Managing Solid Waste
2022

Peace Corps

Acknowledgments

Managing Solid Waste is a compilation of information and activities that Peace Corps Volunteers, their counterparts, host families, and community leaders can use to identify local barriers to the effective and sustainable management of solid wastes. Once these barriers are identified, Volunteers and local stakeholders can reflect on the behavioral issues that prevent the mobilization of individuals and communities to overcome these obstacles. Volunteers and local stakeholders can then develop practical solutions to these issues. The manual is premised on the assumption that community "buy in" is a prerequisite for sustainable solutions. Given that, what are those factors that promote or impede community interventions in the disposal and/or reuse of waste materials?

Contents

Acronyms

CED	Community Economic Development
HDPE	High Density Polyethylene
HHW	Household Hazardous Wastes
LDPE	Low Density Polyethylene
LPF	Logical Project Framework
MSW	Municipal Solid Waste
PACA	Participatory Analysis for Community Action
PCV	Peace Corps Volunteer
PET or PETE	Polyethylene terephthalate
PHA	Polycyclic Aromatic Hydrocarbon
PM	Program Manager
PP	Polypropylene
PS	Polystyrene
PTS	Program and Training Specialist
PVC	Polyvinyl chloride
RIC	Resin Identification Code
SPI	Society of the Plastics Industry
SWM	Solid Waste Management
SWOT	Strengths, Weaknesses, Opportunities, and Threats
UNEP	United Nations Environment Program
VRG	Volunteer Reporting and Grants

Introduction

If there is one issue that far too many Peace Corps Volunteers encounter during service, it is poor management of trash. They see it with unfortunate frequency: piles of garbage attracting flies and vermin; mounds of burning trash; plastic bags clogging drainage ditches; mosquitoes breeding in old tires and plastic yogurt cups; broken glass, metal cans, and even medical implements; and litter marring beaches and roadsides. If you are one of those Volunteers, and your community has identified waste management as an issue it would like to address, you may be able to work with your community to do something about its garbage. The intent of this manual is to help you do so.

Contributing to community-identified solid waste issues easily fits into the goals and rationales of all Peace Corps program sectors: Environment, Agriculture, Community Economic Development (CED), Youth in Development, Health, and Education. However, past project documents often did not include solid waste contributions, so many Volunteer efforts in this area were not official assignments. Rather, many Volunteers responded to solid waste management needs identified by their communities and contributed to community solutions outside of their designated projects. As illustrated in the links below, there have been multiple examples of Volunteers demonstrating commitment in this area across all continents.

- https://www.peacecorps.gov/paraguay/stories/basura-cero/

- https://www.peacecorps.gov/moldova/stories/students-become-leaders-recycling/

- https://www.peacecorps.gov/senegal/stories/working-cleaner-senegal/

In recognition of this growing problem, the current Peace Corps strategy for the Environment sector has included Solid Waste Management (SWM) as one of the four core thematic areas (alongside Youth Environmental Education; Soil & Water Improvement; and Tree Planting, Nurseries, and Forestation). This manual was created to provide Peace Corps Volunteers (PCVs) with the requisite information to enable them to better collaborate with their communities on SWM issues.

This manual covers a range of SWM topics:

- The introduction explains why SWM is important and summarizes some of the adverse environmental and health aspects of inadequate management of solid wastes.

- Chapter One describes the best practices for handling various kinds of waste found in rural/village settings.

- Chapter Two discusses the concept of behavior change and the application of behavior change tools for solid waste management interventions. It is one thing to know best practices on handling various categories of solid waste, but quite another to support people as they apply those practices in their daily lives.

- Chapter Three provides examples of activities that PCVs and local partners have undertaken with communities, households, schools, and local municipalities to address solid waste management issues.

- Chapter Four presents an overview on survey instruments, tools, and methodologies that have been used by PCVs and communities in the design and implementation of SWM interventions.

Solid Waste Management: A Serious Global Problem

Without organized ways of disposing of garbage, garbage can accumulate to dramatic levels. Small and/or burning piles of trash in people's yards and along roadsides are a common sight in many parts of the world.

Health Impact

Solid waste isn't just offensive to see (and smell). It can create serious health problems and can have negative environmental effects as well:

- Organic waste attracts flies. These flies pick up various types of bacteria and viruses. Upon landing on people's food, flies typically walk around, regurgitate, and excrete, transmitting the bacteria and viruses to humans as they go. Flies have been linked to the spreading of at least 65 different diseases, including dysentery, typhoid fever, and cholera, and they have been shown to carry the eggs and cysts of a range of parasites, among them ascaris, giardia, and cryptosporidium.

- Organic waste also attracts rats and other rodents, which transmit a host of diseases, including Hanta virus and the bacterium infection leptospirosis. Rats, in turn, bring in predators, even poisonous snakes. Garbage also attracts stray dogs that can carry rabies.

- Plastic containers, old tires, and other types of refuse that hold rainwater provide breeding places for mosquitoes, notably <u>Aedes aegypti</u>, a day-flying mosquito that transmits dengue, chikungunya, yellow fever, and Zika viruses. The females of the species prefer human-created containers for egg-laying.

- Burning piles of trash composed of many different kinds of waste can release toxic substances into the air, which people can then inhale. For example:

    1. Burning various types of plastic—including neoprene, chlorinated polyethylene, and especially PVC (polyvinylchloride)—releases fumes containing dioxins and furans, which studies have linked to cancer and respiratory disease. Burning polystyrene (Styrofoam) and bleached (white) paper products also emits dioxins into the atmosphere.
    2. Ash particulates can irritate the eyes and throat and damage the lungs, causing bronchitis, emphysema, and lung cancer, and can seriously affect people with asthma or certain allergies.
    3. Burning magazines with colored inks releases toxic metals, such as lead and cadmium, which have been linked to birth defects and kidney and liver disease.
    4. Electronics contain toxic metals like mercury, cadmium, and lead. Little is known at present about the impact these elements have when electronic waste is burned.
    5. Burning organic waste can release substances called polycyclic aromatic hydrocarbons (PAHs), some of which are thought to be carcinogenic. Tiny aerosol droplets (also called organic dust) produced by burning organic waste frequently contain bacteria and fungi that, when inhaled, increase the risk of respiratory disease.

- When rainwater strikes improperly designed open refuse dumps, it percolates down through the dump, eventually ending up in groundwater. As it does, it comes in contact with buried wastes and draws out chemicals or constituents from those wastes. This percolating water is called leachate, and it contaminates wells and surface bodies of water that people use for drinking, washing, and bathing. Dumps called "sanitary landfills" create minimal leachate because

they are lined on the bottom and sides with materials, like plastic or clay, that are impermeable to water, and they provide ways to drain off accumulated water where it can be properly disposed of. Dumps in many developing countries, however, often do not include these features, particularly in rural areas.[1]

- Waste generated from primary health centers in rural areas presents additional risks. Materials that have been in contact with sick people and their blood and bodily fluids can, when released into the environment where people can come into contact with them, spread a host of afflictions, notably Hepatitis B, Hepatitis C, tetanus, and HIV. These materials can be classified as either "sharps" or "non-sharps." Sharps include syringes and other needles, blades, infusion sets, and broken glass; examples of non-sharps are bandages, swabs, used and obsolete vaccine vials, and bedding.

> ### Suggestion
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> For countries and communities that have the capability, forums to raise awareness about the importance of source separation programs can be initiated as a precursor to establishing take back and/or recycling programs.

Ecological Impact

Plastic waste is everywhere; an estimated **500 billion** plastic bags get made every year. Since plastic decomposes extremely slowly, much of this plastic eventually enters the watershed, ultimately ending up in the ocean. According to the journal *Science,* 8 million metric tons of plastic debris entered the oceans in 2015.[2]

- Once in the oceans, the plastic waste accumulates. Natural gyres have concentrated plastic refuse in the extensive and infamous Great Pacific Garbage Patch, as well as lesser-known areas of concentration in the Atlantic and Indian Oceans.[3] Whales, dolphins, seals, sea turtles, and seabirds are known to ingest these pieces of plastic, mistaking them for food. Sea turtles and seabirds, in particular, are known to starve when the plastic accumulates in their stomachs.

- Plastic breaks up over time into increasingly smaller pieces. Tiny micro-pieces of plastic, or micro-plastics, get consumed by filter-feeders such as shellfish and eaten by zooplankton. Everything that eats these tiny floating animals, from fish to whales, then consumes the plastics themselves. Humans, too, can accumulate plastic from eating seafood. A 2015 study conducted by the University of California-Davis found 25% of the fish in markets in California and Indonesia had plastic items in their guts.[4] Scientists at the Rochester Institute of Technology recently discovered abundant micro-plastics entering the Great Lakes. At present, very little is known about the ecological and health impact of micro-plastics.[5]

- Plastic items such as six-pack rings and fishing line ensnare wildlife.[6]

- Leachate carrying toxic substances from dumps can also seriously affect aquatic ecosystems. Particularly, toxic concentrations can directly kill aquatic organisms, while lesser amounts of non-biodegradable substances can pass up through food chains, concentrating in those animals

1. https://www.epa.gov/landfills/municipal-solid-waste-landfills
2. http://science.sciencemag.org/content/347/6223/768
3. https://www.epa.gov/trash-free-waters/impacts-mismanaged-trash
4. Kat Kerlin. "Our fish comes with a side order of debris." UC Davis. September 24, 2015.
5. www.sciencedaily.com/releases/2016/12/161219151752.htm
6. Matthew J. Hoffman, Eric Hittinger. "Inventory and transport of plastic debris in the Laurentian Great Lakes." *Marine Pollution Bulletin*, 2016; DOI: 10.1016/j.marpolbul.2016.11.061

at the top, a process known as bioaccumulation. Leachate from organic waste can overload surface water with nitrogen and phosphorus, leading to oxygen depletion that suffocates aquatic organisms.

- Large amounts of organic refuse produce methane as a byproduct of anaerobic decay (in the absence of oxygen). Since methane is a powerful greenhouse gas, this contributes to global warming and climate change. Burning trash releases large amounts of the greenhouse gas carbon dioxide into the air.

Summary

Human beings generate waste. The types and scale of the waste generated may vary according to the culture, country (rural, urban), and level of economic development. As indicated in the preceding paragraphs, the inadequate management of this waste often results in serious environmental and health problems for communities and the individuals who reside in them. When we mismanage the waste we produce, the consequences may be felt over long periods of time, and the obstacles standing in the way of addressing these consequences through better waste management are formidable. The importance of safely and effectively managing waste for sustainable human development is widely recognized and is included in the 17 United Nations Sustainable Development Goals (SDGs). In SDG 12 (Ensure sustainable consumption and production patterns), target 12.5 states "By 2030, substantially reduce waste generation through prevention, reduction, recycling and reuse."

Although there is recognition of the problem, the money, technical know-how, transport, resources, and citizen initiatives required to resolve these challenges are often in short supply. Through the adoption of a waste management hierarchy, communities are encouraged to promote behaviors and processes that (1) reduce consumption, (2) reuse materials, (3) recycle materials that can no longer be reused, (4) recover energy, and (5) safely treat and dispose of waste. Despite the aforementioned barriers, over the years Volunteers and their community partners have found ways to apply creative, locally relevant solutions to barriers identified by their community, implementing the "3 R's" (Reduce, Reuse, and Recycle) of the waste management hierarchy.[7] The next chapters describe the technical solutions that Volunteers and their community partners have employed to address the many different types of wastes that they have encountered.

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7. https://www.epa.gov/smm/sustainable-materials-management-non-hazardous-materials-and-waste-management-hierarchy

Chapter 1: How to Handle Solid Waste

During your time in your community, members of your community may identify solid waste management needs that are going unaddressed. While some community members may identify areas for collective action, others may not. You may need to identify local behavior patterns (existing or expected)—recognizing that influencing behavior is fundamental to inclusive and sustainable development. The Peace Corps approach to development is premised on influencing behavior in ways that promote positive, inclusive, and equitable socio-economic development.[8] The specific tools used to assess and initiate existing patterns of community behavior are provided in the following chapter.

This chapter describes how you can assist community members to handle the various sorts of solid wastes that they have identified and are likely to encounter. It will discuss the ideal practices for taking care of municipal solid waste, organic waste, household hazardous wastes, plastics, metal, and medical wastes.[9] You may find, however, that the "ideal" practices are not feasible in your host community. There may not be any sanitary landfills, recycling centers, or hazardous waste facilities around. In cases like this, you and your community will need to identify, design, and implement waste management practices that are the most appropriate for the community. This chapter will outline some of the options.

Before Throwing It Out: The Three R's—Reduce, Reuse, and Recycle[10]

The initial step in managing solid waste is to *reduce* the amount of it generated in the first place. For instance, if members of your community identify the use and disposal of single-use plastic bags as something they'd like to reduce, you can work with community partners to develop and promote a locally acceptable alternative. In many areas, production of tote bags and similar items from locally sustainable materials can lead to reduced use of plastic bags and could provide a source of income for rural women and others. (Single-use plastic bags have been banned in Kenya, with positive results.[11])

Next, perhaps members of the community can *reuse* trash instead of throwing it out. See page 83 for some examples of a larger range of useful items made with recycled plastic, from "water bottle walls" to purses and soccer nets.

After exploring these two options, another option is to *recycle* the remaining trash. The idea is to transform "waste" into "resources": food scraps and some paper can decompose into compost, while other types of paper, plastic, and metal can all be recycled where recycling is a viable option. Composting and recycling cannot only improve people's health and environment, but their income as well. As part of a trainee's community mapping exercise (i.e., who does what in the community), trainees may wish to find out if there are "waste pickers" in the community. Waste pickers are individuals who earn a living by recycling, using, and selling materials that others have

> ### Suggestion
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> You may wish to consult the website of the Global Alliance of Waste Pickers to find out if there is a waste pickers association in your community or a neighboring community.[12]

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8. Peace Corps. "Environment Sector Strategy." https://peacecorps.libguides.com/c.php?g=875508&p=6286784

9. The U.S. Environmental Protection Agency provides additional examples of ways to reduce and handle wastes. See https://www.epa.gov/environmental-topics/land-waste-and-cleanup-topics

10. https://www.epa.gov/smm/sustainable-materials-management-non-hazardous-materials-and-waste-management-hierarchy

11. https://www.theguardian.com/world/2018/apr/25/nairobi-clean-up-highs-lows-kenyas-plastic-bag-ban

12. www.globalrec.org

thrown away. You can learn whether they are organized as a group, and if so, what their challenges and strengths are.[13]

Successful recycling programs have the following components:

- Separation of different waste—e.g., glass, paper, metal, plastic, or organic waste—at the source, such as at home, at a business, or at school.

- Transport of the separated waste to a collection center.

- Amassing the waste at collection centers.

- Transporting it to a facility like a buy-back center or waste processing facility that will accept it.

- Processing the waste at the facility or passing it on to another facility.

Organic waste, such as food scraps, plant debris, and paper (non-glossy) is best "recycled" naturally, namely through composting. That leaves hazardous and medical wastes that cannot be reused or recycled and that need to be kept out of the air, water, and soil. Household hazardous waste, such as old batteries and used pesticide containers, are best handled in specialized facilities.

> ### Suggestion
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> If there is a specialized facility in your country that is accessible to members of your community, you and your community partners could work with local community leaders to organize a one-day drop off program for hazardous household waste.[14]

Since disposal of medical wastes involves burning in high-temperature incinerators, this probably falls outside of your and community members' scope. ***However, you and your host-country partners could contact the local clinic/hospital that is generating these wastes and work with them to develop a mechanism on how they can safely dispose of them.*** In the United States, the EPA has developed stringent guidelines on the disposal of medical wastes that don't involve incineration.[15]

Whether recycling and waste disposal solutions are feasible will depend on local circumstances.

Below are some waste disposal options in more detail.

Food and Plant Waste

According to UNEP, organic waste made up 65% of the waste stream in low-income countries in 2011. Organic waste in Peace Corps countries primarily consists of food scraps and agricultural plant debris. Organic waste contains nutrients, which means microbes, fungi, and other living things can eat it and break it down. The best thing to do with organic waste is to process it ***so it is available to living things you want to encourage, such as agricultural crops and garden plants***, *and NOT accessible to living things you do not want to feed, such as rats, flies, and stray dogs*. PCVs working with communities around the globe have provided numerous examples on how to process organic wastes into a variety of beneficial products:

- Togo: https://dantablog.wordpress.com/2017/03/07/in-the-spotlight-peace-corps-togo

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13. http://documents.worldbank.org/curated/en/227581468156575228/pdf/472210BRI0Box31ing1sectors01PUBLIC1.pdf

14. For guidelines on how to organize such an event, search for the U.S. EPA document *Household Hazardous Waste Management: A Manual for One-Day Community Collection Programs*.

15. https://www.epa.gov/rcra/medical-waste

- Ecuador: http://farmertofarmer.blogspot.com/2016/03/from-peace-corps-to-farmer-to-farmer.html

- Panamá: https://azueroearthproject.org/eco-guides/making-and-using-compost

- Senegal: https://www.joyceslee.com/tawa-fall

- Jamaica: https://mxdrum.wordpress.com/2016/05/10/brewing-compost-tea-from-worm-castings

- Zambia: https://deannadent.com/2012/11/03/mujila-farms-training-composting-demo

- Paraguay: http://zimbabweparaguay.net/about-slf/paraguay-garden-project

As you embark on the processing of organic waste, you have to be conscious of a few things: Who in the household (or institutions that generate larger amounts, such as schools and churches) has oversight over the production and disposal of such waste? In many communities women are responsible for food preparation and cooking, production, and/or purchase of food for the family/household, ensuring the cleanliness of family compounds, etc. It therefore stands to reason that their input is essential. Thus, the community mapping exercise should also be seen through a gender lens. Remember your PACA tools, including PACA lenses. The PACA approach consists of six lenses, with each lens introducing a distinct perspective for ensuring that your use of PACA is truly inclusive, participatory, and sustainable. Those six lenses are: behavior change; facilitation; gender; intercultural competence, diversity, equity, and inclusion (ICDEI); language; and power.[16]

As you and members of your host community begin to transform organic waste into a valuable raw material (compost) that will increase the productivity of the soil, you should attempt to promote gender equity in all facets of the process. This means that the people who collect the organic waste, transform the organic waste into a valuable raw material, and use this raw material to increase agricultural production should be the primary beneficiaries of this effort.

Compost

Compost is a mixture of carbon- and nitrogen-rich organic material that decomposes to become humus, which is the dark organic material in soils.

