



# *Synergies*

A READER FOR REGIONAL SUSTAINABILITY

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**We explore the surprising connections that are all around us in our local community, the Lowcountry, and throughout the region.**

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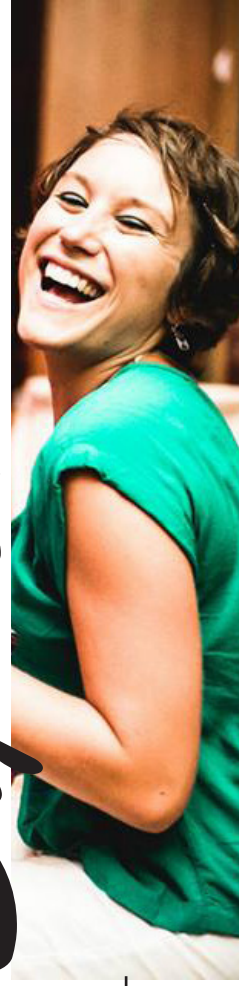
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## Students in Sustainability

### Composting in Schools: It's Elementary!

*Olivia Cohen*

Peanut butter and jelly, macaroni and cheese, kids and dirt: Some things just go together perfectly. With Charleston County School District's composting program, though, the relationship between young students and dirt is taking on a whole new meaning.

The composting program in Charleston County School District, or CCSD, began last year at the suggestion of Food Waste Disposal, a composting business serving the Charleston area. Wayne Koeckeritz, who owns Food Waste Disposal, approached the school district about creating a pilot program in 11 elementary schools to see if composting would work well in an educational setting.

Maggie Dangerfield, the Sustainability Coordinator for CCSD, recalled that Koeckeritz's timing was impeccable: CCSD had a strong recycling program in place and was looking for a new project that could make the district more sustainable. "We were looking for the next step to take that [waste] stream up a level, and then we had the opportunity because of Charleston County's composting facility and Wayne coming up and saying, 'I want to work with you.' It was the perfect storm."

Last year's pilot program not only recovered input costs, but also generated savings for the district. After the program's initial success, CCSD was ready to expand its efforts. "We really hit the ground running expanding this year, which was really great," Dangerfield said. They expanded the program to include 32 schools, the majority of which serve students in grades K through 5. All together, the schools account for 18,000 students, a threefold increase from last year.





*A pile of compost at the Bees Ferry Landfill Facility, where the compost is processed and stored. (Photo courtesy of Charleston County)*

The program's expansion did not reduce waste in every school, but it certainly made a difference. "We were able to reduce our waste service in I'd say 85 percent of the schools participating in the program," Dangerfield said. "I think next year, now that it's a well established program, any reductions that weren't made last year will probably be able to get made."

The program was so successful in part because of the school's triple waste stream of trash, recyclables, and compostables. "I thought it was pretty easy because they had different colors and labels for each bin," Paisley Stewart, a nine-year-old student at James Island Elementary School said.

Even more importantly than waste diversion, though, is the educational component of the composting program. By installing composting bins in elementary schools, Dangerfield hopes that students will develop composting as a life habit and skill. "I think generally students know exactly what goes in [composting bins] and I'd say most of them make the right choices and put things in the right place," Dangerfield said. "I think the knowledge base is definitely there."

Paxton Williams, age 13, certainly knows about composting from the program in which he previously participated at James Island Elementary School. "You take your leftovers and you dump it and you turn it into soil for better nutrients for plants," he said.

Some of that nutritious soil stays at the schools. "I'd say about 50 percent of our schools have gardens in some capacity," Dangerfield said, and those gardens can use the compost free of cost, making the composting program beneficial not only to the students' education, but also to their health.

As the program continues to expand in the coming years, Dangerfield hopes that it will make a positive impact in the lives of students. "We're teaching our students and we're not just having somebody do it for them. They're being empowered by having that knowledge and knowing what to do."



*The Greenheart Garden at Mitchell Elementary School in Charleston. About 50 percent of schools in the program have a garden. (Photo by Olivia Cohen)*





# Growing Up Fast with Slow Food: The Youth Community Action Club

*Olivia Cohen*

At 18 years old, both Mina Rismani and Grayson Frizzelle are well on their way to becoming experts in what is arguably one of the most important fields of the 21st century - food. These two young women, along with a dozen peers, spearheaded Charleston's first youth chapter of Slow Food International - the Youth Community Action Club, or YCAC.

Slow Food, which began in 1986, is an international movement that promotes healthy eating and living through sustainable use of the environment. Although headquartered in Rome, the organization functions through 150 grassroots chapters located around the world.

"Slow Food does a lot of different projects on the international scale, but we really did our own spin on the movement," Mina said. From their first project at a homeless shelter to their final project at a farm, the group explored social and environmental aspects of food systems through community-focused projects over the course of four transformative years.

"The first few years were a little tough," Grayson said, recalling her freshman year as a founding member of YCAC. "As high school kids, we had a disadvantage because not that many organizations were willing to work with us." After many "awkward" phone calls to potential community partners and sponsors, the group raised enough money to prepare a meal for Crisis Ministries, a shelter serving the Charleston area. This initial project spurred the group to tackle social justice issues regarding access to food on a larger scale, inspiring their projects for the next two years.

"It was sophomore year when we branched out," Grayson said. Not yet old enough to drive, group members created a portable garden in the bed of a pick up truck. A local Whole Foods sponsored the project with a \$2,000 grant in exchange for the right to bring the truck to elementary schools in Mt. Pleasant, a wealthy suburb of Charleston.

The truck quickly generated buzz around Charleston, and YCAC soon received calls from elementary schools all over the bridge-filled Charleston area requesting to see the portable garden. Grayson recalled the group's disappointment that they could only cater to schools in Mt. Pleasant, saying, "We'd have to be like, 'I'm sorry, we can't make it over the bridge. We're never going to be able to give your students this opportunity.'"

YCAC was not about to let logistics hold them back from expanding their reach, so they came up with a plan: "We built a trailer." Building completely from scratch, the group divided themselves into teams of engineers, designers, and planters. An additional team of curriculum creators rounded out the trailer's purpose - to travel to schools in every part of the Charleston area in order to teach under-privileged children about plants and nutrition.



The group partnered with WINGS, an after school program held at James Simons Elementary School on the Charleston peninsula for children with emotional and behavioral challenges. YCAC created a science-based program that focused on plant science and nutrition, providing an opportunity for WINGS students to access healthy foods and build a stronger foundation in science.

"A lot of [the kids] had never tasted something as simple as a cucumber," Mina said. "And I think a lot of them were fascinated that they were actually able to grow something."

WINGS students were not the only ones fascinated with growing food. For their final project, YCAC created a program under Mina's leadership called "A Day in the Life of a Farmer" in which participants spent a full day working on a farm and learned about food systems first hand. "I think we've really come full circle," Mina said, from preparing food to educating others about food and finally to the root of the matter - growing good food well.

Group members also experienced growth over the four years. "I think it's definitely made us more confident," Grayson said. Mina added, "We developed people skills and business skills so much earlier than our peers."

As Mina and Grayson go off to college, they hope to leave a legacy of positive community building and partnerships around Slow Food's core tenets - service and food. "I hope that [YCAC] just carries on and continues to go off into the community in ways that strengthen it," Grayson said. "Without an informed population, how are you supposed to build a strong community?"



*YCAC grew a garden in a trailer that they could bring around to schools in the Charleston area.*





# Slam Dunk Sustainability: The Next Play Initiative and Sustainability in College Sports

Emily Li

Sustainability, sports, and entrepreneurship. What's the connection? Some might say there is none. But at Davidson College in North Carolina, the eco-friendly-hyper-athletic student body - with the help of Sustainability Director Jeff Mittelstadt - combined all three. Their innovative national sustainability initiative culminated as the annual student-led The Next Play program, which uses sports to address sustainability issues.

