



Mitigating Pollution Through Green Infrastructure and Sustainable Materials Management Mini-Grants: Community Education and Integration Projects Throughout EPA Region 2

Project Summaries

2013-2015

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Arts+Action Cafeteria Waste Reduction (CWR) Project

Organization: Cafeteria Culture

Project Lead: Debby Lee Cohen, Director & Founder of Cafeteria Culture

Location: PS/IS 34 M Franklin D. Roosevelt School, New York City

Amount Awarded: \$5,000

Project Description:

With the expanding NYC school plastic recycling and composting programs, PS/IS 34 M Franklin D. Roosevelt School system wanted to make sure they were doing what they could to contribute. The Arts+Action Cafeteria Waste Reduction (CWR) Project is a 3-month residency program, providing urgently needed school cafeteria waste reduction, recycling, and composting. This project had two parallel tracks. The first being The Cafeteria Ranger track where K-8th graders are taught garbage and recycling basics in order to oversee cafeteria recycling and waste sorting. The second track was a multi-disciplinary "Make Change Messaging" workshop taught to a 5th - 7th grade class. Through the workshop lesson plans were used to engage the entire school community on the serious topic of garbage.

The primary project goals were to increase school cafeteria solid waste diversion rates to over 80% and shift the overall school culture towards embracing "green" behavior, all led by student change. Students wanted to be engaged in the project's programs. Many students took great pride in making a difference in the waste reduction and recycling accomplishments.

Special Recognition: Several of the 5th graders were asked to interview Grammy Award winner, Pharrell Williams, for the HBO Children's special on the environment.

Major Project Outcomes:

- Dramatic decrease of bags per day on Launch Day of the program and an above 80% rate decrease on Zero Waste Lunch Challenge Day.
- Reduced curbside garbage volume decreasing custodial labor and truck idling time.
- Sustainable and Reduce-Reuse-Recycle knowledge gained throughout the student body.

Take Home Message:

The Arts+Action Cafeteria Waste Reduction (CWR) Project is easily transferable to other school districts. This project provides knowledge to a younger generation helping students understand the importance of "green" behavior while providing leadership and communication skills. These skills and ideals would be valuable to students throughout many districts.

Personnel, Materials, and Measurable Outcomes:

Personnel Engaged: Teachers, administrators, and K-8th grade students at the PS/IS 34 M Franklin D. Roosevelt School system

Materials/Presentations: The entire 5th grade class attended a rally at NY City Hall. Three students spoke for the press along with City Council Members and environmental leaders. The rest of the students stood on the steps of City Hall. They appeared widely in local press.

Fig. 1

OCT. 2 2013 **EXTRA! ZERO WASTE NEWS - PS/IS 34 M NYC** FREE

AMAZING FIRST DAY!

October 1, 2013 - Launch Day
We went from 10 bags to 1 1/2 bags of garbage!

We **decreased** the amount of **garbage** by:

- 57 pounds of **liquid**,
- 14 pounds of **recyclable trays** (paper boats),
- 4 ounces of **recyclable paper**,
- 13 pounds of **recyclable cartons and plastic!**

Keeping all this from going to a **LANDFILL** and **INCINERATOR!**

CAFETERIA RANGER!

THANK YOU
 STUDENTS AND CAPTAINS
 FOR DOING AN AMAZING JOB!
 KEEP UP
 THE GREAT WORK!

**CAFETERIA
 Culture**

STACKING BOATS!

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Fig. 2

LESS THAN A POUND!

PS/MS 34 - Zero Waste Lunch Challenge!

It's a record!

Only 13 ounces of garbage
 from 395 students, Pre-K through 8th grade!
 Everything else was recycled or composted!

Great job everybody!
 October 22nd, 2013

Thank you NYC Council Member Rosie Mendez, Syracuse University, The US Environmental Protection Agency, Johnson Ohana Charitable Foundation, El Sol Brillante- Children's Garden, the 14th St Y, and PS/MS 34 teachers, staff, and STUDENTS!

CAFETERIA Culture www.cafeteriaculture.org

Composting Mania: An Environmental Program from Eugenio Brac School to Community

Organization: Puerto Rico Composta Inc.
Project Lead: Raul Lopez Maldonado
Location: Eugenio Brac Elementary School, Naguabo, Puerto Rico
Amount Awarded: \$5,000

Project Description:

Puerto Rico produces approximately 3.6 million-tons of waste per year, of which 35% is compostable material that ends up useless in landfills. The Compost Mania program aims to cut down on the waste going to landfills by establishing a vermicompost/compost environmental program for the 4th grade students of Eugenio Brac Elementary School in Naguabo, Puerto Rico. The program covers many residents impacting 75 students directly, and has an overall impact on the whole scholar community. A scholar garden using the compost material recovered from the program is harvested for food preparation at the school and community.

The program revealed a high content of organic matter that represents a great opportunity to obtain a useful product named compost that has valuable uses for the scholar community. The school uses a "school to community approach" to impact the community and the students' families through a final Home

Composting Workshop where composting initiatives implemented during the project are presented.

Special Recognition: Migdalia Roque, the main educator behind the project was recognized by Amgen Co. as the winner of its Excellence Science Award.

Major Project Outcomes

- Part of the food harvested at the scholar garden has been returned to the scholar dining room to be used for the preparation of food.
- Students have a better understanding of the composting process, and around 50% of students now have composting and gardens at home.
- All vegetative waste was diverted from the scholar dining room.
- Over the course of 5 months of low/rapid and vermicompost students collected around 100 pounds of compost.

Take Home Message:

This program should be used as an example to help generate future educational and action programs at a higher level that will support the efforts of public and private sectors that deal with solid waste management issues in Puerto Rico.

Fig. 3



Fig. 4



Figure 3: Compost recovery and packaging

Figure 4: Scholar garden exhibition to the community

Personnel, Materials, and Measurable Outcomes:

Personnel Engaged: Multiple teachers and 75 Eugenio Brac Elementary School students.

