

D-Lab Waste

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Office Hours: Mon/Fri 10-12 (9-416)

Enrollment: 10-12 Students

Lectures: Mon & Wed 3-4:30pm; fieldtrips, labs & team mtgs: Fri 2-4pm

Overview:

D-Lab Waste explores waste management in low-and-middle-income countries, examining strategies that simultaneously diminish greenhouse gas emissions and provide enterprise opportunities for marginalized populations. Through a reciprocal learning relationship, students will work in partnership with wastepickers, scrap metal collectors, a composting cooperative, municipal workers, and a local NGO to devise technology and business models that support the development of a sustainable, integrated waste management system in Bluefields, Nicaragua. Throughout the course, D-Lab waste will employ personal and group reflections as a tool for investigating the complex relationship between development work and issues of race, gender, class, and civic engagement.

Course Format:

Through lectures, case studies, fieldtrips to Boston-based waste-to-energy businesses, and guest speakers, D-Lab Waste will examine approaches for developing sustainable waste management strategies in cities and remote communities in Africa, India, and Latin America. Once students have gained a solid understanding of waste strategies, they will deploy their knowledge in the field, creating design solutions with mentors and community partners for three mini-waste challenges. The course culminates in a two-week fieldtrip to Bluefields, Nicaragua, a municipality on the Atlantic Coast. Given the region's culture, terrain, and climate, students will design appropriate technology and business models for a recycling enterprise, a compost to-small-scale agriculture initiative, and an anaerobic digester.

The course is divided into four modules, including:

Module I: Introduction to Waste Management and Recycling

An overview of waste management in the US and the Global South, including the public health and environmental impact of open-air dumpsites, waste stream composition, underserved communities, and current systems for managing waste.

Module II: Waste Management and Recycling in Low and Middle-Income Countries

The second module will focus on key waste management strategies, including waste-to-energy technologies, composting, and recycling. Also in module two, D-Lab Waste will divide into student teams to investigate three mini-waste challenges and propose solutions.

Module III: Social Entrepreneurship and Business Models

The third module explores models used to develop waste enterprises, including networks of waste picking cooperatives.

Module IV: Designing Waste Initiatives for Bluefields, Nicaragua

Module four is devoted to project development. At this time, student teams will work with community partners, developing specific waste management projects for the municipality of Bluefields, Nicaragua, including a waste to energy project, a composting to small-scale agriculture initiative, and a recycling enterprise. Team projects will be completed during a two-week IAP trip to Nicaragua's Southern Autonomous Region (RAAS) where students will work hand-in-hand with local partners, including waste pickers, scrap metal collectors, and a composting cooperative, building out projects and providing presentations to residents, local government officials, and the UNDP.

Course Goals:

- Understand waste management strategies used in urban centers and small, isolated communities in Africa, India, and Latin America, with emphasis on the environmental and public health implications of current practices.
- Document case studies of innovative collection, recycling, and waste-to-energy businesses developed in low-income settings, including dumpsites and waste picking cooperatives.
- Understand public policy, financing mechanisms, and management strategies that support sustainable, integrated, solid waste management systems that strive to meet a goal of zero waste.
- Develop appropriate technologies, business models, and dissemination plans for waste initiatives in the developing world.

Projects and Class Deliverables:

In addition to weekly readings and reflections comprised of 1-3 paragraphs, a sketch, a design, or even a photo and a 10-minute team oral report, student teams will create a mini-waste challenge project design that corresponds with a challenge we will face in our January fieldtrip to Bluefields, Nicaragua. The report will give details on the solution's innovative design, ease of use given the particular environment, affordability, dissemination strategy, and, where applicable, enterprise model. Student teams will then select one of three waste challenges to develop with community partners in Bluefields, Nicaragua, communicate with community partners on problem definition, carry out background research and brainstorming, design appropriate technology, and devise an effective dissemination plan. During January IAP, in collaboration with local partners, student teams will provide a presentation of their project to residents, the municipality of Bluefields, and UNDP, Nicaragua.

