



Guidebook for Environmental Education on Solid Waste Management in Africa



Introduction

Along with the rapid economic growth and rise in urban population, many African cities are experiencing significant increases in the amount of waste. At the same time, they are facing challenges of unsanitary living conditions caused by inappropriate waste management including insufficient collection services. To make collection services work and improve sanitation, environmental consciousness and behavioural changes of residents are indispensable, such as refrain from littering and shift to disposing rubbish at a fixed time and fixed place. However governments and municipalities have not been successful in providing relevant information and conducting activities for awareness raising to encourage change of behaviours. As a consequence, interest and cooperation of their residents in waste management are not sufficiently enhanced.

Under the major objective of the African Clean Cities Program (ACCP): to support improvement of waste issues by sharing knowledge, this guidebook is developed as a manual or resource guide for those who are engaging environmental education programs befitted to their local circumstances in African countries and cities. By addressing basic knowledge and listing points to note, as well as incorporating local cases implemented by Japanese municipalities and JICA's Japanese Overseas Cooperation Volunteers (JOCVs)¹ working in Africa, it also intends to provide readers a clear image for planning and implementing programs for environmental education.

We sincerely hope that this guidebook will contribute to promotion of sustainable waste management and to realize clean and healthy cities in Africa amidst of growing concerns of waste problems.

Last but not least, we would like to express our heartfelt gratitude to all the professors, JOCVs, and all the stakeholders for their support in writing and editing of this guidebook and provision of relevant material and information.

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Global Environment Department
Japan International Cooperation Agency (JICA)

¹ Japanese Overseas Cooperation Volunteers (JOCV) is an overseas volunteer dispatching system run by JICA as part of the Japanese government's official development assistance for the purposes of contributing to the economic and social development of developing countries and deepening friendship, goodwill, and mutual understanding. From its inception in 1965 through March 2019, the program has placed a cumulative total of 44,000 volunteers to 91 countries worldwide.

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How to Use this Guidebook

Guidebook Objective




This guidebook has been created assuming an audience mainly comprising practitioners in municipalities and educational institutions engaged in environmental education and community awareness raising in the waste management sector in Africa. It is meant to be used as a manual or a resource guide in developing and implementing education and awareness programs.

Guidebook Structure


This guidebook is structured for practitioners to read along and compare to their own situation, describing an educational/awareness program step-by-step, from preparation through to its implementation and monitoring. It is also structured to help the reader understand the PDCA cycle (Plan-Do-Check-Act) as a framework for project management.

| Structure | Chapter / Section |
|---|----------------------|
| Situation assessment, problem analysis, issue selection | Chapter 1, Chapter 2 |
| Planning | Chapter 3 |
| Implementation, monitoring | Section 4.1, 4.2 |
| Evaluation | Section 4.3 |

Relevant and additional information is provided in the page margins for deeper understanding.

| Icon | Additional Information |
|---|------------------------|
|  | Keyword |
|  | Case study |
|  | Related material |

Recommended Additional Resources for Use with this Guidebook

In addition to this guidebook, JICA has made several guidebooks and information on waste management and environmental education available online. In addition to the related materials (denoted with ) listed in the page margins, please also reference the following materials:

- **Activity Handbook for Environmental Education Volunteers**

- To address the environmental problems of daily life - (JICA, 2011)

- https://www.jica.go.jp/volunteer/outline/publication/pamphlet/pdf/handbook_english.pdf

- **Supporting Capacity Development for Solid Waste Management in Developing Countries**

- Towards Improving Solid Waste Management Capacity of Entire Societies (JICA, 2005)

- (available in English, Spanish, and Japanese)

- https://www.jica.go.jp/jica-ri/IFIC_and_JBICI-Studies/english/publications/reports/study/topical/waste/index.html

- **African Clean Cities Platform (ACCP) website**

- (available in English, French, and Japanese)

- <https://africancleancities.org/>

- Basics of Municipal Solid Waste Management in Africa for Everyone Involved in

- Municipal Solid Waste Management in Africa

- African Waste Management Data Book

- Profiles on solid waste management by country/city

01 Basics Before Starting an Initiative

1.1 Waste Issues and Waste Management in Africa

The issues with waste are numerous. For example, littered streets tarnish a city's appeal, and illegal dumping and open burning of waste in town can damage resident health. Also, waste must be reduced to extend operation period of landfills.

Developed nations have addressed these waste issues one by one as cities expand and the economy develops. Many African nations, however, are experiencing urbanization at a pace unseen in developed nations, eliciting numerous issues all at once.

It can be hard to decide where to start when faced with this state of affairs. In order to prioritize the available measures, it is important to start off by analysing the structure of the issues: what they are (i.e. fundamental nature of the problems) and what is causing them. This chapter will provide the basic knowledge required to understand waste issues and analyse the situation and issues in a country or city where you are working.