Advancement of Project: The school awarded an additional \$5,000 to continue the project Compost Mania for future years

Materials/Presentations: A training on "How to start a Composting Mania Project" has been scheduled for all interested science teachers of Naguabo's school and bordering towns.

Fig. 5

Week #	Date	Description	Hours	Educational expense and Outreach Materials
Weeks # 31-#34	March 10-April 4	To continue the composting activities Planning of the Earth day.	3 hours	150
Weeks # 35-#36	April 7-April 18	Closing activities of the project. Open house of the achievements.	15 hours	300
Weeks # 37	April 21-25	Continues the harvesting phase. Students will collect the food from garden. To continue the composting activities from garbage to garden.	4 hours	100
Weeks #38-#40	April 28-May 9	To repeat the diagnostic test to the 4 th grade students in order to measure the knowledge acquired. To train the school faculty showing the results and benefits obtained during the project. Field trip coordination to the commercial compost facilities.	6 hours	195
Weeks #40-44	May 5-30	End of the project...Evaluation of the project. Post interview with the Scholar director.	5 hours	150
Weeks 45-49	June 1-30	Closing meeting with the Teacher of the project. Working with paperwork, reports, measurement of the achievements.	10 hours	250
Total				1,145

BIG!Compost Food Scrap Drop-off Expansion to Down to Earth Farmers Market

Organization: BIG!Compost

Project Lead: Gina Baldwin, BIG!Compost Program Coordinator

Location: Down to Earth Farmers Market in Greenpoint, Brooklyn, New York City

Amount Awarded: \$5,000

Project Description:

Much of New York City's food waste ends up in landfills, but thanks to BIG!Compost some of this food waste is being diverted away from landfills to be composted. BIG!Compost is a community-scale composting network that works to increase capacity for, acceptance of, and participation in composting in New York City. The program serves the public by hosting weekly and event-specific food scrap drop-offs, training community members in urban composting best practices, and providing high-quality compost to amend our city's soils. The finished compost is used in community gardens, street tree beds, and other public green spaces.

Through the dynamic and informative food scrap drop-off pilot at the Down to Earth Farmers Market, there was a reduction in the amount of solid waste that goes to the landfill from New York City.

The finished compost produced through this program is provided to environmental stewards and community organizations in the local community. Local youth and community members were engaged in direct action to provide residents with the necessary information to become educated environmental stewards.

Major Project Outcomes

- Over the course of 12 months, a total of 25,070lbs of food scraps was diverted from distant landfills.
- Over the last 10 weeks of the program when staff was present, 145 community households participated per week, diverting an average of 752lbs of food scraps per week from the landfill.
- On community tree care workdays, locally made compost was applied to street tree beds to help demonstrate the full-circle benefits of composting.

Take Home Message:

Composting is a great way to reduce waste and emissions from both transportation and landfill pollution. This particular program uses composting to provide soil for gardens and city tree beds producing a beneficial product from waste.

Fig. 6



Fig. 7



Personnel, Materials, and Measurable Outcomes:

We reached an average of 145 community households per week diverting an average of 752lbs of food scraps per week from the landfill for a total of 25,070lbs of food scraps over twelve months.

Materials/Presentations: The BIG!Compost project at the Down to Earth Markets was mentioned in the Greenpointers Blog in 2013.

Personnel Engaged: 8 community members and 29 PS31 students cared for local street trees using compost soil.

Advancement of Project: The composting program is now fully funded through the NYC Department of Sanitation's NYC Compost Project.

Green Infrastructure Improvements at New Roots Community Farm

Organization: GrowNYC's Open Space Greening

Project Lead: Mike Rezny, Program Manager, Open Space Greening GrowNYC

Location: Bronx, New York City, New York

Amount Awarded: \$5,000

Project Description:

GrowNYC saw the opportunity to address stormwater management issues, and provide vital space for education opportunities and neighborhood gathering by installing various forms of green infrastructure to improve New Roots Community Farm. GrowNYC built a retaining wall in order to level a previously sloped area providing a footprint for a cloth-roofed tensile structure to harvest rainwater at the International Rescue Committee's (IRC) New Roots Community Farm in the Bronx. The retaining wall includes several additional raised beds acting as rain gardens to capture runoff from the higher-grade structure footprint.

Work was done in conjunction with New Roots to design a structure and area to be used as a gathering place for the local gardeners, IRC refugee clients and, specifically, for students from KIPP Charter School, Bronx Leadership Academy, and Cardinal Hayes High School. The layout will include additional seating areas that are more suitable for program and community gatherings. The garden can now better engage more local school students in community workdays by giving them the responsibility of their own food production beds, and providing hands-on learning opportunities.

Major Project Outcomes

- A retaining wall was built to create flat area for a structure footprint.
- A retaining wall is being utilized to build raised beds to capture runoff and provide additional growing space.
- A flattened area for structure footprint and mulch so the area retains water.
- A sitting area allowing for programs and community members to meet.

Take Home Message:

Green space such as community farms are important educational tools. They provide an area where the community can come together. Improving the New Roots Community Farm by installing a retaining wall that slows runoff velocity, while including rain gardens and rainwater harvesting systems is a smart way to combine green technologies, and provide benefits to the surrounding community.