Compost provides many benefits when applied to gardens, among them:

- Increasing water retention and aeration

- Improving soil structure

- Making nutrients available

- Buffering soil pH

- Increasing germination rates and times

- Encouraging the development of soil micro-fauna, such as bacteria and fungi

- Reducing the need for commercial fertilizers

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16. https://peacecorps.libguides.com/paca

Composting Techniques

There are three major composting techniques, each with different benefits and disadvantages.

- Pits

  1. *Pros:* Pit containers are beneficial because they prevent the compost from drying out; they retain their moisture content. This can be beneficial in an extremely arid climate or in the hottest months.

  2. *Cons:* This type of composting is labor intensive, having to dig out a 1 x 1 x 1 meter pit.

- Containers

  1. *Pros:* Containers, such as wire or wood fencing or plastic bins, are beneficial because they are easily managed and are less of a mess.

  2. *Cons:* With this system, more materials are needed and materials have to be maintained.

- Piles

  1. *Pros:* The pile composting method requires much less labor, is easier on the back, and prevents waterlogging.

  2. *Cons:* The pile needs to be watered more frequently.

Types of Compost Piles
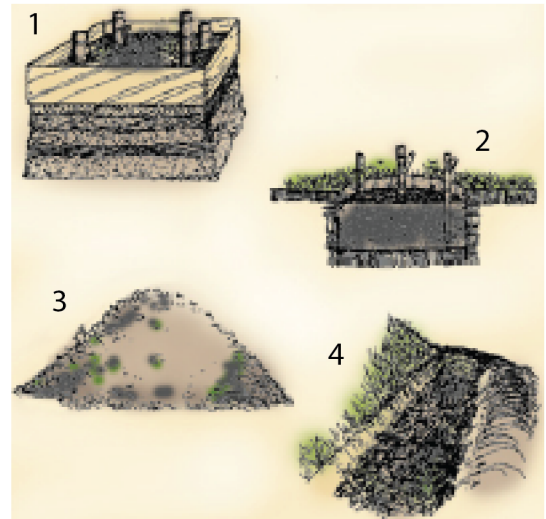
1. Above ground 2. Underground 3. Volcano compost pile 4. Contour compost ditch

Source: Peace Corps & USAID, Soil and Water Conservation for Small Farm Development in the Tropics. p. 80. July 2014.

To make compost:

- Choose a location, ideally a shady spot such as the shade of a tree, that has a nearby water source, and, in consultation with community partners, choose the technique best suited for the situation.

- Gather materials. The most important components supply large amounts of nitrogen and carbon when they break down. In order to make this easier to remember, think of them as green and brown materials, as shown in the table below.

Nitrogen-Rich Materials (Green)	Carbon-Rich Materials (Brown)
- Green leaves - Green grass - Green weeds (pest free) - Manure (not from household pets such as dogs or cats) - Food scraps - Old fish - Fruit peels - Banana stalks	- Dry leaves - Dry grass - Peanut hay/shells - Millet stalks/chaff - Old roofing thatch - Rice hay/bran/hulls - Newspaper/cardboard - Sawdust - Ashes - Corn cobs and stalks (can take a long time to compost)

Eggshells can be added as well to contribute calcium.

Materials that should not be composted include anything non-biodegradable, such as plastic and metal, and weeds that have pest or disease problems, as these might infect the compost. Large quantities of meat scraps, fish scraps, or bones will smell bad and attract pests. Dog or cat feces should not be added.[17]

Making Compost

Following are the basic steps to making compost:[18]

- Mark out a 1-meter square footprint on the ground if constructing a pile, or dig out a 1-meter cubed pit if building a pit.

- Place a 10- to 15-centimeter layer of carbon-rich (brown) material on the bottom. The more absorbent the materials, the better, as this will later help retain moisture and nutrients that might otherwise leach out of the compost pile. Dry grass and old roofing thatch tend to work well.

- Water the first layer until it is moist.

- Place a 10- to 15-centimeter layer of nitrogen-rich (green) material on top of the first layer.

- Continue this process, alternating carbon-rich materials with nitrogen-rich materials until the compost is AT LEAST 1 cubic meter (m^3). The compost pile will work more efficiently if it is larger than this, but it will not heat up adequately if it is smaller than 1 m^3. Cover the pile with grass, soil, or plastic to hold in moisture.[19]

- Drive a sharpened stick or metal rod through the top of the pile all the way to ground level.

- Visit the compost, ideally daily, but at least weekly, and pull the stick out to monitor the heat, moisture content, and smell of the pile.

- When possible, uncover, turn, and water the pile to increase aeration and maintain adequate moisture.

- When mixing the compost, move the less decomposed material from the outside of the pile into the middle so it can break down. This should be done once every 1−2 weeks; the actual time may vary according to soil conditions (sandy, clay, etc.) and the prevailing climate.

After roughly six weeks (again depending on the climate), the compost should be finished. Before using it, sift it thoroughly and add any undigested material to a new compost batch.

Keep in mind:

- Smaller materials will decompose faster, so chop up larger items before adding them to the pile.

- If there is too much carbon, the pile will not heat up and will take longer to break down. If there is too much nitrogen, the pile will start to stink as nitrogen off-gasses in the form of ammonia.

- High oxygen levels help feed beneficial bacteria, increasing the heat of the pile and speeding the decomposition process. Again, make sure to turn the compost every 1−2 weeks.

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17. https://www.stonepierpress.org/gardeningnews/howtocompost
18. https://www.nrdc.org/stories/composting-way-easier-you-think?gclid=COyG3YyulM8CFVBZhgodnLsB9Q
19. https://homeguides.sfgate.com/make-compost-pit-48677.html

- The compost pile should be damp, but not soggy. If it is too dry, it will decompose slowly. If it is too humid, it can lead to rot.

Inorganic Waste

Plastic

Plastic waste is everywhere and, since it doesn't decompose, it accumulates and travels the countryside via wind and running water, creating significant health and environmental problems as it goes. Almost all communities and Volunteers will encounter plastic waste. What can communities do?

To begin, it is helpful to know the types of plastic used locally, as this can make a difference when determining which reusing and recycling options are available. Beginning in 1988, the Society of the Plastics Industry (SPI) began classifying different plastics with the Resin Identification Code (RIC).[20] These are the little triangles with numbers and abbreviations on the bottom of plastic items. The RIC recognizes seven different categories.

Source: Recycle Plastic Stock Photos and Images[21]

- Plastic #1: Polyethylene terephthalate (PET or PETE). The kind of plastic typically used for soft drink and water bottles, as well as bottles for vegetable oils, salad dressings, mouthwash, and peanut butter.[22]

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20. https://www.epa.gov/rcra/medical-waste
21. https://www.123rf.com/stock-photo/recycle_plastic.html?sti=m5fcqnj2xxbcv3dh21|
22. https://www.star2.com/living/living-environment/2017/08/29/recyclable-plastics-types/

- Plastic #2: High density polyethylene (HDPE). A sturdy, often white plastic used to contain milk, juices, bleach, detergents, household cleaners, and shampoos.

- Plastic #3: Polyvinyl chloride (PVC). A stiff, usually white plastic that is made into piping and tiles. Containers made with PVC should never hold food and drink.

- Plastic #4: Low density polyethylene (LDPE). A soft, flexible plastic used in squeeze bottles. This is the plastic found in cling wrap and disposable grocery shopping bags.

- Plastic #5: Polypropylene (PP). A plastic that can be either soft and flexible for yogurt cups and ketchup bottles, for example, or hard and stiff as with small medicine bottles and dental floss containers.

- Plastic #6: Polystyrene (PS). Also known as styrene, this plastic often, but not always, appears foamy and can be found in egg cartons, take-home food containers, disposable coffee cups, and Styrofoam "peanuts."

- Plastic #7: Miscellaneous. This category includes everything from large, blue 3−5 gallon water bottles to compact discs.

These numbers and symbols will identify plastic items in the United States and in many other countries. This may not be true, however, with plastic items in your country of service. In that case, a plastics recycling facility, if available, can help identify examples and which types they will accept.

Recycling helps achieve a primary goal of waste management: keeping plastic out of the waste stream!

Ways to keep plastic out of the waste stream include:

- Use less plastic in the first place: The best example of this is the ubiquitous shopping bag that people use to carry groceries and other items from stores. After a few minutes of use, they get thrown away and seemingly last forever, piling up on roadsides and in drainage ditches, streams, and eventually oceans. Some countries, including Kenya, Rwanda, Jamaica, Panama, and Malawi, have now banned them entirely,[23] while other countries have announced legislation to ban or severely restrict the importation and/or use of plastic bags, or to tax their use.[24]

- Use reusable tote bags or even newspapers instead: There are a number of innovative and fashionable alternatives to plastic bags (see, for example, Nyika Silika's blog post in response to the banning of plastic bags in Kenya).[25]

Likewise, communities can reduce use of plastic soda bottles by using reusable water bottles instead.

- Reuse plastic: People can make a host of useful items with plastic bottles and other plastic waste. Easy projects include garden planters; more time-consuming projects requiring a group effort include nets for soccer goals and eco bricks with which people can even construct small buildings (see page 83 for some examples). Households can make some of these items for their own use; organizations like co-ops and youth clubs can also find making things with plastic to be enjoyable and even financially rewarding.

Suggestion
Remember the **3 R's**! Participating community members should try to **reduce** their use of plastic, **reuse** what they can, and **recycle** if possible.

  Reusing plastic containers would also seem to be a good idea and certainly simple to do. Doing so, however, can present some health risks. The moist and warm environment in a used plastic beverage bottle, for instance, can harbor disease-causing bacteria. Therefore, thoroughly wash bottles with soap and water if they are going to be reused for food or drink. A few times doing this, however, will create small cracks and crevices in the plastic, which will make the bottles increasingly difficult to clean. Only reuse these bottles a few times at most.

  The kind of plastic being reused also makes a difference. Containers made from high density polyethylene (HDPE, Category #2), low density polyethylene (LDPE, Category #4), and polypropylene (PP, Category #5) are thought to be safe to reuse a few times. As a general rule, containers made for containing food products are safe to reuse. Those made to store chemicals and/or for industrial use should never be used to store food or any other edible products.

- Recycle plastic: If plastic can't be replaced or reused, then it should be recycled. Whether this is a realistic option for the community you serve will depend on whether a plastic recycling facility is accessible and will accept the plastic items the community is discarding. PETE and HDPE plastics (Categories #1 and #2) are much more likely to be accepted than the other categories.

- If these options aren't feasible, then community members should be encouraged to dispose of plastic in a sanitary landfill. Sanitary landfills are more effective than dumps at preventing plastic

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23. https://plasticoceans.org/rwanda-plastic-bag-ban
24. https://www.statista.com/chart/14120/the-countries-banning-plastic-bags/
25. http://www.nyikasilika.org/10-alternatives-plastic-bags

from eventually ending up in our rivers and oceans.[26] Communities should strongly discourage burning plastic. **Burning plastic presents unacceptable health and environmental consequences and should never be done! A host of very toxic pollutants, including dioxin and mercury, are released when plastic is burned.**[27]

- If there are no waste pickers in your community, there is no accessible recycling facility, and there is limited community interest in applying the 3 R's, then the best option is for your community to dispose of the items in a local landfill. Once again, you will use your community mapping experience and PACA tools to: 1) work with local leaders to identify and address barriers, 2) facilitate meetings, and 3) work alongside interested community members to mobilize others in the community, in this case to prepare a space for controlled dumping as an initial step toward developing a sanitary landfill.

Paper

Paper is another type of organic waste in that, over time, it decomposes, so at least it will not end up endlessly circulating around the Great Pacific Garbage Patch. Nonetheless, improperly disposed of paper waste can adversely affect human health and environmental quality.

As with plastics, what you and your community can do with paper waste will depend to some extent on the types of paper involved and the disposal/recycling resources available. The U.S. Environmental Protection Agency (EPA) separates paper into four categories:

- Old corrugated containers (OCC): This is also known as corrugated cardboard. Mills use old corrugated containers to make new recycled-content shipping boxes, as well as recycled paperboard for product packaging (cereal boxes, shoeboxes, etc.).

- Mixed paper: Mixed paper is a broad category that often includes items such as discarded mail, paperboard, magazines, and catalogs. Mills use mixed paper to produce paperboard and tissue; as a secondary fiber in the production of new paper; or as a raw material in non-paper products such as gypsum wallboard, chipboard, roofing felt, cellulose insulation, and molded pulp products (like egg cartons).

- Old newspapers (ONP): Mills primarily use old newspapers to make new recycled-content newsprint and in recycled paperboard and tissue, among other paper grades.

- High-grade de-inked paper: This is made of high-grade paper—such as letterhead, copier paper, envelopes, and printer and convertor scrap—that has gone through the printing process. It must first be de-inked before it can be reprocessed into high-grade paper products such as printing and writing papers or tissue.

Options for handling paper:

- Recycling: To be able to recycle paper products, your community needs access to a paper mill that will accept and process the waste paper into other paper products. The categories of paper each mill will accept will vary.

- Composting: Adding shredded, small pieces of newspaper, cardboard, and un-shiny and uncoated paper to compost adds the "brown" component, thereby turning paper "waste" into a resource that can help plants grow. Note that glossy paper, like magazine pages, cannot be used

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26. https://oceanconservancy.org/trash-free-seas/plastics-in-the-ocean
27. https://www.unep.org/news-and-stories/story/plastic-bag-bans-can-help-reduce-toxic-fumes

as compost because it contains various dyes and inks that can contaminate the compost.[28] See composting instructions under "Food and Plant Waste," above (pp. 6–9).

- Paper as fuel: In some places, waste paper is converted into paper "bricks" as a substitute for fuel wood.[29] Glossy paper or papers with high ink content should not be used in the production of paper bricks. The burning of such ink may release hazardous fumes and create a health hazard.

Metal

Household and municipal waste can also contain metal cans, typically aluminum for beverages and steel with a thin tin coating for food. The metal in these cans can be melted down and used to make new cans and other items, so ideally they would head to a recycling facility once empty. This is yet another opportunity to use your community mapping exercise to identify waste pickers, their associations, or other individuals or groups that may be on the lookout for scrap metals. Making things with recycled iron/steel, aluminum, and copper takes place in many countries worldwide; you and community members you're working alongside will need to find a facility that will accept metal before beginning a metal recycling effort in your community.

If there are no waste pickers or recycling facilities that will take metal, an alternative way to handle used cans is to make useful items out of them![30]

If none of these options will work, the best strategy is to dispose of metal items in the nearest municipal landfill. A Volunteer's initial assessment of the local environment would have indicated where community residents dispose of their waste materials. If there is no municipal landfill or place to formally dispose of waste materials, use your PACA tools (Chapter 3) to find out why this is the case.[31] As with almost all Volunteer activities, changing individual and community behavior can be problematic in the best of times, so as an outsider, your best bet is to identify local change agents and support their efforts. **Sustainable solutions always require local leadership and community buy in!**

Glass

Glass bottles and other items should also ideally be recycled. This is a great source of income for waste pickers. If recycling is not an option, the best thing to do with glass is to reuse these items or bring them to the municipal landfill.

Old Tires

Compared with other categories of waste, few old tires end up in the waste stream. They are mentioned here, however, because what they lack in total mass, they make up for with negative health impact. Tires are prime breeding sites for mosquitoes and lead to mosquito-borne diseases. Deposited in a dump, tires take an extremely long time to decompose, well over a century, and they create a fire hazard. Tires burn easily, with a very hot fire that is hard to extinguish. Burning tires produce a dense, black smoke that contains carcinogens such as benzene, PCBs, and dioxins, and metals such as arsenic, cadmium, and mercury, not to mention tiny particles that can settle in the lungs when inhaled.

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28. https://www.nrdc.org/stories/composting-way-easier-you-think?gclid=COyG3YyulM8CFVBZhgodnLsB9Q
29. http://untrainedhousewife.com/use-shredded-paper-to-make-bricks-for-fuel; https://dengarden.com/home-improvement/How-I-make-quick-and-easy-Newspaper-Bricks-for-burning-in-my-fire
30. https://shusko.wordpress.com/tag/recycling/
31. https://pclive.peacecorps.gov/pclive/index.php/pclive-resources/resource-library/2374-paca-field-guide-viewing/file

Whenever it's an option, the best thing to do with old tires is to recycle them. The EPA has published guidelines on the recycling of tires, and although it is specifically designed for the Mexico-U.S. border, some of the suggestions have general applications.[32]

Many countries use waste tires as a key fuel source in cement production. These tires are fed into cement kilns, generating energy for critical industrial processes. However, without adequate air pollution controls these kilns emit harmful air pollutants. In countries where environmental controls are not very strong, this "solution" can lead to other environmental problems, such as declines in air, soil, and water quality if the proper filters are not used or maintained.

Household Hazardous Waste

Household hazardous wastes (HHW) are products that one would typically find in a residence or residential area and that can "catch fire, react, or explode under certain circumstances, or that are corrosive or toxic." These products require special care when disposed of.[33]

HHW may include:

- adhesives
- latex- and oil-based paints
- paint thinners and strippers
- grease and rust solvents
- wood and metal cleaners
- nail polish and removers
- cosmetics
- household polishes and cleaners
- oven cleaners
- liquid drain openers
- lighter fluids
- fungicides and wood preservatives
- insecticides, herbicides, and rat poisons
- used oil and oil filters
- fuel injection and carburetor cleaners
- antifreeze
- batteries
- broken thermometers

The best ways to handle HHW are:

- Reduce the amount of this type of waste by purchasing only the amount of the hazardous material needed in the first place.

- Reuse leftover products by donating unused portions to friends or community organizations.

- Recycle leftover household hazardous products that are recyclable. In many of the countries where the Peace Corps operates, there may be relatively few facilities that properly handle and

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32. https://nepis.epa.gov/Exe/ZyPDF.cgi/P100SGFE.PDF?Dockey=P100SGFE.PDF
33. https://www.epa.gov/hw/household-hazardous-waste-hhw - relatedlinks

recycle hazardous waste. In such cases, PCVs should work with local authorities and/or environmental organizations to identify opportunities for proper disposal of such wastes. Wastes that can be recycled might include used oil or certain types of batteries.

- If empty containers of hazardous waste cannot be recycled, the safest means of disposal is to first damage the containers so they cannot be reused, making sure to leave on the label, and then dispose of them in a sanitary landfill. They should not be burned or left out in the open.

Suggestion
If your village doesn't have easy access to a household hazardous waste (HHW) disposal site, work with community partners and the municipality to host a collection day. Collect HHW from the community and transport it to a city that accepts it.