This year's Next Play initiative was a venture pitch tournament that invited Division I colleges and universities that qualified for the NCAA basketball tournament to send teams of undergraduate and graduate students to Davidson College. The teams then pitched business plans focused on incorporating athletics into sustainability and competed for more than \$28,000 in prize money and financial incentives. More than 30 judges and representatives from over 30 organizations in the sustainability field oversaw the event.

Equally as impressive as the on-campus sustainability initiatives at Davidson are student initiatives that induce change in the "real world." The winners of the 2014 Next Play program developed an array of sustainable projects in the athletics industry, including a business that locally sells and resells sports equipment, a venture exploring the use of llama wool in organic sleeping bags, and the building of a green sports facility.

And it's evident that the strong spirit of sustainability and athleticism at Davidson College stays with students long after graduation. Mittelstadt discussed a sustainability initiative developed by a 2009 Davidson College alumni, Andrew Lovedale. A former member of the Davidson Men's basketball team, Lovedale started an organization in Nigeria called Access to Success which aims to "empower youth and their communities to achieve positive change through Christian-based athletic and educational programs in Nigeria." This past year, for the first time since its conception, the organization helped one of their students attain a scholarship to a university in the United States. As Mittelstadt said, "What they're doing is using sports to address social issues."

In addition to the tournament, Davidson also fostered on-campus sustainability initiatives as part of a five-month, first-year program of sustainability and sports at the college, including four zero-waste football games. The last zero-waste football game diverted more than 90 percent of all waste from landfills through intensive recycling and composting efforts.

Despite how progressive these sustainability efforts might seem, the link between sustainability and athletics at Davidson is nothing new. Last year, students started a Student Athletes Sustainability Council that featured representatives from many sports teams. The Council's goal was to collaborate among different sports teams in order to come up new projects for the Council as well as Davidson's Sustainability Office to work on. Together, they have organized shoe recycling collections, clothing and T-shirt drives, and awareness initiatives such as reducing the number of disposable cups used during sporting events by providing athletes with water bottles.



Mittelstadt said, “Students were a huge part of [the sustainability effort],” whether it was by volunteering at the Next Play event, or being “trash boys” (as the sustainability and waste industry calls them). In fact, not only was the Next Play initiative largely student-run, but Mittelstadt said that “the idea for this program, as a whole, came from the students.” He went on to say, “I came out about a year and a half ago as the first Director for Sustainability, and within the first few months almost half the students that came to talk to me about sustainability were Division I athletes from Davidson College. And so it sort of made sense that we concentrate on sports in some way as the lens through which to view sustainability.”



*The Next Play Initiative encourages entrepreneurship and sustainability through sports. (Photo courtesy of Davidson College)*

From facility management, to nutrition and food consumption for athletes and audiences, to technology like swimming pools, lighting, building materials, energy management, sports and sustainability go hand in hand. “Everything that we talk about in sustainability can be related to sports in some way,” Mittelstadt said. Sports also relate to the social aspect of sustainability, and work closely with social sustainability in terms of connecting to a surrounding community, creating access to events, and using sports to address social issues like Access to Success.

Ultimately, The Next Play venture pitch tournament at Davidson University is a unique blend of athletics, sustainability, and entrepreneurship, and while it’s not the first of its kind, it is certainly rare and paving the way for a new perspective on sustainability. Going forward, Mittelstadt hopes to open the program up to a wider range and number of student athletes, and involve more schools and organizations. The idea, he says, is to get people to think outside the box and challenge the way that society limits the areas in which sustainability can be applied.

# Transitional Justice in the Age of the Industrial Agricultural System

*Olivia Cohen, Lexa Keane, & Emily Li*

Like a tire in a muddy pothole, our society is mired in the industrial agricultural system.

Think back to this morning and you can see just how dependent you and most of the American population are on the existing infrastructure of the system. Chances are, you woke up and ate breakfast out of some sort of package: cereal box, oatmeal cylinder, yogurt container, bagel bag - all vehicles for nutrition whose usefulness begins in a factory and ends on your kitchen counter. You probably have some sort of idea about the raw ingredients required to make your breakfast of choice, but let's face it: have you ever made cereal? And maybe you have, but did you grow your own grains? If all the grocery stores in your region closed tomorrow, could you still eat? A week from tomorrow? A month from tomorrow?

If this all sounds familiar, if you rely on your weather app more often than you step outside and trust your intuition, then you are not alone. You are doing nothing wrong. You are living the best you possibly can within the confines of The System.

If you're not familiar with exactly what The System entails, don't blame yourself. In its simplest form, a system is the life cycle process of an object or phenomenon as explained by inputs and outputs. In its most complex form, a system is an interweaving of processes that determine social and cultural norms and become the infrastructure upon which we build our lives. (We'll go more in depth about what the industrial agricultural system entails later in this article.) In the meantime, keep in mind that, although they might seem unrelated, your greenhouse tomato is as much an output of the system as fertilizer bombs.

So why does this system exist, and why are we stuck living within its confines?

## Roots of the Modern Global Agricultural System

With the onset of the Green Revolution in the 1960s, many believed that our problems with food consumption and exponentially increasing population were over. What we didn't realize is that we were simply pushing those problems back. In developed countries such as the United States, it's easy to ignore the increasing issues surrounding unsustainable agricultural problems. With powerful agricultural interests represented in the government, an effective water system of which agriculture accounts for more than 80 percent of water consumption, and a reliance on cheap fossil fuels, citizens of the United States have the luxury of being disconnected from the monoculture systems that grow their food, dependent on fossil-fuel based fertilizers and pesticides.

Norman Borlaug, who many refer to as "the father of the Green Revolution," helped steer the world away from a critical food shortage crisis that first manifested itself, as many of these issues do, in the most poverty-stricken populations of the world. India, in particular, was in need of a miracle. In 1943, as many as four million people died in the Bengal famine, due to starvation and malnutrition. India was forced to import millions of tons of grain to feed its growing population in the following two decades, but by the early 1960s, India was faced with crippling drought and food shortages.



But with Borlaug's new crops – fast-growing dwarf wheat varieties and miracle rice – India was able to grow a surplus of crops for both their citizens and export and has not experienced famine since. World grain production has more than doubled, with the average farmer able to grow two yields in the time it previously took to grow one. And yet, unsustainable misuse of these technologies has resulted in a recent slump in India. Yield growth has flattened due to over irrigation, salinization, and waterlogging; overuse of pesticides and fertilizers has contaminated water tables, leading to pesticide presence in breast milk and blood and a wide increase in prevalence of cancer; the financial costs have driven farmers into staggering debt and led to tens of thousands of cases of farmer suicide.

There are solutions to this prevalent issue of unsustainable agricultural practices, especially in developing nations where people do not have the resources to support themselves during times of frequent food shortage. One is what many are referring to as the next green revolution – GMOs, or genetically modified organisms. This kind of biotech, available through major agricultural corporations such as Monsanto, aims to increase yields through genetic modification of core plant monoculture species such as corn, cotton, and soybeans.

At first, this kind of new technology seems like the answer, allowing farmers to increase their yields. The

president worked with the World Bank to subsidize fertilizer and hybrid corn seed to farmers. Previously, more than one-third of the population relied on food aid to survive; with the new seeds, farmers' harvests topped national records, demonstrating the potential success of such programs. And yet, environmentalists continued to err on the side of pessimism, standing by their mantra: TANSTAAFL, or, "there ain't no such thing as a free lunch." Along with these subsidy programs came the characteristics of unsustainable agriculture – a dependence on fossil-fuel based pesticides and fertilizers, unbalanced distribution among farmers, a reliance on the system, tainted soil, depleted aquifers, and an understanding that the incredibly costly fertilizer subsidy program cannot continue indefinitely.

As the same story continues in developing countries struggling to defeat famine with unsustainable agricultural systems in place, it's no wonder the critics are starting to mobilize. Vandana Shiva, one of India's harshest critics of the Green Revolution, blames the strictly economic priorities behind the new unsustainable farming initiatives. She criticizes the emphasis on simply increasing yields while ignoring environmental and social impacts of food production on local communities, instead advocating small-scale, biologically-diverse farms and sustainable, community-based agricultural practices.