Fig. 8



Figure 8: Long bioswale with retaining wall supporting growth of perennials and native plants

Personnel, Materials, and Measurable Outcomes:

Personnel: Three people were involved in labor and consulting

An Internet-Based Approach to Efficiently Deliver Recycling, Waste Reduction and Litter Reduction Instruction to 3rd – 5th Grade Students in Onondaga County's 18 School Districts

Organization: Onondaga County Resource Recovery Agency (OCRRA)

Project Lead: Andrew Radin, Director, Recycling and Waste Reduction OCRRA

Location: Onondaga County, Syracuse, New York

Amount Awarded: \$5,000

Project Description:

The Onondaga County Resource Recovery Agency (OCRRA) understands that the expansion of sustainable material management throughout Onondaga County is possible through younger residents, and more specifically 3rd through 5th grade students in Onondaga County's 18 school districts. OCRRA knows that it is important to energize and motivate students at a young age to assume stewardship of their recyclables and trash both at home and at school; to empower students to see that sustainable materials management begins with them, and that they can make a difference in their neighborhood, their community, and their world by assuming personal responsibility for their waste generation.

This is what OCRRA did using an internet-based program that has online videos and classroom games, teaching approximately 12,000 3rd through 5th grade students in Onondaga County about sustainable materials management, and recycling and waste management processes. Through this program students will be able to model sustainable waste reduction practices at home and at school, and will be able to communicate the importance of these actions to their peers, as well as to younger school children and family.

Major Project Outcomes

- Five highly creative, professionally-produced videos and several interactive supplemental games that engage 3rd through 5th graders to help them understand sustainable materials management.
- A robust "teacher guide" manual of more than twenty non-digital classroom activities that supplement the videos and correlate with required curriculum standards.
- Students have a better understanding of solid material management.

Take Home Message:

This project will be easily accessible to all educators in Onondaga County, and beyond, via the internet. Students will be able to learn educational priorities through hands-on participation at the teacher's convenience throughout the school year. It is important to use such an easily accessible resource to help educate young minds in order to make a difference in the way future generations think about sustainable materials management.

Fig. 9



Fig. 10



Figure 10: Screenshot from one of the one of the interactive games (lessons) in which students sort common household items into the correct container

Personnel, Materials, and Measurable Outcomes:

Personnel: Teachers from 18 school districts within Onondaga County and approximately 12,000 students.

Materials/Presentations: Five highly creative, professionally-produced videos and several interactive supplemental games. A robust “teacher guide” manual of over twenty non-digital classroom activities that supplement the videos and correlate with required curriculum standards

Fig. 11

Name: _____

Recycling Sequencing

Directions: Please cut and paste the recycling steps in the correct order.

A new product made from recycled material is ready for use!

Materials are packed into separate bales of newspaper, cardboard, plastic materials and metal cans.

Once they're in bales, the recyclables are sold to other companies to start their new life as something new.

Recyclables are sorted by people and machinery including conveyers, magnets and even light sensors.

The truck takes them to a MRF, that's a material recovery facility.

Green Waste Reduction Leadership Project

Organization: Syracuse City School District

Project Lead: Michael Puntschenko

Location: Onondaga County, Syracuse, New York

Amount Awarded: \$5,000

Project Description:

The Syracuse City School District understands how important it is to educate both students and teachers in waste reduction efforts in their buildings. To increase probability for project success, teachers received training from the Onondaga County Resource Recovery Agency (OCRRA) on how to educate students on waste reduction, reuse, and recycling (the 3 R's). Students then promoted strategies for diverting materials from the waste stream and educated their peers and community on the importance of waste reduction. Each school conducted two waste audits taking place before and after the school-wide education effort to help show the program's effectiveness. The audits included separation and categorically weighing waste in classrooms.

At the end of the curriculum, projects were presented to the community as part of a Community-Wide Sustainability Celebration at the Milton J. Rubenstein Museum of Science and Technology (MOST). The SCSD believes that as students grow and eventually become the renters, workers, and homeowners of tomorrow, they will bring the knowledge gained through this project to the broader community, positively impacting our waste management efforts.

Major Project Outcomes

- Teachers utilized the OCRRA curriculum to educate students about waste management issues and the three R's. Students were given pre and post assessments to measure their learning.
- Two waste audits were conducted to help show the progress in waste reduction after the OCRRA curriculum was taught to the students. The results showed an overall 2% reduction in waste. This was most noticeable in the reduction of paper film plastic waste by 54% and 33%, respectively.

Take Home Message:

After a curriculum has been developed the ability to transfer projects like the Green Waste Reduction Leadership Project between districts becomes more possible. Sharing this project with other districts allows for further development, making for a more successful project. Educating younger students and engaging them in waste reduction practices is important for the future success in waste reduction methods in schools and at home.

Fig. 12



Fig. 13



Figure 12: Hughes K-8 School students sort through trash collected from second floor classrooms into categories

Figure 13: Students sort and weigh each waste category

Personnel, Materials, and Measurable Outcomes:

Fig. 14: Difference in waste at the end of the curriculum

Category	Difference (lbs)	% Change
Mixed Paper (mail, magazines, newspaper)	10.5	54%
Cardboard	-6	-60%
Metal cans (except returnables)	0	0%
Other metals	0.5	100%
Recyclable plastic containers and bottles (except returnables)	0	0%
Glass (except returnables)	0.5	100%
Returnable cans and bottles	0	0%
Styrofoam	-1.5	-150%
Film Plastic (bags, wrap)	1	33%
Hazardous Waste	0	0%
Electronics	0	0%
Organics (food waste)	-0.5	-1%
Other Waste	-3	-26%
Total	1.5	2%

Materials/Presentations: The Green SCSD coordinator presented the efforts of the students via a display and discussions with passersby at the MOST Sustainability Event at the Milton J. Rubenstein Museum of Science and Technology.

Personnel: Students, teachers, and custodial staff from 18 different school districts throughout Onondaga County

Where Does My Solid Waste Go?

Organization: Grupos Ambientales Interdisciplinarios Aliados - GAIA Corp.