After completion of the course, D-Lab Waste instructors will continue to work with student teams to formulate a plan for continuing initiatives, including UROPS and Public Service Center Exploration Grants. These funds will be used to further design work and plan field tests with D-Lab Waste partner organizations in India, Brazil, and Nicaragua.

Grades will be based on:

1.) Book Presentations	10%
2.) Team Project #1/Presentations	30%
3.) Team Project #2/Presentations	30%
4.) Classroom Participation	20%
5.) Weekly Reflections	10%

Class Schedule:

MODULE I: INTRODUCTION TO WASTE MANAGEMENT & RECYCLING

Introductory lectures encourage students to think creatively about waste solutions, endorsing innovative trash management strategies that take a region's history, culture and economy into account. Additionally, introductory lectures will include methodologies for working with community partners and an introduction to Nicaragua and the Southern Autonomous Region (RAAS) where students will work with community partners to develop waste management strategies.

Class One (Wednesday, September 7th) – Course Introduction

- D-Lab Waste and Student Introductions
- Statement of Purpose
- Brief intro of five municipality waste management project and January travel to Bluefields, Nicaragua
- Break into three groups to select non-fiction/fiction books about Nicaragua for student presentations

Books for Selection:

The Death Of Somoza, Claribel Alegria and Darwin J Flakoll

Blood of Brothers: Life and War in Nicaragua, Stephen Kinzer and Merilee Grindle;

The Country Under My Skin: A Memoir of Love and War, Gioconda Belli;

The Jaguar Smile: A Nicaraguan Journey, Salman Rushdie;

Or choose poetry, fiction, or non-fiction of your choice, suggested Nicaraguan authors/poets:

- Ruben Dario
- Ernesto Cardenal
- Claribel Alegria
- Gioconda Belli

Fieldtrip #1 (Friday, September 9th)

- Wheelabrator Incinerator, Saugus, Ma.; 8:15 am at steps 77 Mass Ave

Class Two (Monday, September 12th) – Waste & Recycling, Cambridge, Ma.

- Guest Speaker: Randi Mail, Recycling Director, Cambridge, Ma.
- Students submit statements of purpose

Readings (select and be ready to talk about the three articles, or choose to read the book listed below):

“History of Cambridge Recycling Program,” Xeroxed handout

“*Recycling Returns: Ten Reforms for Making New York City’s Recycling Program More Cost-Effective,*” by Mark A. Izeman and Virali Gokaldis, Natural Resource Defense Council, April 2004.

“*A Gospel According to the Earth,*” by Jack Hitt, *Harper’s*, July 2003

Cradle to Cradle: Remaking the Way We Make Things, by William McDonough and Michael Braungart, North Point Press, 2002

Class Three (Wednesday, September 14th) -- Nicaragua Past & Present

- Guest Speaker: Daniel Alegria, Nicaraguan journalist, talks about post-1980 Nicaragua and the Southern Autonomous Region (RAAS)
- Film clips of Nicaragua since the early 1980s, providing a historical overview
- Student presentations (three/5-10 minute talks) of selected books

Lab (Friday, September 16th)

- Coordinate teams for waste challenges

Class Four (Monday, September 19th)

- Guest Speaker: Maria Tereza Carvalho, University of Sao Paulo professor who has created an e-waste program in partnership with a recycling cooperative

Readings:

“Exporting Harm: The High-Tech Trashing of Asia,” prepared by the Basel Action Network and the Silicon Valley Toxics Coalition, 2002.

