

# Paper Radio

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Issue #2: Trash | August 2012



## FOREWARD

Producing the Trash Edition of Paper Radio has allowed me to put together a series of articles with colleagues and students I've had the great pleasure of working with for years now. It has also gotten me to think deeply about how I might bring my own household closer to zero waste.

In Ed Humes' book, "Garbology", which inspired the Q&A featured in this issue, he interviews one of my heroes, Bea Johnson. Bea and her family live a zero waste life in Mill Valley, California. Their efforts to aggressively reduce household garbage have motivated me to do more in my own home. Zerowastehome.blogspot.com has been especially helpful in my quest.

My hope is that you will read these articles about trash and understand why I am fascinated by garbage as a means for reducing greenhouse gas emissions, for recovering natural resources, and for creating businesses in partnership with people living in extreme poverty.

- Libby McDonald,  
Director of Global Sustainability  
Partnerships, CoLab



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# HOW JAHNARA KEEPS HER CITY CLEAN

*BHARATI CHATURDEVI is an environmental activist and writer who works with Chintan, a non-profit in India.*

Jahnara Begum is up by half past 5:00 in the morning. By 7:00, she has cooked lunch, woken and bathed her two children, fed the family breakfast, and reached work. Her own morning snack is a glass of tea and a glucose biscuit - a cheap, flat cookie most of the Indian middle classes now buy to feed stray dogs and homeless children begging at the street corners. Jahnara's



*Photo by Bharati Chaturdevi*

work is to pick the trash of a hundred and fifty households in the heart of Delhi. At each door she rings the bell and a maid greets her with an unsorted bag of trash.

By about 11:00, Jahnara has loaded just under half a ton of waste on her cycle rickshaw. From this damp mixture, she will remove paper, cardboard, metals, and plastics with her bare hands. Each day, she salvages nearly eighty kilos. At the end of the day, she will earn more than the average shop assistant in a small grocery store. But she will receive much less respect. Everyone dislikes waste pickers.

“They are dirty,” is a usual refrain. “We may look dirty but it’s us who keep the city clean,” waste pickers typically respond.

In Indian cities, waste pickers segregate and recycle nearly 20% of the waste. They do this through a complex chain of traders and re-processors. Without the waste

pickers, such a chain would cease to exist and India would lose its only recycling system. A unit of plastic, for example, increases in value by 750% before it is even converted into something else. Its value increases when it is cleaned, washed, and segregated into a category of its own.

But keeping the city clean is only the tip of the iceberg. Globally, the approximately twenty million waste pickers are key green actors in a consumptive world. By keeping waste out of landfills and recycling it instead, greenhouse gas emissions are significantly reduced. In Delhi, for example, waste pickers prevent 3.6 times more greenhouse gas emissions than any single waste project nationally registered for carbon credits.

Other downstream and upstream benefits follow. By recycling metals, waste pickers reduce the need for mining, and mining devastates both ecologies and communities. By recycling plastics, they reduce the trash that will choke animals on land and in the oceans. By recycling paper and cardboard, they ensure these materials don't end up rotting and spewing methane in dumps. All over the world, such cooling agents reduce the carbon footprint of hundreds and

thousands of people who can afford to consume. When they find intact goods, they use them at home or trade them. They live the 3 Rs – Reuse, Reduce, Recycle. Waste pickers remind us that the real green economy is already playing out.



*Photo by Bharati Chaturdevi*

# WHEN WASTE PICKERS AND MIT STUDENTS COLLABORATE

*BILIKISS ADEBIYI, ANNA GROSS, ANGELA HOJNACKI, and KEVIN KUNG are all students at MIT.*

**W**aste pickers know what they need to improve their work. MIT students want to get out of the lab. When waste pickers and students come together, they can develop technologies that provide earning opportunities for people living in extreme poverty *and* make cities cleaner. In the summer of 2012, several waste picker groups and student groups did just that. Read about four such collaborations here.

## **NISARGRUNA SMALL-SCALE BIOGAS PLANTS**

*Anna Gross*

In an effort to address the multitude of human health and environmental problems caused by refuse-littered streets and over-capacity landfills, Stree Mukti Sanghatana (SMS), a women's organization based in Mumbai, India, has turned to anaerobic biodigestion as an urban waste management tool. The process, in which organic waste decomposes in the absence of oxygen, creates methane gas that is captured and utilized as cooking fuel. Not only does this offer an alternative to firewood and propane, it prevents the release



*Shalu Nanaware works with Stree Mukti Sanghatana.  
Photo by Anna Gross*

of methane, a potent greenhouse gas, into the atmosphere. As part of its Parisar Vikas program, established in 1998, SMS trains female waste pickers to operate small-scale bio-gas plants.

