the Seneca

Sometimes you hear them when you're near the lake:
cannon-shots, cloudless thunder from the gut of the earth:
echoes, and you swear you've made a mistake.

Iroquois claimed it was the sound of the Great
Spirit not yet done making, still shifting people and dirt,
packing black powder with celestial wadding near the lake

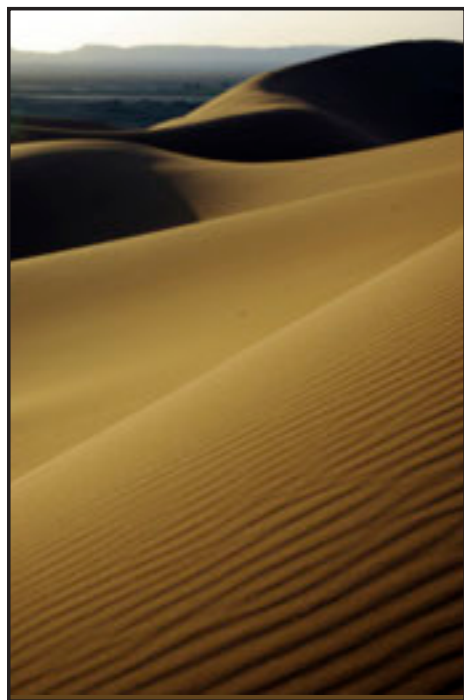
into ghosts of cannon-barrels, thunder-sticks. Winter breaks
and ice sneaks off the banks, so you walk out onto the water,
feel swells under the ice, swear that you've made a mistake.

At the head of Cayuga, there's a firing range. Hunters take
aim; shoot at the cratered foam bucks and faceless boards,
sometimes you can hear the shots from down the lake

and then it becomes a bloodless battleground, paced
by muzzle flashes and natural gas booms, first
echoes, then bullets, knowing in that instant your mistake

was that the Seneca didn't have any guns, any place.
The sky and the water their sanctuary, a chanting church
sometimes you can hear when you're near the lake,
echoes of deer-hide drums, swearing you've made a mistake.

-Luke Johnson



Lexicon for the Dry Months

When I say *River*, I mean foot-slip
on furred rocks, our hot limbs dipped
and stirring, my hair and neck jeweled
with relief and caddis-fly casings.

Canyon means summer ponds parched
and buzzing with flaxen grasses,
black butterflies leading us high, low, faster,
and all that burning and twitching.

And when I say *Coyote*, recall the gnawed
deer foot shaded by berry bramble;
think of me at your side, ravenous, and
offer your sweat instead to the flies.

-Sarah Cox

Recollections of a Moveable Sky

The Tomorrow People, they were sometimes
called, stayed in the Dust Bowl, perhaps
because they'd made it-
some years ago they'd built their
dugout homes of matted earth
and prairie grass. They put down roots
and seeds in the soil and it bore
beginnings, fertile and ripe for grains and
growth, and something else that man can't
really make, but rather makes a man
believe he can own what he cultivates.

Every person worth
his weight in grain dealt with
the worst of the Dusters differently.
Big Hugh Bennett pounded
the land with a money-laden
fist and encouraged the men
to be men. They took up offense
against this threat from the land that
couldn't be tamed by their hands,
and hatched plans pitched by money-hungry
"experts," masters of pseudo-science who claimed
that shooting bullets into the darkened sky
would cause rainfall. Just like in World War I,
they said, it always rained after a battle.
In the Dust Bowl all it rained
was bullets.

This was nothing to the rituals purloined
from the Natives once driven off this
once ripe land. Rain dances, or
spearing snakes on fence posts, belly up,
for miles and miles across the Plains.
Maybe it was enough that these schemes
took their minds and eyes away
from the black, swollen clouds,
like swarms of dusty locusts descending,
with enough static electricity in them to
knock over two people in a handshake.

Then there was Hazel Lucas who each morning
rinsed the damp cloths braided and stuffed
in the windowpanes. She put water in the kettle
over the fire then sat at her kitchen table
in white elbow-length gloves, tugging deliberately
till each finger was satisfyingly snug. She'd sit
there in those gloves as the room filled with dirt,
defiance at its finest, the last of the Last
Chancers, and she'd worry and she'd wait,
wait for the water to boil.

They all stayed and they waited,
with crackpot schemes,
nine mouths to feed,
and the audacity that brought them
in the first place. To be new and strong;
to build a living thing from scratch.

-Lauren Bieler





Examining the Contributions of Community Gardens to Social Capital

By Breanna Detwiler

Introduction

Shaping the first settlements, agriculture has been a central aspect to the character of our communities and the support found within them. For centuries, life was built around food, the production of which required many hands and bonded people around the common goal of sustaining themselves and their families. In many ways today's community gardens are reminiscent of what is appreciated about agrarian culture of generations ago; they develop the idea of a group of people working together to feed themselves and each other. Community gardens acknowledge the important agrarian traditions of the past and build upon the essential aspects of that memory to create an alternative model of agriculture.

When I began visiting community gardens in North Carolina I recognized that they were providing a valuable service to their communities not only by providing a space to grow food, but also by encouraging social development. I saw in these gardens some reclamation of our traditional farming heritage manifested in new, innovative ways,

suitable to many different types of modern lifestyles. This investigation was motivated by my interest in the ability of community gardens to address what I perceive as deepening social divisions that are occurring as we urbanize and lose touch with the land and one another in the process.

The goal of my research is to examine how community gardens increase social capital through the deepening of community bonds and social relationships. I entered this research assuming that forms of social development, such as community dialogue across lines of difference (i.e. race and class), are beneficial to individuals and encourage individual empowerment. In this model of social capital, empowerment is seen as individuals' ability to recognize and cultivate their inner power and assets and exercise that power to create change in their lives and their communities. Such recognition and cultivation of inner power is often encouraged by reciprocal and trusting relationships with others that spark and promote individual strength and

confidence. When individuals are empowered to create change in their lives, and have a venue and support structure to do so with others, community members better address their common concerns as a collective. By improving community conditions, the individual quality of life of community members is further improved. I sought to answer the question: In what ways do community gardens contribute to the social empowerment of individuals and the well-being of our communities? I also sought to examine how community gardens, as an alternative to the industrial method of agriculture, contribute to social development and food security.¹

Theoretical Framework

This research is shaped by the assumption that community has value in the power individuals are able to draw from working within a supportive group of people to increase their quality of life. Community, as it is used in this research, is defined as a social assembly of people that encourage individuals and groups of individuals to interact through community bonding and dialogue so as to support each member of the collective and promote the common welfare (Willie, Willard, and Ridini, 2008)

Robert Putnam, in his book *Bowling Alone*, defines the model of social capital used for this analysis as referring "to connections among individuals—social networks and the norms of reciprocity and trustworthiness that arise from them" (Putnam, 2000, p. 19). To Putnam, "the core idea of social capital theory is that social networks have value" and can increase productivity of individuals and communities, much like a screwdriver acts as physical capital or a college education as human capital for individuals" (Putnam, 2000, p. 19). In other words, networks of people create a kind of resource, or capital, which empowers individuals involved in networks to help create a better quality of life. Social capital acts as a means for individuals to create change in their lives through social support networks and trusting relationships with others. Social capital can be viewed as the foundation of communities that is malleable, the strengthening of which creates greater community health and well-being as it empowers individuals within their social networks. Social capital can be built by encouraging social networks and relationship throughout the

community "encouraging initiative, responsibility, and adaptability" (Flora and Flora, 2003, p. 215).

Scholars typically refer to one of two kinds of social capital, bonding social capital, consisting mainly of homogenous groups of individuals along common racial, class or gender lines, and bridging social capital consisting of connections between individuals of diverse backgrounds (Flora and Flora, 2003). While both forms of social capital are important in strengthening communities, bridging social capital is the primary concern of this study. Bonding social capital is far more common than bridging and occurs in churches, schools, recreation leagues and in other social spheres as people are usually more comfortable socializing with others of similar interest or backgrounds. Given the history of racial and social segregation in the U.S., bridging social capital occurs less often. Community gardens have the potential to be places where diverse participants interact making them particularly unique and valuable in their ability to promote bridging social capital.

To date little research has examined what specific practices promote social capital building. Understanding what practices are contributing to the promotion of social capital is crucial to creating a model for effectiveness in other community gardens as well as determining helpful policy around issues of land use, green space, and community greening.

Methodology

To better understand how community gardens promote social capital, I selected three well established community gardens in the Piedmont of North Carolina to observe: Anathoth Community Garden, a faith-based garden in Efland, North Carolina; the Elon Community Garden, a university-based community garden in Elon, North Carolina; and SEEDS Community Garden, an urban garden located just outside of downtown Durham, North Carolina. Gardens were chosen for their diversity of programs, their rootedness in identifiable communities and regional reputation. All three of the gardens also had a main communal growing space, an important attribute when examining social interactions, which are less likely to occur in community gardens based solely on an individual plot system.

Field research at the three gardens was collected over the course of nine months, March to November of 2008. Site visits were generally two to three hours long, congruent with the garden work hours. The method of field research was participant observation. While working with other garden members I observed and joined in on their conversations and work, often building relationships with garden members. After leaving the garden sites, careful, detailed field notes were taken on the nature of the day's conversations, the work accomplished and anything I observed related to the goals of the research. Field research was supplemented by interviews with key garden informants such



as managers, organizers and participants. The interview questions were open-ended and allowed the garden participants to guide the direction of the interview. The formal interviews along with field interviews and observations created a triangulation of observations, which allowed me to use convergent

ideas to better support my assessment of social capital promotion in gardens.

My field research observed what aspects of each garden's structure, managerial style and daily operation promoted social capital building measured by four criteria: social networks, trust, reciprocity, and participant empowerment.² At each garden these contributing factors of social capital building occurred uniquely and in various levels. From this research several attributes foundational for the formation of social capital emerge as well as the illumination of how each of these three gardens can inform similar projects within civil society.

Anathoth Community Garden Cedar Grove, North Carolina

History and Background of the Garden

The Anathoth Community Garden³ in Cedar Grove, North Carolina was established in 2005 by a community attempting to heal after the local murder of shop owner Bill King. When Bill was shot, many in the community perceived the murder as racially motivated as Bill was white and his wife Emma African American. After being asked to help raise funds for a reward for King's murderer, Reverend Grace Hackney, pastor of the Cedar Grove United Methodist Church, reflected with some church members, and they came to the conclusion that what the community truly needed was peacemaking. The church organized a prayer vigil that brought a hundred people, black and white, church members and non-members, together in the small town of Cedar Grove to stand up against violence in the community.

Prior to the prayer vigil, Reverend Hackney and the congregation had been discussing how the church might better address poverty in the Cedar Grove community by utilizing the gifts they had as a church and as individuals. After the murder, discussions continued, and a garden was imagined not only as a way to address poverty, but as a place of reconciliation after the murder of Bill King.

Shortly after the prayer vigil, Scenobia Taylor, a community member unaffiliated with the church, had a vision that she was to give some of her family's land to the church for a garden. She leased

her land to the church for \$1 for 99 years or until her death. The church hired Fred Bahnson, a local homesteader and Duke Divinity writing tutor, who participated in discussions around faith and food at the Cedar Grove UMC as the garden manager and with the help of two large grants and individual contributions the garden was established.

The unofficial mission of the Anathoth Community Garden is "plant gardens and eat what they produce . . . seek the peace of the city to which you have been sent" from Jeremiah chapter 29 verses 5 and 7. As the mission indicates, the garden has a two-fold purpose: first to provide food, but also to create a peaceful community where one did not exist.

For some garden members the garden provides the majority of their community interaction and gives them a venue for social networking and establishing supportive relationships.