*Pesticide use became popularized during the Green Revolution - a short-term solution with long-term repercussions.  
(Photo courtesy of Global Water Partnership via Flickr Creative Commons)*

## Roots of the Modern Domestic Agricultural System

While it's evident agriculture has shifted and adapted in significant ways on a global scale, the United States has had its fair share of change in the agricultural sector. Before World War II revolutionized the agriculture industry in the United States, previous Senator Faircloth of North Carolina said, "Agriculture was a way of life. It had nothing to do with a business... The first goal of agriculture was to subsist." Small-scale farms were the norm, with farmers raising just enough crops to live on year after year, with perhaps one or two domestic animals. When Germany invaded Poland in 1939, the world went to war. German submarines sunk U.S. exports to England and Europe, and agricultural exports from the United States sank to 30 percent below the average of the Depression years before the war.

The federal government responded in several ways to the rising, desperate demand for food overseas. One such way was the Land-Lease Act of 1940, which was essentially an export program for farmers that allowed the federal government to supply food commodities to the Allies. These demands for larger quantities of food and the financial benefits of growing more led to an agricultural boom. Between 1940 and 1945, net cash income for farmers increased from \$4.4 billion to \$12.3 billion. When the United States finally joined the Allied war effort, food demand only increased, and as a result farmers worked even harder to produce even more food. This led to a rapidly shifting attitude of farmers in the United States, from subsistence farming to a focus on producing as many crops as the land could offer.

For example, Hormel introduced a revolutionary new canned meat product in the 1930s called Spam. This

form of meat quickly proved to be an ideal combat ration, as it could be shipped easily and wouldn't spoil in storage. By the middle of World War II, Hormel was producing more than 15 million cans of Spam for the troops every week, and doubled their net sales. The corporation purchased more than 1.6 million hogs each year, and 90 percent of the canned goods ultimately went to the military. Hog production went hand-in-hand with large-scale corn monocultures in the West, which fed the hungry pigs. In 1941, officials from the Agricultural Adjustment Administration, representing the federal

government, personally visited major farms to ask farmers how much they could expect to increase production. In October 1941, Colorado farmers were asked to increase hog production by 30 percent and cattle by 18 percent.

Ultimately, a variety of measures led to the institutionalization of the agricultural market. As the war went on, farmers became reliant on the

federal government in order to keep producing as much as they were with fewer workers. Though U.S. farmers resorted to several measures in order to keep crop exports soaring, including seeding more acres, raising more livestock, and working longer days, one of the major contributions to agricultural productivity was more efficient farm technology. This included machinery as well as more effective fertilizer and pesticide. With these methods, agricultural exports and crop productivity continued to rise. Before World War II, previous Senator Faircloth said, "There was absolutely no need for any attempt for modernization or increased efficiency." The war, and all its needs, ultimately pushed the United States into the modern agricultural age.

Ads such as this became popular in the 1940s, showing a cultural shift toward militarization of everything - including the natural world.



## What role does Transitional Justice play?

The Green Revolution provided accessibility and a surplus of food to nations that would have otherwise fallen to impoverished conditions where food insecurity runs rampant. Yet, the same technological advances driven by multinational institutions aiding countries in need have also induced a severe dependency on unsustainable mechanisms such as monocultures, GMO crops, and pesticide use. It is after observing these positive feedback loops of the food system that elements of transitional justice can be discussed.

What exactly is transitional justice? According to the United Nations, transitional justice is the "full range of processes and mechanisms associated with a society's attempt to come to terms with a legacy of large-scale past abuses, in order to ensure accountability, serve justice and achieve reconciliation." In simpler terms, transitional justice simply refers to addressing the abuse of human rights in a variety of fields.

So why are we examining the system so closely? The main reason is to expand public awareness of the system and how it works. The purpose of this discussion is not to perpetuate a downward spiral into apathy, or to reinforce complacency as a defense mechanism. Adopting such negativity or passivity can lead to victimhood, an outlook which traps people in the system by making them feel powerless to enact change. Probing the power dynamics of the industrial agricultural industry involves addressing those who dwell in the arm pit of the industry, the stuck and the mired, such as farmers who rely on governmental subsidies to provide fertilizers or patented seeds.

Are those who dwell in the space of limited accessibility and economic instability capable of inducing transitional justice? Contrary to popular belief, a wide variety of individuals and groups play a role in constructing the industrial agricultural fortress, including urban communities, pesticide corporations, and monoculture farmers. But those who reap the most economic benefit from the industrial agricultural system are oftentimes those who play multiple key roles and thus have greater capabilities of leveraging the system in their favor. Furthermore, what are industrial agriculture and Monsanto-type barons going to do with that leverage? Are they willing to work with critics such as Vandana Shiva to reshape the system into a more democratic

mold, or will they continue to manipulate individual stakeholders for their own economic benefit? Forty minutes from downtown Charleston, Cheri Ward's Blue Pearl Farms seems worlds away from the hustle and bustle of the city. Situated on the edge of the



*Vandana Shiva is an environmental activist and high-publicity critic of the industrial agricultural system.*

Francis Marion National Forest, her farm is a haven for blue crabs, blueberries, and most notably, bees. After over ten years as a beekeeper, Cheri has accumulated 50 hives of healthy bees - an increasingly difficult feat in a world where pollinator health is on the decline.

"You don't want to say they're happy bees, but they're happy bees," she said with a smile. Cheri's farm is a rare example of a largely self-sustaining ecosystem. She and her partner, Richard, refrain from chemical and pesticide use and prefer holistic care for their farm. For example, in order to protect their blueberries from hungry birds, they attracted Martins, a naturally



Think about the ways in which you are embedded within the system. When you're flicking through channels on TV or skimming newspaper headlines, it's easy to feel disconnected from major foreign issues that you feel don't apply to yourself. It's comforting to rely on a false sense of security that you are safe and insulated from the world's issues. This attitude seriously debilitates solidarity movements on local, regional, national, and global scales because the emphasis on "alien" or "foreign" experiences inhibits the ability to familiarize with agricultural or food justice issues abroad. Specifically, misconceptions of food justice issues within the United States result from a loss of connection and recognition during cross-cultural understandings of food justice issues. For example, studies have shown that farmers all over the world are bearing the burden of depression, cancer, and an assortment of other lethal health problems through exposure to pesticides, many containing lethal neurotoxins such as organophosphates. The effects of pesticide use on the environment and physical health of humans is not a pinpointed geographic injustice; it is an issue experienced by many communities on local and global scales.

## Political Reconciliation and Agriculture

Transitional justice institutions are primarily designed to establish and promote political reconciliation through increasing and expanding dialogue, addressing trauma, and countering denial in cases of civil unrest (Leebaw, 95-96). These institutions are established in order to both expose and acknowledge political violence and lay the groundwork for legitimate compromises. However, these two goals are inherently conflicting, because priority on reconciliation with one system tends to lessen the energy that goes toward creating an improved one (Leebaw, 97). Transitional justice institutions also serve to open political space for silenced or marginalized people. This is important for establishing specific criteria for restorative measures and transforming victimhood into empowerment. While it is imperative to address and process injustices, clinging to a victim mentality can inhibit further growth and progression toward a restored political system. In regards to industrial agriculture, victimhood induces a set of false limitations that can prevent farmers from preserving bio-diverse crops, or consumers from taking greater accountability in the choices they make.



*Monoculture crops, such as this field, are an example of the mechanization of agriculture. They often require lots of machinery and are subsidized by the government.*



## Systemic Quandaries

Our agricultural system is often perceived as an oversimplified industrial production line, but in reality, growing food is a complex process. This preference for imposed linear rather than organic cyclical processes is evident in the unsustainable production of food. How do we restore empowerment to a system that essentially views farmers as assembly line workers?