Batteries

Virtually every household has some batteries that are used and no longer work, and assisting in their safe disposal provides an effective entry point to engaging families and communities to practice the 3 R's![34]

There are a variety of batteries that are used for a variety of purposes. The following are some types of batteries to be aware of:

- Spent lead-acid batteries (SLABs). These are primarily used in motor vehicles (cars, motorcycles, etc.), but can also be used in industrial, commercial, and institutional applications. Although proper recycling takes place in many countries, the processes undertaken to extract lead are hazardous to the workers and surrounding communities if done improperly.[35] There is no safe threshold for levels of lead, and absorption is particularly harmful for young children, pregnant women, and nursing mothers. Additional information (available in English, French, and Spanish) on the environmentally sound management of SLABs can be found online.[36]

- Lithium-ion batteries. "Primary" non-rechargeable lithium batteries come in common sizes—AAA, AA, C, D, and 6 and 9 volt—but are distinct from "lithium-ion" batteries that are rechargeable. Rechargeable lithium-ion batteries come in pouches and in cells called "18650," among other sizes. These are a similar size to AA batteries but are not exactly the same and often get bundled together to make the battery pack for a power tool or electric vehicles, or for other larger applications. Lithium-ion batteries are widely used in cell phones, laptop computers, power tools, video cameras, and handheld electronics. However, lithium-ion batteries can also be quite volatile.[37]

  It is difficult to assess whether or not lithium-ion batteries still have any charge, so it is always possible that a battery could end up causing a thermal event long after being disposed of. They can contain heavy metals that should not enter the groundwater or atmosphere. Consequently, they should not be disposed of in the regular waste stream.

- Button batteries. These are the small circular buttons you find in a host of items ranging from watches to remote controls. Several types exist: mercuric oxide, silver oxide, lithium-ion, and zinc air. As these batteries are small, they are a hazard to small children, who may try to ingest them. **Swallowed batteries can rapidly burn through a child's esophagus!**

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34. https://www.bioenergyconsult.com/recycling-lead-acid-batteries
35. *Ibid*.
36. http://www3.cec.org/islandora/en/item/11665-environmentally-sound-management-spent-lead-acid-batteries-in-north-america
37. https://www.consumerreports.org/safety-recalls/why-lithium-ion-batteries-still-explode-and-whats-being-done-to-fix-the-problem

- Nickel-cadmium batteries. These are cylindrical, rechargeable batteries that come in the same sizes as alkaline and carbon-zinc batteries. Non-spillable cadmium is a toxic heavy metal. **These batteries should never be incinerated or burned as they will release toxic vapors.**

- Alkaline and carbon-zinc batteries. These are used in many common items, such as flashlights. Alkaline batteries used to contain mercury, but manufacturers in the United States and other countries phased out the use of mercury. You may, however, occasionally encounter alkaline batteries made in other countries that still do contain mercury. Be sure to check the label.

Electronic Waste (e-waste)

Consumer electronics such as cell phones, computers, and televisions present a new and growing waste disposal challenge. These products contain a host of toxic metals that should not enter the waste stream, such as lead, cadmium, mercury, selenium, arsenic, and chromium. These products also contain precious metals, such as silver, gold, copper, cobalt, rare earth metals, and platinum. For both these reasons, e-waste is considered a prime candidate for recycling.

Quantities of electronic waste are rising significantly worldwide, including in countries where the Peace Corps serves. This trend is set to significantly accelerate with the expansion of renewable energy technologies in response to climate change. In the coming years, greater adoption of solar panels, energy storage mechanisms (e.g., batteries) linked with off-grid power systems and solar-powered consumer items will also increase the quantities of e-waste generated, particularly in countries where the Peace Corps serves.

Furthermore, some countries export e-waste to other countries, to take advantage of factors such as lower labor costs. Taking apart electronics is dangerous work. People working with the toxic materials electronics contain must follow extensive safety precautions so they do not poison and injure themselves. Unfortunately, not all countries enforce safeguards that protect e-waste recyclers. This issue has been increasingly recognized as a global problem, and there are numerous interventions created to address this challenge, such as the "solving the e-waste problem/StEP initiative."[38]

The increased awareness of the environmental challenges associated with e-waste (including the United Nations Sustainable Development Goal, SDG 12: Ensure Sustainable Production and Consumption Patters), coupled with wider access to information through the Internet, means that you and your community can find information on e-waste recyclers in your country.[39] How can parties know if an electronics recycling facility follows responsible and safe recycling practices? A growing number of facilities are certified to standards that dictate what exactly qualifies as a responsible electronics recycler. Two such standards are: 1) The Responsible Recycling Standard for Electronics Recyclers (R2)[40] and 2) The e-Stewards Standard for Responsible Reuse and Recycling of Electronic Equipment.[41]

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38. See http://www.step-initiative.org/publications.html. For an article that focuses on the threat posed to children's health in Africa from e-waste disposal, see https://www.ncbi.nlm.nih.gov/pmc/articles/PMC8392572/.

39. As of 2019, the global average e-waste collection rate was 22.8%. However, rates differed dramatically by region: Europe & North America, 46.9%; sub-Saharan Africa: 1.6%; Latin America & the Caribbean, 1.2%. For more information about e-waste, visit the following links: https://www.eenews.net/articles/what-happens-to-used-solar-panels-doe-wants-to-know/; https://www.epa.gov/international-cooperation/cleaning-electronic-waste-e-waste; https://www.gov.uk/research-for-development-outputs/drivers-barriers-and-opportunities-of-e-waste-management-in-africa.

40. www.sustainableelectronics.org

41. www.e-stewards.org

Chapter 2: Changing People's Behavior Regarding Solid Waste

It is one thing for some members of your community to know how best to handle trash; it's another to transfer this knowledge to others and have them take the time to do so. An important key to any project's sustainability is behavior change within a community. It is widely recognized that changing behavior is usually more complicated than just providing information.

In response to this reality, development practitioners, especially in the public health field, have developed a straightforward methodology to maximize the likelihood that behavior change will occur. It lays out, step by step, what practitioners need to know before trying to educate people. By employing it, Peace Corps Volunteers, others working in development, and involved community members can direct their efforts toward delivering the most high-impact messages to the most important target audiences in the most effective ways. This chapter describes this methodology. Many solid waste management initiatives fail, not because technical solutions are lacking but because people are unwilling or unable to employ them.

Again, the best way for Volunteers to successfully engage in behavior change strategies is to become proficient in using *The Participatory Analysis for Community Action (PACA) Field Guide for Volunteers*.[42] The *PACA Field Guide* provides an approach that uses lenses, phases, and tools, which can be used to engage communities, and most importantly, to promote local ownership for inclusion and long-term sustainability of any project. Following a community assessment and prior to engaging in any activity, the Volunteer and community partners will determine: 1) the information that needs to be delivered, 2) the target audiences to whom the information is to be delivered, and 3) how this information will be delivered. The target audiences (priority group) may be the individuals whose behavior is to change. They also can include the people (the influencing group) who can influence the behavior of the primary (priority) group.

It is important to keep in mind that just improving the "awareness" of the priority group individuals, through showing them improved ways to manage their solid waste and why, will often fail to bring about behavior change. It is vital that you and your community partners first take the time to fully understand why some in the community aren't adopting the behavior in the first place. To bring about behavior change, change agents need to know the barriers standing in their way and need to direct efforts toward breaking down those barriers.

Suggestion
For any project, including ones involving solid waste management, it is critical to use PACA phases, lenses, and tools when engaging within your community. Sustainable behavior change is always community based and community driven.

The behavior change methodology is logical and straightforward. To employ it, community members need to identify the issue they want to address and ask the following questions:

1. Do members of the community see the issue as a problem? If so, which community members?
2. Is there broad consensus that the issue is indeed a problem?
3. What are the solutions proposed to effectively and sustainably address the problem?
4. What are the barriers preventing concerned community members from implementing these solutions and thus addressing the problem?

42. https://peacecorps.libguides.com/paca

5. What has to be done to break down these barriers?

6. Once the barriers have been removed, what resources are required to implement the solutions, and who in the community will be tasked with taking the lead?

7. What measures need to be taken at the outset to ensure that the activity is "owned" by the community and that the intervention is "sustainable" after the Volunteer's departure?

Step #1: Is the Identified Issue Their Problem?

The first step, logically enough, is to determine if the issue your community partners have identified as a problem is also seen as a problem by other members of the community. The issue should meet the following criteria:

- There is a community consensus that the issue is seen as a problem.

- It is significant enough that it is worth addressing.

- It is something you and your community partners have the capacity to address.

- The activity/intervention to resolve this problem is something sustainable, and the community will continue addressing the issue after your departure.

Who determines whether a solid waste issue is important will vary. Sometimes, your country of service will have identified this as a major concern, perhaps in the context of an overall environmental or health strategy. Your Peace Corps program manager may have done so; it may be an objective or activity that is part of your project framework, or it may be a potential secondary project that local stakeholders are encouraging you to consider. Regardless, it must be a problem that people in your community know exists and want to resolve. It may also be an issue that you recognize when you carry out your community assessment as you begin your service.

The Peace Corps strongly recommends that you conduct a community assessment in a participatory manner with the members of your community. In the Environment sector strategy and your country-specific logical project framework (LPF), conducting a community assessment is a prerequisite to engaging in any project-related activities. With this in mind, the agency has developed PACA tools for you to use. These tools will assist you with community entry and throughout your time in service.

Once you have begun to integrate into your community, you can employ PACA tools while you and your community identify any waste-management issues, and other issues, at hand.

Assessing your community together with the people with whom you will be working will help your work in several ways. First of all, it can encourage people to think about issues they haven't much considered and enable them, like you, to learn important aspects about their community. It will help people get to know you, thereby easing your community entry. In addition, it will begin the process of actually addressing problems in a sustainable manner, because when people identify problems, they typically also discuss solving them. The use of participatory approaches can therefore assist individuals and communities to design and implement sustainable solutions for identified problems. **The key word is "sustainable," as communities are much more likely to continue an activity that they have taken ownership of**.

To identify the solid waste issues confronting your community, you and your community partners can gather evidence in at least three ways: 1) direct observation, 2) community resident interviews, and/or 3) oral and written testimonies from country "experts." Remember that individuals see things differently depending on their individual lenses. A mother may identify issues that are potential environmental

health hazards to her young children in ways that male teenagers may not; or farmers may be worried about the impact of their livestock consuming plastic bags and therefore willing to champion non-plastic alternatives. It is beneficial to ensure that a wide spectrum of the community is engaged when gathering evidence.

Direct Observation

Take a walk with your counterpart and/or community residents around your neighborhood to observe solid waste issues and see what you all find. The table/checklist below suggests some things to look for:

Solid Waste Observations	Yes	No
Open dumping		
Do you notice trash being dumped in the open in public (e.g., by the side of the road or in vacant plots) and/or in private spaces (someone's yard)?		
If yes, where are the dumps located?		
In people's yards?		
In random places along roadsides, in town plazas, or in other public places?		
Outside town on open land?		
Other? (Describe)		
What is in the dumps? Do you notice:		
• Hazardous materials (containers labeled as chemicals, batteries, etc.)?		
• Household hazardous wastes (cleaning products such as bleach, etc.)?		
• Food scraps, paper, and other potentially compostable materials?		
• Plastic, metal cans, and other potentially recyclable materials?		
• Tires, plastic containers, and other potential mosquito breeding sites?		
• Glass, metal, and sharps (e.g., needles, scalpels) from health centers that can physically harm children and others who might come into contact with them?		
Are the dumps protected from wandering children and others who might injure themselves there?		
Are undesirable animals frequenting the dumps (e.g., rats, mice, flies, feral dogs)?		
Do local residents consider open dumps to be a public nuisance?		
By looking at the trash items in the dumps and where the dumps are located, can you tell who (industry, restaurants, households, etc.) are using the dumps?		
Are there people working in the dumps? Are they collecting things to resell?		
Are they looking for food?		
Are the majority of these people men?		
Are the majority of these people women?		
Burning trash		
Do you notice people burning trash in the open?		
If so, do you notice the following items being burned?		
Plastic		
Hazardous materials		
Tires		

Solid Waste Observations	Yes	No
Is the trash being burned near people's homes?		
Do the burning piles of trash belong to individual households or are they communal?		
Do you notice an odor of burning trash?		
Litter		
Do you notice litter?		
If so: Does it accumulate in specific places? (Describe)		
Can you determine who created the litter based on what is in it and where it is located? (Describe)		
Do you notice plastic waste clogging drainage ditches and creating stagnant water where mosquitoes can breed?		
Is the litter creating a public eyesore?		
Trash receptacles		
Does the community have public trash receptacles?		
If so: Are they emptied on a regular basis?		
Are they overflowing?		
Are they covered so flies, wasps, rats, etc., can't get to the trash?		
Are people using the receptacles, or do you notice litter scattered around them?		
Are there public places where receptacles could be installed? (Describe)		

Interviewing Community Residents

The opinions and views of community residents are vitally important when designing and implementing any project. By interviewing members of the community, you and your counterparts can find out 1) how the residents you interview are handling their trash and 2) how they would *prefer* to handle their trash. Again, for a number of reasons, you should do this with counterparts. They will know the people being interviewed and know how best to ask questions; their language skills will be superior; rather than relying on you to summarize, they will hear evidence first-hand (which will have greater impact); and they will gain the opportunity to become increasingly committed to improving the situation after hearing the concerns and desires of their fellow citizens.

Here is a sample interview form you can use:

Household Solid Waste Interview
Name of community:
Number of household members: Ages: Genders:
Interviewer: Date:
Who in the household has primary responsibility for waste disposal?
What do you do with your trash? • Food scraps: • Plastic: • Metal: • Paper: • Crop residue: • Other (describe):
Who in the household decides what to do with these different kinds of trash? • Food scraps: • Plastic: • Metal: • Paper: • Crop residue:
Who actually handles the different kinds of trash? • Food scraps: • Plastic: • Metal: • Paper: • Crop residue:

Household Solid Waste Interview
Are you satisfied with the options available to you or would you prefer to do something different?
What would you like to be able to do? (e.g., have regular trash pick up, recycle, compost, dispose of your wastes in a sanitary mini-landfill)
What do you think is preventing you from being able to dispose of trash the ways you would prefer?
Is there anything about the way trash is handled in the community that bothers you and that should be improved? (e.g., litter, burning, open dumps, animals associated with trash, no public trash receptacles, no trash pick up, no community recycling)

An example of a more formal and extensive interview format, from Jocelyn Hospital's Peru Solid Waste manual, can be found in Chapter 4.

Interviewing Country Experts (Ministry Officials, NGOs, Extension Agents, Health Workers, etc.) and Consulting Official Documents and Research Studies

You and your counterparts can also learn more about the solid waste situation in your community by consulting the following:

- Official documents, such as country environmental and health strategies

- Research reports carried out by country ministries, universities, and NGOs

- In-country experts (ministry officials, NGO extension agents, health workers, Peace Corps staff)

Try to find out if solid waste management has been identified as a significant problem in the country. If it has been identified as such, try to answer the following questions:

- What are the identified health and environmental impacts?

- What are the recommendations for addressing the issue?

Once the solid waste survey is completed, having used all of the techniques at your disposal, process what you have seen. Do this with a counterpart or with a focus group from the community.

With the focus group, record on a flip chart or blackboard what people say are the main solid waste problems facing the community. You or a counterpart conducting the focus group may find it helpful to draw a large map on flip chart paper (or use the one you may have developed during initial PACA exercises) and locate the places where community members have identified significant solid waste issues (e.g., overflowing trash receptacles, open dumps, drains clogged by plastic, burning trash).

Ask the convened group to rank the issues in order of significance. See if they can arrive at a consensus as to what the priority issues are. To do so, you and your counterparts can employ a problem priority matrix:

Problem Priority Matrix[43]

Exercise objective: To develop a diagram showing the main solid waste problems identified by the community.

Time required: 1 hour.

Materials: Newsprint and markers, or blackboard and chalk.

Methodology:

Step 1: You or a counterpart explains to the participants that the plan is to determine, as a group, what problems have been identified and which, if any, are most important to the community or group.

Step 2: Prepare a dual-entry matrix with the same number of rows and columns as the number of problems identified.

Step 3: Start with the cell that includes Problem 1 (first column) and Problem 2 (second row). Ask the participants, "Which problem seems more important, number 1 or number 2?" or "Which problem needs to be solved most urgently, number 1 or number 2?" Once there is a consensus, record the most important problem in the cell.

Step 4: Repeat the exercise comparing all the problems, two by two. At the end, half the matrix will have been filled (since only half is necessary).

Step 5: Count how many times each problem appears in the matrix so that issues can be organized in order of frequency. The problem that appears most often will be the most important one. This comparison by pairs is less subjective than other prioritization methods.

Step 6: Ask the participants what they think about the exercise. Write down the result and give the sheet of newsprint or a copy of the results to the group.

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43. Frans Geilfus, *80 Tools for Participatory Development*, Inter-American Institute for Cooperation on Agriculture. 2008. Available at http://repositorio.iica.int/bitstream/11324/4129/2/BVE17089190i.pdf

Here is an example of a solid waste problem priority matrix:

Problem	Open dumping	Burning trash	Widespread litter	Mosquito breeding sites	No recycling facility	No community trash pick up	Rats, flies, other vermin	No waste collection center
Open dumping	x							
Burning trash	x	x						
Widespread litter	x	x	x					
Mosquito breeding sites	x	x	x	x				
No recycling facility	x	x	x	x	x			
No community trash pick up	x	x	x	x	x	x		
Rats, flies, other vermin	x	x	x	x	x	x	x	
No waste collection center	x	x	x	x	x	x	x	x

Step #2: Identifying the Solution

Once your community has pinpointed the solid waste problems that they want to address, the next step is to determine how they would like to solve those problems. What solid waste alternatives are available? Should people recycle, compost, or at least stop burning trash? Does the community need to begin regular trash collection? Does it need to establish a waste collection center? Does everyone need to be alert to mosquito breeding sites created by litter and remove them?

With your focus group, brainstorm possible solutions to the problems that have been identified. At this stage, people should consider their ideal scenarios without too much concern as to feasibility. Record people's suggestions.

An example of how to record group members' answers:

Solid Waste Issue	Suggested Solutions
Open dumping	Work with municipality to establish community sanitary landfill as an alternative. Place trash bins in the town plaza and on street corners and arrange for regular pick up. Reduce waste being disposed of in households. Recycle different categories of solid waste. Pass and enforce a local regulation prohibiting open dumping.
Burning trash	Stop burning trash! Reduce waste being disposed of in households. Work with municipality to establish a community sanitary landfill. Establish system of community household trash pick up. Construct household mini sanitary landfills. Recycle different categories of solid waste. Pass and enforce a local regulation prohibiting trash burning.