One of the goals of the garden is to create a place where people are strengthened through the reciprocal relationships they have in their community that not only support them, but empower them as a critical part of their social web or network. The garden also serves as a place of reconciliation and peace where the stranger is greeted. All are welcome to participate in the garden and the communal nature of the workdays, all sharing one growing space, reinforcing the collective aspect of the garden. The communal work spirit of the garden and bi-weekly potlucks where garden members reflect over a shared meal encourage cross-cultural social interaction rarely supported in other settings. For some garden members the garden provides the majority of their community interaction and gives them a venue for social networking and establishing supportive relationships.

The Elon Community Garden Elon, North Carolina

History and Background of the Garden

The Elon Community Garden was created as the project of Dr. Toddie Peters' Environmental Ethics class at Elon University in North Carolina in

the fall of 2006. The class perceived two disconnects they sought to address with a garden space: first, they saw a disconnect between students and the natural world, and second, they saw a division between Elon students and the greater Elon-Burlington community. Like many universities, Elon struggles to introduce students on a somewhat confined campus to larger community issues, such as post-industrial poverty. The garden was imagined as a space where Elon students, faculty, staff and the residents unaffiliated with the university could come together to discuss community issues such as town ordinances around bike paths, university growth and so on.

The garden seeks to provide whole, nutritious food to those in the area who do not have access to such produce due to income level or lack of access in their neighborhood. Food is distributed from the garden in three ways: to the Alamance County Emergency Night Shelter's Good Shepherd Kitchen, which provides a hot lunch prepared by a skilled chef and staff to anyone in the community in need of a meal; to local families who do not have access to high quality produce who volunteer time in the garden as part of the "Food for Families" program, which seeks to provide two or three local families with whole, nutritious foods year-round; and by garden volunteers who collect food during garden workdays.

The primary core of manual labor volunteers in the garden are Elon students. Elon faculty and staff also contribute to the garden through class partnerships, donation, volunteering expertise, and, during the summer, serve as the core group of garden maintainers as most students do not remain on campus during the summer. For the past three summers the garden served as one of several service sites for the Elon Academy students. In the garden, students discuss issues of sustainability, as well as focus on addressing hunger issues in Burlington, North Carolina where many families lack food security. Several Elon classes have partnered with the garden as part of service learning, or service required for an academic course at the university. Other classes have come to the garden to learn about local food, to see how food is produced and, in the case of one class, even to work in their own class garden plot.

The mission of the Elon Community Garden “is to foster education, spirituality, service, and sustainability by successfully maintaining a garden that will encourage community development within Elon University and community partners.” The garden workdays serve as a communal work time when plot renters, students, faculty, staff and local residents can come together to share in garden planting, maintenance and projects. Besides

. . . to foster education, spirituality, service, and sustainability...

bringing the community together during workdays, periodically the garden hosts large events such as potlucks and harvest festivals with the purpose to bring all community members together around the garden’s mission and ideals and to encourage participation.



SEEDS Community Garden Durham, North Carolina

History and Background of the Garden

In 1993, Brenda Brodie, a Durham nurse, found an opportunity to address prevention and health issues in her community through the healing process of gardening and in 1994, with the help of her friend Annice Kenan established South Eastern Efforts Developing Sustainable Space, Inc. or SEEDS. SEEDS began with several garden projects, but many failed due to lack of leadership and other struggles. Only a garden established on an old Southern States Cooperative site in Northeast Central Durham continued to function becoming the lasting model, though it too faced many struggles, such as the creation of quality soil and ridding the site of weeds and wire-grass as well as thefts and break-ins. They began to succeed by establishing

working partnerships with those in need in the community.

The SEEDS garden consists of two parcels in northeast Durham, a large parcel called Southside and a smaller area known as the Market Garden. The Southside Garden includes twenty-five community-garden plots rented and maintained by local residents who pay between one and thirty-five dollars per year, based on a sliding scale, for raised bed plots of various sizes. While anyone is welcome to rent a plot, priority is given to people who live near SEEDS and those on a limited budget. The Southside Garden also includes communal areas maintained by community volunteers and SEEDS staff. Garden facilities such as an outdoor classroom and fire circle help facilitate a diverse range of group activities that can take place in the garden such as community festivals, weddings and retreats.

In 2000, SEEDS received a grant from the Warner Foundation⁴ that allowed SEEDS to create the Durham Inner-City Gardeners (DIG) program, which employs local teens to work in the SEEDS market garden, selling their produce at the Durham Farmer’s market. The DIG program, which has become SEEDS signature program, “empowers teens by teaching organic gardening, sound business practices, healthy food choices and food security values” (South Eastern Efforts Developing Sustainable Spaces, Inc., 2002). Each year SEEDS’ maintains a staff of five Durham youths to work as the Market Garden’s paid year-round crew as well as a larger temporary summer crew. Each Saturday, year-round and summer DIG youths sell the produce grown in their Market Garden and the flowers from the Southside Garden at the Durham Farmer’s Market. After the market on Saturdays DIG youths cook and eat lunch together. As part of the program, youths also attend conferences on food issues and urban farming.

SEEDS official mission reads, “SEEDS encourages respect for life, for earth and for each other. We help individuals, neighborhoods and communities grow together through gardening, gathering and education.” This mission is accomplished through programs like DIG, but also through early education activities such as SEEDlings, a free after-school program for 1st through 5th grade children created in response to a neighborhood need

for affordable childcare. Each day, SEEDlings work with SEEDS’ staff and volunteers in and outside of the Southside garden learning about nature and gardening.

Discussion

The goal of this research was to examine how community gardens increase social capital through the deepening of community bonds and social relations. The research assumes that social development, such as community dialogue across lines of difference such as race and class, are beneficial to individuals and communities. The theory of social capital used in this study was grounded in the work of Robert Putnam and examined social capital in relation to the contributing factors of empowerment, trust, reciprocity and dialogue.

In evaluating these programs, I have identified five common attributes that appear to be foundational for the promotion of social capital in community gardens.

- 1) Each garden began building social networks and partnerships from the onset of the project, which contributed to the garden’s success and persistence.
- 2) Gardens focus on education as a form of participant empowerment and, in doing so, further disseminate their focus on sustainability and food security.
- 3) These partnerships brought support in terms of people to advance the project, but also helped gardens gain financial support from individuals and organizations that were interested and/or invested in the gardens’ mission.
- 4) Gardens provide a natural, green space in which people can come together for workdays, events and other communal activities, encouraging further social networking and community interaction.
- 5) Each of the gardens, as part of their mission, serves as a form of protest against industrial agriculture, and mainstream food options.

Successful community gardens seem to be effective in their missions not only because they

encourage participant empowerment and social networks within the garden fence, but they are also established through social networking practice. Each of these three gardens was established by a group of individuals engaging in discourse around their community, their food and how they could effectively make positive change in their area. By engaging in participant discourse and through partnerships, gardens created a strong base of community support. For example, community discussion and dialogue at the Cedar Grove UMC

Gardens bestow members with the knowledge that the choices they are given in the supermarkets are not choices at all.

encouraged people to air their concerns around community poverty, and the group collaborated as to what would alleviate some of the problems they saw. The group was open to suggestions and ideas during their conversations, allowing the community garden idea to generate, and through a series of community events, become established. These talks were the beginning of the social networking and education that would continue into the actual garden as people work and discuss community issues. The richness of the community dialogue and participant discussion prior to garden inception contributes to the dialogue and social networking seen currently.

As the gardens sought support in the community they created short and long term partnerships with groups and individuals that encouraged their success. In the Elon Community Garden, a mutually beneficial partnership with the Elon Academy gave the garden financial support and a summer volunteer base, and gave the Academy a nearby service location that would also supply food to some of the families in the program. Gardens also benefited from funding sources such as major grant programs that support the gardens' mission. Funding allows gardens to support a diverse variety of programs that reach a broad community audience. Besides funding, perhaps the most important form of support for these gardens is access to land. Each of these three gardens is relatively assured to be able to keep and maintain the garden in their current space, but not all gardens have such assurance. Access to land is a serious issue in the establishment

of community gardens that I will explore in my policy recommendations.

Gardens provide a much-needed service to communities by creating open, accessible, green space to all people. The promotion of social capital requires a place in which people can meet, work and have discussions. Each of the three gardens examined in this study do so. Urban gardens, such as SEEDS, are particularly valuable in this respect as they offer a green, natural space in an urban, industrial environment. In field and formal interviews, participants often commented that they enjoy the "peace" the garden brings them. Gardens provide a green space that can be utilized by diverse groups, encouraging bonding social and bridging social capital. At SEEDS, the DIG program provides youth with a job and a space in which they can create social networks and trusting, reciprocal relationships. These types of relationships and the activities youth participate in build bonding and bridging social capital as youth engage with their peer group and the larger community in the garden setting. The promotion of bridging social capital was also fostered by garden events such as the Anathoth potlucks where people from diverse cultures and backgrounds share in a meal. Gardens provide the suitable space necessary for the promotion of different forms of social capital and strengthening of community well-being.

Empowerment of participants through education around gardening and sustainable practices occurs extensively in each of the gardens. Gardens teach participants the knowledge to make their own choices around their consumption habits and empower them with the knowledge of how to grow their own food. In the DIG program, students learn that their choices are not limited to the types of produce offered to them in the grocery store. Through gardening they are given the knowledge that there are many varieties of produce that they can grow themselves. Through this power of choice and other confidence-building activities related to their job in the garden, youth are empowered to create the best life for themselves, each other, their families and their community.

Each of the three gardens acts as a protest against unsustainable forms of agriculture and a lack of real choice in the food market. Instead of writing letters and having meetings with

representatives, garden participants hold up their pitchforks and protest through working towards the type of agricultural system they want to see. They seek to engage participants in making real changes in their food system and their lives instead of resigning themselves to eat and accept what is presented to them in the mainstream.

Gardens protest the capitalist food system itself. Gardens bestow members with the knowledge that the choices they are given in the supermarkets are not choices at all. In fact, what is presented to them at the supermarket and in commercials is a lack of choice. In the capitalist food system the consumer is given limited choice, and the only options presented to them are those that the system, in this case, the food producers, choose to give the consumer. This, in fact, dis-empowers the consumer while under the veil of providing choices.

Under the industrialized agriculture model, consumers have no choice in what varieties of produce are cultivated as companies grow in monocultures

and actively fight against genetic diversity. Under the industrial model of food production, consumers have no connection or say in production. In fact they are so far separated from the farm they have little understanding of the seasons in which certain crops grow in their area. Finally the industrial model of agriculture offers little interaction. Farmers interact with the companies they work for or sell to whose only interaction with the consumer is through packaging and promotion. In this model consumers are ultimately disempowered at every stage of the food system. What community gardens, CSAs and farmer's markets seek to do, is empower consumers with a multitude of choices, choice in produce, choice in production, and choice in interaction within the system.

In the alternative model presented by community gardens, participants are empowered at every stage. In gardens participants are educated in crop diversity and the variety of produce that can be grown. Participants, like John at the Anathoth



garden, are exposed to purple potatoes, something not often found on a grocery store shelf. Participants can also choose what they want to grow. In the garden democracy, they can voice desire to grow certain crops, which is usually welcomed by garden management. Participants in community gardens are actively involved in food production from seeds to seedlings to plants to harvest. They can see how their food is being cultivated and are part of the process. Finally, participants in community gardens benefit from the community interaction around growing their own food. They interact with garden leaders who help educate them in gardening and they interact with other community members while working in the garden. Garden members interact while they grow food for one another and their communities creating an incredibly deep sense of interdependence that cannot be created in the industrial model of agriculture. Community gardens are empowering because they allow people to really

engage in an alternative model of production: an exchange that is not based on profits, but instead is based on people.

This sample of community gardens is of course not representative of all community gardens. These gardens were specifically chosen for the capacity to promote bridging social capital, but, as I reflected in the history of community gardens, community gardens are as diverse as the area in which they are located and the mission they seek to support. Each garden is unique in its structure and mission and has unique contributions to its community, but there are two central results of this inquiry in these gardens that can be applied by other groups wishing to promote social capital to build healthy communities. First, this work provides some insight into how these three different types of community gardens successfully promote social capital in ways that can be modeled for other groups seeking to build and strengthen their communities.