Parisas Vikar simultaneously creates jobs, improves working conditions, and promotes zero waste strategies. Dr. Sharad Kale of the Bhabha Atomic Research Centre (BARC) has modified the conventional technology to include a predigestion step, in which aerobic thermophilic bacteria begin the decomposition process and ultimately help generate a higher quality methane and weed-free fertilizer. Institutions throughout the Greater Mumbai region have adopted his Nisargruna model. There are now more than 100 plants in operation, many of which are run by SMS.

### **THE GREEN GREASE PROJECT** *Angela Hojnacki*

The Green Grease Filtration system is a simple device used to filter waste vegetable oil (WVO) collected from restaurants and households. Students from three universities – MIT, University of São Paulo (USP), and the Aeronautical Institute of Technology (ITA) – collaborated to develop the device. The Green Grease filtration system uses simple and inexpensive materials, such as plumbing parts and blue jeans, to remove 100% of the solid particles and more than 85% of



*Walter Volpini and Denis Ferreira installing a waste vegetable oil filtration system at ARES Cooperative. Photo by Marta Marella*

the water from the oil, significantly increasing its value. Rede CataSampa (the São Paulo union of waste pickers) piloted the system in May 2011. The Green Grease filtration system is now being implemented in seven São Paulo waste picking cooperatives.



*Making charcoal briquettes from organic waste in Kibera.  
Photo by Kevin Kung*

## **TAKACHAR** *Kevin Kung*

In many urban slums, uncollected waste negatively impacts health and the environment, while the rising cost of charcoal can cause serious financial strains on slum residents. In Kibera, which is outside of Nairobi, 60% of household waste is organic, which is either left to decompose or set on fire. Takachar, through a unique system of incentives, engages

local waste-management cooperatives to mobilize slums to turn in their waste – and not just the few households that can afford waste pick-up services. Takachar then creates charcoal from organic waste, a valuable local fuel in great scarcity. During summer of 2012, Takachar worked with a local cooperative to optimize aspects of charcoal production, including waste sourcing, carbonization, briquetting, and marketing. Ultimately, Takachar aims to impact: greenhouse gas emissions, by keeping organic waste out of informal dumpsites; livelihood income of residents, by providing jobs; and deforestation, by offering an adequate fuel substitute to wood.

## **WECYCLE** *Bilikiss Adebiji*

Wecycle is a pedal-powered collection vehicle. Wecyclers use the vehicle to collect source-separated recyclables directly from households, and award points in exchange for materials collected. Households receive their points via SMS and redeem them for basic items, reducing their household expenses. Wecyclers carried out initial research in Lagos, Nigeria in January 2012, collecting 300 kilograms of recyclable material from over 300 people. The team of students from the Sloan School of Management traveled to Lagos in August 2012 to launch a pilot that reached 800 households. Wecyclers simultaneously provide low-cost recycling collection services and incentivize participation from households.

# TRACKING TRASH WITH WASTE PICKERS IN BRAZIL

DIETMAR OFFENHUBER and DAVID LEE are PhD students in the Department of Urban Studies and Planning and conduct research at the Senseable City Lab at MIT.

**A**s a result of ongoing urbanization, many cities face challenges providing basic infrastructure such as waste and recycling collection for their residents. In many places, these services are provided by a growing informal sector. In Brazil, self-organized cooperatives of *catadores*, or informal recyclers, have a long history. Today, they are organized coun-

trywide in over 500 cooperatives totaling 60,000 members. These cooperatives form a national movement that helps shape public waste policies. In São Paulo, *catadores* collect 90% of recoverable materials, and constitute an essential recycling infrastructure for the city.

In 2010, Brazil adopted a new national solid waste law requiring cities and private businesses to collaborate with waste picking cooperatives. While this law offers vast new opportunities for the cooperatives, it also brings new challenges, putting waste pickers under pressure to quickly formalize and professionalize while facing increasing competition from private recycling firms and private waste incineration companies. Currently, many cooperatives are not yet ready to take full advantage of the new laws.

Traditional managerial wisdom offers little benefit to their bottom-up systems. Yet, the *catadores* know many things about the city; they read and navigate the city differently from



The recycling cooperative Coopamare, underneath a road overpass near central São Paulo. Photo by Dietmar Offenhuber

most other urban dwellers. Documenting and mapping this tacit knowledge, identifying the amounts of waste recovered from respective areas, and discovering opportunities for expansion and optimization produces valuable information for the cooperatives, improves their position with the municipal government, and supports the internal training of new collectors.