Solid Waste Issue	Suggested Solutions
Widespread litter	Organize trash cleanups. Put trash cans on platforms to prevent dogs or other animals from tipping them over. Put covers with latches on trash cans to prevent rodents from entering. Place trash bins in the town plaza and on street corners and arrange for regular pick up. Establish a community sanitary landfill. Establish system of community household trash pick up. Construct household mini sanitary landfills. Recycle different categories of solid waste. Pass and enforce a local regulation prohibiting littering.
Mosquito breeding sites	Search trash piles, litter, and elsewhere for open container breeding sites and remove them. Start a program to use scrap tires for gardens in homes, schools, or community centers, e.g., use scrap tires as "fencing" to line pathways. Search for plastic debris clogging drainage, thereby creating stagnant pools of water, and remove the debris.
No recycling facility	Locate a recycling facility sufficiently close by. Identify a means of transporting recyclables to the facility and arrange for transport. Make paper bricks as an alternative energy source to firewood. Make eco bricks with plastic bottles and paper and construct benches and/or a small building with them. Create art projects that can be sold by women's groups or schools in local markets or partner with local NGOs. Make items from plastic trash for sale at a nearby tourist market.
No community trash pick up	Establish a community trash collection system.
Rats, flies, other vermin	Remove open dumping sites. Place trash bins in the town plaza and on street corners and arrange for regular pick up. Reduce waste being disposed of in households. Raise garbage cans on platforms. Use garbage cans that have connected covers to prevent rodents from entering. Establish a community sanitary landfill. Establish system of community household trash pick up. Construct household mini sanitary landfills.
No waste collection center	Establish a waste collection center.

After brainstorming solutions, you and your counterpart and/or focus group will need to choose among them. Here are two tools to use when choosing:

Solution Evaluation Matrix[44]

Exercise objective: This exercise can help you and your community determine the feasibility and/or sustainability of the different solutions they have come up with during the brainstorming session.

Time required: Maximum 3 hours, depending on the complexity of the issue and the number of participants.

Materials: Paper, cards, markers, blackboard, or newsprint.

Methodology:

Step 1: Determine and reach consensus on evaluation criteria. Depending on the nature of the alternative, the criteria might include the following:

- Benefits: Productivity/income-generating capacity, quality of life
- Sustainability: Can we do it with little external aid and continue doing it after the aid is withdrawn?
- Sustainability: How can we ensure the continuation of the activity after the departure of the PCV?
- Fairness: Will everyone benefit equally from the alternative?
- Technical and social feasibility: Can it be done, and is it acceptable?
- Waiting time: When will we start to see the benefits?
- Cost

The facilitator should play a proactive role to ensure that all important criteria are included.

Step 2: Prepare a matrix with the rows headed by the different solutions to be evaluated and the columns headed by the evaluation criteria.

Step 3: Agree on the units and the scoring method.

Units: These depend on the level of group literacy. The exercise may be done with numbers, crosses, symbols; the range should be from 3 (e.g., 1 = poor; 2 = indifferent; 3 = good) to 5, preferably no more.

Method: By consensus (in this case, the facilitator fills out the matrix) or by voting (in this case, the participants enter their "vote" on the matrix).

Step 4: For each alternative, review the different criteria and write down a score for each. The facilitator should avoid a common mistake: confusing positive and negative scores, e.g., using 3 for "highly beneficial" and 5 for "long wait" or "cost too high." To avoid this mistake, it is a good idea to express all the criteria in positive terms (e.g., speed of impact, need for financing).

Step 5: Once the matrix has been completed, the scores can be added or combined to prioritize the different alternatives.

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44. Frans Geilfus, *80 Tools for Participatory Development*, Inter-American Institute for Cooperation on Agriculture. 2008. Available at http://repositorio.iica.int/bitstream/11324/4129/2/BVE17089190i.pdf

Problem: Plastic bag litter everywhere

Solution	Benefit	Help needed	Everybody benefits	Feasible	Do we have to wait?	Costs	Score	Priority
Ban plastic bags	☺	☺	✦	X	X	☺	7	3
Recycle plastic bags	☺	✦	☺	✦	☺	✦	9	4
Make items from recycled plastic bags	☺	✦	☺	☺	☺	✦	10	2
Promote use of non-plastic bags made from locally available materials	☺	☺	☺	☺	☺	✦	11	1

X = 0   ✦ = 1   ☺ = 2

SWOT Analysis[45]

Exercise objective: To get a clearer idea as to the feasibility of proposed solutions, you and your community can carry out a SWOT analysis. SWOT stands for strengths, weaknesses, opportunities, and threats. This analysis can be employed to compare alternative solutions, consider advantages and disadvantages, and thereby try to anticipate possible problems.

Time required: 1–3 hours, depending on the complexity of the issue and the number of participants.

Materials: Paper, cards, markers, blackboard, or newsprint.

Methodology:

For each alternative solution to be analyzed, brainstorm to establish four series of characteristics:

- Strengths: What are the advantages of this solution?

- Weaknesses: What are the disadvantages of the solution?

- Opportunities: What external elements (in the community, the society, institutions, the natural environment) could positively affect the outcome of this alternative?

- Threats: What external elements (in the community, the society, institutions, the natural environment) could negatively affect the outcome of this alternative?

This exercise can be used to review the elements included in the evaluation matrix. The advantage is that it includes external factors that can affect the outcome of the alternative.

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45. Frans Geilfus, *80 Tools for Participatory Development*, Inter-American Institute for Cooperation on Agriculture. 2008. Available at http://repositorio.iica.int/bitstream/11324/4129/2/BVE17089190i.pdf

Strengths	Weaknesses
• Community organization • Local knowledge • Community support • ?	• Political will to ban plastic bags? • Sustaining local collection campaigns • Changing attitudes on littering • ?
Opportunities	**Threats**
• Inexpensive locally available materials • Local demand for traditionally made bags • Increased household incomes • ?	• Opposition from makers of plastic bags • Affordability of traditional bags • Sustaining campaigns against plastic bags • ?

Now, having evaluated the feasibility, effectiveness, and likelihood of success of the solution options, the focus group should rank them in order of preference. Try to arrive at a consensus on what to focus on.

Step #3: Identify the Target Audience

The next step is to identify the people who will need to implement the solutions and what they need to do. These people will be the **primary audience**. In some cases, identifying these individuals will be simple and straightforward. For example, if your community is trying to increase the number of individuals who compost organic waste in their home gardens, the target audience will probably be whoever in the household would decide whether to compost and/or who would actually compost (not always the same person). If the solution is to clean up litter or remove mosquito breeding sites, the target audience would be the individuals who would carry out these tasks (for example, members of a youth environmental club). If the idea is to install trash barrels in the town plaza, the target audience might be town authorities who would pay for the barrels and the general public who would use them.

With community-wide waste management solutions that include many moving parts, however, there may be a need to involve more than one target audience. For instance, if the focus group decides the community needs to start a plastics recycling program, the target audiences might include:

- Household members who would sort plastic waste in their homes

- Students, teachers, and school administrators who would sort plastic waste in their schools

- Owners of commercial establishments who would sort their plastic waste

- Waste pickers or their associations who would collect plastic waste in public spaces

- Local enterprises who would pay for recyclable containers to distribute to households and commercial establishments

- Town authorities who would

  1. Set aside a piece of land for a community collection center where recyclables would be temporarily stored

  2. Arrange payment for individuals to pick up the recyclables from the households and establishments and transport the waste to the collection center

3. Arrange payment for individuals to transport the waste from the collection center to the re-cycling facility
4. Distribute the money that the recycling facility paid for the recyclables

- Individuals who will be transporting the recyclables to the collection center and to the recycling facility

- Individuals who will be managing the collection center

Preparing Behavior Statements

Once the primary individuals or groups that will be the target audience have been identified, community partners should compose behavior statements that clearly define the behaviors that the target audience should adopt. The statements must be explicit so that everyone can agree on what behavior changes they are striving for and so they will know how to plan for and monitor the changes. Behavior state-ments need to include:

- The target audience

- An action verb in the present tense

- Relevant details (e.g., frequency, quantity, duration)

For example:

- Household members separate plastic waste from their trash once a week and place it in desig-nated containers, to be taken to the town collection center.

- Members of the youth environmental club collect litter and bring it to the community trash col-lection center.

- Individual waste pickers collaborate to deliver recyclable materials in bulk quantities.

- The town council purchases trash barrels for the town plaza.

- Visitors to the town plaza dispose of their trash in the trash barrels.

Step #4: Identifying the Barriers to Behavior Change

Next, you and your community partners should determine what is preventing people from adopting the behaviors that are being advocated. **If these behaviors are beneficial to the community, why aren't people already doing them?**

A common assumption is that, to change behavior, one only needs to show people how to do something and why it is in their interests to do so. While this might seem logical in some instances, lack of aware-ness is not always why people aren't adopting a behavior that would seem to be beneficial to them-selves or their community. Frequently, other factors will be the explanation.

It is important that change agents take the time to try and understand people's behavior before trying to change it. Individuals need to understand community barriers to behavior change prior to conducting education programs.

Development workers have come up with 12 different **determinants**, or reasons why people behave as they do.

Important Determinants that Influence Behavior

The Four Most Powerful Reasons

These reasons should always be explored when doing research to plan a behavior change activity. They are commonly found to be the most powerful.

Does the individual think he or she can perform the behavior? Is it easy to do? (Perceived competence)	Does the individual think people who matter would approve of the behavior? Is it popular? (Perceived social norms) "People who matter" can include spouses, friends, mothers-in-law, and religious and community leaders.
Does the individual think that good things will happen if he or she performs the behavior? Will there be benefits? (Perceived positive consequences)	Does the individual think that bad things will happen if he or she performs the behavior? Will there be disadvantages? (Perceived negative consequences)

Other Key Reasons

- Can the individual get the products or services required to perform the behavior? (Access) This is often an issue with solid waste management.

- Can the individual remember to do the behavior and how to do it? (Cues for action/reminders) Examples are radio announcements reminding people of the date and location of waste collection and a sticker with the steps on how to separate household wastes according to the principles of the 3 R's.

- Does the individual feel vulnerable to the problem? (Perceived susceptibility/risk)

- Does the individual feel the problem is serious? (Perceived severity)

- Does the individual believe the behavior will solve the problem? (Perceived effectiveness)

- Does the individual believe it's God's will that he or she have the problem or that God will solve it? (Perception of divine will)

- Do existing laws and policy encourage or discourage adopting the behavior? (Policy)

- Does the culture encourage or discourage adopting the behavior? (Culture) Culture includes the history, customs, lifestyles, values, and practices within a self-defined group. Culture may also be associated with ethnicity or with lifestyle, such as "youth" culture.

With solid waste management, there are several common barriers. It is not very important how to classify them; some, as illustrated in the list below, could fit under more than one determinant. Rather, the purpose of this list is to suggest some solid waste determinants to be alert for.

- **Does the individual think he or she can perform the behavior? Is it easy to do? (Perceived competence)**

  1. Sorting trash on a regular basis is time-consuming, inconvenient, and unpleasant.

  2. Composting takes time, is smelly, attracts flies and rats, and is hard to do; previous attempts at composting have failed.

  3. Taking waste to a collection center to be recycled is time-consuming and inconvenient.

  4. It is difficult to know what can be recycled and what cannot (e.g., different grades of plastic, different types of paper, different kinds of batteries).

  5. There are no convenient, attractive, and durable household receptacles with lids in which to store the separate trash categories.

  6. It isn't known how to make useful and even profitable items from plastic and other types of waste.

  7. The quality of compost made at a resource recovery center for community distribution is difficult to maintain and guarantee.

  8. Individuals might steal personal trash receptacles.

- **Does the individual think "people who matter" would approve of the behavior? Is it popular? (Perceived social norms)**

  1. People might think that recycling, composting, or making crafts from waste is odd behavior and a waste of time.

- **Does the individual think that good things will happen if he or she performs the behavior? Will there be benefits? (Perceived positive consequences)**

  1. Litter isn't perceived as an eyesore; people are used to it so it doesn't matter.

  2. There are no apparent environmental, health, or economic benefits to recycling plastic, paper, or glass that are worth the effort.

  3. Leaving trash in a communal open dump moves it sufficiently far away so it is no longer a nuisance.

  4. Removing open dumps won't decrease personal contact with flies, rats, and feral dogs.

  5. Community governments don't see all the ways that improved solid waste management can benefit the community (economically, health-wise, environmentally, improved quality of life).

- **Does the individual think that bad things will happen if he or she performs the behavior? Will there be disadvantages? (Perceived negative consequences)**

  1. Sorting trash is dirty, unpleasant drudgery that can actually make you sick.

  2. Keeping trash around until it can be picked up or taken to a collection center is smelly and unpleasant and attracts flies, rats, and other undesirable creatures.

3. Because the community collection center is far away, it is inconvenient to carry the recyclable waste there on a regular basis.

- **Can the individual get the products or services required to perform the behavior? (Access)**

    1. There is no collection center.

    2. There are no trash cans in the community.

    3. There are trash cans in the community, but no one empties them and takes the trash to an acceptable location, so they fill up, overflow, and attract wasps and bees.

    4. There are no receptacles that households can use to segregate and store different trash categories.

    5. There is no community trash pick up or transportation available to take household recyclables to a community collection center.

    6. There is no transport that can take recyclables or household hazardous waste materials to a facility outside the community that can process them.

    7. There are no accessible places that will accept and adequately process plastic, glass, paper, metal, and other recyclables.

    8. There are no accessible places that will safely process hazardous waste and electronic waste.

- **Can the individual remember to do the behavior and how to do it? (Cues for action/reminders)**

    1. It's hard to remember when trash is picked up.

    2. It's difficult to remember how to properly compost or separate recyclables.

- **Does the individual feel vulnerable to the problem? (Perceived susceptibility/risk)**

    1. Trash burning in a communal dump is distant enough that the smoke is diluted when it reaches the home, posing no personal risk.

    2. There is no significant risk from contracting malaria and other mosquito-borne diseases as a consequence of trash being left in open dumps.

    3. There is no significant risk of contracting diseases because of open trash pits if you don't actually come into physical contact with them.

    4. Leaving trash in a communal open dump moves it sufficiently far away so it is no longer a personal nuisance.

- **Does the individual feel the problem is serious? (Perceived severity)**

    1. Breathing smoke from burning trash and other trash items doesn't seriously compromise health.

    2. Litter may be unattractive, but it doesn't really matter.

    3. Open dumps might be ugly, but they don't really matter: They don't significantly contaminate water supplies through leachate, increase populations of mosquitoes and other vermin, or pose a disease risk to people who come into physical contact with them.

- **Does the individual believe the behavior will solve the problem?**

    1. Cleaning up open dumps won't really reduce the incidence of mosquito-borne disease and the abundance of flies, rats, and feral dogs.

    2. Recycling won't significantly reduce the amount of litter.

    3. Composting won't lead to significant gains in crop yield.

- **Does the individual believe that it's God's will that he or she has the problem, or that God will solve it?**

- **Do existing laws and policy encourage or discourage adopting the behavior? (Policy)**

    1. There aren't adequate country or community laws regulating the handling of solid waste, and there isn't adequate enforcement.

    2. There aren't sound country or community policies about solid waste.

    3. The country/community isn't committed to implementing its policy.

    4. The country or community isn't making an adequate effort to educate citizens about the policy or laws.

- **Does the culture encourage or discourage adopting the behavior? (Culture)**

    1. People are used to doing what they are doing—e.g., littering, burning, dumping—and don't see anything wrong with it. Everyone does it.

    2. People aren't used to recycling.

    3. Composting implies that a person is too impoverished to use commercial fertilizer.

    4. Only poor and desperate people work with trash; it's embarrassing and associated with low status.

How to Identify Behavior Change Barriers

Once your counterparts and other members of your community have identified and agreed on desired behavior changes, identifying the barriers to those behavior changes is crucial if any efforts are going to result in meaningful change. As a Peace Corps Volunteer, you should have opportunities to collaborate and contribute to this effort.

Living at your site, you have time to develop trust and friendships that can encourage people to share with you what they are thinking and feeling, and their concerns, hopes, and dreams. Over time, you can observe what people are actually doing. You can gain insights about beliefs, values, patterns of thinking, and worldviews that will not reveal themselves to others who are only in your community for a short time. You also have the support of Peace Corps staff and have been trained by them, and you know how to employ PACA tools to help you integrate into your community.

Below are a few ways to learn about the barriers to adopting sound solid waste management action.

- *Ask a local expert.*

    People who have had experience helping people manage solid waste or that have a deep and informed understanding of the people with whom you are working can be excellent sources of information. These individuals include your counterpart and community residents you know and trust, but can also include extension agents, NGO personnel, and Peace Corps staff.

- *Observe people who do and don't engage in the desired behavior, and compare them to identify similarities and differences.*

  Notice, as unobtrusively as possible, who is performing the behavior and who is not. Try to understand what the differences are between the two groups. For example, who is composting or recycling and who is not? Do the "doers" have anything in common with one another that the "non-doers" do not, and vice versa? Perhaps, for instance, the "doers" know that compost makes soil more fertile and capable of storing water during drought and the "non-doers" do not. Or maybe recyclers live closer to the collection center than those who are not recycling, or they have kids who participate in an environmental club at school where they learn about recycling and the non-recyclers do not. If there are clear differences between "doers" and "non-doers," perhaps this knowledge can lead to a strategy to motivate the "non-doers" to join the "doers."

  One advantage of observation is that over time people take observers for granted and don't notice them. If performed with an open mind, observation can uncover unexpected information. One disadvantage is that observations might not be representative of all performers of a behavior. Also, generalizations made from informal observations, without concrete data, may not be accurate. Furthermore, observers can change how people behave by observing them, and observers might be biased in their observations by gender, circumstance, or personal characteristics.

- *Facilitate focus groups.*

  As discussed in Step #2 above, focus groups bring together a randomly selected group of people who share a common characteristic, along with a facilitator. The facilitator comes prepared with a list of questions and discussion topics and records the conversation to capture any discoveries and insights. The value of a focus group is that the participants encourage each other to think more deeply about the topic and also provide a truth check. If one person says something that isn't true, another person in the group can correct or contradict that statement.