Second, understanding the importance of these gardens has specific implications on local and federal policy that should be changed or created to further support community gardens.

Each of the gardens is based in a different power base within civil society: a university, a faith community and an urban community. Each garden represents a different set of goals, values and mission shaped by the different constituencies within the civil society they seek to address. Anathoth serves as a model of a successful faith-based garden whose mission is to provide food for those in need and foster peace in the community. Elon is a university-based garden that seeks to educate students, faculty, staff and community members in food production and in the process, not only bring people together in the garden space, but also work together to feed one another. The SEEDS Community Garden works to establish a green space in an urban setting to educate people on where their food comes from, but also to address community issues like child-care and at-risk youth. The contributions of these three gardens to the promotion of social capital in their respective communities, influenced by their respective situations, is valuable as a resource to other gardens interested in achieving similar goals. Groups can and should look to the gardens that address similar aspects of civil society, but they can also look across models to better understand how to achieve specific goals.

For example gardens seeking to empower youth might look to the SEEDS model of leadership and empowerment that occurs in the DIG program. At DIG, youth are leaders. Youth have specific jobs they act out every week, and through those leadership roles and the responsibility they develop, youth are empowered. Observing DIG youth in the garden leading groups and at the market selling produce, it was apparent they felt ownership of the space and were confident in their ability to accomplish their jobs. Other groups interested in creating self-assured youth could look to the SEEDS model of leadership for ways to achieve the goal of confident, empowered youth.

Gardens seeking to build bridging social capital could look to the Anathoth model of leadership, which encourages community member-to-community member education and empowerment. Community members teach one another how

to plant, how to eat, how to live together. They encourage one another's pursuits in becoming more sustainable. The Anathoth staff encourage community member to community member interaction and interdependence by assigning groups with projects with which they are expected to take ownership. As an ownership and teamwork ethic arises, members seek to help one another succeed. They become invested in a project together through discourse, trust, and reciprocity in one another's lives. Community member to community member interaction seems the best facilitator of bridging social capital as social networks are created across lines of difference and participants' skills, assets and inner power are activated through working, talking and problem solving with other garden participants.

Gardens seeking to bridge a divide between two specific communities, such as a university community and their surrounding area, could look to the Elon Community Garden's model of education and outreach. This model facilitates empowerment through participant education. The key leaders serve as experts and educators in the garden and encourage participants to make aspects of their lifestyle more sustainable. Workshops and lessons given by managers promote education around sustainable issues. Key leaders also encourage dialogue around issues of sustainability with participants, which further promote stewardship practices.

This research is just the beginning in terms of what can be gained from long-term studies of community gardens, which could increase the understanding of individual and community empowerment occurring in garden spaces. While this study did not attempt to survey all participants, but rather sample interested parties through interviews, participant surveys might be useful in evaluating the effect of gardens on participants' lives. Long-term observation through longitudinal studies of participants' lives and activities inside and outside of gardens would be extremely illuminative of how social capital built in community gardens is exercised in participants' lives and in the community.

Policy Recommendations

This inquiry into community gardens has specific implications on local and national government policies that affect community gardens. After establishing that community gardens are effective

and unique in their ability to promote social capital, policy must reflect this understanding by assisting groups seeking to improve their communities through gardening. Local governments can support gardens and their mission by granting access to public lands and unused lots. Municipalities should recognize the ability of gardens to beautify space, empower and educate which increases community health and well-being. Land use and zoning regulations can



be created to be more permissive of reclamation of unused spaces. Land acquisition is a significant barrier that could be eased by local regulation. When people have long term access to plots of land they are more likely to invest in the space, and in turn, the community.

On a national level, consideration for alternative forms of agricultural production such as community gardens need to be provided for in legislation, specifically in the ultimate agricultural policy, the Farm Bill. The 2008 Farm Bill makes some incremental strides towards including more community based food system support, but it does not provide the funding and support necessary to accelerate and aid these alternative food systems. Hunger Free Community Grants included in the Farm Bill, assist programs with the costs of feeding those in need in the community. Community gardens could qualify and use such funding, but it is often limited to organizations that purchase or receive donations and provide food directly to the community such as food banks. The Community Food Project Grant Program distributes \$5 million

in one-time allotments anywhere from \$10,000 to \$300,000 to private non-profit food projects that help communities create self-reliant food systems and manage food, nutrition, and farm issues (United States Department of Agriculture, Cooperative State Research, Education, and Extension Service, 2007). But this is not nearly enough. Only about 18% of groups who apply for Community Food Project Grants receive one, and since the funding is appropriated it is subject to discretionary spending and is not mandatory (United States Department of Agriculture, Cooperative State Research, Education, and Extension Service, 2007). Greater funding and support needs to be provided for community food projects with an understanding that it is not only about food, nutrition, and farm issues but also concerns social interaction, community support, and greater community well-being.

Perhaps the most important impact the Federal Government can have on community gardens is through the U.S. Cooperative Extension Services. Agricultural extension agents have the potential to play a tremendous role in the encouragement of transitioning from unsustainable models of agriculture to more sustainable models such as community gardens. In my own experience as a community gardener, I have seen the difference a supportive agriculture extension service can have. When the Elon Community Garden first began, the county extension agent came to our site and talked to Elon Academy students about agriculture and plant biology. The agent spent much of his time disparaging the idea of organic gardening while stomping through planted garden beds much to everyone's horror. He did not seem to understand the goals or mission of the garden. More recently, a visit from the new county extension agent demonstrated the impact of a supportive agricultural service. The agent not only understood the garden's goals as a sustainable form of agriculture, but also was excited about the garden's mission and role in the community. He offered his expertise in helping create a plan for water capture from a building near the garden. He also suggested websites and people who might be helpful to the garden project. Extension agents can also help interested community gardens meet one another and find space in which

to establish a garden, using the network of farmers, master gardeners and concerned citizens created through the agency.

Conclusions

As Anathoth, Elon and SEEDS demonstrates, community gardens are valuable assets as they build healthier communities in terms of ecological health and empowered citizens. Gardens help educate broad groups of people in the importance of sustainable agriculture. Participants recognize the benefits of caring for the land and understand they do not have to participate in the industrial agriculture model of food production; they can reclaim their food system and produce food for themselves and their communities. Gardens teach valuable lessons in the importance of not ceding so much power to industrialization, which has led to a loss of jobs and compromised the integrity of our eco-system. Gardens educate participants about the kinds of ecological issues around food occurring in the country, and empower participants to actively work to make a change. They encourage participants to recognize that they have a voice and a say in how we engage in agriculture as a society and also how we socially interact.

In community gardens, participants grow food with those around them and, in doing so, engage in one another's lives through conversation while working. Social interactions in gardens build a community social network made up of trusting, reciprocal relationships that participants can depend on in times of need, much like the mutual aid networks of the 19th century agrarian communities. Finally, community gardens promote bridging and bonding social capital, which is incredibly valuable at creating cohesive communities that foster understanding and acceptance of different cultures, ethnicities and economic backgrounds. These forms of social capital are also useful in creating positive community change, as community members are empowered to address issues around them, such as lack of affordable child-care. Using the social capital participants have built up in community gardens they are able to create positive change in their life and the life of their community, together. 🌱

Footnotes

¹Food security is defined as the ability of community members to obtain nutritious food, grown in a sustainable fashion, easily and locally.

²These criteria were the product of the constant comparative method and were not only informed by Putnam's definition of social capital, but also by what I observed in the field and through interviews.

³In the Old Testament, God instructs Jeremiah to buy a field in Anathoth during the Babylonian siege. Jeremiah is guided to plant the field and eat what is produced as well as to seek the peace of the garden. The garden draws upon this story for its name and mission.

⁴The Warner Foundation awards grants to North Carolina projects seeking to improve the quality of life for low-income individuals and communities.

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Author Bio

Breanna Detwiler (Elon class of '09), author of this research, was born and raised in the rolling hills of Warrenton, Virginia. At Elon she received her B.A. in Environmental Studies and minors in Religious and Non-Violence studies. Disheartened by the loss of farmland in her community she has been motivated to work on farmland preservation as well as alternative methods of food production. While at Elon, she managed the Elon Community Garden and worked to foster student and community interest in local food production. She also worked closely with the Elon Academy both in and out of the garden during her time at Elon. Breanna is currently studying for her MS in Environmental Management at Queen's University in Belfast, Northern Ireland as a George J. Mitchell Scholar.

WHO'S COUNTING?

Climate Change and Disease

By: Kristine Silvestri

In 2001, over 2,000 scientists from over 100 countries formed the United Nations Intergovernmental Panel on Climate Change (UNIPCC). The group found that humans are responsible for increases in global temperatures due to mass deforestation and the release of heat-trapping gases from fossil fuels like carbon dioxide (Epstein, 2005). The panel concluded that should global warming continue the planet would experience warmer mean temperatures, greater heavy rains, less snow, brief winters, and other extreme weather patterns (Soverow, Wellenius, Fisman, & Mittleman, 2009). The World Health Organization believes that since the mid 1970s, there have already been 150,000 deaths annually from global warming, and approximately five million disability-adjusted life years (DALYs) annually for people in developing countries. Deaths from climate change are due to extreme heat, illnesses caused by air pollution, forced migration, and increases in infectious disease in water, insects, and rodents (Patz & Olson, 2006). The purpose of this article is to briefly explain how an increase in temperature and rainfall due to global climate change has affected the spread of infectious disease in humans.

Water and Food Borne Diseases

In the UK, researchers found the frequency of food poisoning every month was strongly correlated with the temperature in the previous 2-5 weeks. Approximately 30% of reported cases of Salmonella occurred when the temperature was 6 degrees Celsius above the mean for that month (Patz & Olson, 2006).

Oregon State University found that for every increase in 10 degrees in the outside temperature, certain types of urinary tract and gastrointestinal

infections increase by 17 percent ("Hot weather," 2009).

A 1993 outbreak of Cryptosporidium, a water-borne parasite, in Milwaukee killed over 50 people and exposed 400,000 additional people. The outbreak's origin was uncommon heavy spring rains and run off from snow that melted. One study found that all water-borne disease outbreaks, including the Cryptosporidium outbreak, within the past 50 years in the U.S. had a marked seasonality within significant watersheds, demonstrating a strong correlation to heavy precipitation (Patz & Olson, 2006). During El Nino in Lima, Peru from 1997-1998, winter temperatures were 5 degrees Celsius above the average, leading the number of daily admittances for diarrhea in medical facilities to double compared to the preceding five years (Patz & Olson, 2006).

Vector Borne Diseases

West Nile Virus

West Nile Virus levels in the United States are dependent upon warmer temperatures, greater humidity, and heavy precipitation. These factors are



independent of each other's effects and the season (Soverow et al., 2009).

When temperature was 5 degrees Celsius higher than the mean weekly maximum, the incidence of West Nile was 32-50% higher than normal in the following 3 weeks (Soverow et al., 2009).

A 20-mm increase in the collective weekly precipitation was related to a 4-8% increase in the number of cases of West Nile reported in the subsequent 1-2 weeks (Soverow et al., 2009).

Lyme's Disease

Ticks have moved northward in Sweden, the U.S., Canada, and the Czech Republic as winter temperatures increase (Epstein, 2005; McMichael, Woodruff, & Hales, 2006).

Malaria

Models predict that global temperatures will raise 3 degrees Celsius by 2100, causing the annual number of malaria cases to increase by 50-80 million (Union of Concerned Scientists, 2009). That would be an increase of 16-28% new cases every month (Patz & Olson, 2006). Areas most affected will border current risk areas with higher altitudes and latitudes. The parasite will cause seasonal epidemics in a population with little or no immunity, making for epidemics with high levels of sickness and death (Union of Concerned Scientists, 2009).