Project Lead: Colibrí Sanfiorenzo-Barnhard

Location: San Juan, Puerto Rico

Amount Awarded: \$5,000

Project Description:

In Puerto Rico, each person generates about 5.6 pounds of solid waste per day, 90% of which ends up in landfills. There are approximately 1,600 public schools in Puerto Rico, most of which have no recycling programs. The “Where Did My Waste Go?” project is a crucial pilot program in order to help reduce the amount of solid waste being put into landfills. The program helped schools and a civic center develop solid waste management actions to reduce their contribution to Puerto Rico landfills. By connecting public schools to their communities we bring together action and knowledge. Transforming the theory into practice, we are connecting youth and adults with the urgent solid waste management problem in Puerto Rico. Through exercises, seminars, and workshops the program was able to get more families and community members involved in reducing, reusing, recycling, and composting, thus ensuring the program’s sustainability. For many students, this was an eye opening experience showing how much can be diverted from landfills for recycling.

Major Project Outcomes

- Two schools were able to establish solid waste management stations and receive once a week curbside recycling pick up from the Municipality of San Juan.
- Trina Padilla de Sanz High School did a 10-week data collection of the recycling materials in their stations and was able to divert 479 pounds of material from the landfills in that time period.
- The Casa Taft 169 Civic Center was able to establish the recycling infrastructure for receiving material from the surrounding residents; this includes kitchen scraps for composting. This is the first community-operated recycling pick up center for paper/carton, plastic, glass, and aluminum in the Santurce area.

Take Home Message:

The “Where Did My Waste Go?” project should be introduced to other municipal districts throughout Puerto Rico. In many areas recycling is impossible due to the lack of infrastructure to support it. Establishing recycling centers and seminars to better enable residents and school systems to recycle will result in a reduction of solid waste going to Puerto Rico landfills.

Fig. 15



Fig. 16



Figure 15: Constructing the recycling center with volunteers from Basura Cero Puerto Rico and neighborhood residents

Figure 16: Civic Center Casa Taft 169 recycling bins

Personnel, Materials, and Measurable Outcomes:

Personnel: Approximately 200 students from all three schools participated in seminars, workshops and hands-on activities that taught them about the realities of solid waste management in Puerto Rico. One-hundred students visited the Carolina landfill.

Measurable Outcomes: The Trina Padilla de Sanz High School did a 10-week data collection of the recycling materials in their stations and was able to divert 479 pounds of material from the landfills in that time period.

Vermicomposting Experiential Classroom Education Program

Organization: Capital District Community Gardens (CDCG)

Project Lead: Matt Schueler, Grow Center Planner, CDCG

Location: Troy, New York

Amount Awarded: \$5,000

Project Description:

The Vermicomposting Experiential Classroom Education Program introduced minority and underserved youth from Troy High School to pressing environmental issues facing the region. Many students were introduced to the experience of farming, gardening, and the importance of local food production for the first time. The program engaged students from Troy High School in grades 10 through 12 with hands-on experiential learning on the viability and practice of vermicomposting to manage food waste. Troy High school utilized Capital District Community Gardens' Produce Project urban farm as an outdoor classroom to educate students from two science classes--"Food, Land, and People" and environmental science. These classes connected them to composting projects in their community, and strengthened the relationship between Troy High School science teachers and CDCG's Produce Project, which is a year-round jobs training and educational program for disadvantaged youth from Troy High, engaging more than 25 students each year.

Major Project Outcomes

- Students built their own worm bins and managed them throughout the semester in the classroom.
- A curriculum unit centered around vermicomposting and waste management was developed, which can be replicated by the Produce Project Educator for future presentations to high school classes.
- The students, many of whom are minorities and underserved, learned about pressing environmental issues facing the region, while being introduced to the experience of farming, gardening, and the importance of local food production.

Take Home Message:

This program was able to connect underserved and minority youth with a vermicomposting program that was in conjunction with the CDCG's Produce Project outside of the school. The Produce Project helps students overcome barriers by providing job skills training, educational curriculum, and mentoring, which may be lacking from school or home. Incorporating school curriculum with outside programs is a good way to help encourage students who need more assistance than traditional classes provide.

Fig. 17



Fig. 18



Figure 17: Students examining rows of trench composting on CDCG's Produce Project Urban Farm

Photo courtesy: Capital District Community Gardens

Figure 18: CDCG's Produce Project Educator, Tolu Fashoro, presents to a science class at Troy High School about vermicomposting

Photo courtesy: Capital District Community Gardens

Personnel, Materials, and Measurable Outcomes:

Personnel: Sixty students and multiple teachers from two science classes participated in the vermicomposting education program through in-class presentations and a joint class field trip to the urban farm in fall and spring. The Capital District Community Gardens provided two personnel to assist with the program.

Materials/Presentations: Curriculum was successfully developed centered around farming and vermicomposting, with a focus on local activities in the Troy community.

Composting Pilot Project

Organization: St. John Community Foundation

Project Lead: Celia Kalousek

Location: St. John, Virgin Islands

Amount Awarded: \$5,000

Project Description:

The St. John Community Foundation understands the importance of waste reduction by conversion of would-be organic trash to a valuable product necessary for the health of our soils and for food production. With this in mind, the foundation supported the coordination of The EARTH Program at Giffit Hill School pilot project to fund a large scale compostable waste pick up from St. John area restaurants and businesses. In previous years the school has not been able to acquire the necessary amounts of green matter (i.e. fresh organic waste like kitchen scraps) to offset the large amounts of brown matter (leaves, soil, sticks, cardboard, and mulch), but with the help of 7 -12 local businesses obtaining the necessary green matter became possible.

The project focused on educating the wider community of the importance composting can play in the wider goal of trash reduction in the territory, and provided not only the education to local restaurants and businesses but the tools necessary to get started. Students worked to create drop-off locations for materials such as cardboard, paper, and kitchen waste that can then be incorporated into existing composting systems at Giffit Hill School. The intended long term impact of this project will be to affect student behaviors in the cafeteria, increase the size of the GHS composting area, and to institute widespread knowledge and acceptance of composting in the community as a way to reduce waste and increase soil viability.