Getting out of the system is as easy as apple pie - made from scratch, that is! It requires a much higher degree of self sufficiency than most people have the time or resources to pursue. Imagine if every individual were responsible for growing his or her own food. That means that every person would need sufficient land, money and time to make raised beds, time to make compost, money to buy seeds, and time to nurture plants and learn how to nurture them.

That is a heavy burden for an individual who is already working an eight hour day and has existing obligations to family and friends. It is an even heavier burden for people who work two or even three jobs to make ends meet.

So this leaves us in a predicament: either the only people who can disengage from the system are those who have benefitted the most and have money, land, and time at their disposal, or communities need to join together in solidarity for the common cause of self sufficiency.

Can you see the sense of victimhood at play here? In American culture, individualism is encouraged when coping with injustices. Individuals often feel tasked with finding unique solutions while simultaneously siloed from lines of support - a breeding ground for victimhood. A shift toward community oriented solution making will alleviate the pressures of industrial agriculture on any one single person.

Research has shown that the factors behind effective community management of a resource are many and vary considerably. In their co-written book called "Working Together: Collective Action, the

Commons, and Multiple Methods in Practice," Poteete, Janssen, and Ostrom identify six microsituational variables that they claim are necessary in order for a community to effectively cooperate. These include a high marginal per capita return of cooperation, a high sense of security, a widespread knowledge of the reputations of each participant, a relatively long time horizon, the



*Community gardens, such as this one in Charleston, provide an option for resource-strapped individuals to disengage from the system.*

freedom to enter and exit the group, and effective communication among all participants. However, with the average American changing jobs and residences at a higher rate than ever, it is hard for these kinds of communities to feasibly develop.

That being said, it's not impossible. By using transitional justice as a catalyst to mobilize Americans into a healthier agricultural system, we see an opportunity for communities to come together. This requires participants to make an active effort to prioritize cooperation and collaboration. The first step is recognizing the importance that community development has in disengaging from the toxicity of the system.

## What is the Intention?

Given the circumstances at hand, our conclusion is not one that rests all of our solutions in an elitist greenwashing plan. We cannot honestly say that growing your own food, biking for transportation, buying local organic food, and carrying your groceries in a reusable bag will solve any of our current issues. Although those are all valuable practices, they still contribute to the system in which they are embedded; they are band-aid solutions. In order to totally disengage from the system, we must look past individual actions to study the seeds of intention from which they emerge. The first step toward finding the original intention behind any action in the system is to admit your place within it. Are you a consumer? A producer? A subsistence grower? And what does that role mean exactly - to you, to your community, to the System itself?

Admitting your positionality within the system helps to transcend the limitations and loss of accountability and empowerment that stems from an objective mentality. The authors of this article, for instance, recognize that we view the system through a doe-eyed, academic idealism, far disconnected from the farmers who suffer. To embrace our positionality means that we must acknowledge the intention with which our food system was founded and the role we play within it. Given the wartime history of our modern industrial agricultural system, a history that encouraged quantitative production above all else, the intention of our current agricultural system is warfare.

We must ask ourselves, what is the intention for our next food system? For it is in these monumental and pivotal questions that we can stop reducing issues to a single point and engage in a more holistic approach to solution making. Our current domestic and global food systems are in need of justice. It is time that we fade out antiquated processes of linear industrial production in favor of synchronistic systems. This transition calls to the forefront a truth embedded within each of our beings: it is our responsibility to foster an agricultural system that emanates diversity and conscious decision making. What roles will you fulfill during this time of change and transition?

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*Summer Sprigs by Olivia Cohen*





# The Beauty of Bees

## What They Can Teach Us and Why We Must Protect Them

*Story by Olivia Cohen*

*Photography by Britton Holmes*

Forty minutes from downtown Charleston, Cheri Ward's Blue Pearl Farms seems worlds away from the hustle and bustle of the city. Situated on the edge of the Francis Marion National Forest, her farm is a haven for blue crabs, blueberries, and most notably, bees. After over ten years as a beekeeper, Cheri has accumulated 50 hives of healthy bees - an increasingly difficult feat in a world where pollinator health is on the decline.

"You don't want to say they're happy bees, but they're happy bees," she said with a smile. Cheri's farm is a rare example of a largely self-sustaining ecosystem. She and her partner, Richard, refrain from chemical and pesticide use and prefer holistic care for their farm. For example, in order to protect their blueberries from hungry birds, they attracted Martins, a naturally defensive bird, by installing dried gourds. In exchange for a few berries, the Martins will keep other birds away.

The natural care with which Cheri and Richard maintain their berries extends to the way they care for the bees. Because of the farm's isolation, the bees are not exposed to common pesticides and chemicals found in municipal spraying or homeowner gardens. In addition, Cheri and Richard intensively manage their bees by checking their hives once per week in order to foresee any potential issues and provide preventative care.

"Being active stewards of the bees is part of maintaining the population and keeping them healthy," Cheri said. "Our focus is on making sure anywhere we put our bees is bee friendly."

Cheri and Richard take such great lengths to protect their bees not only because they are an economic and personal investment, but also because there has been an ongoing national epidemic of unhealthy bees. "Over the last ten years, there has been a tremendous amount of pressure on bees," Cheri said. This pressure extends from the ever more common presence of the parasitic varroa mite, which sucks the blood of both adult bees and developing brood, to the destruction of entire hives through Colony Collapse Disorder, or CCD.



# Colony Collapse Disorder: History and Modern Prevalence

CCD was first reported in October 2006 by beekeepers who inexplicably lost thirty to ninety percent of their hives - an unusually high amount. Ever since then, average hive loss has hovered around 33 percent for the past seven winters, with some fluctuation. CCD is characterized by a sudden loss of most worker bees with very few to no dead bee bodies present, but with the queen and brood remaining.

"It's becoming really, really hard to keep bees alive in any circumstances," said Carl Chesick, the head of the Center for Honeybee Research in Asheville, North Carolina. Chesick and a team of volunteer researchers are working to create the industry's first set of long term baseline data regarding honeybees. They hope to fully understand the modern stressors that bees face so that beekeepers and policy makers alike can make well-informed decisions about how to best protect these pollinators. "[Our research] is pretty unique in that universities and bee labs don't do anything like this," he said. "We're not trying to prove anything right now. It's very long term, very intensive."

The Center for Honeybee Research's main project is called Project Genesis. This three-year-old project studies twenty bee hives divided between two yards, one of which uses conventional beekeeping techniques such as a wax foundation in frames and spraying for mites and other issues, and the other in which the bees draw their own comb and do not receive treatment of any kind. The goal of this project is to see if there is a difference between conventional and natural beekeeping practices. So far, the researchers have noticed patterns, but it is too soon to draw definitive conclusions.

However, Chesick noted that the mite count is three times higher in the treated hives than in the untreated hives, a difference of approximately 40 mites versus 12. "I can't think of why that would be," Chesick said. "I'm just keeping facts...Somehow having those chemicals that are supposed to kill [the mites] are making them more hardy."

Traditional beekeeping teaches that mites and other diseases can be treated through spraying, but there is a movement among beekeepers to take a more natural approach and employ techniques that require a larger time investment than spraying alone.

Richard Hanks, a longtime Master Beekeeper and past executive board member of the South Carolina Beekeepers Association, advises beekeepers to constantly renew their hives in order to break the brood cycle of the varroa mite. Renewal requires putting the queen bee into a new frame so that she can hatch fresh, uninfected brood. In addition, application of essential oils is a natural treatment that retards the mite's growth.

However, these cures require that beekeepers maintain an artisanal level of production. With the bee population in decline, large-scale commercial bee farms are increasingly used to fill the gap, which perpetuates weak bees and unhealthy colonies. "We're running puppy mills for bees right now," Chesick said. "It's possible to force bees as a product. How good of an idea that is, I'm not sure."