Mosquito borne diseases are affecting higher altitudes in Asia, Central Africa, and Latin America. This is due to evidence of warming at high altitude sites in the tropics and the rising shift in the elevation of the freezing level (0 degrees Celsius) by 150 meters (Union of Concerned Scientists, 2009). In Africa, it is estimated that Zimbabwe's highlands will become endemic with malaria by 2050, and that the East African highlands warming trends could let them be affected as well (Patz & Olson, 2006).

A study on malaria between 1968 to 1993 in central Ethiopia's Debre Zeit region, found that warming trends contributed to an increase in malaria, even when controlling for factors like drug resistance, population migration, or level of vector control efforts (Patz, Campbell-Lendrum, Holloway, & Foley, 2005).



An increase of .5 degrees Celsius creates a 30% to 100% increase in mosquito abundance (Patz & Olson, 2006), and boosts mosquitoes' danger by escalating reproduction, the amount of blood meals they ingest, and their breeding season. Increased temperatures also condense the maturation period for the microbes they produce, which allows malaria parasites to spread faster (Epstein, 2005).

In 2000, three cyclones and rain attacked Mozambique for six weeks, and in the Punjab region of India monsoon rainfall and El Nino led malaria rates to multiply fivefold (Epstein, 2005 ;Patz 2006).

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Fueled By HUNGER

By John McGreevy

The lack of environmental education in the rural Haitian village of Layaye seems quite obvious and disheartening to outsider observation. Without any infrastructure for trash disposal, women gather the week's garbage from the church yard, loading it into piles with wicker brooms.

The Interconnection of Charcoal Production And Chronic Hunger in Rural Haiti

Outside the capitol city, meandering roads and rivers follow the contours of the rural countryside. The land, once covered in dense tropical rainforest, is now deforested and barren.



Above: The daily burning of plastics and other trash releases smoke from Layaye's center

The resulting conglomeration of soda bottles, plastic bags, and styrofoam packing peanuts is burned on the side of the dirt footpath as children run to church.

Mothers accept the water-borne parasites that fill their children's stomachs as unpreventable ails of daily life. Children take breaks from soccer games to use the "toilet," usually a five-gallon bucket in the next field. Unbeknownst to the majority of villagers, mismanagement of the environment contributes significantly to the prevalent hardships of rural Haitian life.

Layaye sits deep in the notoriously impoverished central mountains of Haiti: it served as the home base for my three-week study on solar oven implementation and its effects on life in the community. The simple ovens capitalize on the country's average 5.5 peak sun hours (full hours of sunlight on one square meter area) or 5.5 kWh/m², compared to around 4.5 in North Carolina (Ray and Cardell 2008). Countries with a shortage of fuel and an abundance of sunlight have seen successful implementation of solar ovens for cooking, baking, and water purification (Haraksingh 2001; Karekezi et al. 2002; Wilson and Green 2000).

Distribution and demonstration of the ten solar cookers to local families allowed for valuable observation and informative conversations with the women of the area. Through these home visits

and meetings with village elders, trends in fuel use became apparent. Wood and charcoal are Haiti's primary sources of cooking fuel and are declining in availability. Fuel wood is also expensive, costing roughly 30-40% of the average Haitian household income (Tucker 2002).

During my first visit three and a half years ago, the priest and leader of the area informed me that mangos were a staple food for the community and people refused to cut them down for any reason. Since that time, poverty-stricken locals have felled many fruit-bearing trees for fuel, including multiple large mango trees. After felling mango trees, men place the giants underground and slowly burn them for two to three days. These subsistence farmers, who make well under a dollar a day, then bring the finished charcoal to cities for sale. The little cash they receive is used for more substantial food, clothes, and medical supplies, when such items are available.

In rural Haiti, the loss of a few trees oftentimes results in immediate hardship. The significant deforestation in Layaye came to light after two weeks of daily interaction with a 19-year-old orphan, Elisson, from the nearby town of Hinche.



A local girl Meeka (*Above*) and a subsistence farmer (*Below*) eat rice and beans after a solar cooker demonstration.

In response to an informal inquiry about the impact of losing trees for cooking fuel, Elisson replied with a heavy accent, "This tree cut down, it is mango. It belongs not to the man who cut it but to everyone. He is hungry. He cut to make charcoal and sell for food."





No simple solution exists to the complex issues of poverty and environmental degradation in Haiti, but understanding the ramifications from these issues allows for steps to be made in the direction of sustainable progress. Implementation of simple solar ovens and high-efficiency stoves requires less fuel wood for cooking in Layaye. These initiatives do little to stifle the sale of charcoal however, and widespread promotion of sustainable practices is essential to combat the growing concern of malnutrition in rural Haiti.

Three and a half years had passed since my first visit to the rural village of Layaye, and my most recent, longer stay in the Haitian countryside brought forth a frenzy of emotions. Amongst the palm-draped huts and meandering headwaters I found relief in the simple, genuine nature of life and loathing for the ever-present struggle for sustenance. Nonetheless, the environmental issues plaguing Layaye villagers were distinctly powerful in themselves. After all, it is those issues that repeatedly bring hardship to people who have taught me so much, and whom I have grown to love deeply. 🙏



The technically “sustainable” energy of fuel wood is environmentally detrimental when not renewed, and little to no timbering regulations exist in Haiti. Some studies have shown that nearly 600 square meters of forest area per person are needed in order to sustain entirely wood-based cooking practices. The high demand and the low supply

“For me... two, three weeks I walk and eat only mangos I find on ground. They are for everyone to eat. But now, it is hard.”

of cooking fuel burdens the people of Layaye (Burkhardt 2006). As my research deepened, the impact of this became harder to stomach. “I go to school in Hinche. Me, I have no family and so I have no food,” Elisson quietly spoke during one moonlit evening conversation. “For me... two, three weeks I walk and eat only mangos I find on ground. They are for everyone to eat. But now, it is hard. Trees in Hinche are cut for burning, and food is hard to find.” The sentiment was not unique to Elisson, but the villagers consider the trees public and nothing is done to prevent their removal.



Above: After three days of slow-burning, the mango charcoal is ready

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John McGreevy is a senior double major in biology and environmental studies and a member of the 2010 Periclean Scholars. He performed research on renewable resources in rural Haiti and worked to continue the developmental partnership between the village of Layaye and The Cathedral of the Immaculate Conception from Memphis, TN in January 2010. John’s long-standing passion for the environment and the impoverished is influenced by such classics as *50 Things Kids Can Do To Save The Earth*, *The Good Book*, *The Very Hungry Caterpillar*, and his parents.

WHO'S COUNTING?

Martha S. and Carl H. Lindner III Hall Receives LEED Gold Certification
By The Elon Office of Sustainability



Lindner Hall anchors the Academic Village and Elon College, the College of Arts and Sciences. It is the first building on Elon's campus to pursue LEED certification. LEED stands for Leadership in Energy and Environmental Design and is the nationally recognized benchmark for sustainable design and construction. The LEED system was created by the United States Green Building Council (USGBC), a non-profit organization working to make green buildings available to everyone within a generation.

Construction on Lindner Hall began in the spring of 2008 and was completed in May 2009. Gold certification was awarded in the fall of 2009. Many sustainable features contributed to Lindner Hall's Gold certification. The chart (pg 29) and items below are some of the highlights. Visit the Sustainability Web site to learn more about Lindner Hall at <http://www.elon.edu/sustainability>.

- Renewable energy: photovoltaic panels and a solar water heating system provide a portion of the building's energy needs reducing the need for fossil fuel based energy.
- An interactive display with real-time energy usage information.
- The automatic irrigation system outside Lindner is entirely supplied with reclaimed stormwater.
- Occupancy sensors turn off lights when rooms are not in use and high efficiency light-emitting diode (LED) technology is employed.
- Based on cost, 25% of the building materials contain recycled content.
- The structural steel used in the building contains 93% post-consumer recycled content.
- The drywall is 95% pre-consumer recycled content and 5% post-consumer recycled content.
- Based on cost, 30% of the building materials were regionally sourced.

The LEED system includes six different areas: Sustainable Sites, Water Efficiency, Energy and Atmosphere, Materials and Resources, Indoor Environmental Quality and Innovation and Design Process. Each area has a certain number of available points. The total number of points received determines which level of certification a building earns. The LEED system utilized for Lindner Hall was LEED for New Construction and Major Renovations (LEED-NC) Version 2.2, which has a total 69 possible points. There are four levels of certification. Lindner Hall received 40 points and thus a Gold certification.

Sustainability Facts

Martha S. and Carl H. Lindner III Hall

Building Use	Classrooms and Offices
Size	35,590 SF

LEED for New Construction Rating (out of 69 possible points)

Total Score	40
Sustainable Sites	7
Water Efficiency	3
Energy & Atmosphere	9
Materials & Resources	6
Indoor Environmental Quality	10
Innovation & Design Process	5
Certification Level	Gold

Energy Efficiency	27%
Carbon Emissions Avoided	48 tons/yr
Water Efficiency	49%
Landfill Diversion	95%
Green Space Provided	1.19 acres

Project Team Profile	
Owner	Elon University
Architect	Spillman Farmer Architects
Engineers	Edmondson Engineers
Contractor	J.H. Allen, Inc.
Landscape Architect	McBride Hess Design Group
Commissioning Agent	Commissioning WorCx



Online Media Portrayal of Climate Change

*An Analysis of CNN and BBC Coverage
Preceding the 2009 Intergovernmental Panel on Climate Change*

By Jess Sikking

Introduction

In recent years many environmental concerns have become global concerns. Issues associated with the environment such as carbon emissions, pollution, and nonrenewable versus renewable energy, attract both national and international media attention. The ways these issues are portrayed in the media can have a significant impact on how audiences interpret and respond to these issues. According to Robert Cox (2010), “A similar set of facts may be perceived quite differently when editors chose dramatically different media frames for stories” (p. 163). I decided to investigate how BBC news, the world’s largest broadcasting corporation, and CNN news, a world leader in online news and information delivery, frame issues regarding climate change and carbon emissions.

Media Framing

Media “frames” are the central organizing themes that connect different aspects of a news story (e.g., quotes, leads, narrative structure, etc.) into a coherent package to suggest what is at issue (Cox, 2010). Framing analyses examine how the media

includes, excludes, and organizes information about an issue and forms the selected information into a package for an audience to understand. Not only do frames allow journalists to organize and make sense out of the infinite universe of potentially available information (Karlberg, 1997), frames also serve as a tool to “control public attention to an issue, manage scope of participation in a debate and define the nature of problem and what should be done” (Nisbet, 2010, p. 53).

Since many news outlets frame stories in similar ways, Nisbet (2010) delineated a generalizable typology for media frames, which he asserts can be applied across many science-related issues, including climate change. For my analysis, I examined the dominant frames used within the BBC and CNN articles according to frames discussed by Nisbet (2010) and Karlberg (1997), namely the adversarial frame, economic reductionism frame, technological development frame, and social progress frame.

Adversarial frames are devices used to frame conflicts between two or more groups involved in environmental

conflicts. This type of framing device is characterized by two specific features: 1) dichotomy and duality; and 2) extremism and confrontation. The dichotomy and duality feature pits two sides against each other, while extremism and confrontation dramatizes conflict issues, stressing the extremes of that issue (Karlberg, 1997; Nisbet, 2010). The economic reductionism frame reduces environmental issues to economic terms. This frame organizes environmental issues using a cost benefit analysis. The technological development frame focuses on technological advancement coupled with environmental improvement. Finally, the social progress frame focuses on improvements to the environment caused by changes in society constructs (Nisbet, 2010).

The implications of such framing for climate change are important to consider. Media frames organize issues so that they are manageable for readers; however many times these frames can lead readers to develop certain opinions about the environmental issues. According to Nisbet, frames are meant to “serve as a valence-neutral organizing device for arguments and interpretations,



meaning that it may lead to pro-issue, anti-issue, and neutral positions, but in some cases one position may be expected to surface with more frequency” (2010, p. 53).