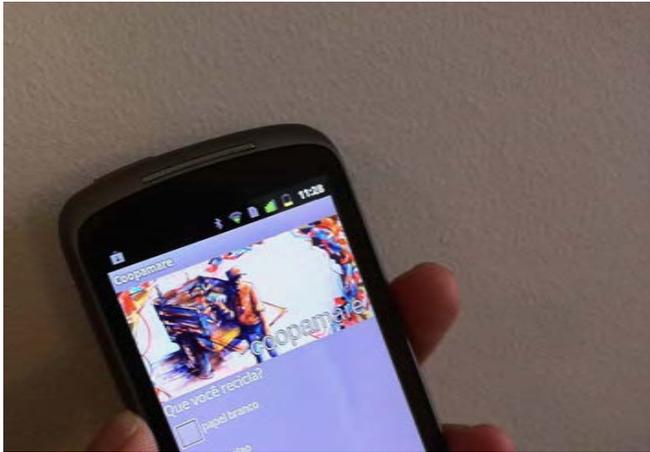
MIT's Community Innovators Lab (CoLab), MIT Senseable Cities Lab, and the University of São Paulo are collaborating on a project called Forager. Forager is named after the microeconomic theory of optimal foraging. Ultimately, it is an exploration of how communication technology can help run a recycling cooperative. Together with COOPAMARE, a coop located in central São Paulo, Brazil, Forager developed and evaluated tools for running an informal urban infrastructure. Forage tracking consisted of two main interventions – mapping the spatial organization of the cooperative using inexpensive GPS loggers; and designing, prototyping, and evaluating a software platform for community-based recycling. We, the authors of this article, participated in developing and using these tools.

In the first part, each waste collector carried a small GPS logger on his or her daily route. At the end of the day, we conducted interviews with the collectors in which they used a laptop to see their collection paths traced on a map. We



*Researchers and cooperative members fill in details on the map of a manual picker's walking route. A public workshop at the end of the experiment allowed the whole cooperative and members of the community to respond to and augment the collected geographic data. Photo by David Lee*

then asked collectors to comment on their movement decisions. The maps aggregated from the collected traces reflect this spatial logic of collection and provide a valuable opportunity for the participants to reflect about their spatial organization.



*A smartphone application for São Paulo residents to request recycling pickups directly from catadores. This prototype was demonstrated at the workshop to elicit feedback on what could or could not work in an on-demand pickup system. Photo by David Lee*

In the second major part of the project, the design of a participatory media platform was explored with the cooperative in a workshop using functioning prototypes. Inside the cooperative, this platform allows for real-time data management because the data facilitates coordination with potential clients. Outside the cooperative, residents and businesses can

inform the cooperative via smartphone or a website about material (metals, paper, plastic, etc.) they have available for collection and coordinate pick-up times.

Forager's work with the cooperative has shown that informal waste infrastructures operate under a different logic than traditional urban infrastructures, and every technological solution has to address this difference. The recyclers' movements are highly selective. They focus on spatially dispersed individual sources – apartments, markets, and businesses – rather than servicing a coherent area. This approach allows them to pick out the most profitable clients from a particular area, but it also creates logistical problems.

Beyond explicating the hidden knowledge of the cooperative, participatory mapping had another important effect. By placing their movements “on the map”, it conveyed a sense of identity for the cooperative, providing tangible evidence of their place in the city.

*This text is partially excerpted from an academic paper on the project at the upcoming ACM Participatory Design Conference: Offenhuber, D., & Lee, D. (2012). Putting the Informal on the Map - Tools for Participatory Waste Management. Proceedings of the Twelfth Anniversary Conference on Participatory Design 2012, PDC '12. Roskilde, Dk.*

# TURNING TRASH INTO TREASURE AT RECOLOGY

*KRISTIN WATKINS is a Sustainability Program Specialist at Recology in San Francisco, and an MIT Alum.*

**R**emember that pencil you threw away, or the old mattress you just wanted to get out of your house? Did you think it would go straight to the landfill? If you live in San Francisco, think again.

The Artist in Residence Program at Recology San Francisco offers six artists per year the opportunity to make trash into treasure. Recology is a resource recovery company in San Francisco that collects all household recyclables, composta-



*Artists collect their materials from this dump.*



*Materials recovered from the dump.*

bles, and in total offers about 20 different ways to get rid of what most consider trash. Through working closely with the city of San Francisco, Recology has helped the city reach a nation-leading 77% diversion from landfill in 2010. The Artist in Residence program is one more way that Recology is pioneering new programs in the resource recovery industry. Resource recovery differs from waste management because it approaches the waste stream as resources that can be separated and recovered instead of being collected and buried or burned.

Both current artists and alumni utilize the studio space adjacent to the San Francisco transfer station – the last stop for waste before it goes to a landfill – to make their creations from what others are throwing away. Artists collect materials from the public disposal area at the transfer station facility and bring materials back to their studios. They even scour the trash for pencils, paint, and glue since they aren't allowed to use any outside materials.