UNEP 2009. **RECYCLING – FROM E-WASTE TO RESOURCES.** *Sustainable Innovation and Technology Transfer Industrial Sector Studies. StEP – Solving the e-waste Problem.* UNEP (United Nations Environmental Program). July 2009.

http://www.unep.org/PDF/PressReleases/E-Waste_publication_screen_FINALVERSION-sml.pdf

No Class (Wednesday, September 21st)

Discussion w/Guest Speakers (Friday, September 23rd, 2-4)

- **Nohra Herrera**, a third generation waste picker who was central in the formation of the Asociación de Recicladores de Bogotá (ARB), which includes twenty-four cooperatives, is a leader in the Colombian and international recycler movements.
- **Jyoti Mhapsekar** is co-founder and current President of Stree Mukti Sanghatana (Women's Liberation Organization) based in Mumbai. As the convener of the Parisar Vikas Project, Jyoti has organized and trained 3,000 women waste pickers in microfinance, leadership, literacy, composting, biomethanation, and gardening.
- **Lucia Fernandez** is the Waste-Pickers Global Coordinator for WIEGO. Working with waste picker organizations globally, ranging from small cooperatives and trade unions in her native Uruguay to large-scale networks, Lucia has been instrumental in the creation of the Latin American Network of Waste Pickers.
- **Christie Keith** is the International Co-Coordinator of the Global Alliance of Incinerator Alternatives (GAIA), a global network of more than 600 grassroots organizations and individuals working together for zero waste and environmental justice.

Lab (Monday, September 26th, 3-4:30)

- Meet with team members to develop and write-up project work plan.

Class Five (Wednesday, September 28th) – *Introduction to Waste Management in the US and the Global South*

- Introductory lecture on waste management in low and middle-income countries: environmental benefits accompanied by job creation for people living and working in dumpsites

Read the David O. Wilson article plus one other:

“Solid Waste Collection that Benefits the Urban Poor: Suggested Guidelines for Municipal Authorities Under Pressure,” by A. Coad for a CWG Workshop, March 2003, www.skat.ch/publications/prarticle.2005-09-29

“Global Climate Change Mitigation Scenarios for Solid Waste Management,” by S. Monni, R. Pipatti, A. Lehtila, I. Savolainen, and S. Syri, Technical Research Centre of Finland, VTT Publications, 2006.

“Integrated Sustainable Waste Management Tools for Decision Makers—Set of Five Tools for Decision-Makers, Experiences from the Urban Waste Expertise Programme,” by A. Scheinberg, WASTE, Gouda, www.waste.nl, (2010)

“Development Drivers for Waste Management,” by D.C. Wilson, *Waste Management and Research*, vol 25, pp198-207.

Class Six (Friday, September 30th, 2-4 pm) -- *Waste Disposal and Public Health*

- Guest Speaker: Jorge Emmanuel, public health scientist working with medical waste in the Philippines.
- Discussion of work plans devised for waste challenges.

Readings:

“*Training Resource Pack for Hazardous Waste Management in Developing Countries*,” by D.C. Wilson, F. Balkau, and M. Thurgood *Training Resource Pack for hazardous Waste Management in Developing Countries*, UNEP, ISWA, and the Basel Convention, www.unep.fr/scp/waste/hazardous.htm (2003)

“*Safe Management of Waste from Health-Care Activities*,” A. Pruss, E. Giroult, P. Rushbrook, WHO, Geneva, 1999.

MODULE II: WASTE MANAGEMENT & RECYCLING STRATEGIES

Going deep into specific waste strategies, continuing to work on waste challenges, presentations to clients, and project reflections.

Class Seven (Monday, Oct 3rd) -- *The Global Waste Picking Movement, A Historical Perspective*

- Re-use and Recycling, WIEGO’s Lucia Fernandez leads a discussion on wastepicker cooperatives and the worldwide network of informal recyclers, including collection and municipal support

Readings:

“*Informal Recycling Sector*,” by B. Chaturvedi, School for Advanced International Studies, John Hopkins University, Washington D.C., December, 2006.