Other identified characteristics

In addition to examining the dominant frame, I also determined whether these articles were obtrusive or unobtrusive and proactive or reactive. Media coverage of obtrusive events occurs when news stories present information in such a way that it demonstrates a significant impact on a specific population; unobtrusive media coverage, on the other hand, presents stories in such a way that the events seem “remote from one’s personal experience” (Cox, 2010, p. 157). Reactive coverage is episodic, reporting on events after they occur; proactive coverage focuses on long-term trends, presenting information that educates and/or warns readers about an impending issue (Cox, 2010).

Issues such as climate change involve “diffuse and drawn-out processes” and often lack visual quality (Cox, 2010, p. 162). Thus, climate change may be seen as a nonissue by media because of its relative invisibility. As a result, media are often forced to report this and other environmental issues in sensational ways, dramatizing events for newsworthiness in order to pass through editorial and network gatekeeping channels. It often falls to journalists to gain public attention about important issues that aren’t necessarily affecting a large number of people

in a visible way or issues that do not attract public attention on their own (Cox, 2010).

The Issue

Climate Change and Carbon Emissions

Reducing carbon emissions is a major concern for citizens around the world and policy makers in the political, economic and environmental sectors. According to the Earth Policy Institute, worldwide carbon emissions from burning fossil fuels have surpassed 6.5 billion tons. The amount of carbon in the atmosphere has increased from 280 parts per million (pre-industrial revolution) to 370 parts per million (today’s amount), a 32 percent increase. The atmospheric concentration of carbon dioxide has increased 1.5 ppm a year within the last 20 years. The increased level of CO₂ in the atmosphere and the presence of other greenhouse gases (GHG) traps more of the earth’s heat which causes global temperatures to rise. Even though the atmosphere has the capacity to constantly “fix” carbon, the atmosphere can only fix so much. As CO₂ emissions continue to increase the rate of capacity to fix carbon continues to decrease. According to many scientific findings, the rising temperatures are “responsible for melting ice, rising sea levels, and a greater number of more destructive storms” (Eco-Economy Indicators - Carbon Emissions- Carbon Emissions Climbing| EPI, 2009).

To gain support for the reduction of CO₂ released

into the atmosphere, the public must be aware of its effects. Understanding carbon emissions, where they originate, and the side effect of increased CO₂ levels, are important issues to address. The media have the potential to raise the salience of such issues among the public, thus it is important to investigate if and how the media present this information to the public, and if so, what frames are used.

Methods

This study analyzed how CNN News online and BBC News online framed environmental news stories within the three months preceding the Intergovernmental Panel on Climate Change (IPCC) at the United Nations Climate Change Conference in Copenhagen, Denmark, in December 2009.

Sources Investigated

BBC is a public service broadcast network whose goal is to inform, educate and entertain (BBC, 2010). BBC has 8 television channels plus regional programming, 10 national radio stations, 40 local radio stations, an extensive website, and is funded by a license fee paid by UK households. BBC World Service and BBC Worldwide are also part of the larger BBC Corporation. BBC World Service is funded by a government grant and broadcasts to the world through radio, television and online in 32 different languages. BBC Worldwide is the commercial segment of the corporation. According to its website, BBC has

an extremely diverse audience and therefore must frame information to suit an audience pool of varying political beliefs, social constructs, and educational levels.

CNN is headquartered in Atlanta, Georgia, and provides news from around the world. CNN has a large global team of news professionals that work to deliver breaking news and information via online and television. The broadcasting network uses a variety of multimedia technologies including live video streaming and audio packages. In 2009, Nielsen Cume rated CNN as the U.S.'s number two cable news network ("The State of the News Media," 2009).

Sampling Period

The IPCC was held in December 2009. I analyzed articles published from September 2009 through November 2009 from BBC News online and CNN News online. I selected this time frame because I wanted to analyze how a national news organization compared to an international news source regarding coverage of climate change preceding a major global climate conference. Also, I chose to analyze online news stories because according to a recent Pew Research study, more people are acquiring their news from online sources (Pew, 2008).

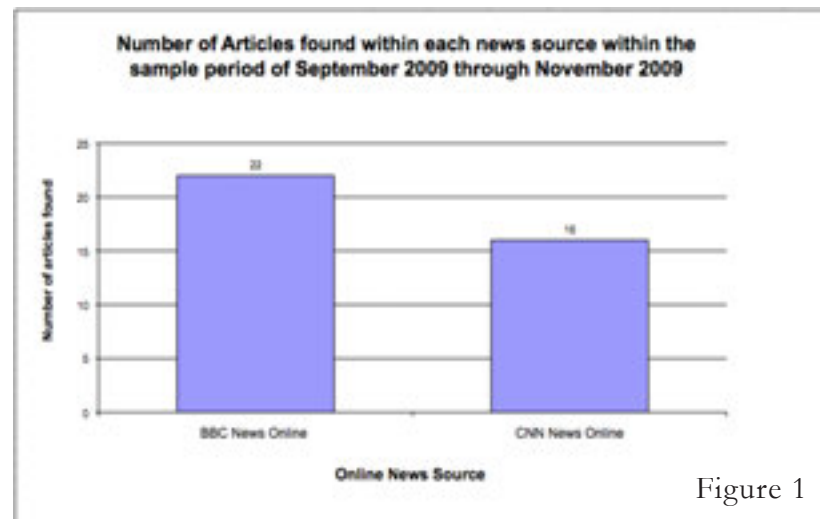


Figure 1

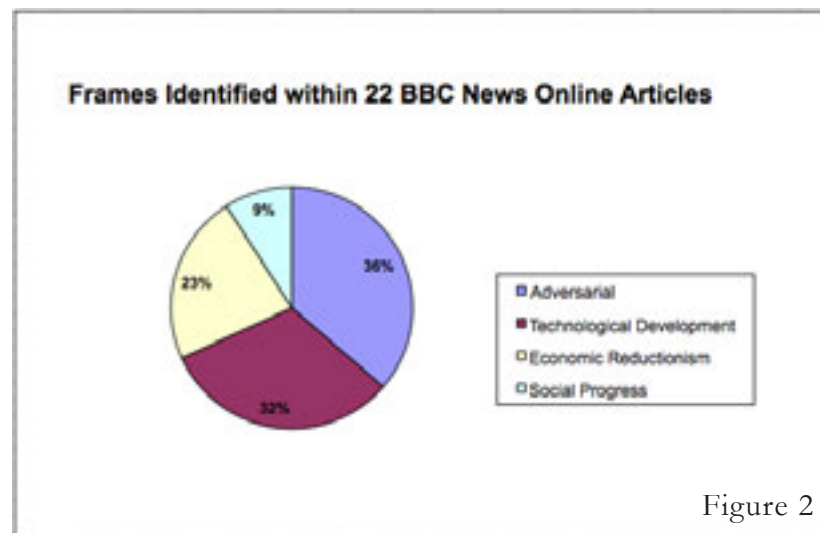


Figure 2

Search Criteria

In the search engine from each news source, I searched for articles that focused on "climate change" and "carbon emissions" and only selected articles for investigation that discussed these topics specifically.

Data Analysis

I coded the length of all articles, and then categorized articles according to their dominant frames: adversarial, economic reductionism, technological development, or social progress. I also analyzed whether the articles were obtrusive or unobtrusive and proactive or reactive.

Results

Within the 3 month sample period, CNN published 16 articles and BBC published 22 articles that focused on climate change and carbon emissions (See Figure 1). The average length of CNN articles was 660 words compared to the average length of BBC articles which was 500 words. There were no significant differences between CNN and BBC articles regarding the dominant frames, or in whether the articles were unobtrusive or obtrusive, reactive or proactive. The majority of the articles from CNN and BBC had an adversarial frame, were unobtrusive and were reactive. Figures two through seven demonstrate these similarities.

Discussion

During the three month sample period for each news organization, BBC and CNN had similar results in terms of length,

dominant frame, and other characteristics of the coverage (reactive versus proactive, unobtrusive versus obtrusive). Overall the research suggests BBC and CNN structured their stories in similar ways. The data suggest that BBC and CNN both used four specific frames; adversarial, technology development, economic reductionism and social progress, to organize their stories. Most important to consider is the fact that both BBC and CNN both used the adversarial frame most frequently. According to Karlberg (1997), the adversarial frame has the potential to limit public understanding of environmental issues. This frame, because of its tendency to dichotomize issues, may inhibit public awareness about environmental issues and stunt the public's connection with the natural environment. With the limited number of perspectives presented to the public, audiences may be unable to develop a complete understanding of very complex issues, in this case climate change. Other viewpoints are extremely valuable when it comes to environmental issues.

This type of frame also amplifies positional demands from two sides, usually 'pro' environment versus 'anti' environment. In reality no one is truly against the environment; instead there are many convoluted reasons why environmental degradation and other such issues occur. Whether that is economical or societal, those issues tend to forgo mentioning and therefore lead the public to develop latent opinions about the two sides. Adversarial frames

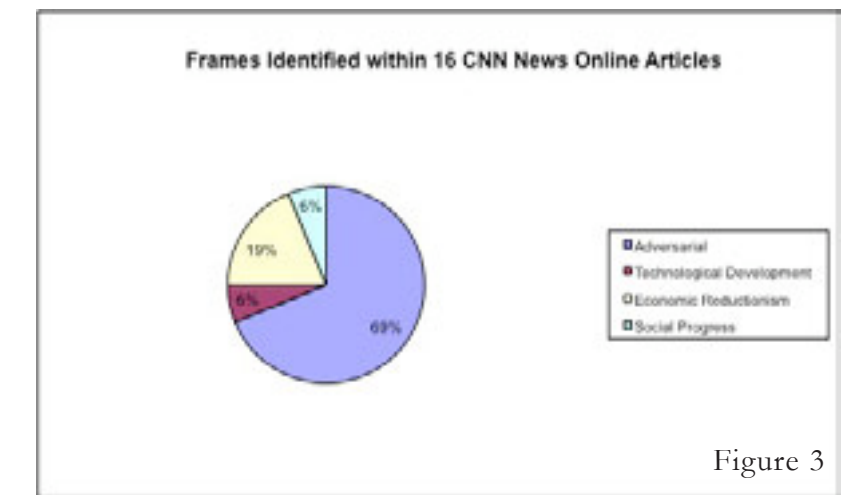


Figure 3

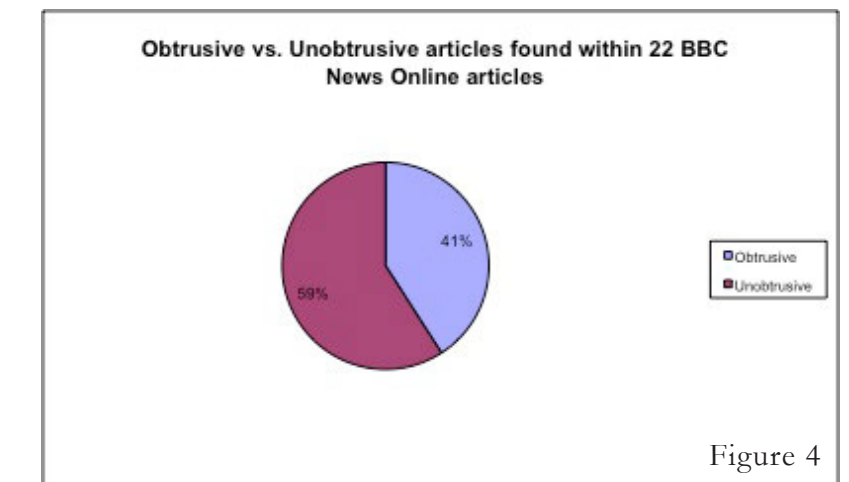


Figure 4

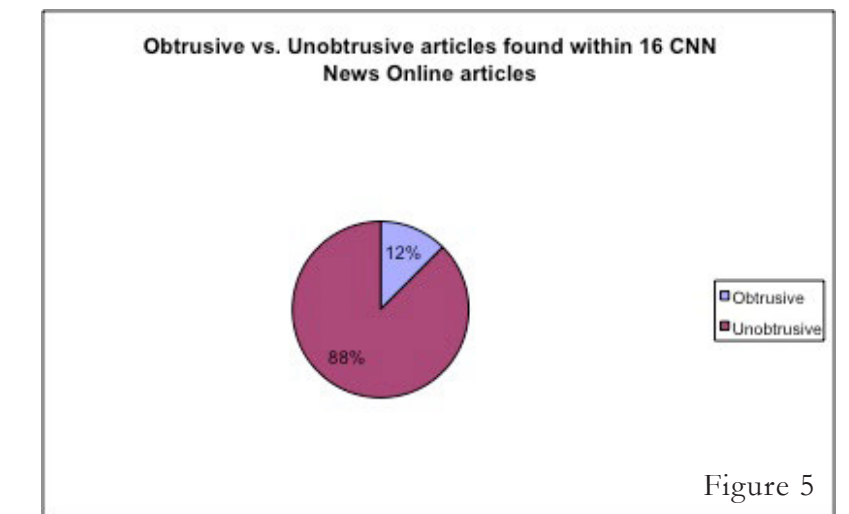


Figure 5

provide a narrow and limited view of environmental issues, frames amplify mass media polarizing individuals and social groups. This could cause a further misunderstanding and prejudice toward climate change issues. According to Cox, adversarial frames amplify mass media discourse that is most destructive in interpersonal communication and relationships (2010).