Major Project Outcomes

- Business owners enthusiastically support creating less trash for our small island and helping to create a stream of locally made compost for our school system.
- Moving bin areas to the lower field increased the available space for on-site composting at Giffit Hill School. The movement also put the composting bins in closer proximity to the garden.
- There is an increased understanding throughout the island that composting is a beneficial and attainable way to reduce waste and increase soil viability.
- Prepared to give day long "Composting 101" hands on workshop open to the public.

Take Home Message:

Many businesses and community members may be environmentally conscious, but do not have the knowledge or tools necessary to take action on topics like food waste reduction. This project reached out to the community and helped them to participate in food waste reduction by making it easy to become a more environmentally friendly business or residence. Examples like this composting pilot project should be used to show how important it is to educate and help coordinate environmental efforts.

Fig. 19



Fig. 20



Personnel, Materials, and Measurable Outcomes:

Personnel: Students and teachers, as well as 7 -12 local businesses donated food waste regularly.

Materials/Presentations: The next step for this group will be to create a day-long “Composting 101” hands-on workshop that will be free and open to the public.

Fig. 21 **Carbon-to-Nitrogen Ratios and the N-P-K of Compostable Materials**

**NITROGEN CONTENT AND CARBON-TO-NITROGEN RATIOS
for Waste Materials**

Material	Nitrogen(% of total weight)	Ratio of Carbon to Nitrogen(C;N)
Activated sludge	5-6	6:1
Alfaalfa	2.4-3	16-20:1
Blood	10-14	3:1
Bone meal	*	3.5:1
Bread	2.10	*
Buttercup	2.2	23:1
Cabbage	3.6	12:1
Carrot,whole	1.6	27:1
Clover,red	1.8	27:1
Cocksfoot	2.55	19:1
Cottonseed meal	*	5:1
Fern	1.15	43:1
Fish scrap	6.5-10	5.1:1
Garbage,green	3	18:1
Garbage,raw	2.15	25:1
Kentucky bluegrass	2.4	19:1
Lawn clippings,young	4	12:1
Lettuce	3.7	*
Manure,farmyard	2.15	14:1
Manure,chicken	3.2	7:1
Manure,cow	1.7	18:1
Manure,horse	2.3	25:1
Manure,human	5.5-6.5	6-10:1
Manure,pig	3.75	*
Manure,poultry	6.3	15:1
Manure,sheep	3.75	*
Manure,steer	1.35	25.3:1
Meat scraps	5.1	*
Miloganite	*	5.4-1
Mustard	1.5	26:1
Newspaper	.05	812:1
Oat straw	1.05	48:1
Onion	2.65	15:1
Peanut hull	*	11:1
Pepper	2.6	15:1
Pigweed	3.6	11:1
Potato tops	1.5	25:1
Purslane	4.5	8:1
Ragwort	2.15	21:1
Sawdust,raw	.11	511:1
Sawdust,rotted	.25	208:1
Seaweed	1.9	19:1
Sewage,fresh	*	11:1
Slaughterhouse wastes	7-10	2:1
Soybean meal	*	5:1
Timothy grass	.85	58:1
Tobacco	3	13:1
Tomato	3.3	12:1
Turnip tops	2.3	19:1
Urine	1	44:1
Vegetables,non-legum	2.54	11-19:1
Wheat flour	1.7	*
Wheat straw	.3	128:1
Wood,white fir	.06	767:1

Carbon-Nitrogen ratios_Caribbean focused.pages

- Readily accessible high Nitrogen sources in Caribbean
- Readily accessible high Carbon sources in Caribbean

*Other high Nitrogen sources in Caribbean: Fish guts from fish market, bat guano, donkey manure, & most green plants (must be covered as nitrogen gasifies and rises).

*Other high Carbon sources in Caribbean: Most dried grasses (guinea, sudan, lemon, etc.), coconut husks (shredded), dried banana leaves, & cardboard.

Leckie J.; Masters G.; Whitehouse H.; and Young L. Other Homes and Garbage. San Francisco: Sierra Club Books, 1975.

Farallones Institute. The Integral Urban House. San Francisco: Sierra Club Books, 1979

Gotaas, H. Composting. Geneva: World Health Organization, 1956

Environmental Solid Waste Manager Future Teachers and Recycling/Composting Clubs at Elementary Schools in the Arecibo, PR Region

Organization: Department of Physics & Chemistry, University of Puerto Rico at Arecibo

Project Lead: Angel A. Acosta-Colon, University of Puerto Rico

Location: Arecibo, Puerto Rico

Amount Awarded: \$5,000

Project Description:

In Puerto Rico, around 70-80 % of solid waste disposed in landfills can be recycled, however Puerto Rico only has a 10% recycling rate. This project took the first steps to fixing this problem by educating 22 future elementary school teachers from the University of Puerto Rico at Arecibo about the solid waste management problem in Puerto Rico. Focus was put on recycling, composting, schools gardens, and the creation of recycling/composting clubs at their schools. The training consisted of 4 workshops (20 hours of continuing education) covering the whole spectrum of solid waste management and recycling. After the creation of the clubs, the teachers/schools will present results, difficulties, and activities achieved during the period of the project.

Through the project the 22 students became active environmental managers creating workshops, fairs, and recycling/compost clubs at schools. This is not an easy process in Puerto Rico, as the creation of an "official" club is difficult because the school cannot create them. Clubs have to be created by the Department of Education, which tends to take a long time. The 22 students have impacted schools throughout Arecibo, helping educate the younger generation and the surrounding community in solid waste management.

Major Project Outcomes

- The future schoolteachers impacted 11 schools, one community, and one university with a total of 198 and 267 students impacted directly or indirectly, respectively.
- Twenty-two students were selected and completed the workshop to become environmental managers.
- Workshops, environmental fairs, and demonstrative tables impacted eleven schools from five municipalities

Take Home Message:

Providing higher education in sustainability efforts and other environmental topics is important, as this allows for these environmental stewards to provide accurate and relevant information to communities. This program was able to spend time with only 22 students, but resulted in impact of hundreds.