  Each meeting has three parts: the opening, the questions, and the closing. During the opening, the facilitator welcomes the group, introduces the purpose and context of the focus group, explains what a focus group is and what will happen, and makes introductions. The facilitator should ask the focus group participants if any of them have experience with focus groups; if so, they may be invited to explain to the others what focus groups are and how they are used to learn about a subject. During the question section, participants ask and discuss the questions. At the closing, facilitators thank the participants, give them an opportunity for further input, and tell them how the information will be used.

  Some points to keep in mind: Participants for the focus group are usually selected randomly from the target group. There should be separate groups of doers and non-doers of the target behavior, if they are known. Ideally, the number of participants should be between 5 and 10. Allow a couple of hours for the discussion. The facilitator should plan to ask fewer than 10 questions. Questions should be carefully written and edited based on what was learned from the background research, observation, and interviews. The facilitator can use a few warm-up questions to get the conversation flowing and then move to the more important questions. Participants should be reminded that there are no right or wrong answers, that the goal of the exercise

is to gather their perceptions. The facilitator should pay close attention to group dynamics, giving everyone a chance to participate. During the conversation, someone should tabulate the number of times different statements are said, and note the most common statements.

Focus groups are very useful when learning about social and cultural norms. They provide in-depth information, and indicate the issues most important to the participants. They also reveal how people typically talk about an issue. Focus groups are time efficient because they offer many opinions in a short amount of time. The disadvantage is that with so many voices, fewer questions can be asked. They are also not statistically representative, so the results can't be generalized to the broader population. Of all the methods, focus groups require the strongest language skills. They are harder to conduct with a translator because translation slows down the dynamic. A high level of sophistication with the language is required to understand nuances and decode the interactions, so having a local counterpart in the role of facilitator may be best.

- *Conduct surveys.*

Surveys can reach many more people than focus groups, and they are intended to produce data that can be statistically analyzed. By involving a large sample, surveys can provide insights into what the majority of people think about a subject. Survey questions should be clearly and simply stated. The interviewer should test the questions in advance to make sure they are properly understood.

"Intercept surveys" involve approaching individuals in public places, such as markets, with very short surveys about the individuals' preferences, perceptions, or behavior. For example, a survey could be just two questions

1. "Do you do (the behavior)?"

2. If yes, "Why?" If no, "Why not?"

Surveys may not be appropriate to use in some cultures because of issues of trust and suspicion. Also, as a Peace Corps Volunteer integrated into the community, you may find this technique to be too formal and off-putting to people with whom you typically relate in a relaxed, friendly manner. Community members and counterparts might feel more comfortable using this technique.

- *Converse one-on-one.*

Where appropriate, you can also ask about people's behavior in one-on-one conversations. You can do this through formal interviews or informal conversations with people like neighbors and friends who know you and who feel comfortable talking with you.

With formal interviews, plan the questions ahead of time. If conducting multiple interviews, try to ask the same questions the same way, but you can ask follow-up questions when they might provide useful information. Interviews can be informal, or they can follow structured questionnaires.

When preparing for interviews, be completely honest with the interviewees about your reasons for doing the interview. Organize your questions in a logical way and consider how you are going to process the results when you write the questions. Be alert to any factors that might lead to inaccurate answers; for example, interviewees often answer in a way they assume the interviewer wants to hear, not what they really think. You can also end up with inaccurate responses

by asking questions in a leading way or by reacting positively or negatively to answers. Code your notes and keep recordings confidential. Do not reveal the identities of your sources unless they give permission to do so. Of course, be polite, respectful, and considerate of interviewees' time. Conduct the interviews in quiet locations to avoid distractions.

Though less structured, you can also pick up valuable insights over time in the course of informal conversations. It is crucial to any of your efforts to get to know people, gain their trust, and, through day-to-day interactions, develop an accurate understanding of their beliefs and concerns.

When you and your community partners are conducting the barrier analysis, be alert to another potential target audience: the so-called influencing group. **Members of this group will be the people who influence the attitudes and behavior of the primary group. They might be family members, religious leaders, extension agents, close friends, political party leaders, or individuals in the community that people look up to.** Should you identify an influencing group, you may decide to include them as a target audience.

When working alongside counterparts while they design an effective behavior change strategy, it is important to know the priority group well. Applying PACA tools at the beginning of and throughout your service should prove critical. You should never stop learning about the people in your community—the longer you spend in your community, the more opportunities you will have to gain insights.

Stages of Change

If you and your community counterparts have decided that educating priority group members or influencing group members is the most promising strategy for bringing about behavior change, then together you will need to determine how much the target audience already knows. If people are already aware there is a solid waste problem, there won't be a need to focus on increasing their awareness.

It will be helpful, therefore, to determine the *stage of change* that the target audience is in.

The Stages of Change[46]

The stages of change are:

1. Pre-contemplation—not yet acknowledging that there is a problem behavior that needs to be changed

2. Contemplation—acknowledging that there is a problem but not yet ready or sure of wanting to make a change

3. Preparation/determination—getting ready to change

4. Action/willpower—changing behavior

5. Maintenance—maintaining the behavior change

6. Relapse—returning to older behaviors and abandoning the new changes

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46. Adapted from Continuing and Professional Education, Virginia Tech University; available at http://www.cpe.vt.edu/gttc/presentations/8eStagesofChange.pdf

Stage One: Pre-Contemplation

In the pre-contemplation stage, people are not thinking seriously about changing and are not interested in any kind of help. People in this stage tend to defend their current habit(s) and do not feel their behavior is a problem. They may be defensive in the face of other people's efforts to pressure them to change.

Stage Two: Contemplation

In the contemplation stage, people are more aware of the personal consequences of their present habits, and they spend time thinking about them. Although they are able to consider the possibility of changing, they tend to be ambivalent about it.

In this stage, people are on a teeter-totter, weighing the pros and cons of quitting or modifying their behavior. Although they think about the negative aspects of their current behavior and the positives associated with giving something up (or reducing), they may doubt that the long-term benefits associated with changing will outweigh the short-term costs.

It might take as little as a couple weeks or as long as a lifetime to get through the contemplation stage. (In fact, some people think and think and think about giving up their behaviors, but may never get beyond this stage.) On the plus side, people at this stage are more open to receiving information about their behaviors and more likely to actually use educational interventions.

Stage Three: Preparation/Determination

In the preparation/determination stage, people have made a commitment to make a change. Their motivation for changing is reflected by statements such as: "I've got to do something about this. Something has to change. What can I do?" This is sort of a research phase: People are now taking small steps, trying to learn how to change their behavior.

Stage Four: Action

This is the stage where people believe they have the ability to change their behavior and are actively involved in taking steps to do so. People at this stage tend to be open to receiving help and are also likely to seek support from others. Hopefully, people will then move to…

Stage Five: Maintenance

At this stage, people maintain the new behavior. They remain aware that what they are striving for is worthwhile and meaningful. They are patient with themselves and recognize that it often takes a while to let go of old behaviors and practice new ones until the new ones are second nature. Even though they may think about returning to their previous behaviors, they resist the temptation and stay on track, though they may temporarily relapse.

Stages of Change Model

Pre-contemplation

Contemplation | Preparation

Relapse | Action

Maintenance

Stable behavior
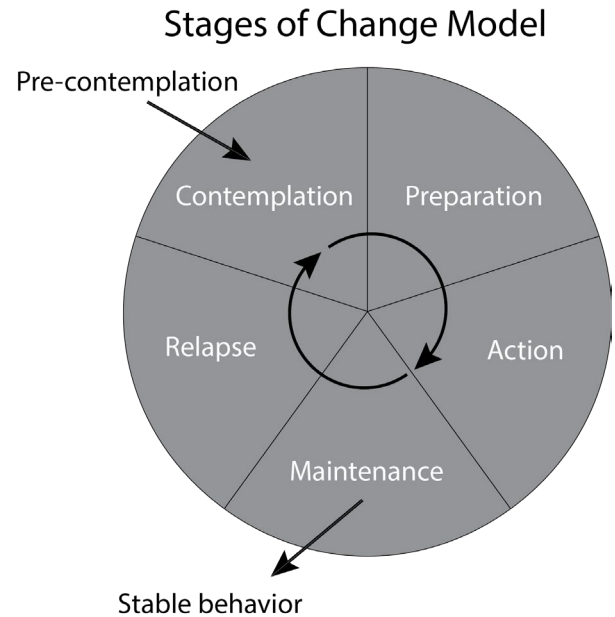
Stage of Change	Characteristics	Techniques
Pre-contemplation (awareness)	Not currently considering change: "Ignorance is bliss"	Begin making target audience aware of benefits of changing behavior and ways to do so Encourage re-evaluation of current behavior
Contemplation	Ambivalent about change: "Sitting on the fence" Identifying and promoting	Continue identifying and promoting new behaviors Encourage evaluation of pros and cons of behavior change
Preparation	Some experience with change and are trying to change: "Testing the waters"	Identify and assist in problem solving re: obstacles Verify that people have skills needed for behavior change Encourage small initial steps
Action	Practicing new behavior	Encourage new behavior and trouble-shoot obstacles
Maintenance	Continued commitment to sustaining new behavior	Provide follow-up support and reinforce new behaviors
Relapse	Resumption of old behaviors	Determine causes for relapse, reassess barriers, and address

To record what is learned, the individuals monitoring the priority group can use the chart below:

Behavior to be changed	
Priority group	
Influencing group	
Knowledge, skills, and attitudes (KSAs) related to the behavior	(What the priority group knows, feels, and practices regarding the behavior)
What does the priority group want?	(Common desires and motivations)
What do they do?	(What most people spend their days doing: Where do they go? Where do they meet?)
Priority group demographics	(Age, income, residence, skill set, language, education level)

Barriers to the desired behavior	(What prevents members of the group from practicing the desired behavior?)
Stage in the change process	(Pre-contemplation, contemplation, preparation/determination, action, maintenance, relapse)

Write a Bridge to Activities

Now that the barriers preventing people from adopting new solid waste management practices have been identified, the next step is to describe activities that aim to break those barriers down. This will be described in the program's **bridge to activities**. The "bridge" is very important, because it summarizes what your counterparts and you will be trying to accomplish. Once that is clear, your counterparts and you will be able to select the activities most likely to realize the program objectives.

A bridge to an activity is usually a simple, straightforward statement, typically beginning with a directional verb (e.g., increase, decrease, improve, reinforce) and proposing to change the perception of the priority group. The reasons people give for their behaviors are often rooted in their perceptions, not in objective facts. Bridges to activities are always about the priority group, so it is not necessary to mention the priority group in the wording. There is always at least one bridge to an activity written for each reason for behavior found to be important.

Here are some examples:

- *The barrier:* People do not know where to recycle plastic.
  - *The bridge to activities:* Increase people's access to a place where they can take recyclable plastic by establishing a collection center.
- *The barrier:* People don't see the connection between open dumps and incidence of mosquito-borne diseases.
  - *The bridge to activities:* Increase people's perception that open dumps can lead to increases in mosquito numbers. Local hospitals or health clinics sometimes carry informative materials or have statistics that can be used to make the issue relatable.
- *The barrier:* People have no place in the town plaza in which to deposit trash.
  - *The bridge to activities:* Provide trash cans in the plaza where people can put waste. Work with the local government to find an option that would work best for your community.
- *The barrier:* People believe that composting is too difficult and causes too many problems with odors, flies, and rodents.
  - *The bridge to activities:* Increase people's perception that composting is easy and, if done properly, does not lead to offensive odors or vermin. Create your own small compost to serve as an example.

Once the bridges to activities have been clearly stated, define what the subsequent activities will attempt to accomplish.

Select Activities to Break Down the Behavior Change Barriers

Now your community counterparts are ready to decide on what those behavior change activities are. Activities should be developed only after goals are determined, and those activities should be selected based on all the information captured in your group's community assessment. There should be a clear connection between the activities selected and the behavior change barriers that have been identified.

Activity descriptions start with an action verb, for instance: "Organize the youth club to prepare an exhibit at the local school describing how to recycle household waste," or "Conduct a workshop at a local farm demonstrating composting techniques." It should be very clear that the activities address the barriers or create incentives recorded in the planning chart.

Continuing with the examples above, you and the community members you're working alongside can do the following:

- *The barrier:* People know of no place where they can take plastic to recycle.
  - *The bridge to activities:* Increase people's access to a place where they can take recyclable plastic by establishing a collection center.
  - *The activities:*
    - Speak to the town governing council about establishing a plastics collection center.
    - Locate a facility nearby that will accept plastic waste.
- *The barrier:* People don't see the connection between open dumps and incidence of mosquito-borne diseases.
  - *The bridge to activities:* Increase people's perception that open dumps can lead to increases in mosquito numbers.
  - *The activities:*
    - Set up an old tire and some plastic containers on the school grounds and fill with water, watch for arrival of mosquito larvae daily, and, when they appear, take students, teachers, town leaders, and members of the farmers' group and the women's co-op to see them (and then empty the water).
- *The barrier:* People have no place in the town plaza in which to deposit trash.
  - *The bridge to activities:* Provide trash cans in the plaza where people can put waste.
  - *The activities:*
    - Work with the kids in the school environmental club to make trash bins out of plastic soda bottles.
    - Arrange with the town and school leaders to inaugurate the bins with a community event that will promote their use among residents.
- *The barrier:* People believe that composting is too difficult and causes too many problems with odors, flies, and rodents.
  - *The bridge to activities:* Increase people's perception that composting is easy and, if done properly, does not lead to offensive odors or vermin
  - *The activities:*
    - Set up a compost pile at the community center and use it to demonstrate to members of the farmers' group and the women's co-op how to compost.
    - Schedule time to visit the households that attempt to compost to provide ongoing advice and encouragement.

Once the activities phase is completed, it should be clear how the activities directly relate to the behavior barriers and how everything in the plan holds together. To ensure this is the case, trace the connections backwards (a chart or table illustrating the plan can help). Does the activity clearly connect to the objective as expressed in the bridge? Will achieving the bridge objective break down the behavior change barrier? If the stated barrier falls, will that motivate and enable the target audience to do what's needed to address the issue? If the target audience acts in accordance with the plan, will that solve the problem?

Before actually implementing the program, the program should again be reviewed by a number of individuals. These individuals include knowledgeable experts, counterparts, Peace Corps staff, people in the community whose judgment and honesty you trust, and the people who will be expected to actually carry out the plan. All of them should say whether they clearly see the connections, if the plan makes sense, if it stands a reasonable chance for success in solving the problem, and if it seems plausible. If they don't see how the plan holds together, it very well may not. In that case, the proposed activities may not break down the relevant barriers, and behavior change may not occur. They should also say whether they see any likely difficulties and obstacles that will present a challenge implementing the plan and, if so, if they can recommend how to confront them. The plan should be adjusted around this feedback.

Implement the Program

Finally, the program can begin! It is worth repeating that the efforts behind this program should be based on a careful assessment of the situation being addressed. You and your partners should not, in other words, begin here and think of a rationale afterwards.

Responsibility Matrix

ACTIVITY	WHO CAN DO IT?			WHO DOES WHAT?	
	WE CAN DO IT OURSELVES	WE CAN DO IT WITH HELP	THE STATE	ASSOCIATION	NGO

PACA tool to plan out who does what when

Activity	Responsible Party	Month											
		1	2	3	4	5	6	7	8	9	10	11	12

Goal 1: Producing local alternatives to single-use plastic bags

Activity	Sub Activity	Person in Charge	Month
Producing traditional (non-plastic) bags	Undertaking community mapping on SWM	Counterpart and PCV	Within first 3 months at site
	Confirming community interest in alternatives to plastic bags	Counterpart and PCV	Month 4
	Speaking with community leaders and potentially interested parties (e.g., local women's groups) on production of non-plastics alternative bags	Counterpart, PCV, and interested members of the community	Month 4
	Undertaking a market survey on the demand for non-plastic alternative bags	Counterpart, PCV, and interested members of the community	Month 5
	Identifying locally available materials for producing non-plastic bags	Counterpart, PCV, and interested members of the community	Months 5–6
	Identifying financial and logistical requirements for producing non-plastic bags	Counterpart, PCV, and interested members of the community	Months 5–7
	Identifying potential producers	Counterpart, PCV, and interested members of the community	Months 5–7
	Organizing bookkeeping, management, and marketing training for producers of non-plastic bags	Counterpart, PCV, and/or interested NGO and producers	Months 7–9
	Opening of local bank accounts and MOUs with suppliers of raw materials and supportive NGOs	Producers and interested NGO(s) (supported by the PCV and counterpart)	Month 9
	Accessing materials, financing, and logistical support to produce non-plastic bags	Producers (supported by the PCV, counterpart, and NGO)	Months 8–10
	Develop and initiate marketing campaign for non-plastic bags	Producers (supported by the PCV, counterpart, and NGO)	Month 9 and onwards
	Production and sale of non-plastic bags	Producers (supported by the PCV, counterpart, and NGO)	Month 10 and onwards

Goal 2: The inhabitants of Santo Domingo will receive and participate in waste collection services in their homes

Activity	Responsible Party	Month											
Community-Wide		1	2	3	4	5	6	7	8	9	10	11	12
Technical Exchange – Trip to Loja, Ecuador	Municipal representatives, PCV	X	X										
House visits to raise awareness about waste management in inhabitants	Municipal representatives, PCV, Social Services		X	X	X	X	X	X					
Creation of informative brochures	Municipal representatives, PCV		X	X									
Radio and TV spots	Municipal representatives, PCV, Social Services		X	X	X	X	X	X	X	X	X	X	X
Mural Painting	Municipal representatives, PCV						X	X					
Clean up campaigns with the community	Municipal representatives, PCV, Social Services		X			X			X				
Announce collection schedule	Municipal representatives, PCV, Social Services					X							
Create and pass out information sheet (collection schedule)	Municipal representatives, PCV, Social Services					X							
School Program													
Meeting with school directors	Municipal representatives, PCV				X								
Training & Follow up with teachers	Municipal representatives, PCV				X	X							
Environmental education activities with regard to waste	Municipal representatives, PCV					X	X	X	X	X	x	X	X
Drawing contest with waste theme	Municipal representatives, PCV									X			

Checklist for Implementing a Solid Waste Management System

(Not all the categories will be applicable to every type of waste management system)

Logistics

- Is there a set collection schedule?
- Is there an efficient collection route?
- Is there a trained collection staff?
- Is there a secure storage area (for implements, waste, recyclable material, compost, etc.)?
- Is there a defined final disposal site?

Community Participation

- Is there community participation in the management of the project?
- Is there a set schedule to call community meetings?
- Have community members been appropriately trained to participate in the waste program (take out their trash, separate their waste, not throw waste in the streets, etc.)?
- Are community members aware of the benefits of participating?
- Do community members know the waste collection schedule?