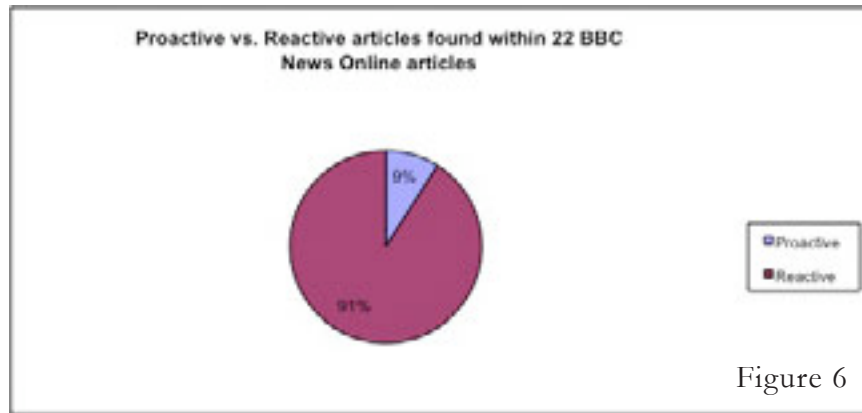


Figure 6

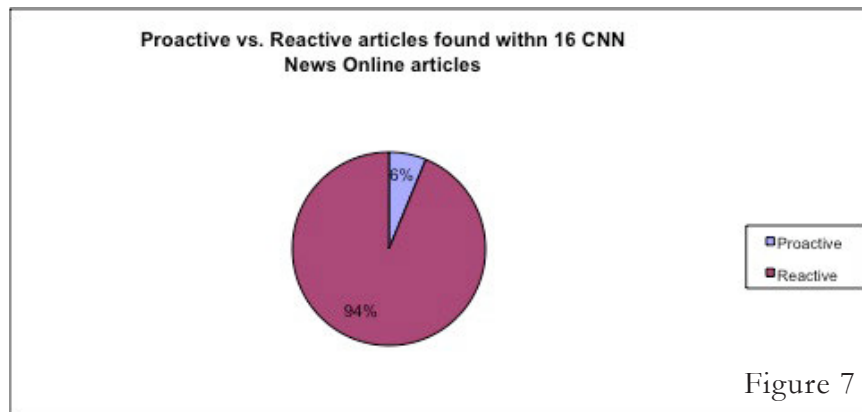



Figure 7

It is also important to recognize the implications of the obtrusive, reactive nature of the coverage, including the potential for the media to foster society's habit of being reactive rather than proactive when it comes to climate change issues. The findings from this preliminary investigation suggest climate change, like many other environmental issues, is most often covered when it can be connected with an actual event rather than warning readers about potential risk. In many instances environmental warning signs appear unobtrusively, such is the case with climate change, but will later have an obtrusive impact. It is important to consider the media's potential role in avoiding hazardous situations and perhaps even preventing environmental disasters through obtrusive and proactive reporting that educates

on pending issues and warning signs.

Despite the shrinking news hole and the gatekeeping responsibilities, BBC News and CNN News, like many news organizations, are striving to capture the essence of issues from a variety of perspectives. The media environment faces many obstacles – time, space, news value and endless amounts of information. It is my hope that the media will understand their global value and strive to create unbiased, fair and newsworthy stories in hopes of becoming vehicles of change and progress. Including a diversity of perspectives within news articles provides readers with more than a dueling perspective on environmental issues, helping the reader more carefully and critically examine an issue and

providing a broader context for understanding an issue. 

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Author Bio

Jess Sikking is a senior Environmental Studies major with a minor in Communications. This research started during the fall semester of 2009, and she has worked on it ever since.

Solar Cooking Around the World

By: Kristin Schulz

In the first few semesters as members of the Periclean Scholars Class of 2010, the students learned a great deal about international development and what it takes to make a project effective and sustainable. Each class of students in this organization takes on an individual development project in the country of focus – in this case Ghana, a West African country about the size of Oregon. The academic courses taken teach the Pericleans about the unique culture and issues in the focus country and empower them to work together with community partners to promote positive change.

In fall 2008, the 2010 class of Periclean Scholars was assigned a research project on an issue of choice in the region. The author and her research partner, John McGreevy, were particularly interested in learning more about Ghana's environmental concerns and how those impact rural Ghanaians. An extensive paper was written on viable alternative energy solutions for the country and the two presented their results at SURF in April 2009, as well as published the paper in the 2009 issue of Visions magazine. The author's interest in renewable energy technology and development projects was piqued when she read an article in Parade magazine in February 2009 that introduced her to solar cookers. The story described how women

in refugee camps in Chad, the very ones housing those escaping the genocide in Darfur, were using tinfoil-covered cardboard structures to boil water and cook food. The concept is simple: place food in a covered black pot and then in a plastic oven-bag to help retain heat; then place the pot on the reflective surface where it absorbs the sun's UV rays in a greenhouse-like effect converting the sun's energy into heat to effectively cook the food (a thermometer can be used to measure the temperature inside the pot). This inexpensive, easy-to-use technology was quite literally saving lives as it prevented refugees from having to leave the camps in search of firewood taking the risk of being attacked or raped.


Fascinated by the pure ingenuity of this solar cooking initiative, the author began to research more about what can be done with solar cookers. These basic structures actually have a plethora of benefits: food retains its nutrients and will not burn or stick to the pot, no money has to be spent on cooking fuel, there is

no risk of smoke inhalation, and water can be pasteurized providing an easily accessible supply of safe drinking water. Research from her Periclean Scholars assignments taught the author that deforestation was a major issue in Ghana and that firewood is becoming increasingly difficult to find. Furthermore, Ghana receives high rates of UV rays all year long. It was clear that solar cooking could be quite effective in the Ghanaian partner communities and soon the author began brainstorming how to introduce this technology to the Pericleans' friends in Ghana.

Extensive collaboration with Dr. Brian Digre (leader of Elon's winter term program in Ghana) led to the plan to introduce solar panel cookers to a few rural Ghanaian villages during the 2010 January course. In conjunction with a Ghanaian university and technical school professors and village chiefs, preparations were made to offer local workshops in the communities that would be visited by the winter term course. Dr. Digre's students would be the



workshop leaders. The next step was to teach the Elon students about solar cooking and prepare them to lead these in-country workshops. After the author led a number of sessions with the Ghana winter term class, these students were ready to lead their own demonstrations. Money was raised to buy 16 CooKit kits from Solar Coolers International, which the students brought to Ghana in their luggage. A few Ghanaian families received two kits, each including the cardboard cooker, a pot, a few oven bags, a water pasteurization indicator (or WAPI), and informational material.

The community members in Ghana seemed very excited about the CooKits. Dr. Brian Digre believes the technology could be most useful in the dry, northern region of the country and in urban areas where access to firewood is most difficult. The author is continuing contact with the local leader to determine if solar cooking will be a realistic option for the communities long-term. If the reaction is positive and demand for the technology increases, this initiative with the Ghana winter term program will continue and expand in coming years. One of the technical schools is already talking about making their own solar cookers which will be much cheaper and available to even more families. There is tremendous potential for the future of this initiative and the author looks forward to continuing working with the Ghanaian communities on exploring the future of solar cooking in Ghana. 

Waste-to-Energy Incineration

The Viability of Incinerating Over Land Filling For Municipal Solid Waste

By Samuel Shoge

The Problem

Every year, American's dispose of hundreds of pounds of refuse, equaling 4.5 lbs per person per day, twice the amount the average European and Japanese citizen throws away (Hinrichs, 2006). Even with such high disposal rates, the amount of solid waste generated is growing at a rate of 1.2% a year (Hinrichs, 2006). This large and ever-expanding waste stream poses a formidable economic and environmental challenge. Waste management constitutes the fastest growing segment of a municipality's budget. For the majority of local governments around the nation, solid waste management ranks behind only schools and highways as the major budget item (Hinrichs, 2006).

Besides money, much more is at stake when it comes to landfills – environmental pollution, water quality deterioration, space limitations, landfills reaching full capacity, public opposition hindering new site development, loss of valuable resources – and many other issues are being raised by citizens, legislators, regulators, and public officials (Qasim, 1994).

Sanitary landfills are the most widely utilized method of solid waste disposal around the world thanks to relatively low costs of land and lower start up and operating costs of landfills

over incinerators. With increased use and public awareness of this method of disposal, there is much concern with respect to the pollution potential of the landfill leachate (Qasim, 1994). Leachate is produced when water filters downward through a landfill, picking up dissolved materials from the decomposing waste ("Landfill Leachate," 2009). Depending on the composition and extent of decomposition of the refuse and hydrological factors, the leachate may become highly contaminated. Generally, leachate has a high biochemical oxygen demand and high concentrations of organic carbon, nitrogen chloride, iron, manganese, and phenols. Many other chemicals may be present, including pesticides, solvents, and heavy metals ("Landfill Leachate," 2009). As leachate migrates away from a landfill, it may cause serious pollution to the groundwater aquifer as well as adjacent surface waters. There is growing concern about surface and groundwater pollution from leachate.

The Solution

WTE incineration is the controlled burning of solid waste at extremely high temperatures, often as high as 2000°F. WTE incineration should not be confused with simple open burning

of refuse or the more widely used mass burn incineration used in the first half of the 20th century in the U.S. In a WTE incinerator, the heat generated by the process is captured and turned into usable energy by boiling water and converting it into steam. The energy produced can be used either in the form of steam for proximity heating or in the form of electricity produced by steam turbine generators. Incineration of MSW does not completely eliminate, but does significantly reduce, the volume of waste to be land filled. The reductions are approximately seventy-five percent by weight and ninety percent by volume (Rand, 2000).

The incineration of solid waste fulfills two purposes in the advanced waste management system. Primarily, it reduces the amount of waste for sanitary land filling and it uses waste for energy production (power or district heating). Hence, waste incineration plants are generally introduced in areas where the siting of sanitary landfills is in conflict with other interests such as city development, agriculture, and tourism (Rand, 2000).

The Drawbacks


Although WTE facilities have several advantages over landfilling, economics has really hindered the development of these facilities. Waste incineration involves high investment costs, operating, and maintenance costs; therefore the resulting net treatment cost per metric ton of waste incinerated is rather high compared to landfilling. Depending on the actual costs (which are sensitive to the size of the plant) and revenues

from the sale of energy, the net treatment cost per metric ton of waste incinerated will normally range from \$25-100 with an average of about \$50 (Rand, 2000). Depending on the quality of the leachate control and gas extraction, the net cost of landfilling ranges from \$10-40 (Rand, 2000).