Personnel, Materials, and Measurable Outcomes:

Personnel: Twenty-two university students

Fig. 22

<i>School/Community</i>	<i>Level</i>	<i>Municipality</i>	<i>Activities</i>	<i>Impacted Student</i>
Colegio de la Vega	K-12	Vega Baja	Workshops	25 ^D
Segunda Unidad Antonio Reyes	10-12	Camuy	Workshops	23 ^D
Segunda Unidad Antonio Reyes	K-9	Camuy	Workshops	20 ^D
Los Caños	K-6	Arecibo	Workshops/Fairs	20 ^D & 100 ^I
Eli Ramos Rosario	K-6	Barceloneta	Workshops	30 ^D
Community of Horno	-	Barceloneta	Fairs	-
Timoteo Delgado	K-6	Arecibo	Workshops	25 ^D
Victor Rojas II	K-6	Arecibo	Workshops	22 ^D
Manuel A. Díaz (special ed)	K-6	Morovis	Workshops	15 ^D
Dolores Gómez	K-6	Arecibo	Fairs	125 ^I
Francisco “Pancho” Rivera	K-6	Arecibo	Workshops	18 ^D
Sabana Hoyos	K-6	Arecibo	Workshops	42 ^I
UPR - Arecibo	-	Arecibo	Compost/Garden	-

Coastal Debris Removal and Storm Sewer Identification Project

Organization: Vieques Conservation and Historic Trust (VCHT)

Project Lead: Mark Martin Bras, VCHT

Location: Vieques, Puerto Rico

Amount Awarded: \$5,000

Project Description:

The Vieques Conservation and Historical Trust (VCHT) understands the importance of protecting the local coastline from waste and other pollutants, in order to protect areas that contain coral reefs, sea turtle nesting sites, and a variety of shore birds. To help do this they launched the Coastal Debris Removal and Storm Sewer Identification Project, which facilitated a number of beach cleanups, sewer system labeling, and educational workshops to promote awareness and continue conservation efforts to reduce waste in critical coastal environments. More than 20 beach cleanups have been conducted, each used as an educational experience to inform the surrounding public about the importance of protecting the coastline.

To help combat the lack of information regarding stormwater drains, labels were designed to be placed on drains and inform the community of how the contaminants can potentially enter waterways. Stormwater drain labeling is part of the sticker campaign, which included a trip around the island of Vieques labeling trashcans, recycling bins, and other waste management structures with a traditionally recognized design

and anti-litter slogan. The VCHT hopes that the stickers will deter people from littering and help stop further waste from reaching the coastline.

Major Project Outcomes

- Trash and litter reductions at cleanup sites, especially in the case of the bioluminescent bay of Puerto Mosquito.
- A total of 121 garbage bags were removed from Puerto Real bay.
- Great success in beach cleanups due to large numbers of participants, which included students, fishers, community leaders, interns, volunteers, teachers, and visiting university groups.
- Storm drains were identified for labeling in Esperanza, Isabel Segunda, Bravos the Boston, and Monte Santo.

Take Home Message:

Spreading knowledge and discouraging people to pollute at the point of pollution may result in less money being used for cleanups in the future. Taking time to educate people on important environmental matters is an important step; otherwise cleanups will be a never-ending cycle.

Fig. 23



Fig. 24



Fig. 25



Fig. 26



Figure 25: Duracast marker for the storm drains with a non-slip, high-grade material installed with a specialized adhesive

Figure 26: Trashcan sticker installed as a diamond shape

Personnel, Materials, and Measurable Outcomes:

Personnel: Cleanup participants, which included students, fishers, community leaders, interns, volunteers, teachers, and visiting university groups

Materials/Presentations: Stickers to be placed and/or used as an educational prop

Fig. 27

Dates	June- September 2014	2014	January 2013-2015
SYR-EFC Coastal cleanup title	Manta Program beach cleanups 6	Manta Costa Cleanups 2	President call to action-beach cleanup days-2
Participants	Ages 5 to 18- Participants 125 students/ 4 educators/18 Volunteers/1 VCHT staff/2 VCHT interns 1lifeguard	Underwater cleanup with Interns from Wellesley College and students from Manta costa project and a local watersport provider JAK watersports Ages 12 and above- 12 community participants/ 8 Manta Costas students/ 2 Interns/ 1 lifeguard/1 VCHT staff/4 JAK watersports captain and guides	Ages 8 and above- over 20 community and visitor participants/3 Interns/ 2 VCHT staff/1 lifeguard/tourist participation
Area	Esperanza Pier and coastline of Puerto Real Bay, Puerto Mosquito Bioluminescent bay	Esperanza and Puerto Real bay	Esperanza and Puerto Real Bay Underwater and shore line cleanup
Total number Collected bags	76 bags of trash, 6 from the underwater 12 from P. Mosquito	15 bags/ 7 underwater-	Approximately 30 bags of trash
Materials collected	aluminum cans/ plastic and glass bottles/ micro plastics/ discarded fishing or boating equipment/ lighters/ cellular phone parts/ clothing/ snorkeling equipment/ straws/lionfish	450 aluminum cans recovered in the underwater component/ 1 trashcan/ plastic and glass/ cups/ cigarette boxes/1 backpack/ clothing/ fishing line and hooks, /straws/ micro plastics/Vieques tourist maps/ car tires/ discarded fishing traps/plastic bags.	Underwater- approximately 500 aluminum cans, plastic and glass bottles/ micro plastics/ 2 pieces of luggage/ clothing/ ceramic figurines/ mattress/ fishing equipment/ lionfish/ plastic bags/other items.