Following the work of one artist in residence, Reddy Lieb, the program has continued to make beautiful glass bowls.



*Broken glass from Muni bus shelter.*



*Glass plate made from the Muni broken glass.*

The glass pieces used to make these bowls come from old Muni bus shelters that have been vandalized beyond repair. The kiln, designed by previous program participant Penelope Starr, is made from old bed frames and special electric coils.

Current artist Amy Wilson Faville, who lives in Oakland, used trash to inspire her art even before getting involved with Recology. She was motivated by the illegal dumping she saw around her house in Oakland, and the abandoned piles of clothes, wood, and broken electronics soon became her paintings. Now, while in residence, Amy is using materials from the dump to create imagery of different parts of the transfer station, such as the mattress collection and carpet collection areas.

After the completion of each artist's residency, Recology hosts an art exhibition where much of what these artists have created is for sale. The art that the program keeps is displayed at onsite exhibitions in the art studio and the Recology offices, as well as offsite locations in the Bay Area. The San Francisco International Airport is planning an exhibit in the United Airlines terminal.

Another unique element of the Artist in Residence program is the sculpture garden tucked away behind the transfer station. This three-acre nature area includes sculptures and

artwork from past artists and offers a quiet respite from the clamor of the transfer station. Many of the plants in the sculpture garden were also rescued from the dump and replanted here.

This one of a kind program in San Francisco has been running for 22 years. It offers artists the opportunity to be inspired in a different way, and it offers the public a chance to understand the potential of re-used materials. Almost 100 artists have participated in the program. Schools, art groups, and the general public alike enjoy tours of this amazing facility, totaling over 150 tour groups per year.

*For more information about the program or to go on a tour, visit [www.recology.com/AIR](http://www.recology.com/AIR). All photos in this article are by Kristin Watkins. More images of the art are available at [www.flickr.com/artatthedump](http://www.flickr.com/artatthedump).*

# AN INTERVIEW WITH ED HUMES, AUTHOR OF GARBOLGY: OUR DIRTY LOVE AFFAIR WITH TRASH

*KIM VAETH is a poet who teaches writing at MIT.*



*Portrait of Ed Humes. Photo by David Bayles*

## **1. Why a book on garbage? What drew you to the subject matter?**

The question of waste is pivotal and seemed to be at the heart of a lot of our environmental and energy woes. So it seemed natural to look at this oddly invisible world of waste. People do not know how much they throw away and how that waste has many more lives. That's our real opportunity.

## **2. You dedicate the book to your grandmother, Maggie. Can you talk about what she taught you about waste and garbage?**

I grew up in the 60s with its culture of abundance – we wasted things. For her, waste was a mortal sin and she tried to encourage me to understand the value of things. She had the coolest house filled with things that continued to have a useful life for her – it was like being in a museum. If a tool or device was broken, she saw things in it that might be useful down the line. It was a different way of being, forged by the Great Depression.

### **3. Tell us about Mary Crowley.**

Mary is a sailor who loves the sea. Her's is one of the lone voices out there talking about cleaning up the mess of the marine plastic cataclysm we are creating for ourselves. Fish are ingesting plastic rather than plankton – the effect of this toxic material in the food chain can become quite serious.

### **4. What are the really great technologies – the best technologies for waste management that you are seeing out there?**

Our whole way of thinking about what we call waste is totally wrong. I'm convinced that relying on any one technology for waste disposal is our downfall. No one technology focuses on reducing the waste stream or on finding solutions for replacing the disposable economy with one that is reusable.

The landfill option – even recycling one hundred percent – cannot be our only useful alternative and until we start creating incentives for less waste, none of these individual solutions are going to lead us to where we want to be. I like the attempts some governments are making to create producer responsibility for the waste they manufacture.

### **5. You dedicate a whole chapter to our disposable economy, i.e. our consumer culture. Why is that?**

Because of the absurdity of our consumer economies. By persuading people to buy new stuff, we have overturned the basic instinct to be thrifty. Throwing good stuff away only works if you cannot run out of things. Wastefulness and thrift are polar opposites. We are way out of whack. None of these high-tech or low-tech initiatives is the final solution until we focus our efforts on reducing the waste stream and then figure out what to do with what's left. Tackling waste in the first place is the ideal. We can't say "let's get rid of it" unless we try to figure out where to put it.



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CoLab Radio's ([colabradio.mit.edu](http://colabradio.mit.edu)) mission is to encourage the open sharing of ideas that serve a better future for all communities. CoLab Radio is a city and regional planning publication where people who are doing the daily work of improving communities can document their projects and express their ideas.

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