<http://wiego.org/wiego/waste-pickers-united-nations-climate-change-conferences>

main article: Fernandez Lucia, *Towards a Wastepickers Global Network*, published in spanish into Suarez F. and Schamber P. editors, “*Recicloscopio vol.2: Miradas sobre recuperadores urbanos de residuos de América Latina*”, 2011, Buenos Aires, Argentina, and italian into Ruberto C. and Fernandez L. editors, “*Raccoglitori di Residui; Una panoramica globale sul primo anello del circuito del riciclaggio*” Dec 2008, Rome, Italy.

update resume available online and in english

at http://www.inclusivecities.org/newsletter/August_2011/Waste_Pickers.html#Glo

bal Alliance

“Refusing to be Cast Aside: Waste Pickers Organizing around the world,” by M. Samson, WIEGO, Paris and Johannesburg, (2009).

Class Eight (Wednesday, October 5th) -- Incineration & Landfill

- Lecture & discussion: Landfill and Incineration, a historical perspective
- Guest Speaker: Geoffrey Brown, activist in the anti-incineration movement
- Student teams present group work plans, followed by discussion

Readings:

“*Minimum Requirements for Waste Disposal by Landfill*,” by Ball, J.M. and Bredenhann, L. Department of Water Affairs and Forestry, Republic of South Africa, 2nd edition, 1998

The Garbage Wars: The Struggle for Environmental Justice in Chicago, by David Naguib Pellow, chapter three

“Decision Maker’s Guide to the Planning, Siting, Design, and Operation of Landfills in Middle and Lower Income Countries,” by P. Rushbrook and M. Pugh, SKAT/World Bank, Washington D.C. (1998).

“The Landfill Step-Ladder: Landfill Policy and Practice in an Historical Perspective,” by D.C. Wilson in *Waste Management*, CIWM, Northampton, UK, pp24-28. 1993.

Team Meeting/Lab (Friday, October 7th)

- Student continue developing waste projects with initial collection of data and Skype meetings with clients and mentors

Friday at 5 pm meet to travel to New Forest Institute in Maine. We will return Sunday evening.

Monday, October 10th -- Holiday

Class Nine (Wednesday, October 12th) -- Food Waste, Compost, and Manure

- DUSP graduate Elisha Goodman leads a discussion on Food Waste and Composting Initiatives

Readings:

“Project Design Document: Composing of Organic Waste in Dhaka by Waste Concern (Bangladesh) and World Wide Recycling (Netherlands)” CDM Executive Board Registry,
<http://cdm.unfcc.int/UserManagement/FileStorage/3QBI7J803ZD1UQYIIIDO71F0>

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“Decentralised Composting for Cities of Low and Middle Income Countries: A User’s Manual,” Waste Concern, Bangladesh and EAWAG, Switzerland; www.eawag.ch/organisation/abteilungen/sandec/publikationen/publications_swm/index_EN, 2006.

“Unpublished documents related to working with the informal sector to develop community composting in Jakarta, Indonesia,” Harvard Institute (HIID), Cambridge, Ma (1990).

http://www.ilsleda.org/usr_files/news/biodigestoresbi_791922.pdf

http://www.endev-bolivia.org/images/stories/proyecto_endev/biogestores/Descargas/Difusion/Manual-construccion-BDG.pdf

Team Meeting/Lab (Friday, Oct. 14th)

- Student teams meet to work on waste challenges

Class Ten (Monday, October 17th) -- *Anaerobic Digestion and Biogas Markets*

- Guest Speaker: D-Lab’s Victor Grau

Readings:

BioCycle Magazine, selected articles—copies for distribution

Sloan Report on Mumbai digester technology and business model

Class Eleven (Wednesday, October 19th) – *Case Study, Oil as Fuel*

- Dany Bode, Mission Goorgoorlu, Senegal
- Compare other grease car organizations (Green Grease Monkey, Greasecar.com, Fossil Fuel Free in Braddock)

Fieldtrip #4 (Friday, October 21st)