Turning Trash into Resources: Papercrete Pot Production

Organization: Island Green Building Association, DBA Island Green Living Association

Project Lead: David Minner and Sarah Haynes, EARTH Program Coordinator

Location: Virgin Islands

Amount Awarded: \$5,000

Project Description:

The EARTH program and Island Green Living Association (IGLA) recognizes the issues associated with the inability to recycle plastic and glass bottles in the Virgin Islands, as there is currently no major recycling or reuse effort in place. The reasons for the absence of any concerted effort include lack of funding, challenging shipping logistics, and lack of government support. Both programs believe that the wasteful disposal of glass and plastic bottles can be re-directed into valuable building materials, reducing the importation of construction materials, and saving on shipping and disposal costs.

The EARTH program and IGLA worked together in conjunction with 15 fourth and fifth grade students from

Giff Hill School to design and test three different papercrete mixtures to be used to construct 2-gallon papercrete pots. After a lot of trial and error, papercrete proved to be an unsuitable material to make the pots. It was found that a new mixture called “plasticrete” (made up of shredded plastic strips) should be used instead for future garden pot applications. With more testing, evaluation, and public acceptance of plasticrete, future applications for this recycled mixture of materials for a garden style pot should be considered.

Major Project Outcomes

- Forty hours of hands on learning (trial and error, success and failure) with 15 fourth and fifth graders from Giff Hill School campus being taught by teachers and high school peer teachers in the art of using recycled materials to make papercrete and plasticrete.

Take Home Message:

Even though the project was unsuccessful in the production of a papercrete garden pot, product development was accomplished by finding recyclable product that cuts down on the wasteful disposal of plastic. Further development may result in a more viable option in using “plasticrete” to make useful products for the Virgin Islands.

Personnel, Materials, and Measurable Outcomes:

Fig. 28

Service	Personnel	Hours	Amount
Hands on design			
	Doug White eco architect	20	275
	Rosemary Richards GHS art teacher	40	1000
Collection of paper/plastic		50	500
Education plan and project supervision	Sarah Haynes	40	1000
	Total		\$2775

Impacting Communities through Vermicomposting and the Use of Compost in School Gardens

Organization: University of Puerto Rico - Ponce

Project Lead: Ramon A. Santos Ruiz

Location: Ponce, Puerto Rico

Amount Awarded: \$5,000

Project Description:

The University of Puerto Rico – Ponce (UPR-P) knows how important it is to educate the school system’s community in sustainable waste management practices in order to provide a healthier future for residents and the environment in the Ponce area. To help accomplish this, UPR-P put together a series of workshops and activities to help educate students, as well as teachers and parents/guardians, on the solid waste management practices of recycling, composting, gardening, and vermicompost. The workshops served as a general introduction to solid waste management, the project proposal, and composting as a viable, sustainable way of managing materials and reducing the impact of waste.

UPR-P worked with students and faculty from the Aurea Collazo School to advance their current vermicompost system by providing the school with more detailed techniques and do a qualitative comparison between different techniques. The UPR-P also worked with the Herminia García de Cintrón School to build a compost bin and construct a nursery (with irrigation) where the compost can be used. Participants used yard waste and cafeteria food scraps for the composting process. Composted soil was used to improve school gardens. This project impacted the school community, both in learning about and applying composting practices, but also, on a more personal level, affecting daily life in the school.

Major Project Outcomes

- A three bin compost system established and operated by students at Herminia García de Cintrón School.
- Various community and school education and outreach efforts which resulted in reduction and better utilization of food waste, an increase in recycling efforts, and an awareness of pollution mitigation efforts.

Take Home Message:

Education through first hand experience is critical for pollution reduction awareness in a community. With a student-run compost system at the school, students were able to learn how to reduce their food waste, and create a useful product out of material that otherwise would enter the waste stream. These practices can be applied at home and throughout the community.

Fig. 29



Fig. 30



Island "Upycling": Turning trash into building products

Organization: Island Green Building Association

Project Lead: David Minner, EARTH Program Coordinator

Location: St. John, Virgin Islands

Amount Awarded: \$5,000

Project Description:

Most building materials used on the Virgin Islands are shipped from Florida and South America, resulting in expensive shipping costs on materials for many of the construction projects that occur on the island. EARTH and the Island Green Building Association (IGBA) want to reduce the importation of construction materials by building structures out of glass and plastic waste. There is currently no major recycling or reuse effort in place for plastic and glass bottles in the Virgin Islands, so reusing these materials will reduce the costs of disposing plastic and glass.

The project team worked with Giffit Hill School students to build a garden wall and seating area in the lower campus vegetable garden to demonstrate the possibilities of reusing materials in new construction. Students worked directly with community experts such as architects and builders to create these green-build structures. The glass and plastic structures serve as an example of what use our resources of glass and plastic can and should have beyond the one time transportation of drinking fluids. Students gained valuable communication and leadership skills while learning how to reuse plastics and glass when new structures.

Major Project Outcomes

- A 100ft sitting wall composed of recycled wine bottles and recycled papercrete was built.
- Thirty-six students at Giffit Hill School in grades 4-12 were taught environmental stewardship through their collection and reuse of glass bottles and paper, and students' participation in the active construction of a garden and water diversion bottle wall.
- The community of St. John, VI was educated on the recycling and bottle wall project through three power point presentations presented to a total of 150 people.

Take Home Message:

With no environmentally friendly or cost effective ways to dispose of glass in the Virgin Islands, using these materials for sustainable construction is a great use of waste. This project also brings the school community together to help spread environmental awareness.