Despite the new pressures on bees, Chesick and other bee advocates believe that ultimately, the bees will be fine; it's ourselves we have to worry about. "The worry is not so much the bees," Chesick said. "They'll be able to survive. The problem is we need the bees."

Bees pollinate \$15 billion worth of crops in the United States every year and are responsible for one out of every three bites of food. A world without bees would still produce food, but prices would rise exorbitantly because people would be forced to pollinate by hand. In addition, the variety of foods that people eat on a regular basis would be greatly diminished, resulting in less diverse, flavorful, and nutritious food.

The Obama administration recently recognized the importance that pollinators play in our national economy by creating a federal strategy to promote the health of honeybees and other pollinators. A Pollinator Health Task Force comprised of individuals from fourteen government agencies are charged with implementing a

Pollinator Research Action Plan, creating a Public Education Plan, and developing beneficial public-private partnerships. In addition, they will increase and improve pollinator habitats.

Although administrative action has the potential to benefit pollinator populations, Hanks and others believe that the issues facing bees are too holistic for a single government memorandum to possibly address. "The world thought there was a singular problem that was causing Colony Collapse and we live in a scientific world and think in our heart of hearts that for every problem there is a solution," Hanks said. "But there is no one cause of Colony Collapse...It's all the things in the existing environment that bring Colony Collapse."

## Urban Beekeeping: The New Frontier

With the decline of the pollinator population receiving an increasingly high amount of media attention in the past few years, hobby beekeeping has become an ever more prevalent pastime for those hoping to help save the bees. Many of these new beekeepers are located in urban areas, which presents a new set of challenges as the bees are exposed to urban pollutants and pesticides.

Dr. Jennifer Leavey, the director of the Urban Honey Bee Project at Georgia Tech, is on the frontier of studying how honeybees survive in the urban environment of Midtown Atlanta. "We are interested in how habitat fragmentation affects genetic diversity in urban honeybee colonies, how pollution affects honeybees and where bees find forage in the city," she said.



*An observational hive from The Bee Cause Project, which encourages beekeeping as a way for children to reconnect with nature.  
(Photo courtesy of The Bee Cause)*

Although the study is just over one year old, Leavey has noticed promising patterns for this new honeybee territory. So far, researchers have not found higher levels of heavy metal contamination in honey from urban bees than from rural bees, and they have not experienced high levels of pest pressure, implying that urban areas might be a good place to keep bees.

"Most research done on honeybees is done in the context of agricultural settings, so almost everything we learn contributes to our understanding of bees in urban habitats," Leavey said. As the number of beekeepers in urban areas continues to rise, research on city-slicking bees will become ever more important.

Tami Enright also contributes to the existing body of knowledge about beekeeping in an urban environment. She is the executive director of The Bee Cause Project, which aims to install observational bee hives in 1,000 schools. So far, she has installed hives in about 35 schools in the Charleston area as well as in a few local businesses. Most of her hives are healthy, and she contends that urban beekeeping, especially in conjunction with urban gardens, is a good step toward creating a holistically healthy environment. "Some bees even do better in urban than in non-urban areas," she said, citing an example of a rural hive that died because of local municipal mosquito spraying.





The Urban Honey Bee Project and The Bee Cause Project have a second commonality: they both aim to educate others about the importance of pollinators and help people reconnect with nature. Leavey hopes to increase understanding and interest of how urban environments affect honeybees as well as engage the Georgia Tech campus and surrounding community in beekeeping. By exposing others to bees, hopefully they will learn that bees are not malicious and that they are an essential aspect of any ecosystem.

Enright echoes the mission of Leavey's goals, but with the additional goal of helping children in particular reconnect with nature. "I think this generation is really detached from nature," she said, citing examples of Nature Deficit Disorder and a general lack of knowledge regarding the natural world.

Urban environments provide a unique opportunity for bee educators to reach a larger audience than rural bee advocates. Enright said, "We have a goal of helping kids get connected with nature again. And we're using the honeybees to do that." The Bee Cause Project's observational hives are especially effective at captivating the attention and imagination of children and adults alike by allowing people to peer into the inner life of hives. Some schools have even gone so far as to use the bees as a form of recreational therapy for children with prevalent emotional and behavioral needs.

The Bee Cause Project's financial model ensures that no school in want of a hive is left forlorn. They adopted a "pay it forward" model where the schools receive a hive for free but then have to fundraise to the best of their ability for the next school. This model creates a sense of equality and community that not only benefits the local bee population, but also low-income students who may not have much access to nature.

"A lot of kids who are disadvantaged, for them to be able to say, 'I have a garden at my school, I have a hive at my school...' It's a positive story for them to share and it gives them a boost," Enright said.



# The Future of Bees

The relationship between bees and humans extends far beyond the cityscape and the classroom. Bees serve as a mirror to society, exposing potential dangers of modern living of which we might not even be aware.

For instance, the chemical stew of modern industrial agriculture is reflected in beeswax and could possibly contribute to the decline of honeybee colonies. "Wax is like a paper towel," said Chesick, from the Center for Honeybee Research. "It absorbs all these pollutants."

The synergistic relationships among various pesticides from the neurotoxin organophosphate to the antibacterial glyphosate have not yet been studied in-depth, leaving scientists to examine the available signs of how a failed agricultural system affects bees, and by proxy, humans.

However, some scientific research regarding pesticide use and both bee and human health is strong enough in its conclusions to lead to pesticide-restricting policies. For example, the European Union adopted a proposal last year that banned the use of neonicotinoids - a class of pesticides that act as a neurotoxin and have been linked to colony collapse.

Cheri from Blue Pearl Farms sees a link between American society's desire for perfection and the rampant use of pesticides as people attempt to create "perfect" gardens that do not - and cannot - naturally exist. In this quest for perfection, they ultimately create an environment that, while it may look picture-perfect, is disrupting balance in the ecosystem.

This imbalance creates a trap for bees as they continually bring pollutants into the hive, store them in the wax, and feed them to the brood. "They have a toxic environment that they can't get out of," Cheri said.



*Richard Ward tends bees at Blue Pearl Farms. They manage their hives extensively in order to keep their bees as naturally healthy as possible.*



And bees are an integral part of any ecosystem's natural balance. Richard Hanks from the South Carolina State Beekeeping Association said, "One of the things that [people] need to understand is that [bees] are part of the creation in which you and I live. They're one-quarter inch wide and one half inch long, but they have a major, major impact on our lives."

Both domestically and globally, people are beginning to recognize that impact. The next step is to take action. By avoiding pesticide use, planting native species of plants and flowers, and allowing more "imperfect" weeds in lawns and gardens, people can help protect pollinators - and by extension, ourselves. White, purple, blue, and yellow flowers are particularly beneficial to bees, as they are the easiest colors for bees to see.

Back on the edge of the Francis Marion National Forest, Cheri has an abundance of colorful native flowers to keep her bees well fed. She also has a vegetable garden, which she believes is equally important for the health of bees and humans.

"I would really like to see people growing more of their own food and having gardens that they would feel comfortable eating," she said. "It's easy to grow lettuce. That's a good place to start."





## Sustainable Business Spotlight: *Proud Mary*

Story by Emily Li  
Photography by  
Britton Holmes

As a society, we've gotten comfortable simply ignoring the questions we don't want to face. Here's one inquiry we're going to address head-on: where do our clothes really come from? The popularity, convenience, and affordability of the huge modern quantity-over-quality clothing chains of today – Forever21, Urban Outfitters, Nasty Gal, and the like – come with a hefty, unsustainable price-tag. If the average consumer can buy tank tops for \$1.80 and jeans for \$7.80, how much do such cheap articles of clothing cost to manufacture? Who are the people making them? How much are they paid?