Financial Management

- Is there a clear responsible party or parties for the waste system?
- Have all the expenses been accounted for:
  - Trainings (workers, residents, etc.)
  - Educational materials
  - Workers' salaries
  - Transportation
  - Storage costs (waste, recyclable material, compost, etc.)
  - Cleaning implements (brooms, dustpans, etc.)
  - Uniforms/safety equipment
  - Maintenance costs
  - Incidentals (paper, markers, and snacks for meetings)

Monitor and Evaluate the Program

It is important that the program is continually monitored and adjusted based on findings.

- As a Volunteer, you undertake the activity in the context of your sector's LPF. You are expected to use the PACA toolkit to undertake the community assessment using the Household Survey tool (see page 61). Following the completion of the community assessment, you will share the key findings with the local counterparts and community members to identify and agree on the recommendations. Prior to initiating any activity, the next step is to consult with your program manager (PM) or program and training specialist (PTS) to obtain feedback and finalize the recommendations. You will work with the local counterparts, community members, and relevant Peace Corps staff to identify the activities based on the recommendations and agree on implementation strategy.

- After discussing the proposed activity and receiving approval to proceed, you will work alongside your counterparts, interested community members, relevant Peace Corps staff, and others to define the outcomes (what is it that members of the community want to see happen) and the indicators, which will help tell whether the activities are on track to accomplish the desired outcomes.

- Since a key part of Volunteer service is transferring technical knowledge and skills, it is essential that you work closely with community members at every stage of this process. **Sustainability of the activities (i.e., the activity continuing after your departure) is often determined by community members who own and value the activity, and who see its continuation as being in their material interest.**

How to Evaluate the Program

There are often a large variety of factors that determine the success or failure of an activity. Some of these factors you and your counterparts may have some control over (e.g., the quality of the community assessment, the development of survey tools). However, some of the key factors that determine the final outcome are dependent on sustained behavior change (e.g., commitment of community members, response of the community at large to the project), and these factors may be beyond the influence of the individuals you are working with. We will be using pre- and post-assessment to measure any changes in behaviors and practices of the community in solid waste management and compare results. You will use the Household Survey tool between 9–12 months after the completion of the initial assessment to measure changes in behavior and practices related to solid waste management in the community (compared with the findings of the initial assessment).

Record Your Experience

Regardless of whether you feel the activities you were involved in have succeeded or failed in advancing community goals, it is important to accurately record what happened so that others can learn from your experience. So often, Peace Corps Volunteers learn unique insights that can prove useful to other Volunteers, present and future, and to other development workers; but often that information gets lost. In addition to entering your direct activity results (outputs and outcomes), you will share lessons learned, promising practices, and successes through your responses to activity questions and stories in Volunteer Reporting and Grants (VRG). You may also be given opportunities to share your insights with other Peace Corps Volunteers, perhaps in pre-service or in-service training events, or in your final documentation when you complete your service.

To be useful to others who are interested in replicating or continuing your activities, you must go beyond simply reporting that you contributed to the start of a recycling campaign or worked with partners to teach 12 households how to compost. **Instead, it will be vital to describe the context in which you participated in these activities.** In recording your experience, therefore, be sure to describe:

- The issues you and your community confronted and the evidence that these issues were present and worth addressing

- The solutions that your community partners tried to encourage

- The barriers to these solutions that were identified and the evidence for those conclusions

- How you and your partners confronted these barriers

- The target audiences, both priority group and influencing groups

- The strategies employed and the information presented

- How the chosen strategies were implemented, how the information was communicated, and why these approaches were chosen

- The results

- How you and your community partners modified the program to address issues revealed as the project proceeded

- Challenges encountered and measures attempted to confront them

- Lessons learned and recommendations for others attempting similar efforts

Chapter 3: Some SWM Activities for Communities, Households, Youth Clubs, Schools

Peace Corps Volunteers have worked with communities on a range of activities to improve solid waste management. Volunteers have worked with individual households, schools, youth clubs, organizations (such as women's groups and local governments), and entire communities. This chapter describes some Peace Corps Volunteers' activities, with the idea that this may be instructive in developing activities that will contribute toward achieving your community's goals.

Once again, however, it is essential that a community assessment precedes any project-based activities. To maximize the effectiveness of your always-limited time and resources, activities should address the behavior change barriers that have been identified.

Building Awareness in the Community

Increasing community awareness is appropriate when, beside the community members you are working with, there has been apparently little or no consideration of improving solid waste practices, how to employ different practices, and why new practices might be in people's best interests. But do not assume that members of your community are unaware of different practices, or that increasing awareness is a necessary first step. It may very well be that the community is already aware and is not implementing other waste management practices for various reasons.

Awareness-Building Methods

- *Community workshops.* Volunteers and community partners can begin resolving solid waste issues at the community level by conducting workshops for selected groups, such as women's organizations or farmer co-ops, or for the general public. Such presentations can be efficient ways of reaching a relatively large number of people. By sharing their thoughts and questions, people can reinforce each other's enthusiasm, and initiatives can build momentum. Workshops are not, however, typically sufficient by themselves in affecting people's behavior. Rather, they are most useful in generating interest in the topic at hand. Volunteers and community members who employ group workshops, therefore, should plan to follow up with the participants individually.

  A community barrier analysis should reveal the specific individuals who warrant special attention and the information they should receive. Knowing this, it may be necessary to find an appropriate community entity to sponsor the workshop or event—preferably an entity that is interested in the topic and able to attract the target audience the event is meant to reach.

- *Clean-up campaigns.* Community clean-ups are particularly popular with youth groups. They are comparatively simple in concept and easy to do, and the results are obvious and frequently dramatic, so the participants feel they have accomplished something. Such campaigns can be effective educational experiences for the entire community; everyone can see how much trash has been collected and how different an area looks when the trash is removed. As a consequence, communities can feel motivated to tackle solid waste issues more systematically.

  In organizing clean-up efforts, you and your community partners need to first identify potential participants, most likely youth members of clubs and camps, according to their interest and capacity for implementing the clean-up. Community members should pinpoint any entities that

could sponsor the campaigns (e.g., school administrations and teachers) and work with them to organize, promote, and facilitate the campaigns.

During a clean-up campaign, organizers and participants need to pay close attention to safety issues. Participants should be provided with latex gloves, and they should keep away from broken glass, jagged metal, and piles of organic waste that may be harboring rodents and stray dogs. Also, clean-up organizers should identify a sanitary and environmentally sound place to dump or recycle the trash and a means of getting the trash to where it is supposed to go. Otherwise, the collected trash will just remain bagged in limbo.

Some examples of communication and messaging tools that are often used to raise public awareness in such campaigns include:

- Informational brochures
- Household visits
- Posters
- Murals painted by students or members of clubs and camps
- Radio and TV spots

Working with Individual Households to Implement Individual Solid Waste Management Practices

Households can do much to handle their solid waste, even in the absence of coordinated community solid waste programs, like trash pick up and recycling. For example:

- Composting organic waste, like food scraps

- Feeding organic waste to chickens and livestock

- Using alternatives to plastic bags and other non-biodegradable items

- Reusing and retooling plastic soda bottles instead of throwing them away

- Burying non-biodegradable waste, such as plastic, metal, and hazardous waste containers, instead of burning them or dumping them in the open; ideally, they will do so using sanitary mini-landfills

- Cleaning up litter around the home, especially open containers where mosquitoes can breed

Some important steps to keep in mind:

- To begin with, it is essential that you and community members involved in the project establish good relationships and trust with the household members.

- Learn how people are presently managing their waste, and identify how they might do so in more sanitary and environmentally friendly ways. Use observation and interviews, either formal or informal, to learn this information. Use the Solid Waste Observations checklist and the Household Solid Waste Survey form (starting on page 61) to record your findings.

- Identify who, specifically, in the households is responsible for handling different types of waste. Who takes care of the household garden and would prepare and use compost? Who burns the trash? Who uses plastic bags to go to the market? Who decides how to manage waste? (This may not be the same person who actually does the work!)

- Conduct a household barrier analysis. What is preventing the household members from adopting improved ways to manage solid waste?

- Often, household members with whom you and your community partners need to work aren't aware of why changing their solid waste practices is in their best interests, and they might not know how to best manage their waste. For example, household members might not know how to compost or what to do with old batteries and pesticide containers. So, project participants might then try to educate and demonstrate best practices. Or members of the household may not have access to the materials they need (e.g., ash and lime for composting); in such a case, someone on the project may want to find required materials.

- Once improved waste-management practices have been demonstrated and the households appear ready to adopt them, members of the project should plan to visit the households repeatedly to troubleshoot and provide additional encouragement, until the households have demonstrated the mastery, commitment, and confidence to keep going without continued oversight.

Working with Schools to Improve Their Solid Waste Management Practices and to Educate Students on the Subject

Schools generate trash, like food scraps and plastic soda bottles. Interested schools can manage their waste properly. Solid waste management practices can be applied in the classroom and in after-school clubs.

Educating students can, in turn, educate their communities. Students can sponsor events, such as Earth Day celebrations, feature solid waste management practices like composting and recycling in school science fairs, and conduct litter clean-ups. Some student groups have organized themselves to pick up recyclables from households, sell them to recycling facilities, and use the funds for club activities. Students can also relate what they have learned to their families and neighbors. School programs involving composting and recycling can serve as examples for all.

Some important steps to keep in mind when approaching schools about waste-management practices:

- As with any project, the essential first step is to establish trust and good relations, in this case with school administrations and teachers. Their buy-in is essential if improved school solid waste management and education efforts will be sustainable.

- Once a healthy working relationship is established between the school and members of the project, the next step is to establish a working group at the school, consisting perhaps of administrators, teachers, and/or students. The working group, with Volunteer and counterpart guidance and encouragement, can take a look at the current SWM practices at the school and come up with recommendations for improvement. The group can also identify the barriers that need to be overcome for the recommendations to become reality and how to break those barriers down. The *PACA Field Guide* has a variety of tools that you can use to identify problems, solutions, target audiences, barriers, and action plans that define who does what and when.

- The school would then carry out its program. Ideally, buy-in is obtained so that the program is sustained going forward.

- To incorporate solid waste management lessons and activities in the classroom, locate appropriate classes, such as science or health classes, where this material can be taught, and enlist teacher support for the effort (if you have access to other Peace Corps resources, consult Peace

Corps Manual M0044, *Environmental Education in Schools* for tips on how to infuse environmental subject matter into school curricula). For enjoyable and effective club activities that teach about solid waste, consult Peace Corps Manual M0126, *Environmental Activities for Youth Clubs and Camps*, which lists a variety of SWM activities that can be undertaken with in-school and out-of-school youth.[47]

- A sustainable project will continue to thrive after the departure of the Volunteer. It is important that the project design include leadership from counterparts and other community members. This may entail working with teachers or other respected community members to ensure that they are the public "face" of the activity and that their skill sets are continually strengthened as they take on increasing levels of responsibility.

Instructing Youth and Others How to Make Usable and Sometimes Saleable Items from Recycled Waste

People can make many items from recycled waste, especially plastic waste: planters, purses and handbags, baskets, brooms, jump ropes, soccer goal nets, and Christmas trees. Even benches and small buildings using eco bricks (plastic soda bottles stuffed with paper, plastic, or soil) can be made using discarded plastic. Volunteers and program participants in many countries have discovered or created a wide range of such items, and have taught youth, women's groups, and others to make and sometimes sell such things. This has reduced litter and waste that would have otherwise been disposed of, provided an enjoyable activity for youth clubs, and even provided some people with additional income.

This type of activity requires participants to collect the waste with which they will make objects. (In the case of some items, notably eco bricks, a lot of waste will need to be collected.) If saleable items have been made, participants and activity organizers can market and distribute the items.

In some cases, Volunteers have found item ideas on the Internet or arrived at their sites with previously acquired knowledge. In other cases, they worked alongside community members to adapt skills found in the community (e.g., basket making) to employ recycled waste instead of traditional materials. For examples of the variety of items that communities have made with recycled materials, see page 83.

Collaborating with Community Leaders and Appropriate Community Organizations to Establish Community Waste Policies and/or Systems that Support Solid Waste Management in the Community

Volunteers and community members, working with community leaders and organizations, have contributed to community efforts to carry out such practices as setting out trash cans in public places; organizing house-to-house trash pick up programs; establishing solid waste collection centers where people can bring recyclables and food scraps and collect compost; establishing and enforcing local ordinances discouraging littering; sponsoring awareness-raising community events such as Earth Day festivals; and encouraging teachers to incorporate SWM into their school programs.

Key to successfully bringing about change in community solid waste management policies and systems is establishing trust and cordial relations with the leaders and organizations that will be developing and implementing them. All involved—counterparts, involved community members, local leaders, organizations, and Volunteers—will need to come to a consensus about which solid waste management issues to address and how. Local leaders and organizations will know about community residents and how to motivate and organize them, so their advice, participation, and cooperation will be vital. Once strategies

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47. http://files.peacecorps.gov/documents/PC_Environmental_Activities_508_mNd3UVx.pdf

are agreed on, a Volunteer's role in supporting the efforts to realize the strategies will vary, depending on what is needed. For example, a Volunteer might supply technical or small grant support, assist in organizing meetings, bring in technical experts, or simply provide encouragement and motivation.

The following guidelines for establishing a community solid waste management system are adapted from *Solid Waste Management: A Facilitator´s Manual*, by former Peru Peace Corps Volunteer Coordinator Jocelyn Danielle Hospital (in bibliography).[48]

Identify the Type and Level of Service Desired

The type of service desired can cover any sector that produces waste or can involve a combination of several sectors. Be sure to prioritize services based on waste generation and feasibility. Options can include trash pick up from residences, commercial establishments, institutions (such as health centers and schools), and public places (such as parks and plazas).

Level of Service: Coverage of Collection

When starting a waste management collection system, start small. Use this opportunity as a test run to make observations about the process, noting challenges and best practices. This can also serve as a model to educate other community members about the project. Organizers can also use a series of small activities to gauge the interest and dedication of project participants before embarking on a large-scale project. Once a system that works well has been established, it will be easier to expand into other neighborhoods/communities/etc.

Suggestion
If your community begins a trash collection program, it's best if it starts small. Community participants can learn what works best, and which programs and activities can be expanded or should be discontinued.

Level of Service: Frequency of Collection

When starting a waste collection system, the idea is to find a balance between convenience for community members and operation costs. Obviously, the higher the frequency of waste collection, the easier it is for community members to take out all the waste produced for collection. On the other hand, such a high frequency of waste collection would only make sense in a community producing enormous quantities of waste. Generally, in small, rural communities, the recommended frequency of collection is once a week (to avoid flies, pests, and bad odors while also keeping operation costs to a minimum). *Use the information gathered during the waste diagnostic to determine an optimal waste collection schedule.*

Organizational Options

There are various options available for the organization of an SWM program. The first choice is to set up a collection and disposal system with the municipality. This requires that the municipality assign a budget to the program and provide the personnel to both manage and run the project. This is not an easy task. This method normally requires months of preparation and a municipality with the interest and funds to carry out such a program. If the local municipality (i.e., village government) does not show interest in the issue of solid waste management, but the community is supportive and well organized, project organizers can lobby the municipality and present the program proposal at the annual participatory budget meeting. What's required is an idea popular in the community along with the support of a well-

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48. https://pclive.peacecorps.gov/pclive/index.php/environment/item/1353-solid-waste-management-a-facilitators-manual-2008-peru

organized group of people to prepare the proposal. However, keep in mind that this can be a very politi-cal process, which may not always appear rational or fair. This annual meeting may be the only formal opportunity to solicit funds from the municipality. Small funds can be solicited in most municipalities on other occasions, but this funding is not guaranteed even if promised.

Another option is to work with local/regional businesses that are willing to fund the operational costs of a small SWM project. In the case of a middle-income country such as Peru, many large agribusinesses and tourism operations have the money and interest to invest in a project that will improve the stand-ard of living of its workers and the image of the company (or companies). In recent years there has been an increased interest in social responsibility campaigns in that country, and it's a great opportunity for communities and Volunteers to take advantage of. Also, local businesses are great sources for donations (old barrels to be used as trash cans, recyclable material to sell, fruit to feed kids that participated in a clean-up campaign, etc.) and a medium to announce events and/or convey a message (posters in the lunchroom, announcements at meetings, etc.).

In the case of recycling, a group of project participants can work directly with informal recyclers to set up a more formal system of collection, house-by-house. This is a good option because it is in the best interest of community members (especially in very poor areas) to sell their recyclable materials to the recyclers. Also, by working with the recyclers, there is no need to set up a system from scratch. This sys-tem works especially well in establishments like schools and clubs as a way to raise money.

Evaluation of the Alternatives

Storage and Collection

There are four alternatives for storage and collection of solid waste, each with advantages and disadvantages:

Method	Advantages	Disadvantages
Public Storage and Communal Collection	• Quick collection time • No set schedule required	• Waste may not be placed in con-tainers, attracting flies and animals, and can produce strong odors • Neighbors do not want containers near their houses • Misuse of containers leads to high maintenance costs
Storage and Collection by Streets or Sectors	• Relatively quick collection time	• Requires the collaboration of neigh-bors to take out their waste on time • Neighbors do not want the collection point near their houses • Requires neighbors to leave their house and walk to the collection point
Storage and Collection in Front of Houses	• Easy for households • Relatively quick collection time	• Requires a set collection schedule that is followed • Waste left out too long attracts flies and animals, and can produce strong odors
Storage and Collection House-by-House	• Easy for households • Few problems with flies, ani-mals, or odors	• Slow collection process • Requires a relatively set schedule

Transportation

When determining which method of transporting collected solid waste is most appropriate for the community, organizers should factor in maintenance costs, road conditions, and availability. It is better to opt for the simplest method feasible for the level of solid waste produced and the size and road conditions of the community.

Options in Peru, ranked according to cost and labor, include:

High Cost/Low Labor

↑

Dump truck

Tractor with trailer

Motorbike with cart

Animal-powered cart

Bicycle cart

Human-powered cart

↓

Low Cost/High Labor
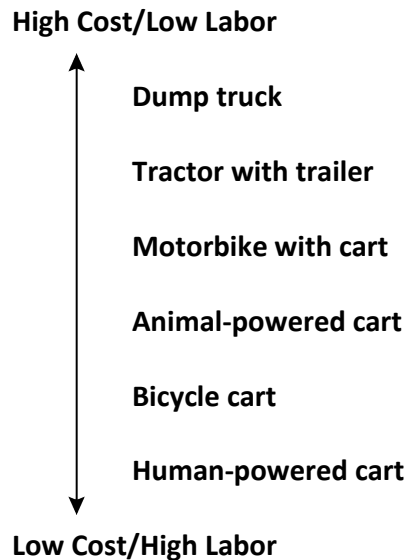
(From Non-Governmental Refuse Collection in Low-Income Urban Areas, Roger Pfammatter & Roland Schertenleib, pg. 9.)