Personnel, Materials, and Measurable Outcomes:

Personnel: Thirty-six students in grades 4-12, faculty from Giffit Hill School, and a local stonemason

Materials/Presentations: A power point on the work completed and the advantages of reusing materials was given to over 150 people in the community

Fig. 31



Fig. 32



Figure 31: Decorating the crown of the recycled bottle wall

Figure 32: Overhead shot of the lower campus vegetable garden

Urban Composting Education Project at Queens County Farm Museum

Organization: Bellerose Community Composters

Project Lead: Aleksander Jagiello, Bellerose Community Composters

Location: Queens, New York City

Amount Awarded: \$5,000

Project Description:

Community Composters (BCC) worked closely with Queens County Farm Museum (QCFM) to expand and develop the farm's existing community compost drop-off location into an engaging and exciting educational tool for the 20,000+ school children that visit QCFM annually, as well as more than 200,000 other seasonal visitors. In a highly urban setting, options for engaging the public in composting programs are limited. The project engaged K-12 schools and the public on how to implement pollution mitigation through organics diversion and management. The project combined educational resources and project implementation to teach compost site visitors about how they can be involved in local organics diversion that takes place at the QCFM.

The project expanded the current system through the addition of a tumbler, which increased the drop-off area's capacity, providing more time for the food waste to break down. Most importantly, BCC used additional funds to construct a new, large-scale vermicompost bin that will diversify the community compost operation and enable us to facilitate the production of an abundance of vermicompost. We believe that in order for composting to be engaging, we must offer a demonstration site which will help students see the process of decomposition in its various stages and forms. To this end, students will explore the composting tumblers and gain valuable knowledge of how composting works.

Major Project Outcomes

- A 1,500 square foot physical expansion of the compost area designed to provide an overview of the QCFM composting process for visitors
- A large bench with seating for more than 20 students, providing visitors with a comfortable environment for learning.
- An 8' x 4' worm bin available for public viewing.
- Six custom made educational signs explaining composting and attracting attention to the farm.
- Construction of a 106 gallon Joraform Compost Tumbler.

Take Home Message:

There is a high level of importance in educating those who are willing to be educated in creating a more sustainable environment. This project improves the capacity of a site to educate the many visitors who come to the QCFM throughout the year. Improving this capacity will allow for more visitors to be educated, and may increase the residential composting movement.

Personnel, Materials, and Measurable Outcomes:

Personnel Engaged: QCFM farm's and Community Composters' employees and volunteers

Materials/Presentations: 6 educational/informational signs and a presentation put together by Brooklyn Tech students on the composting taking place at QCFM

Fig. 33



Vega Baja Environmental Awareness Student Team

Organization: Vega Baja Municipality - Brigida Alvarez Middle/High School

Project Lead: Elsie Garcia, Physical Science and Biology Teacher

Location: Vega Baja, Puerto Rico

Amount Awarded: \$5,000

Project Description:

Brigida Alvarez School District understands that in order to protect the environment in years to come, students have to become aware of the prominent issues threatening the environment. To accomplish this, students and educators provided activities to achieve environmental awareness for students, teachers, and parents in the community. Activities included student-run workshops on recycling for both community members and fellow students; creative reuse activities that incorporated recyclable materials in engineering projects such as the creation of miniature solar cars; and an engineering project where students created human-scale plastic water boats and plastic water rockets as part of a university-led challenge competition.

To help further spread awareness an instructional video was developed where students educated the community about environmental issues in the Vega Baja community. In addition to an instructional video, an app accessible by smartphones was developed to increase environmental awareness and recycling knowledge.

Major Project Outcomes

- Increased environmental awareness in students, teachers, and parents in the community through workshops, presentations, and activities.
- A better understanding of creative ways to reuse plastic.
- Outreach to parents and other community members through students to better encourage community participation and environmental awareness.

Take Home Message:

Engaging the younger generation in activities that are educational and fun is a great way to make them more environmentally aware. This project also uses students to inform the community, which is an effective method of outreach to adjust the personal behaviors of community members.

Fig. 34



Fig. 35



Figure 31: Recycling boat competition

Figure 32: Solar cars made out of recycled materials

Personnel, Materials, and Measurable Outcomes:

Personnel Engaged: Brigida Alvarez Middle and High School students and faculty

Materials/Presentations: Presentations on recycling and environmental awareness

Integration of Students and the Community for the Development of Sustainability in La Perla

Organization: Community Board of La Perla Viejo San Juan, Puerto Rico

Project Lead: Angel Marcano Rivera

Location: San Juan, Puerto Rico

Amount Awarded: \$5,000

Project Description:

La Finca Escuela de La Perla has been training both the community of La Perla and the community surrounding Abraham Lincoln Elementary School in green infrastructure and urban agriculture practices. The community board understands that these communities need help to initiate sustainable movements that are associated with the development of agriculture and infrastructure in the community. Abraham Lincoln Elementary School helped make this project possible by providing a space and faculty members to host the workshops and help set up the recycling system, compost area, orchard, and rainwater collection system.

The second part of the project involved the establishment of the Center of Environmental Education in La Perla. Once complete, the space will be used to repeat the workshops and involve community and non-community members in the experience of establishing a rainwater collection system. The space will also be used for a compost area, an orchard, and the collection of recyclable materials with the help of

the municipality. Once operational, the community will be encouraged to grow food for a farmers market to be held at the building using knowledge gained from the urban agriculture workshops. To get more involvement and ensure the success of the project goals, participants from the School of Fine Arts and residents from the community of La Perla participated both in workshops at the school and the building of the Center of Environmental Education in La Perla.

Major Project Outcomes

- Training on green infrastructure and urban agriculture practices was provided for La Perla and Abraham Lincoln Elementary School community members through workshops.
- An orchard available to all community members was established in a public plaza.
- Community members cleaned an illegal dump-site near the new orchard.
- Development and planning of the Center of Environmental Education in La Perla.

Take Home Message:

This project aims to provide both the knowledge base to understand environmental problems and the infrastructure for the community to use what they learn in the form of an environmental center and an orchard. Often workshops and other educational programs are held for the public, but giving them the resources necessary to act on what they learned is an important next step.

Fig. 36



Fig. 37