Proud Mary, a Charleston-based environmentally and socially conscious textile company, attempts to address some of these questions by bridging the gaping disconnect between maker and consumer. According to their



*Harper Poe is the owner of Proud Mary, a sustainable textile company based out of Charleston.*

Facebook page, Proud Mary “works with textile artisans in developing countries to create a line of ethnic-modern fabric by the yard, home, and personal accessories.” Currently, the business works with four developing countries – Peru, Guatemala, Mali, and Morocco. Facilitators in each location act as both production managers as well as liaisons between Proud Mary’s design team and the region’s local artisan producers. In this way, although it is impossible for Proud Mary to be present in each country at all times, they are still able to commit to long-lasting relationships with local communities of artisans.

While Proud Mary is now a fairly experienced and reputable business with a comprehensive understanding of the industry, getting the business on its feet in the first place was no easy feat. In fact, founder and designer of Proud Mary Harper Poe said she had very little business background before starting Proud Mary. She had just quit her job in New York and was struggling to figure out her next steps. After coming back from a volunteer trip in South America where she fell deeply in love with traditional local South American textiles, Poe started Proud Mary from scratch, armed with a simple vision – to “incorporate design with a business that provided economic development opportunities.”





*Textiles at Proud Mary*

From there, it still wasn't smooth sailing. Although Poe worked with a friend while living in New York to help her get Proud Mary started, she admits that "neither of us had any idea what we were doing." That being said, she recognized the importance of having somebody there for motivation while immersed in a difficult project. Ultimately, by continually asking questions and not giving up, the partners were introduced to key players in the handicrafts industry, which allowed the fledgling business to get the support that it needed throughout its inception. To those struggling in the same boat in developing a solid small business, Poe maintains that the most important thing is to "have passion and keep going!" Even today, Poe says that she is constantly challenged and surprised by the growth of Proud Mary. She says, "There is not a day that goes by that I don't learn something new."

While a business like Proud Mary may not immediately come to mind when considering traditional sustainability, the business' founder Harper Poe stresses the importance of sustainability and community development in her work. "Having a sustainable design business to me means that we continue to support and nurture the relationships we have with our artisan communities, each season building on the previous season," Poe said. Further, she says that she doesn't believe in the short-term benefits of handouts. Rather, by providing fair wages, improving market

access for quality work, and encouraging the use of eco-friendly and local materials, Proud Mary is able to develop long-term, sustainable systems through working relationships.

From the start, Proud Mary flourished under its guiding principle – "Pride, not pity." With these words, Poe hopes to emphasize that a product can be fair trade, impactful, and well designed all at once. Rather than rely on consumers' heart strings to sell merchandise, Poe wants potential customers to "love our products aesthetically and buy them because they are beautiful," while also celebrating the meaning behind them. Ultimately, "Pride, not pity" recognizes that Proud Mary, as a business, has a dedication to quality, aesthetically-pleasing goods – after all, Poe says, if a consumer doesn't like the way a product looks, it doesn't matter how it's made or who made it - consumers simply won't buy it.



*Shoes from Proud Mary*

Currently, Poe is working toward several ambitious new goals for Proud Mary. These include eventual development of a magazine or catalog for their merchandise, creation of a local shoe workshop in Morocco that would allow communities of artisans to have a safe environment to craft and work rather than being at home, and branching out to working with an Asian country such as the Philippines. Ultimately, Proud Mary can be proud of the work that they've done in combining classic chic fashion, sustainability, and international community development into one inspirational small business with a big impact.

# Environmental Management System (EMS): Is it just utopia? Maybe not!

David Desplaces, Ph.D./ISO 9001/14001 IRCA Lead Auditor  
Certified College of Charleston School of Business

Although first applied in 1798 by Eli Whitney who understood the need to set rules to improve the making of muskets for the US government, quality management system (QMS) has since emerged as a standard (ISO 9001) and has been applied by businesses, not-for-profits, and governments around the globe.

By definition QMS seeks to improve an organization's operations to better gain, serve, and retain customers, while reducing costs and improving margins. The benefits of such an approach have shown to make "good business sense" but its distant cousin, environmental management system (EMS), still suffers from debilitating myths. Let's see if we can help demystify them.

## Myth 1: This EMS methodology does not apply to us (i.e. we are a special case, we really do not impact the environment).

### Overall Benefits of EMS:

- x Assurance to customers
- x Increase legal compliance
- x Good PR
- x Satisfy investors/partners/  
government agencies
- x Improve your impact and  
brand
- x Reduce liability
- x Improve cost control
- x Conserving materials and  
energy
- x Facilitate approvals

Answer: All organizations are different and special, but the thinking is the same and can be applied regardless of the activity or sector. EMS is quality assurance through a systematic approach that aims to minimize our environmental impact (beyond meeting any legal or regulatory requirements this is also true only when it is technically possible AND more importantly financially feasible). It might be required for a government agency to build facilities that are energy efficient but only if the cost is not prohibitive. You are going to say why have such expectations then if you are going to apply it?

So what is EMS? It is the part of the organization's management system used to develop and implement its environmental policy and manage its environmental aspects (ISO 14001 Clause 3.8). Aspects are the consequences of the organization activities, products and services produced that in turn can be identified as the cause of undesirable environmental consequences. So what do we mean by that? Our company product-design activity might call for us to reduce the amount of waste being produced that will lead to the conservation of raw materials. The activity is designing; the

aspects is the amount of waste being produced; and the environmental consequences is preservation of national resources.

Just follow standard operating procedures and you will be fine! Although not quite that simple, it does boil down to the organization's preparation of standard operating procedures and manuals at all levels of the organization (from floor cleaning to management decisions to purchase energy efficient copy machines that alter the work flow to minimize the environmental impact), and how routines can be systematically evaluated midstream with the environment in mind.