Furthermore, there is some debate regarding the landfilling of the slag that is a by-product of incineration. The amount of slag created is dependent on the ash content of the waste. In the combustion process, the volume of waste will be reduced by approximately ninety percent and the weight by seventy-five percent. This slag (the remaining residual component after incineration) may contain high levels of heavy metals (cadmium, mercury, lead, etc.) and other toxins harmful to humans and the environment. Because of the potency of the slag in regards to toxicity, the slag that is hauled from the WTE incinerator may add serious stress to landfills where it is disposed. The leachate from a landfill containing slag may potentially be much more toxic than common leachate. However, with an increase in technology and efficiency, modern plants will to some extent vitrify (change into glass) the heavy metals in slag, rendering it insoluble. Much of the slag may therefore be used as road construction material or something similar after sorting (Rand, 2000).

Conclusion

When it comes to trash today, society is faced with an interesting dilemma. There is less space available for new landfills and as tipping fees for existing

landfills continue to soar, a new system for handling our waste is needed. WTE incineration presents the solution to our trash dilemma and has a bright future. There are currently over 100 operating WTE plants in the U.S., but many more are needed to reign in what appears to be a runaway waste stream. Economics will soon boost the appeal of WTE facilities in the near future because the price of treatment per metric ton is reaching an equilibrium point as landfills continue to close around the nation and proposed legislation, such as the Solid Waste Interstate Transportation Act, limits the amount of waste that can travel along the nations roadways. 

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Alternative Transportation at Elon

ENS Senior Seminar Assessment of Student Modes of Transportation and Recommendations to Reduce Transportation Carbon Footprint

By Alison Brooks

Project Conducted By Nicholas Dioguardi, Kelly Fieldhouse, Katrina Folsom, Phil Karavlan, Jackie Koehn, Jordan Lerew, Casey Pickler, Alison Brooks, and Kristin Williams

During the fall semester of 2009 one of the projects of the Environmental Studies Department senior seminar, Environmental Impact Assessment and Policy (ENS 461), was to analyze the methods of transportation currently used by students and to make recommendations as how to reduce Elon's carbon footprint caused by transportation. This project was a charge of Elaine Durr and the Elon University Office of Sustainability. The Office of Sustainability wanted to know more about the current attitudes and transportation patterns of university students and why the current alternative modes of transportation were not being used more often. This was a large task and was broken down into many alternative forms of transportation, including Biobus ridership, bicycling, and carpooling. Additionally, we conducted surveys and held focus group sessions to assess the attitudes of students

toward alternative modes of transportation.

From the focus group and surveys, it appears the biggest barriers to using alternative forms of transportation are the lack of infrastructure and the ease of accessibility to single occupancy vehicles (SOVs), indicating that it is easy to use SOVs and there are barriers to using alternative modes of transportation.

Bicycling is a low impact form of transportation and is one alternative form of transportation that the Office of Sustainability would like to promote. Currently Elon has a bike rental program through Campus Recreation, and it offers 100 bikes per semester to be rented out. However, the bikes are often in a state of disrepair and are rented out in a matter of hours. To further assess the bicycle usage on campus GIS mapping of

the 74 bike racks on campus was conducted. The most popular racks on campus were at Belk Library, Koury Business Center, Moseley Building, and McMichael Science Building. One of the biggest barriers to bike riding on campus is the lack of bike paths and bike lanes for bicyclers to move around safely. Currently Elon has no bike lanes on the roads or bike paths inside campus, forcing bicyclers to either try to share the road with motorists or dodge pedestrians on campus.

In the focus group, many students also indicated they felt unsafe at night riding their bikes in the dark; weather also plays a part in their willingness to ride their bikes. Participants also indicated they wanted more covered racks on campus to protect their bikes from inclement weather.

Another area that we looked into was the Biobus routes, specifically the Westline and Outer Loop. These routes are designed as an alternative means of transportation for



those who live at University Ponte, Campus Trace, Partners Place, Phoenix Arms, Provence, The Crest, Oak Hill, Elon Place, Lawrence Street, Partners Place, Trollinger Apartments, and West End Apartments. In interviews and surveys with Biobus riders, non-riders, and drivers, there were several barriers found with the design of the bus routes. Of the surveyed students, only 10% utilized the Biobus as the primary mode to getting to campus; 28% utilized the Biobus in conjunction with another form of transportation, the most popular combination being riding the Biobus and driving. The common barriers for students were issues with the time the bus came, consistency, drop-off locations on campus, and feeling uncomfortable riding the bus with only a few people. The Biobus drivers also pointed out that the consistent left turns of the route were dangerous, for pedestrians as well as other motorists, which highlights a need to redesign routes for fewer such turns.

The last area of transportation that we examined

was carpooling. Currently Elon offers parking passes for the cost of \$180 for the entire year for students on campus and those who live outside of a certain distance of campus. Elon also has a Rideshare program under the E-net want ads but most of the postings are for one time trips to surrounding cities or to another state, not regular commuting. In order to get a better idea of the effectiveness of Elon's carpool system, Elon was compared to peer and aspirant schools. The average price for a parking pass at peer schools is \$160. This price is not adjusted for the location of the school, urban vs. rural, and other transportation infrastructure that may indirectly control carpooling.

Additionally, when Elon doubled the cost of a parking permit between 2007 and 2008, it led to a 42% reduction in demand for off-campus student parking permits. Many of the peer and aspirant schools offer incentives for people to carpool as well as easily accessible mechanisms for daily ride sharing. Duke University's parking permits for undergraduates, for example,

cost \$240.00. While this is almost double the cost of Elon permits, Duke offers discounts for carpoolers – a 2 person carpool is only half the cost of the permit for 12 daily passes per person, a 3 person carpool is \$4.00 per month per person for 12 daily passes per person, and a 4-5 person carpool is free and receives 12 daily parking passes per person. Duke also offers a carpool matching program where students can put in information about class times and frequency and be matched with someone with a similar schedule. Carpooling has much room for improvement; our research suggests the most effective and easiest means of change would be to increase the cost of parking permits to further discourage off campus residents who don't need them, and a redesign of the rideshare program to be more conducive for daily commuting.

The senior seminar transportation assessment revealed many areas of improvement for Elon's current transportation system, the most noted recommendations being: improved infrastructure for bikes, a reorganization of the Biobus routes, and increased cost of parking passes to reduce SOV usage. It is understood that some changes are more easily implemented than others. The assessment of these areas of change, however, is the first step to reducing Elon's carbon footprint. 🌞

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Water Use and Conservation in North Carolina

By Katrina Folsom

Introduction

Water is a vital element of life and its availability is a major global concern, especially in areas facing pressures of population growth and drought. Although North Carolina's water supply has historically been secure compared to areas like the arid Southwest United States, recent droughts and a rapidly growing population have shattered this security. Extended droughts were recorded in 1998-2002 and 2007-2008 (North Carolina Division of Water Resources). During the summer of 2007, water shortages became pressing in Raleigh when Falls Lake, the city's primary water source, was reduced to less than 100 days of water supply. In the Appalachian Mountains, wells and springs have been running dry with increasing frequency, and some homeowners who have drilled new, deeper wells have failed to reach water (Mitchell, 2008). Despite these recent and recurring drought patterns, North Carolina has generally been underprepared to manage dire water shortages, partly due to a lack of adequate data and research on water use and conservation. This study addresses this need by examining trends in residential water use (a component of total public water use; see Figure 1) and analyzing conservation policies.

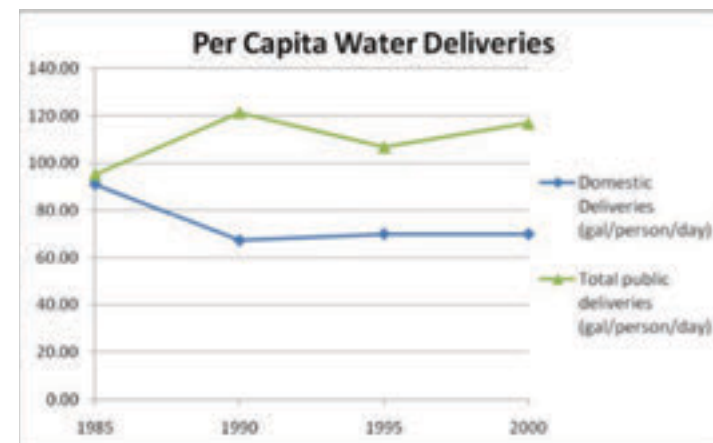


Figure 1: This study focuses on domestic/residential deliveries from public water supplies, which are a subset of total public deliveries that include commercial uses. Public supplies also exclude all self-supplied water from wells.

Background

Between 2000 and 2006, North Carolina grew 10.1 percent, a rate which is 56 percent higher than the national average of 6.4 percent (U.S. Census Bureau 2000). As shown in Figure 2, as the state's population steadily increased, public supply deliveries increased from 460 million gallons per day (mgd) in 1970 to 945 mgd in 2000. The rise in deliveries is due to an increase in population receiving publicly-supplied water for 80 of the state's 100 counties (see Figure 3) and expansion of the area served by public water sources. Although total water use increased, for 61 counties the per capita domestic water use decreased between 1985 and 2005 (see Figure 4), most likely due to improved efficiency in devices such as low-flow toilets. On the other hand, over one third of NC counties maintained nearly the same per capita use or had an increase in per capita use, so success at decreasing per capita use has been mixed.

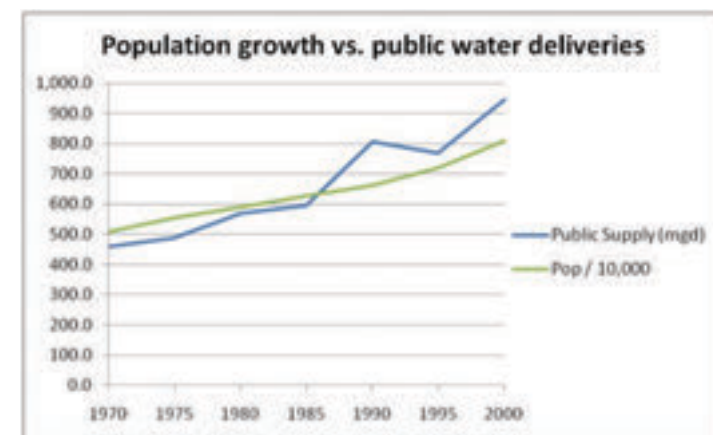


Figure 2: As the population steadily increased, total public supply deliveries increased correspondingly.



Figure 3: The population served by publicly-supplied water increased in the majority of counties, while remaining steady or decreasing in just 20 counties.

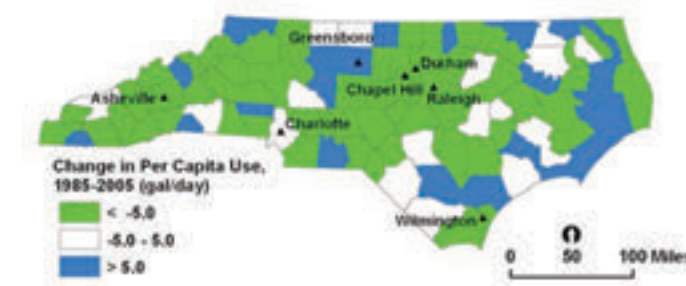


Figure 4: Per capita use decreased in 61 counties, but the rest either increased their per capita use or maintained nearly the same rates over the 20 year period.

Methods and Preliminary Results

The objective of this study is to 1) examine spatio-temporal trends in residential water use from 1992-2007, 2) analyze demographic trends that influence water demand, and 3) identify and critically assess existing water conservation policies. As the maps illustrate, there are differential patterns in water use across the state, leading us to seek explanations for these trends. First we collected water use data from local water supply plans and county-level USGS national Water Use Surveys, and demographic data from the U.S. Census. We then analyzed spatio-temporal trends within a Geographic Information Systems (GIS) and used regression and ANOVA analysis to evaluate geographic and demographic influences on water use.