- Casella Waste Management digester in Rutland, Massachusetts

Class Twelve (Monday, October 24th) -- *Waste Grease and Biofuels*

- Biofuels, MIT Biofuel Club President Angela Hojnacki leads a discussion on opportunities for waste grease
- Hazards of improper disposal
- Biodiesel vs. Straight WVO

Readings:

BioCycle Magazine, select articles for distribution

Class Thirteen (Wednesday, October 26th) – *Solid Waste Management and Social*

Inclusion in Belo Horizonte, Brazil

- Wiego's Sonia M. Dias leads a discussion on her work in solid waste management and social inclusion in Belo Horizonte, Brazil

Readings:

Dias, S. M. Ijgosse, J. Barros, R.T. V. Belo Horizonte City Profile. In : UN Habitat, Solid Waste Management in the World's Cities. Water and Sanitation in the World's Cities 2010. London: Earthscan, 2010.

Dias, S. M. "The Municipal Waste and Citizenship Forum: A Platform for Social Inclusion and Participation." Cambridge: WIEGO, 2011 (Urban Policies Briefing Notes).

Team Meeting/Lab (Friday, October 28th)

- Student teams continue to work on waste challenges

MODULE III: SOCIAL ENTREPRENEURSHIP & BUSINESS MODELS

This module explores a number of business models for the social business sector, identifying how particular case studies might be incorporated into our January 2011 work in Bluefields, Nicaragua.

Class Fourteen (Monday, October 31st) *Developing A Business Model*

- DUSP graduate student Kristen Watkins provides an introductory lecture on social entrepreneurship
- Guest Speakers: Tito Llantada (Ashoka Changemakers Managing Partner)

Readings:

"*Social Entrepreneurship: Creating new business models to Serve the Poor*," http://www.2008.sofimun.org/SOFIMUN2008-CM-UNECOSOC-Topic-A-extra_info-2.pdf

"Social Enterprise Typology," <http://www.4lenses.org/setypology/intro>

"Cooperatives: Principles and Practices in the 21st Century," Pgs 3-4, 27-48, 69-75 <http://learningstore.uwex.edu/assets/pdfs/A1457.PDF>

"Public Private Partnerships Overview," (30 pgs, from Urban Land Institute): http://www.uli.org/ResearchAndPublications/Reports/~/_media/Documents/ResearchAndPublications/Reports/TenPrinciples/TP_Partnerships.ashx

Class Fifteen (Wednesday, November 2nd) *Case Studies, Best & Worst Practices CASELLA*

- Kristen Watkins leads a discussion of key questions: What are some of the common themes between them? What are the advantages/disadvantages of each

model? How could principles from each model be incorporated into our Nicaragua project?

Case Studies:

Zabbaleen (Egypt)

- <http://www.npr.org/templates/story/story.php?storyId=89956754>
- <http://www.mdpi.com/2071-1050/2/6/1765/pdf>

Waste Ventures (India)

- <http://www.wasteventures.org/>

Ciudad Saludable (Peru)

- <http://www.worldhabitatawards.org/winners-and-finalists/project-details.cfm?lang=00&theProjectID=8EEF4EEB-15C5-F4C0-99EC7C59E22CD306>

Waste Concern (Bangladesh)

- http://growinginclusivemarkets.com/media/cases/Bangladesh_WasteConcern_2011.pdf

Student Team Meeting/Lab (Friday, November 4th)

- Student teams refine waste challenge presentations

Class Sixteen (Monday, Nov 7th) – Business Model Case Studies

Class Seventeen (Wednesday, Nov 9th) -- Waste Challenge Presentations & Discussion

(Friday, November 11th)

- No School

MODULE IV: DESIGNING WASTE INITIATIVES FOR BLUEFIELDS, NICARAGUA

Description of the current waste system in Bluefields, Nicaragua; discussion of our vision for a comprehensive, sustainable solid waste system that provides opportunities for enterprise development and job creation; and team selection of one of three waste technologies and/or businesses to develop. Final presentations will be prepared and presented with partners to the local Bluefields municipality and UNDP-Nicaragua.