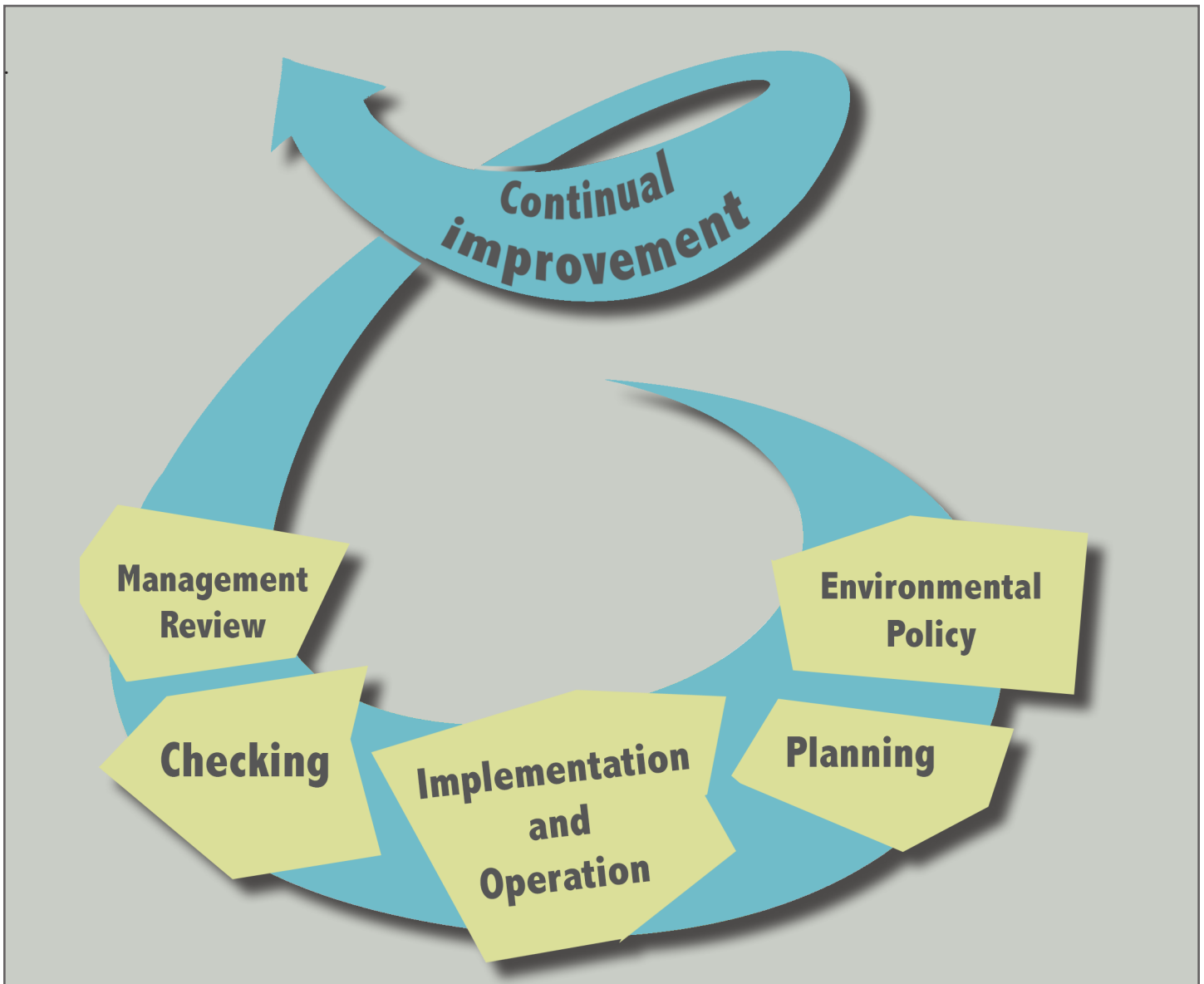


## **Myth 2: Environmental Impact is usually about the end product or service.**

Answer: Environmental impact is actually about thinking to alter not only what we use to produce goods and services, but also the in-process of goods and services, and what procedures to follow to alter these at any stage and with whatever the organization might interact with.

What is most important is to understand the workflow of the organization, the possible threads that link various elements of the organization, and how to alter one's routine and keeping good records so you can measure a positive impact on the environment. It requires learning to continuously improve by conducting reviews and measures of the inputs and the outputs of the organizational processes, while constantly reassessing the resources, work instructions and controls that are in place.

Specifically EMS is an improvement cycle that consists of 4 STEPS: plan, do, check, and act, if you are able to complete an environmental score card with ease, you have embodied the philosophy behind EMS. However, in my opinion very few organizations achieve this. This is because the improvement cycle is seldom the reason why organizations evolve but instead how. The how is as important to answer but still remains a reactive mechanism or a simple knee jerk reaction by management instead of shift in culture.



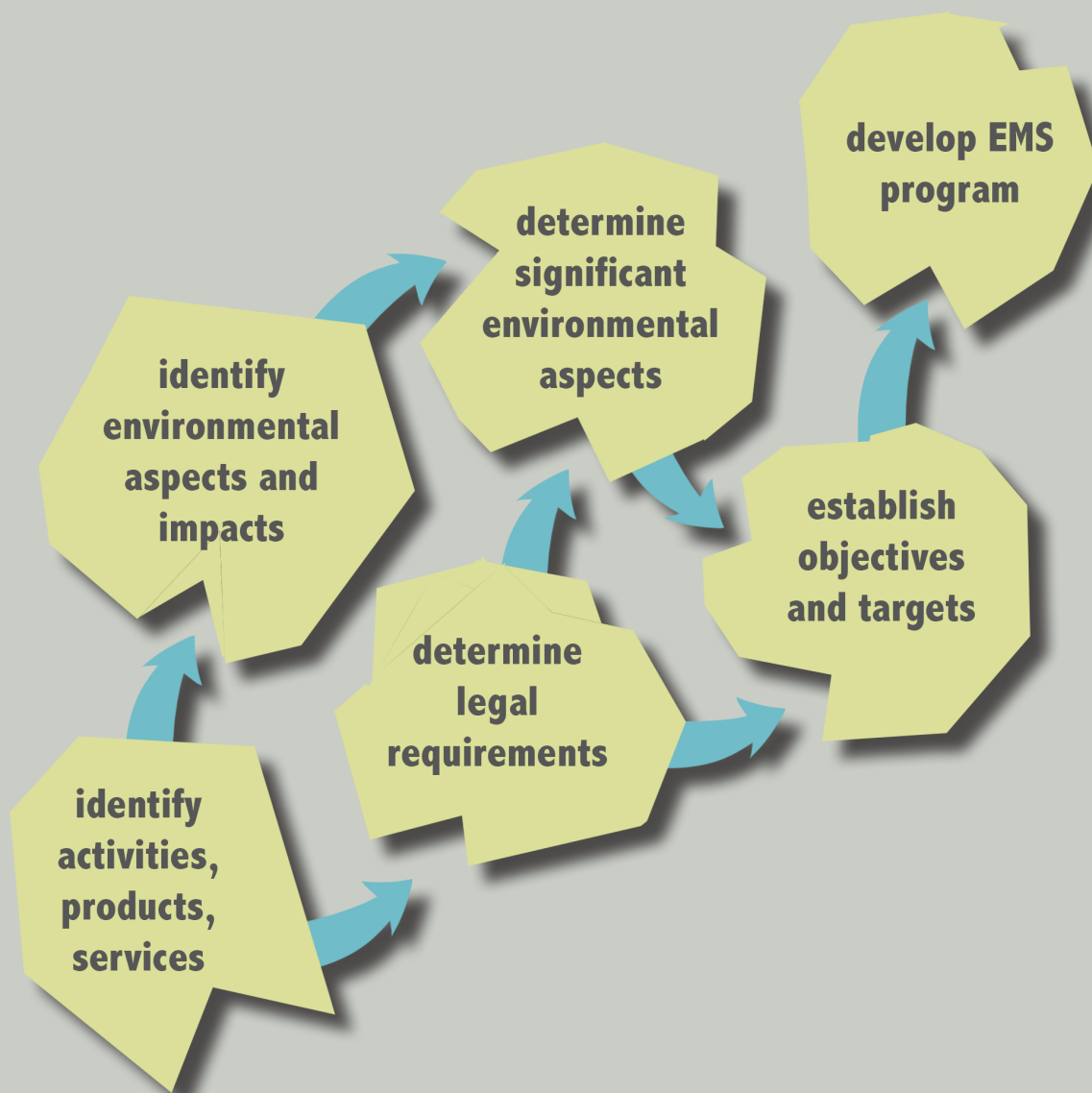


### **Myth 3: We have to hire an environmentalist to take that on.**

Although some good knowledge of the topic is necessary, all you need is a procedure that contains instructions that every member of the organization can follow when conducting investigations which include the collection of information, analysis of that information, and assignment of root cause. It is even more important to determine corrective and preventive actions that will minimize the impact on the environment.

The concept follows the very simple workflow shown in the diagram below. You identify the activities, products and services that are key to the organization. While checking for the aspects and impacts, you determine any legal requirements you must comply with, both will determine what environmental aspects are significant. Next the organization established objectives and targets before designing an environmental management program.