(1) Rapid Population Growth and Urbanization

The African population has been growing faster than any other population in the world in recent years. In the 15 years from 2000 to 2015, the population of Africa has increased by roughly 50%. The growth of the population of African cities is more pronounced, increased even more sharply, by 70%, over the same period. This trend will continue in Africa: from 2015 to 2050, the total population is expected to grow approximately double, and the urban population is expected to grow approximately triple.¹

As populations explode, waste also increases. In many African nations, however, government-run waste collection and treatment services are unable to keep up with the situation. The lag is especially pronounced in Sub-Saharan Africa, where approximately half of the waste remain uncollected, damaging both sanitary conditions and the beauty of cities.² In 2016, 174 million tons of waste were generated in Africa. This is estimated to increase to 516 million tons in 2050—nearly a threefold increase.³

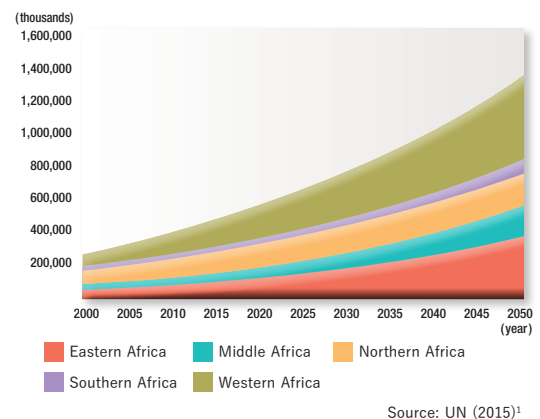


Fig. 1 Urban Population in Africa

(2) Waste Problems in Africa

a) Not maintaining urban sanitation

In African cities, it is common to see rubbish littering the streets and open lots, as well as rubbish spilling out from already full waste collection containers. Rubbish tossed in the rivers and gutters clogs the drainage channels and causes flooding. Such a state can lead to further illegal dumping and make the community less safe (**'broken windows theory'** ). The food waste comprising the bulk of waste in Africa attracts insects and pests. In regions with high temperatures, waste tends to promote the breeding of flies and gastrointestinal pathogens that can cause the spread of diseases such as gastroenteritis, hepatitis, and cholera. In addition, accumulated water in plastic bottles and waste can attract mosquitoes, propagating malaria, dengue fever, and yellow fever.




Overflowing dumpsters



Waste clogging drainage channels

b) Inadequate waste disposal

In many African cities, even where waste is collected, it is not being properly disposed. At least 70% of waste is disposed of in **open dump sites**  in Sub-Saharan Africa.⁴ In addition to pests, open dump sites invite a host of other issues, including offensive odours, fires, the contamination of surface and ground water from leachate, and associated soil contamination. These sites also generate and release methane, a greenhouse gas which contributes to climate change. Worse still, there have been many accidents in recent years with many human casualties resulting from collapse of waste piles in open dump sites.

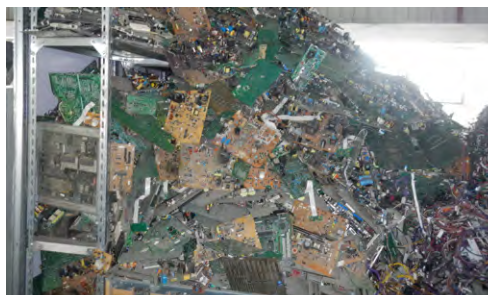


Landfill collapse in Addis Ababa, Ethiopia

c) Increase of waste requiring special treatment for disposal

In Africa, lifestyle changes brought about by economic growth are pushing up the amount of waste requiring special treatment for disposal such as plastics, electronic products, and tires. Additionally, large volumes of used electrical and electronic products are imported from developed countries to Africa for reuse, many of which no longer work and become E-waste (Electronic waste).

Without the adequate techniques and legal system in place for the proper disposal of waste in African nations, lead and dioxins will damage worker health, and the environment will be polluted.



E-waste (Electronic waste)



.....
The theory that leaving the broken windows on buildings alone makes residents think that no one cares about the area, in turn lowering their morale and increasing crime.
.....



.....
Large landfills without pollution control measures, surface compaction and soil covering. There have been frequent accidents with waste mound collapses, including Addis Ababa, Ethiopia (March 2017) and Maputo, Mozambique (February 2018).
.....

d) Many issues are surfacing all at once

In developed nations, the various issues mentioned thus far surfaced over the course of many years and were resolved one by one. In African nations, however, these pressing issues are all surfacing at once over a short period and must be dealt with. Resolving these waste issues presents technical challenges, but will also require social change with the development of legal systems and improvements in, management capacity of relevant agencies, and civil consciousness. These changes can take time.

(3) Objectives of Waste Management

While the objectives of urban waste management will vary depending upon the stages of development and circumstances of each city, the following four represent the main objectives.