According to the literature on the determinants of residential water use, higher income, larger houses, older houses, and larger landscaped yards are all associated with higher water demand (Renwick and Green 2000; Arbues et al. 2003; Campbell 2004; Fox et al. 2009; Harlan et al. 2009; Schleich and Hillenbrand 2009). Home ownership, on the other hand, is associated with lower water use compared to renting (Campbell 2004; Randolph and Troy 2008). The impact of age on water use is uncertain (Arbues et al. 2003; Campbell 2004; Schleich and Hillenbrand 2009).

While these trends in factors driving domestic use are evident in other regions of the U.S., we found limited statistical support to explain the variation in domestic use across North Carolina. This is most likely due to limitations of available data, including unreliability and a collection of data at too large of a scale for accurate analysis. At the county scale, statistically significant variables explaining variation in per capita water use were only found for counties

that are at least 25 percent urban. Three variables were weakly but significantly correlated with per capita water use: per capita income (correlation coefficient, $r = -0.33$, $p < 0.05$), percent exurban area ($r = 0.23$, $p < 0.05$), and percent rural area ($r = -0.50$, $p < 0.001$). These provide limited evidence that higher per capita incomes, less exurban housing densities (areas with large lot sizes outside of suburbs), and more rural housing densities might lead to reduced per capita use at the county scale. Similarly, at the smaller public water supply scale, significant but weak correlations were only found for the largest utilities (top 20 percent by population size). Percent suburban area ($r = 0.24$, $p < 0.001$), percent of the population with at least a bachelor's degree ($r = 0.12$, $p = 0.05$), and percent of owner occupied houses ($r = 0.18$, $p < 0.01$) were significant. However, these variables had very little explanatory power in regression models. Overall, the results were mostly inconclusive, in large part due to data limitations and variability in the populations across the state.

Following the statistical analysis of water use patterns, we conducted a policy analysis of water conservation policies commonly discussed in the literature and implemented in North Carolina. We identified five broad categories of policies and programs that are frequently studied and are evident in NC:

1. Pricing – Conservation-oriented rate structures, such as those that charge higher rates for units of water consumed at higher levels of use or charge more during the summer, provide a financial incentive to conserve water. The Environmental Finance Center associated with The University of North Carolina's School of Government found that on average, utilities in NC charging 10 percent higher rates have 3-4 percent lower residential usage (Eskaf and Hughes 2009).

2. Restrictions – Restrictions are typically put in place during severe droughts to curtail outdoor water use through bans on lawn watering or car washing, for example, but some more progressive municipalities such as Cary, Raleigh, and Durham use year-round restrictions on irrigation (e.g., Alternate Day Watering systems) to promote consistent conservation habits.

3. Incentives - Installing more efficient showerheads, toilets, and faucets can reduce household water use fairly effortlessly over a sustained period of time, so many municipalities offer

incentives for this type of retrofitting. Incentives come in the form of free devices, discounted devices, coupons for the purchase of efficient products, and discounts on water bills with proof of installation.

4. Ordinances – Municipalities employ a variety of ordinances to encourage water conservation, which commonly include mandates for water-efficient devices in new buildings and irrigation-related requirements such as rain sensors that turn off sprinkler systems if it starts raining. The City of Durham and the Town of Cary also have year-round Water Waste ordinances that prohibit the direct watering of surfaces such as sidewalks or overwatering to the extent that water flows off the landscape into storm drains.

5. Education – Educational programs and the provision of information to the public are often considered necessary to teach and convince people to conserve, but their effectiveness is less certain than other policies because it is difficult to separate the impact of education from other more concrete programs. School presentations, marketing campaigns, brochures and online tips, home water audits, and workshops are common educational measures in North Carolina.

Future work will include analysis of the effectiveness of these policies as found by other studies, an analysis of the costs and benefits of each policy, and examples of each type of policy implemented by North Carolina municipalities.

Conclusion

Government and institutional leaders state clearly that North Carolina needs to prepare for increasing demands on water supplies, which requires, in part, useful and reliable data. However, this research found that the existing data on residential water use is at too coarse a scale for accurate analysis and, in some cases, appears to be unreliable. In order to facilitate crucial research and policy development, we recommend that new sources at a smaller scale – neighborhoods, but preferably households, which Kenney et al. (2008) found to be particularly useful – be developed. Also, data tend to be less complete and less reliable in smaller public water supply areas and rural areas, which typically have fewer financial resources and no staff specifically tasked with water use issues. Thus, we recommend that the state offer more support to smaller public water supply areas to enable more effective data collection and water

supply planning. Currently, the Division of Water Resources offers assistance to all public water supply areas as they compile and submit their Local Water Supply Plan, but the DWR itself lacks the staff and money to provide adequate help.

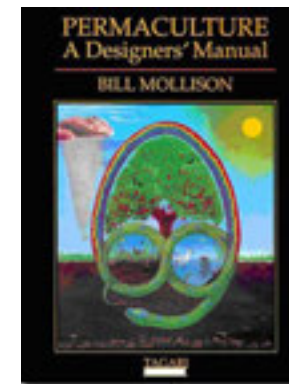
Given that North Carolina began collecting residential water use data in 1992, the state is ahead of many others that have no data to work with. However, the new reality of population growth and frequent droughts is creating pressure for North Carolina to collect more, higher quality data, as arid states in the Southwest U.S. have done for years. In fact, future research could focus on ways in which more experienced states could serve as a model for states newly affected by severe drought patterns. 🦋

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Bill Mollison's Permaculture: A Designers' Manual

A Book Review
By Joey Schmissrauter



"The philosophy behind Permaculture is one of working with, rather than against, nature; of protracted and thoughtful observation rather than protracted and thoughtless action..."

– Bill Mollison

Permaculture: A Designers' Manual, by Bill Mollison, is a book that gives people the tools and the knowledge they need to invest themselves in changing their world. Mollison, who wrote this book in 1988, reiterates the fundamental ways to redesign the way people live together in an ecologically sound, food-productive way.

Permaculture has been long in the making, ever since Mollison wrote *Permaculture Two* in 1979. The books revolve around architectural, agricultural, botanical, and socio-economic designs that help those in the process of creating adaptable farms or gardens. From desert to urban environments, Mollison and collaborators outline the possibilities for converting what would normally be considered unproductive land into diverse, prosperous food plots. *Permaculture: A Designers' Manual* includes in it the overall big picture of where most of our food comes from and the flaws that emerge from continuing on high-energy input methods of food production. One of the greatest features of the book is its detailed illustrations and designs.

Permaculture, or permanent agriculture, creates self-reliant and self-regulating designs for farming and foraging, such as the design for tending to chickens. The current practice of chicken production is carried out in a very energy-inefficient manner, by packing chickens into air-conditioned warehouses lit

by electric lights. This mode of chicken production revolves mostly around the production of eggs. As a result, most of the waste is hauled off and dumped somewhere never to be used. Seeing things through a permacultural schematic, we have the chicken tractor. Chickens placed in chicken tractors (mobile chicken coups) are free to go around pecking and scratching the soil, aerating it while also fertilizing it. There is no need to introduce chemical fertilizers into the soil, send off chicken waste, bring in food to feed the chickens, or use air-conditioned buildings that require high amounts of electric power (created through burning fossil fuels, which is still the principle source of electricity production in the U.S.). A permacultural design becomes apparent by assembling these 'variables' (organisms, what they need, what they make, etc.) into an interdependent, productive system.

I recommend *Permaculture: A Designers' Manual* to not only those that have an interest in agriculture, but really anyone who grew up in a household that hired other people to do work in their lawn and gardens. The amount of time, chemicals, and money that goes into stifling natural processes is accepted far more than it should be. The 'should' part of the last sentence is the best reason why a person can pick up and read through this book. *Permaculture's* greatest strength lies in its own foundation on an ethical imperative towards our environment, from which emerge the permacultural principles and methods on which we can interact better with both the living and inorganic world.

Permaculture is most effective as a farming tool when used in rural and suburban settings for small farms. In an urban setting, it would be interesting to see how cities could produce their own food using permacultural techniques by observing the needs, outputs, and basic qualities that cities have. For example, cities generate heat from asphalt and large numbers of people in a small space. What would it require to capture this heat and use it for food production? When you have a lot of people in one place, there are significant quantities of human waste and trash that are either dumped into nearby rivers or hauled off to a landfill. What would it take to return this 'waste' to useable means? Heat and waste can be very useful in growing edible plants, given that there is an intelligent design to loop these outputs back into a production system as useable resources.

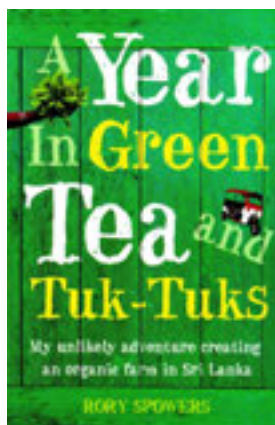
Permaculture originated with one man's inspiration to teach his vision and has evolved into a global community of education and environmental stewardship. There are permaculture projects all over the world, and there are Permaculture Institutes that have been founded to inform and educate those interested in lessening their impact on the environment, through a complex relationship with plants, animals, and even the contours of the land. Though it is an eye-opening manual that encourages learning about the big picture with agriculture and the possible dangers of the over consolidation of American food production in larger agribusiness firms, it also encourages reacting intelligently to one's own dissent with how the world currently works. 🌱

Rory Spowers' A Year in Green Tea and Tuk-Tuks

A Book Review
By Kate Vogt

A Year in Green Tea and Tuk-Tuks is a synopsis of the journey the British author Rory Spowers took to develop an organic, self-sustaining tea estate in Sri Lanka. With two small children in tow, Rory and his wife packed up everything and left cold and dreary Wales for the warmer Sri Lankan climate where they hoped to live within their own ecological footprint. Spowers' story covers everything from the difficulty of maintaining a self-sustaining tea estate to supervising workers of the farm to his personal use of traditional (ayurvedic) medicine.

At times, Spowers' passion and admiration of Sri Lanka was so apparent that the reader could have been



following a promotional tour guide book. There are endless examples of vivid description of the lush landscape and high biodiversity. As Spowers explores his sixty plus acres of land, the reader feels as though they too are discovering a new flower, ancient rock, or family of monkeys at every turn of the page. Possibly because of Spowers' desire to convey so many of these details, some sections seem to drag leaving the reader to wonder if a slightly shorter book would convey a more effective message.

One of the stronger points of the book is Spowers' realistic outlook on the gratification, but also complications, of maintaining a lifestyle within one's own ecological footprint. Taking advantage of the natural ecosystem of the abandoned tea estate, Spowers discovers new ways of moving the farm toward self-sustainability every week; he even builds a natural swimming pool. Readers will find many tips on living an environmentally sound lifestyle sprinkled throughout the text.

A Year in Green Tea and Tuk-Tuks clearly conveys the difficulties in taking on such an endeavor. Accustomed to the Western world, Spowers finds that bureaucratic work moves much slower in Sri Lanka. He also finds the law and logic to often be irrelevant in everyday ordeals. From purchasing property to working with neighbors to supervising his workers, nothing ever quite seems 'fair'. For this reason, any Westerner looking to do some work in or just visit Sri Lanka would find this book very helpful. One finishes reading Spowers' story with a greater sense of Sri Lankan culture and societal norms.

As a 2011 Periclean Scholar whose class project focuses on environmental education in Sri Lanka, Spowers helped me to understand the culture surrounding environmental projects in Sri Lanka and I believe his insights will prove useful as we continue our endeavors. He did an excellent job of portraying both the difficulties and satisfying progress of his journey which, in turn, I am able to relate to our own project. Overall a well-rounded and accurate reflection, *A Year in Green Tea and Tuk-Tuks* is recommended to anyone looking for inspiration to reduce their ecological footprint or with an interest in Sri Lanka as a whole. 🌱



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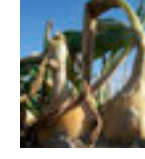
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