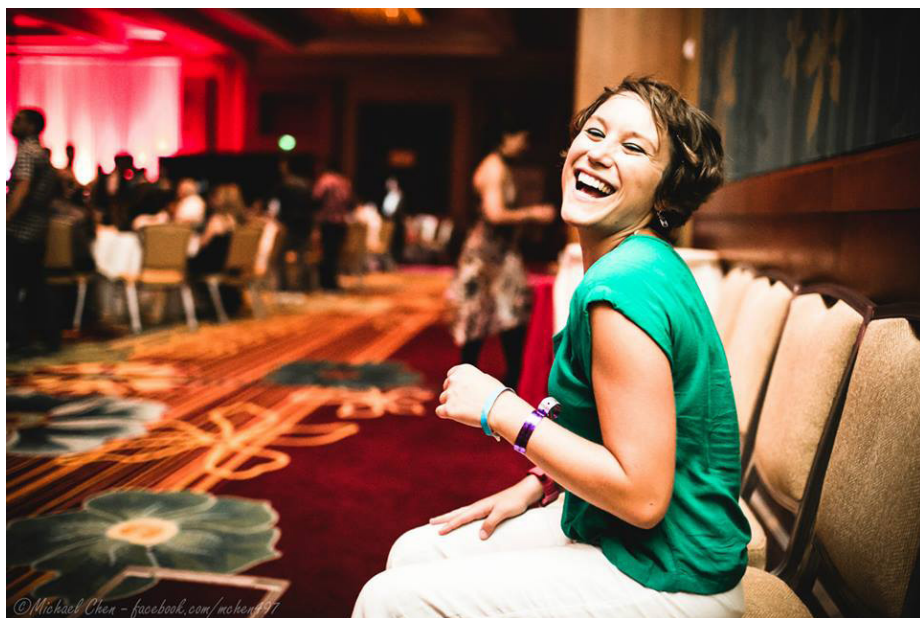
So what's next? Sustainable development, which according to the Brundtland commission calls for meeting the needs of the current generation without compromising the ability of future generations to meet their needs, should be the desired outcome of any entity. It is always possible to manage the triple bottom line, environmental, social and economics issues, because according to John Ruskin "quality is never an accident, it is always the result of intelligent effort." It is time to plan





# Expressions

## Sustainability through artists' eyes



*Alabama native, Charleston transplant Georgia Schrubbe is a freelance writer, social media coordinator, yoga instructor, professional Salsa dancer, and author of "There Is a Live Wire in the Shower and Other Concerns About Life In Cuba." Check out her blog at [www.georgiaschrubbe.com](http://www.georgiaschrubbe.com).*

I picked up a piece of tin foil that, while once smooth and shiny silver, was now browned and wrinkled and looked more like an avocado skin than a piece of tin foil. I shook it, and a few bread crumbs fell out of the creases.

"Toss it." My sister announced, and I threw it in the garbage can.

My parents were out of town, and my sister and I were eagerly seizing the opportunity to throw away all of the tin foil and Ziploc bags that my mom made us wash and reuse over and over again.

Pieces of foil of all sizes and colors were trashed as well as Ziploc bags that were yellowed with age and had Sharpie markings like "Boston Butt. December 2002" written on them.

The cupboards were full of yogurt cups that had been cleaned and stacked in towers, never to be used again. If we threw away an egg shell, my mom would dig it out of the garbage and put it in the compost pile. The leftover heel of a loaf of bread was saved, dehydrated, and turned into breadcrumbs. Wrapping paper, bags, and tissue paper from Christmas gifts were always carefully folded and stored in a closet to be used the next year. My sister custom-made my mom a Ziploc-drying "tree," painted to match the trim in the kitchen.

As a teenager, I rolled my eyes, but as an adult, I've adopted some of the same habits. I have my own collection of washed and reused Ziploc bags, and (though I'm not Catholic), I have what I imagine is crushing Catholic guilt if I throw away something that could be recycled.

Who knows if these...antics are making a difference, but I appreciate my mom making my siblings and I aware of what we do with our trash. Maybe if everyone tried to be a little bit more careful with their waste, we could make a big difference. I guess we just need to watch out and make sure we don't put Ziploc out of business...

## Gathering STEAM: Collaboration Between the Arts and STEM



*Students study weather and climate during a science class at the STEAM Institute, which aims to incorporate the arts into STEM fields to provide a holistic and creative problem solving process. (Photo by Olivia Cohen)*

The fields of science, technology, engineering, and math, or STEM, have become increasingly important in our society as the demand for STEM-related knowledge increases without adequate supply. President Obama has mentioned STEM in the past six State of the Union Addresses and has allocated millions of dollars toward encouraging STEM educators and well-educated students.

500 miles south of the capital in Charleston, S.C., educators hope to give students a holistic A-plus education by changing STEM to STEAM: science, technology, engineering, arts, and math. The 2014 STEAM Institute, created through Engaging Creative Minds, offers six weeks of dynamic day camps based around themes that incorporate STEM fields and the arts for students in grades 3-8.

Erin Leigh, camp director for STEAM, hopes that the camp will help students see that STEM fields and the arts both require critical thinking, collaboration, experimentation and research. "The ways in which we solve problems and actually operate today involves collaboration between the arts and the sciences all the time," she said. By showing students that these two fields share the same ways of thinking, the camp gives students the chance to work outside of self-assigned labels as a "science-person" or an "art-person" exclusively.

Camp sessions focus on a range of scientific topics from force motion to robots, and all coordinate with local teachers, College of Charleston professors, and a variety of local artist and cultural organizations.

Synergies reporters visited the camp during its first week and observed as students learned about climate change in the camp, "It's getting hot in here!" Students attended science class where they studied a variety of topics including photosynthesis, weather, and sea level rise, and then attended art classes, where they made instruments from trash, danced, acted and created zines about sustainability. "Students are getting the sense that choosing to be sustainable is not something that's happening way outside of them," Leigh said about the camp. "It's actually happening right here in Charleston and that they can immediately make contributions to make things better."

View some of the students' zines on the following pages!





"Thus it is essential that the United States enhance U.S. students' engagement in STEM disciplines and inspire and equip many more students to excel in STEM."

-Federal Science, Technology, Engineering, and Mathematics Education 5-Year Strategic Plan





# PLANTS

INHALE



Carbon Dioxide

All plants  
take in  $CO_2$   
and release  
oxygen

It is good  
for us!

Humans  
breathe  
in oxygen  
and release  
carbon dioxide

Oxygen

Have you  
breath out carbon dioxide  
The plants take in carbon dioxide  
that makes oxygen we need to  
breathe. They breathe are letting out  
carbon dioxide which is bad for  
us and give energy.



## GLOBAL WARMING

Global Warming is bad because it  
starts melting the ice melts. It  
gets really hot. The sea level rises. The  
animals die and the weather is getting  
worse. Global warming is bad because  
it makes the sun stronger. Plants in the  
deserts are dying. Another way  
that helps Global Warming is from the  
factories that are making things.



By Hannah  
Parker

Sunlight is  
Green  
Plants  
Water



Plants take oxygen and when plants are  
dead they use oxygen. The carbon dioxide  
from the sun, water, and oxygen  
the sun is what plants use from the  
sun. By Hannah Parker

Steam



# THE SUN GIVES ENERGY AND CO<sub>2</sub> TO THE EARTH

The Sun gives off energy and carbon dioxide that the Earth needs.



The Earth absorbs energy from the sun, and the carbon dioxide is released into the atmosphere.



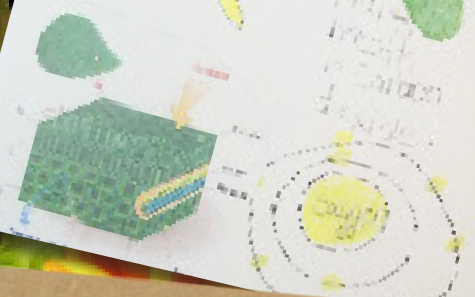
Is not Pat here CO<sub>2</sub> it will heat up and something get fired. Then too much CO<sub>2</sub> can get trapped in the earth's atmosphere so we should stop putting extra in the air.

GO green

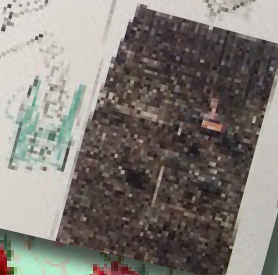
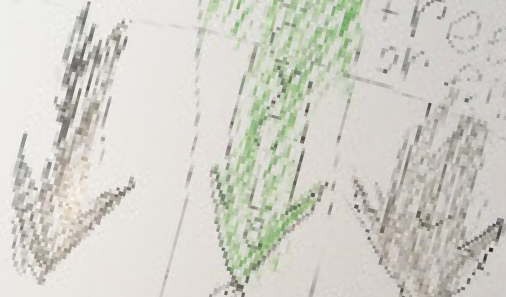


don't put too much CO<sub>2</sub> in the forest

## PLANT Respiration



We bring a water bug down to the forest or field.



ZINES