Class Eighteen (Monday, November 14th) – Participatory Planning

- CoLab presentation on participatory planning
- Reflections #1: Student teams come together to interview one another and gather after-action reflections on flip-cams

Class Nineteen (Wednesday, Nov 16th) *Recycling Routes to Link Remote Communities*

- Natalia Duque Ciceri (MIT's Center for Latin American Logistics) speaks on designing an economically viable recycling route in Nicaragua & Life Cycle Assessment methodology, estimating potential energy recovery from recycling household appliance.

Readings:

“*Model for Global Development of Recycling Linkages*,” by D. Hickman, A. Whiteman, R. Soos, and N. Doychinov, IFC Advisory Service in Southern Europe, International Finance Corporation, Skopje, Republic of Macedonia, 2009

(Friday, November 18th)

- Elisha Goodman meets with students to put together introductory packages for community partners.

Class Twenty (Monday, Nov 21st) – *Developing A Vision*

- Lucia Fernandez lectures on developing a comprehensive, sustainable waste system that incorporates job creation (30-minutes)
- Bluefields current waste system and plan for business creation (30-minutes)
- Divide into teams to develop: 1.) Recycling enterprise with partners working at the Bluefields dumpsite; 2.) biodigester technology and business model with blueEnergy and the municipality of Bluefields; and 3.) compost to small-scale agriculture initiative with a women's composting cooperative

Readings:

UNDP/IADB Solid Waste Management Proposal with enterprise development opportunities for wastepickers designed for Nicaragua's Southern Autonomous Region (copies will be made available).

Fernandez Lucia, *From scavengers to organized waste pickers; political institutional analysis. Working with waste in Montevideo*. published in spanish into Schamber P. and Suarez F. editors

“Recicloscopio: Miradas sobre recuperadores urbanos de residuos de América Latina”

2007. Prometeo Libros, Universidad Nacional Sarmiento. Buenos Aires, Argentina.

Fernandez Lucia, *Spontaneous Recycling Dynamics: crossed glances on the cities of Montevideo and Paris at the XIX century*, Architectural Master thesis (in french), Ecole d Architecture de Grenoble, 2011 online available at http://www.issuu.com/basurita/docs/memoire_pfe_lucia_f

“Putting Integrate Sustainable Waste Management into Practice: Using the ISWM Assessment Methodology,” ISWM Methodology as Applied in the UWEP Plus Programme (2001-2003), WASTE, Gouda, The Netherlands.

“A Horse Of A Different Color: Sustainable Modernisation of Solid Waste Management and Recycling in Developing and Transitional Countries,” by A. Scheinberg, Paper presented at the CWG Workshop, Cluj-Napoca, Romania, 22-23 February 2008.

“Jobs and Services that work for the poor: Promoting decent work in municipal services enterprises in East Africa; the Dar es Salaam project and the informal economy,” Paper presented at the Knowledge-Sharing Workshop organized by INTEGRATION.ITC, Turin, Italy, 28 October-1 November, 2003.

Wednesday, November 23rd Holiday No Class

Friday, November 25th Holiday No Class

Class Twenty-one (Monday, November 28th)

- CoLab’s Alexa Mills offers media workshop (30-mins)
- Teams gather with instructors and mentors to develop projects

Class Twenty-two (Wednesday, November 30th)

- Sanergy Presentation (30-mins)
- Teams gather with instructors and mentors to develop projects

Team Meetings/Lab (Friday, December 2nd)

- Teams gather to develop projects

Class Twenty-three (Monday, December 5th)

- Lecture on methods for scaling projects

Class Twenty-four (Wednesday, December 7th)

- Project presentations and evaluations

Reflections #2 (Friday, December 9th)

- Student teams come together to interview one another and gather after-action reflections on flip-cams

Class Twenty-five (Monday, December 12th) – Reflections Showcased

- After-action flip-cam reflections will be shown, followed by discussion