Final Disposal

A sanitary landfill is the systematic burial of solid waste to diminish adverse health and environmental effects. As a temporary resident of the community, it is not the role of the Volunteer to initiate or lead efforts to construct such a landfill. If the community identifies construction of a landfill as the best solution to their solid waste management issues, then the Volunteer may use appreciative inquiry, asset mapping, and other PACA tools to work with community members needing access to the requisite technical expertise, human resources, and local authorities. A Volunteer should always bear in mind that one of the key principles of Peace Corps service is **"Do No Harm."** Construction of any facility designed for the permanent storage of wastes may entail significant long-term environmental or health risks and requires: 1) significant community support, 2) the formal approval of the local governance structures (to ensure that there is adequate maintenance of the proposed site), 3) an Environmental Impact Assessment, and 4) qualified technicians for pre-site inspection, development of the landfill, and post-opening monitoring (http://jocelynhospital.blogspot.com/).

Reuse and Recycling Alternatives

Ideally, a community waste management system will incorporate recycling. In some communities, informal recycling networks exist where people collect, deliver, and receive payment for recyclables on their own. After learning how these informal systems operate, work with community members to identify places where community solid waste management systems can also deliver recyclables, a key requirement if a recycling program is going to succeed.

The lifecycle of recyclables:

1. Segregation-at-the-source recycling plant is identified
2. Selective collection
3. Collection center
4. Sale of material to middlemen
5. Transport to the recycling plant
6. Consumption

The main points to evaluate when considering a recycling program are:

- Financial aspects (Is a recycling program economically feasible? *See the market study below.*)

- Organizational aspects (Who will be in charge of the program? Where are the targeted sources? How long will the program operate?)

- Educational aspects (How will your community encourage participation?)

- Logistical aspects (Is there a secure area to store the material? Who will buy the recyclable material? How will it be transported?)

Establishing a Community Solid Waste Collection Center

Community collection centers are where community residents can take their waste to be disposed of or, ideally, recycled. Some centers also educate, demonstrating to people how to handle various types of solid waste, e.g., organic waste and toxic waste. Some centers collect organic waste and make compost that community residents can take home.

Functioning collection centers require an appropriate piece of land, ideally somewhere on the outskirts of the community where people will not be constantly exposed to piles of waste and foul odors. People need to be found to work at the centers. Community members need to know the centers exist, have the means to transport their waste to the center, and know the types of waste the collection centers will collect. And, crucially, the collected waste has to be transported to a recycling center or some other appropriate destination.

As with community recycling programs, main points to evaluate when considering establishing a collection center are:

- Financial aspects (Is a collection center program economically feasible? Where will the money come for staff salaries, equipment, materials, and land?)

- Organizational aspects (Who will be in charge of the program? Where will staff come from and how will they be trained and paid? What different components will the collection center include, e.g., a sanitary landfill, containers for recyclables, a community compost pile, community educational programs? How long will the program operate?)

- Educational aspects (How will the community encourage proper public use of the collection center?)

- Logistical aspects (Where will the collection center be situated? Can different types of waste be stored there safely with acceptable impact (noise, odors, blowing trash, etc.) on adjacent neighborhoods? What will happen with different types of waste (organic, recyclables, hazardous, etc.)? How will community waste be transported to the center? How will recyclables and other waste categories be transported from the center to wherever they are supposed to go?)

As can be seen, many different moving parts need to be in place for collection centers to function properly. Consequently, what is required of Volunteers working alongside community members to help establish and manage them will vary. Among other things, Volunteers and community partners can try to spark community leader interest, help organize and facilitate meetings, assist in planning, arrange for technical support, assist in locating sources of funding, help troubleshoot issues that may arise, and provide ongoing encouragement and motivation. Community leaders and participants need to commit to operating the collection centers after the Volunteers depart; subsequent Volunteers might be placed in the communities to follow-up and contribute toward keeping the new centers operating.

Chapter 4: Survey Instruments, Tools, and Methodologies for Effective SWM Interventions

Once you have conducted your community assessment (using your PACA toolkit) and your findings indicate that 1) management of solid waste is a concern expressed by numerous community members and 2) there is an interest in the community in doing something about it, what are the next steps?

You have your community assessment, but how do you, your counterpart, and your involved community members convince those community members that did not participate in the assessment that SWM is indeed an issue that has significant community support? The first step is to provide evidence. Ideally, there would have been previous surveys undertaken by various stakeholders (municipal/village authorities, civil society organizations, etc.) that would provide such evidence. In the absence of such data, you will need to work with interested community members to collect this information by conducting stakeholder surveys. Given the complexity of sociocultural issues involved in requesting information, combined with your limited knowledge of the community and your evolving language skills, the actual survey should be conducted by long-standing and respected members of the community. Your role in this process can be to assist in developing the specific survey instruments and tools that these community members will use.

Suggestion
Community members should conduct a survey to show the level of interest within the community for addressing waste management issues, and whether current services could be improved.

As with any survey instrument, a representative sample size will need to participate. If it is very large number (say 50% of community households), does your group have the resources (human, transport, material) to conduct such a survey? If it is very small (say 5% of community households), would the survey be representative of the views of the community? Your community colleagues may wish to try something in between (maybe 20% of community households). As an example of how to ascertain the views of community members, a sample household survey is included below.

In many areas of the world, solid waste management is one of the key responsibilities of local government. If there are currently no municipal waste management services available or the community finds these services inadequate, community leaders may wish to conduct a survey to identify current bottlenecks or barriers to improved service. Such a survey should identify what is being done at the *institutional* (as opposed to household) level. This survey need not be extensive, and will serve to indicate who (government, private sector, civil society) is doing what in the areas of SWM.

If there is currently no municipal service for SWM and the community would like to establish such a service, then armed with the aforementioned surveys (indicating community support and the absence of adequate SWM services), the next step would be to embark on an exercise to determine the costs associated with establishing an SWM system. This entails identifying all the inputs required to design and implement an effective system, and estimating the costs and expected lifespan. (The examples cited below are also taken from exercises conducted by PCV Jocelyn Hospital in Peru.[49])

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49. http://jocelynhospital.blogspot.com/

Household Survey

HOME SOLID WASTE SURVEY

Name: ....

Address:..District:......................................

Survey performed by: ………………………………………Date:……………………………

GENERAL DATA:
- Age:
    - 10 - 14 years ( ) 15 - 19 years ( )
    - 20 - 24 ( ) 25 - 29 ( )
    - 30 - 39 ( ) 40 - 49 ( )
    - 50 - 59 ( ) 60 and over ( )

- Sex: Female ( ) Male ( )

- Level of Education Achieved:
    - No schooling ( ) Some primary school ( )
    - Primary school complete ( ) Some secondary school ( )
    - Secondary school complete ( ) Technical school ( )
    - College or University ( )

- Civil Status:
    - Single ( ) Married ( )
    - Separated ( ) Widow/Widower ( )

- Occupation: …………………………………………………………………………………….

- How many people live in your home? .... Males: .... Females: ....

- What organizations are active in your community?

- Roughly how much does your family earn per month? ………………………………..

GENERATION OF SOLID WASTE
- What types of trash do you throw away?
    - Food scraps ( ) Paper ( ) Plastic bottles ( ) Metal cans ( )
    - Other ( ) Describe ....

- In what kind of trash container do you deposit your trash?
    - Plastic Bag ( ) Sack ( ) Box ( ) Trash can ( )
    - Other ( ) Describe ....

- How many days does it typically take to fill up your trash container?
    - 1 day ( ) 2 days ( ) 3 days ( ) 4 days ( ) More than 4 days ( )

- Do you clean your trash container? Yes ( ) No ( ) How often?..................

- Where do you keep your trash container?

  - Kitchen ( ) Yard ( ) Other ( ) Describe ....

- Do you think there is a better place to put the trash container?

  - Yes ( ) Where?... Why? ....
  - No ( )

- Who in your family is mostly in charge of disposing of trash?

  - Me ( ) Father ( ) Mother ( ) Son ( ) Daughter ( ) Older Brother ( )
  - Older Sister ( ) Younger Brother ( ) Younger Sister ( ) Whoever ( )

- Is the trash container covered?

  - Yes ( ) No ( ) Sometimes ( )

- How often is trash collected from your home?

  - Every day ( ) Every 2-3 days ( ) Weekly ( ) Rarely ( ) Never ( )

- Who collects the trash from your home?

  - The community ( ) Small business ( ) Name ....
  - Unknown ( ) Other ( ) Describe …………………………………………………..
  - Trash not collected ( )

- Does trash accumulate in your home that is not deposited in a trash container

  - Yes ( )
  - What is done with this trash?
    - Burned ( ) Buried ( ) Deposited in the street ( ) Deposited in the stream ( )
    - Taken to a dump/landfill ( )
    - Other ( ) Describe……………………………………………………………………......

- Do you think there are better ways to handle trash?

  - Yes ( ) What would they be? ....
  - No ( )

- Is there a dump/landfill near your house that you can use?

  - Yes ( )
    - Is it convenient? Yes ( ) No ( )
    - Why or why not…………………………………………………………………
  - No ( )

- What diseases can be spread by accumulating trash?
  ………
  ……………………………………………………………………………

- Why do you think litter exists in your neighborhood?
  ………
  ……………………………………………………………………………

- When during the day do you wash your hands? ....

- Have you participated in any neighborhood clean-up effort?
  - Yes ( ) How long ago?............................. Who organized it?...................................
  - No ( )

TRASH REUSE AND RECYCLING
- What do you do with food scraps?
  - Throw them in the trash ( ) Throw them outside the home ( )
  - Reuse: Yes ( )
    - Composting? ( ) Feeding animals? ( )
    - Other? ( ) Describe …………………………………………………………………………….
  - No ( )

- What do you do with empty glass bottles?
  - Throw in the trash ( ) Recycle ( ) Sell ( )
  - Reuse ( ) Describe …………………………………………………………………..
  - Other ( ) Describe …………………………………………………………………..

- What do you do with empty plastic bottles?
  - Throw in the trash ( ) Recycle ( ) Sell ( )
  - Reuse ( ) Describe ………………………………………………………………….
  - Make new items ( ) Describe …………………………………………………………….
  - Other ( ) Describe ………………………………………………………………….

- What do you do with used plastic bags?
  - Throw in the trash ( ) Burn ( ) Use for garbage ( )
  - Other ( ) Describe …………………………………………………………………..

- What do you do with metal cans?
  - Throw in the trash ( ) Recycle ( ) Sell ( )
  - Use for other purposes ( ) Describe ……………………………………………………………
  - Other ( ) Describe …………………………………………………………………..

- What do you do with paper (including cardboard and newspaper)?
  - Throw in the trash ( ) Recycle ( ) Burn ( )
  - Use for other purposes ( ) Describe …………………………………………………………………

- Are you satisfied with the trash collection service in your neighborhood?
  - Yes ( ) No ( ) Why?...

- If your home doesn't have regular trash collection, would you be interested in obtaining it?
  - Yes ( ) No ( ) Why?...
  - If yes, how often would you prefer trash to be collected?
    - Every day ( ) Every two days ( ) Once a week ( ) Every other week ( )

- Would you be willing to pay for a collection service provided by a micro-enterprise?
  - Yes ( ) How much? :...........................
  - No ( ) Why?...

NOTES AND OBSERVATIONS

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....

....

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Municipal Survey (in Spanish)[50]

Formato de Diagnóstico del Servicio de Limpieza Pública

FASE 1: DIAGNOSTICO

Distrito: _____ Localidad: _____

Provincia: _____ Departamento: _____

Alcalde: Sr(a). _____

Teléfono: _____

Fax: _____

E-mail: _____

Nombre del entrevistado: _____

Cargo: _____

E-mail: _____

1. DATOS GENERALES

1.1. Tipo de Administración:

Administración directa ( )   Empresa Municipal ( )   Empresa privada ( )   Empresa mixta ( )

1.2. Dirección: ....

1.3. Responsable del Área de Limpieza Pública: .... Profesión: ....

1.4. Organismos de control y supervisión: ....

1.5. Presupuesto ejecutado del año anterior en nuevos soles: (pedir documentación):..............................

2. DATOS DISTRITALES

2.1. Características Demográficas:

2.1.1. Población: ....

2.1.2. Tasa de crecimiento: ....

2.2. Características geográficas:

2.2.1. Superficie: km2

2.2.2. Tipo de Calles

---

50. Source: Diagnostico de los Residuos Solidos en el Distrito de El Carmen y Centro Poblado San Jose, pp. 37–40.

TIPO	%
Pavimentadas	
Sin pavimentar	
Inaccesibles	
Total	100

2.2.3. Distribución

Características	Población (%)	Frecuencia de servicio de recolección
URBANA		
• Comercial		
• Residencial		
RURAL		

3. EQUIPAMIENTO

3.1. Vehículo

UNIDADES	CANT.	MARCA	CAPAC.	AÑO	CONDICION *			
					OP.	REG.	F.S.	ALQ.
Compactador								
Volquete								
Baranda								
Camioneta								
Cargador frontal								
Auto								
Otros								

(*) OP. (Operativa) Reg.(Regular) F.S.(Fuera de Servicio) ALQ.(Alquilado)

3.2. Parqueo Automotor

Propio (   )   Área (   )m2   Alquilado (   )   Costo (   )

3.3. Servicio de Mantenimiento

Frecuencia:
- Semanal   (   )
- Mensual   (   )
- Bimensual(   )
- Trimestral (   )
- Semestral (   )
- Ocasional (   )
- Por fallas (   )

Talleres: *Costos:*
- Propio   (   )   - ....
- Terceros   (   )

3.4. Herramientas

DESCRIPCION	CANT.	DURACION	MARCA	AREA DE USO
Escobas				
Lampas				
Coches				
Cilindros				
Recogedores				
Carretillas				
Zapas				
Rastrillos				
Otros				

4. GENERACIÓN DE RESIDUOS SÓLIDOS

Origen	Generación (Ton/día) ó (m³/día)	Observaciones
Domiciliario		
Mercados		
Hospitales y centros de salud		
Maleza		
Desmonte		
Otros (especifique):		
Total (Ton/día ó M3/día)		

5. UBICACIÓN DE PUNTOS CRÍTICOS NDE ACUMULACIÓN DE RESIDUOS SÓLIDOS

Ubicación	Área o volumen estimado de residuo que se almacena (Ton/día ó m³/día)	Observaciones

6. RECOLECCIÓN

6.1. Descripción del sistema:

....
....
....
....

6.2. Personal

TURNOS	CANTIDAD DE PERSONAL	HORARIO
MAÑANA		
TARDE		
NOCHE		

6.3. Unidades recolectoras

Número o código de identifica-cion del camión o unidad recolectora	Marca	Tipo (baranda, compacta-dor, triciclo, etc)	Año de fabri-cación	Capaci-dad por viaje (Ton ó m^3)	Número de viajes por turno	Número de viajes por día	Cantidad total de residuo recolectado por día (Ton ó m^3/día)

7. COBERTURA

Nombre de las Zonas Atendidas	Población	Frecuencia promedio de recolección (diaria, interdiaria, etc.)	Volumen de residuo que se genera en la zona (Ton/día o m^3/día)

Servicios Especiales:

SERVICIOS	N° ESTABLECI-MIENTOS	FRECUENCIA	VEHICULO	CAPACIDAD
Mercados				
Hospitales				
Industrias				
Otros				

8. DISPOSICIÓN FINAL

8.1. Nombre del sitio de disposición final: _____

8.2. Ubicación de la zona de disposición final: _____

8.3. Cantidad de residuo que se dispone (ton/día o m^3/día): _____

8.4. Distancia a la disposición final: _____ Km.

8.5. Tratamiento del residuo sólido:

Enterramiento:	Si / No
Quema:	Si / No
Reciclaje:	Si / No
Ninguno:	Si / No
Otro (especifique):	_____

9. ADMINISTRACIÓN Y FINANCIAMIENTO DEL SERVICIO DE LIMPIEZA PÚBLICA

9.1. Personal asignado directamente al área de Limpieza Pública

Descripción de la labor	Número de trabajadores	Sueldo a la fecha
Jefe / Encargado		
Personal administrativo		
Capataz		
Choferes		
Ayudantes de camión o unidad recolectora.		
Barrenderos		
Otros (especifique		

9.2. Arbitrios _____

Sistema usado de cobranza:

Directo: ( )   Empresa privada: ( )

Otros: ( ) Especificar: ……………………………….............
_____

Frecuencia de cobranza y monto:

Mensual: ( )   Bimensual: ( ) Trimestral: ( ) Semestral: ( )

Otros: ( ) Especificar: ……………………………….............

Ingreso anual o mensual por concepto de limpieza pública: S/. ………….. /mes o año
(especifique si es anual o mensual)

Egreso anual o mensual por concepto de limpieza pública: S/. ………….. /mes o año
(especifique si es anual o mensual)

Número de familias o predios atendidos con facturación: _____

Número de familias o predios que pagan puntualmente: _____

Tarifa: (especifique si es mensual o anual)
      Domiciliaria: S/.   /mes o año
      Comercial: S/.   /mes o año
      Industrial: S/.   /mes o año
      Institucional: S/.   /mes o año
      Otros (especifique categoría y monto): _____
      _____

10. PARTICIPACION VECINAL

TIPO DE ORGANIZACION	CANTIDAD	Existe Dirigencia
CLUBES DE MADRES		
VASO DE LECHE		
COMUNIDADES		
CENTROS POBLADOS RURALES		
OTROS		

11. PRIORIZACIÓN DE LOS PROBLEMAS

A continuación priorice los problemas indicando la escala:
    - alta prioridad (3)   - mediana prioridad (2)   - baja prioridad (1)   - nula prioridad (0)

Área/problema	Valor de la prioridad (del 3 al 0)
▪ Equipamiento	
▪ Financiamiento	
▪ Organización interna	
▪ Burocracia	
▪ Capacitación del personal	
▪ Motivación del personal	
▪ Coordinación interinstitucional	
▪ Participación de la población	
▪ Legislación	
▪ Otros (especifique y asigne el valor de prioridad):	

12. PROYECTOS O INICIATIVAS EN CURSO O POR EJECUTAR

Titulo o descripción breve de la iniciativa, indicando el período de ejecución	Situación		Fuente de financiamiento	Unidad ejecutora
	En ejecución	Por ejecutar		

OTROS ASPECTOS DE RELEVANCIA QUE SE DESEAN DESTACAR EN EL DIAGNOSTICO:
_____
_____
_____

Budget Projections
(English/Spanish, using the Peruvian sol as the unit of currency)

Sample Cost Projection for the Implementation Stage of a Waste Management Program
(district-wide program, covering about 15,000 people)

Financial and physical resources listed in this sample are for illustrative purposes only. Many communities will not have such resources available.

First Step

- Environmental Education Project: **"**Educating the District About Household Solid Waste Management"
  - Printing of displays: 900.00 soles
  - Recording of radio spots: 100.00 soles
  - Printing of information flyers: 250.00 soles
  - Support personnel and evaluation: 800.00 soles
  - **Total: 2,050.00 soles**

- Pilot Waste Separation Project: "Separating Our Solid Waste"
  - Plastic bags to deliver to homes to separate waste: 750.00 soles
  - Sacks for storing separated trash: 1,800.00 soles
  - Table for separating trash: 200.00 soles
  - **Total: 2,750.00 soles**

- Organizational Strengthening: "Improving Organization for Local Action"
  - Training refreshments and materials: 1,000.00 soles
  - Awards for best organization performance: 1,500.00 soles
  - **Total: 2,500.00 soles**

- Human Resources:
  - Professional manager: (900 soles/month) 10,800.00 soles
  - **Total: 10,800.00 soles**

Cost summary during the first project step

- Educating the Public About Solid Waste Management
  - 6 months; 2,050.00 soles

- Separating Solid Waste
  - 9 months; 2,750 soles

- Organizational Strengthening
  - 3 months; 2,500.00 soles

- Human Resources
  - 12 months 10,800.00 soles

Total 18,100 soles

Second Step

- Institutional Strengthening: "Strengthening Municipal Management of Solid Waste"
  - Installation of computerized accounting system: 100.00 soles
  - Inventory of contributors: 500.00 soles
  - Training of service personnel: 2,000.00 soles
  - Municipal regulations: 250.00 soles
  - Internships for service personnel: 800.00 soles
  - **Total: 3,650.00 soles**

- Equipment and Infrastructure of the Solid Waste Management System
  - Street sweepers: personnel, tools and equipment, sweeping plan, sweeping supervision, increase in personnel:
    - 380 soles/person/month; 27,360.00 soles
    - Tools: 2,400.00 soles
    - Equipment and materials: 2,500.00 soles
    - Sweeping plan: 250.00 soles
    - Sweeping supervision: 180.00 soles
    - **Total: 32,690.00 soles**

- Solid Waste Storage and Separation at the Source: homes, schools, municipal buildings, commercial establishments:
  - Plastic bags to separate trash at the source: 8,750.00 soles
  - Digital scale: 2,000.00 soles
  - Sacks for storing separated trash: 1,800.00 soles
  - Table for separating trash: 100.00 soles
  - **Total: 12,650.00 soles**

- Revision of the Route Plan, Replacement of Machinery and Equipment, Supervision of Personnel
  - Revision of the route plan: 150.00 soles
  - Purchase of a compactor: 320,000.00 soles
  - Supervision of personnel: 800.00 soles
  - **Total: 320,950.00 soles**

- Handling of Solid Waste
  - Construction of a solid waste storage facility; creation of waste separator and marketer organizations
    - Construction of a solid waste storage facility: 20,000.00 soles
    - Establishment of a site for composting organic waste: 3,000.00 soles
    - Creation of waste separator and marketer organizations: 900.00 soles
    - **Total: 23,900.00**

Example of Costs Associated with an Urban Solid Waste Management System (Spanish)

Disposición Final: Acondicionamiento de Botaderos
Municipales: Botadero Municipal de Vice y Botadero, Municipal de Becará

- Fase de Cierre Botadero – Vice 10,000.00
- Fase de Cierre Botadero – Becará 10,000.00
- **TOTAL S/. 20,000.00**

Proyecto: "Relleno Sanitario de Vice": Relleno Sanitario Manual: Vida útil 10 años

- Mejoramiento de Vías de acceso 5,000.00
- Estudio de Impacto Ambiental 10,000.00
- Saneamiento Físico Legal 5,000.00
- Construcción de 20 celdas 75,000.00
- Construcción de Infraestructura (caseta), Cerco Vivo, drenaje y otros 64,400.00
- Plan de Cierre 40,000.00
- **TOTAL S/. 199,400.00**

Proyecto: Micro Relleno Sanitario Manual en el Centro Poblado Menor La Tortuga: Vida útil 15 años

- Mejoramiento de Vías de acceso 25,000.00
- Estudio de Impacto Ambiental 10,000.00
- Saneamiento Físico Legal 5,000.00
- Construcción de 15 celdas 65,000.00
- Construcción de Infraestructura (caseta), Cerco Vivo, drenaje y otros 100,000.00
- Plan de Cierre 50,000.00
- **TOTAL S/. 255,000.00**

Recursos Humanos

- Profesional encargado (S/. 1 200 mes) 14,400.00
- **TOTAL S/. 14,400.00**

Cuadro Nº 15: Resumen De Costos De La Segunda Etapa Proyecto/Aspecto Plazo Costo Total

Fortalecimiento del Sistema de Gestión de Residuos Sólidos de la Municipalidad Distrital de Vice

- 5 meses
- 3,650.00

Equipamiento e Infraestructura del Sistema de Gestión de Residuos Sólidos

- 12 meses
- 410,290.00

Relleno Sanitario de Vice 6 meses 199,400.00

Micro Relleno Sanitario Manual en el Centro Poblado Menor La Tortuga

- 6 meses
- 255,000.00

Recursos Humanos 12 meses 14,400.00

TOTAL S/. 882,740.00

Example of Costs Associated with an Urban Solid Waste Management System Expenses[51]

Staff
- Administrative and Technical (01) S/. 12,000.00
- Technician (01) S/. 8,400.00
- Worker (09) S/. 53,003.20

Gas and Lubricants
- Gas 52 weeks x 40 gal. / week x S/. 5 / gal. S/. 10,400.00
- Lubricants (15% of gas) S/. 1,560.00

Maintenance
- 01 Garbage Truck (5% of gas) S/. 520.00
- 02 Tricycle Carts (S/. 360.00 c/u) S/. 720.00

Tools
- Dust Pans (9 Workers x 6 Dust Pans / Workers x S/. 15 p/u) S/. 810.00
- Brooms (9 Workers x 12 Brooms / Workers x S/. 5 /Broom) S/. 540.00
- Rakes (9 Workers x 8 Rakes / Workers x S/. 5 / Rake) S/. 360.00

Depreciation
- Life of a Garbage Truck 10 años
- Life of a Tricycle Cart 2 años
- 01 Garbage Truck (S/. 84,000.00 / 10 years) 8,400.00
- 02 Tricycle Carts (S/. 1,200 x 2 units / 2 years) 1,200.00

Total Expenses S/. (3.5 Nuevos Soles 1 US Dollar) **97,913.20**

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51. Source: Guíametodológica Para La Formulación De Planes Integrales De Gestión Ambiental De Residuos Sólidos, Conam p. 101.

Calculating the Economic Viability of Recycling (Peruvian sol as unit of currency)[52]

Market Study

Material	Amount Able to be Collected Daily (kg/day)	Local Market Price per Kg (S/.)	Total Amount (S/.)
White Paper		0.50	
Plastic PET (soda bottles)		0.50 – 0.70	
Glass (white)		0.10 – 0.20	
Hard Plastic (buckets, yogurt bottle, etc.)		0.20 – 0.40	
Iron		0.10	
Tin (milk cans)		0.20 – 0.30	
Mixed Paper (magazines)		0.05	
Cardboard		0.20	
Newspaper		0.20 – 0.30	

Material	Amount Able to be Collected Daily (kg/day)	Local Market Price per Kg (S/.)	Total Amount (S/.)
Compost			

*The average production of compost is 1/3 the amount of organic waste collected, starting in the third-fourth month

As noted earlier, if a recycling program isn't economically viable on a community-wide level, try working with community groups or institutions that are already organized (schools are great, as are women's clubs and youth groups). A specific program working directly with one group will drastically cut down on expenses (educational campaigns, transport, etc.) and be much easier to plan and organize. These types of targeted programs are also more likely to be sustainable because there is a smaller group of people directly benefiting from the recycling program.

Other points to consider:

- Does an informal recycling system exist in the community/district? If so, what would be the implications of creating a more formalized recycling system? Is it possible to work through these informal recyclers?

- Are there accessible local markets for recyclable products (informal or formal)?

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52. Source: Guía Técnica para la Formulación e Implementación de Planes de Minimización y Reaprovechamiento de Residuos Sólidos en el Nivel Municipal, CONAM p. 33.

- Are there fluctuating local prices for recyclable products? Do prices differ substantially between local buyers? Would it be more feasible to collect and sell only one or two types of waste (for example soda bottles or white paper)?

Reuse of Organic Waste: Composting/Vermiculture

Points to consider:

- Quantity and quality of organic material available

- Willingness of community members and community leaders to separate their organic waste

- Appropriate location and size of the composting area (Does the area have a fence?)

- Access to water

Fundraising and Accounting

The most important point to remember when looking for funding sources for a project is to use creativity. Fundraising events like raffles and auctions are good ways to get a project started or to earn some extra funds for a project. On the other hand, there should be a sustainable source of income to keep the project running. This will be much easier if the project is simple and small. Project participants should try to secure donations from local businesses, NGOs, and the municipality (if they are not already supporting the project).

With respect to tracking expenses, be sure to keep a detailed accounting spreadsheet to both calculate cost projections and record actual costs.

PCV Template for Behavior Change Planning

Part I. Behavior Change Planning Process

PCV Name	
Environmental Issue	
Behavior	
Target Group: **Demographics, want, need, have, where they are, other useful info**	
Influencing Group: **Demographics, want, need, have, where they are, other useful info**	
Barriers/Incentives	
Bridges to Activities	

Part II: Connect Activities to the Sector Goals and Objectives & Plan Tasks

Activity Title (as in LPF)	
Activity Description	
Goals and Objectives of Activity	

Task	Person Responsible	Timeline

How to Use the Activity Planning and Implementation Tracker and the Monitoring and Evaluation (M&E) Plan

As a Volunteer, use the PACA tools to identify local priorities/needs and possible actions/activities to take in your community. Fill in the tracker below as you plan how to implement these actions/activities as you partner with members of your community. This tracker can help you and your community to prioritize and assess the feasibility of each action/activity that works toward a larger community-prioritized objective.

As activities are planned and committed to by you and your community, enter the activities in "planned" status with the relevant details in the Volunteer Portal. You will need to link your activities to a framework and post activity identified in an LPF or initiative at your post. The framework and "post activity" will determine which outputs and outcomes are expected as a result of the activity and will help direct you in the use of the corresponding monitoring and evaluation (M&E) plan. The M&E plan in addition to this tracker helps you to:

- identify relevant data-collections tools and requirements;
- use as reference during data entry into the Volunteer Portal to report timely, complete, and accurate data; and
- document the required evidence supporting your reported data.

As you start to plan and implement activities, make sure to update the Volunteer Portal with any changes to status, duration, or implementation scope as well as outputs/outcomes achieved on an ongoing basis. This information can be seen immediately by post staff to help support you in implementation and improve the anticipated outputs/outcomes.

During each phone call, check-in, or site visit, ask your PM/PTA to review your planned activities and discuss possible opportunities and challenges for implementation and sustainability. Your PM/PTA may have suggestions—for example, about how to increase the impact of the activity, how to tie it more closely into your project's focus areas to ensure sustainability, or how to better monitor or evaluate the activity.

Activity Tracker for Planning and Prioritization

For each capacity area/statement that the community has prioritized for solid waste management, complete the following basic action planning table with possible actions/activities that could support progress toward the objective. Rank the possible actions in terms of locally defined priority and feasibility, including consideration of the resources needed, opportunities, and/or challenges identified. Make additional copies of the below template for each capacity area. After committing to actions, enter the activity in the Volunteer Portal in "planned" status and update on an ongoing basis as implementation starts/ends and data is collected according to the corresponding M&E plan.

Capacity Development/Focus Area: _____

Objective for Improvement: _____

Priority (ranking)	Feasibility (ranking)	Action/Activity	Projected Start Date/ End Date	Resources Needed	Person(s) Responsible	Possible Challenges/ Opportunities

Capacity Development/Focus Area: _____

Objective for Improvement: _____

Priority (ranking)	Feasibility (ranking)	Action/Activity	Projected Start Date/ End Date	Resources Needed	Person(s) Responsible	Possible Challenges/ Opportunities

Examples of Materials Made from Recycled Plastics

In recent years, Peace Corps Volunteers in Armenia, Dominican Republic, Mexico, Paraguay, Senegal, and elsewhere have been very active in working with local communities and stakeholders to produce useful materials, such as soccer nets, building materials, and other items, from locally generated wastes. Guidance on how to mobilize youth and community actors to create these items is included in the section on solid waste activities in the document *Environmental Activities for Youth Camps and Clubs* (pp. 159–172).[53] Below are some examples of what has been done with recycled and repurposed plastic.

Plastic purses

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53. https://pclive.peacecorps.gov/pclive/index.php/pclive-resources/resource-library/2108-m0126-environmental-activities-508/file

Soccer net made from recycled water sachets

Making bottle bricks or eco bricks

Classroom built partially with eco bricks

Building with eco bricks

Eco brick bench

Glossary

aerobic composting
A method of composting organic wastes using bacteria that need oxygen. This requires that the waste be exposed to air, either via turning or by forcing air through pipes that pass through the material.

anaerobic digestion
A method of composting that does not require oxygen. This composting method produces methane. Also known as anaerobic composting.

compost
The material resulting from composting. Compost, also called humus, is a soil conditioner and in some instances is used as a fertilizer.

composting
Biological decomposition of solid organic materials by bacteria, fungi, and other organisms into a soil-like product.

groundwater
Water beneath the earth's surface that fills underground pockets (known as aquifers), supplying wells and springs.

hazardous waste
Waste that is reactive, toxic, corrosive, or otherwise dangerous to living things and/or the environment. Many industrial by-products are hazardous.

heavy metals
Metals of high atomic weight and density, such as mercury, lead, and cadmium, that are toxic to living organisms.

household hazardous waste
Products used in residences (such as paints and some cleaning compounds) that are toxic to living organisms and/or the environment.

incineration
The process of burning solid waste under controlled conditions to reduce its weight and volume, and often to produce energy.

informal sector
The part of an economy that is characterized by private, usually small-scale, labor-intensive, largely unregulated, and unregistered manufacturing or provision of services.

inorganic waste
Waste composed of material other than plant or animal matter, such as sand, dust, glass, and many synthetics.

itinerant waste buyer
A person who moves around the streets buying (or bartering for) reusable and recyclable materials.

landfill gases
Gases arising from the decomposition of organic wastes, principally methane, carbon dioxide, and hydrogen sulfide. Such gases may cause explosions at landfills.

landfilling
The final disposal of solid waste by placing it in a controlled fashion in a place intended to be permanent. The UNEP *Source Book* (see Sources below) uses this term for both controlled dumps and sanitary landfills.

leachate
Liquid (which may be partly produced by decomposition of organic matter) that has seeped through a landfill or a compost pile and has accumulated bacteria and other possibly harmful dissolved or suspended materials. If uncontrolled, leachate can contaminate both groundwater and surface water.

leachate pond
A pond or tank constructed at a landfill to receive the leachate from the area. Usually the pond is designed to provide some treatment of the leachate, by allowing settlement of solids or by aeration to promote biological processes.

lift
The completed layer of compacted waste in a cell at a landfill.

liner
A protective layer, made of soil and/or synthetic materials, installed along the bottom and sides of a landfill to prevent or reduce the flow of leachate into the environment.

manual landfill
A landfill in which most operations are carried out without the use of mechanized equipment.

market waste
Primarily organic waste, such as leaves, skins, and unsold food, discarded at or near food markets.

methane
An odorless, colorless, flammable, and explosive gas, produced by anaerobically decomposing municipal solid waste (MSW) at landfills.

open dump
An unplanned "landfill" that incorporates few if any of the characteristics of a controlled landfill. There is typically no leachate control, no access control, no cover, no management, and many waste pickers.

organic waste
Waste containing carbon, including paper, plastics, wood, food wastes, and yard wastes. In practice in MSW management, the term is often used in a more restricted sense to mean material that is more directly derived from plant or animal sources, and that can generally be decomposed by microorganisms.

pathogen
An organism capable of causing disease.

pollution
The contamination of soil, water, or the atmosphere by the discharge of waste or other offensive materials.

recyclables
Items that can be reprocessed into feedstock for new products. Common examples are paper, glass, aluminum, corrugated cardboard, and plastic containers.

recycling
The process of transforming materials into raw materials for manufacturing new products, which may or may not be similar to the original product.

refuse
A term often used interchangeably with solid waste.

sanitary landfill
An engineered method of disposing of solid waste on land, in a manner that meets most of the standard specifications, including sound siting, extensive site preparation, proper leachate and gas management and monitoring, compaction, daily and final cover, complete access control, and record keeping.

secure landfill
A disposal facility designed to permanently isolate wastes from the environment. This entails burial of the wastes in a landfill that includes clay and/or synthetic liners, leachate collection, gas collection (in cases where gas is generated), and an impermeable cover.

vectors
Organisms that carry disease-causing pathogens. At landfills, rodents, flies, and birds are the main vectors that spread pathogens beyond the landfill site.

waste collector
A person employed by a local authority or a private firm to collect waste from residences, businesses, and community bins.

waste dealer
A person who buys recyclable materials from waste generators and itinerant buyers and sells them, after sorting and some processing, to wholesale brokers or recycling industries.

waste picker
A person who picks out recyclables from mixed waste wherever it may be temporarily accessible or disposed of.

waste reduction
All means of reducing the amount of waste that is produced initially and that must be collected by solid waste authorities. This ranges from legislation and product design to local programs designed to keep recyclables and organic materials (that can be used as compost) out of the final waste stream.

waste stream
The total flow of waste from a community, region, or facility.

yard waste
Leaves, grass clippings, prunings, and other natural organic matter discarded from yards and gardens.

Sources

The primary source for the terms in this glossary is:

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