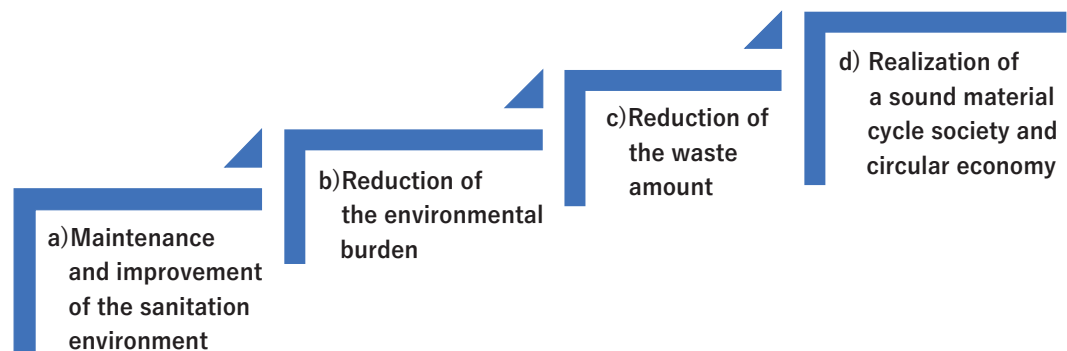


Fig. 2 Incremental objectives of urban waste management

a) Maintenance and improvement of the sanitation environment

In order to improve unsanitary urban conditions, the waste must be collected and removed from living habitats. More specifically, it requires waste to be collected, illegal dumping to be prohibited, and waste littering open lots and other areas to be eliminated.

b) Reduction of the environmental burden

Collecting waste will improve public sanitation in living habitats, but unless properly disposed, the waste will pollute the environment. Reducing and eliminating environmental pollution is an important objective of waste management.

c) Reduction of the waste amount

Reducing waste will lower the costs of waste collection and disposal, as well as reduce environmental burden. Waste reduction can be realised by implementing the 3Rs: reduce, reuse, and recycle. The examples of 3Rs are shown in the following.

- Reduce : using things with care and reducing waste
Example : Only buy or receive necessary things and goods.
: Bring your own bag for shopping.
- Reuse: using things repeatedly
Example : Choose products that can be refilled.
: Give away things that you no longer need.
- Recycle: reusing waste as resources
Example : Sort waste properly so that recycling activities go smoothly.
: Use products created from recycled waste.

Source: Japanese Ministry of Environment, online: campaign.htm⁶


d) Realization of a sound material cycle society and circular economy

Generally, the product lifecycle involves design, production, consumption, and disposal, culminating in waste. The 3Rs refer to various actions designed to reduce waste mostly in the consumption and disposal phases of the product lifecycle. The realization of a sound material cycle society and circular economy is a broader concept that goes back to the stage of product design and tries to conserve resources and substitute the functions of products with more environmentally friendly products or services.

Furthermore, in recent years, climate change measures such as greenhouse gas reductions through appropriate waste disposal and recovering energy through waste-to-energy power generation have become important themes in waste management.

Developed nations have worked to address the four objectives of waste management step by step. With so many issues all surfacing at once, however, it can be easy in developing nations to lose track of where to start and what to prioritize. The highest priorities—what can be thought of as the basis of waste management—are to first collect waste to keep the city clean (Maintain and improve sanitation environment) and to properly dispose of the collected waste to minimise environmental degradation (Reduce environmental burden).

(4) What is Waste Management?

Materials or goods basically become “waste” when they are no longer needed by their owners (waste generation). From there, the waste goes through the stages of storage, discharge, collection, transport, treatment and final disposal. This process is called the waste flow .

Waste management is a process of arranging human resources, materials, and financial capital to ensure that each stage is handled properly in order to achieve the overall waste management objectives. When analysing waste issues, the first step is to confirm what problems are occurring in what phase of the waste flow.



Fig. 3 Waste flow

1.2 What is Environmental Education?

Possible approaches to resolving environmental issues include: 1) policy and systems, such as regulations or economic incentives; 2) technical innovations; and 3) raising environmental awareness. However, boiling it down, people (i.e. citizens) are what form and protect national policies and systems, and people are what drive technical innovation. Thus, raising our environmental awareness is the true foundation behind fixing our environmental issues.

Without the understanding and cooperation of the public responsible for discharging the waste, waste management will not improve. Building that understanding and cooperation requires environmental education.



See Fig. 9 for more detailed waste flow.



See 1.3 “Environmental Education in Developing Countries” in the Activity Handbook for Environmental Education Volunteers.

(1) History and Objectives of Environmental Education

Environmental protection as an initiative got its start in the United States. In the US, land development has destroyed the environment, and a natural conservation movement has begun in response. A number of natural conservation groups were born in the late 19th century to push nature learning and outdoor education. In 1872, the world's first national park was established in the US: Yellowstone National Park. Then, in the 1920s, the park started learning programs to explain park nature, history, and culture.

The term "environmental education" was first used in 1948 at the inaugural meeting of the International Union for Conservation of Nature (IUCN). In 1962, the book *Silent Spring* was published, warning of the destructive effects of pesticides. Environmental education then entered the mainstream vernacular as many countries promoted pollution control and environmental policies. In 1972 in Stockholm, the United Nations Conference on the Human Environment adopted the Declaration of the United Nations Conference on the Human Environment (the Stockholm Declaration), which states that: a) protecting the environment requires everyone taking action, b) this requires interdisciplinary environmental education, and c) mutually negotiated international plans are important.

Next, the Belgrade Charter of 1975, formed at the International Workshop on Environmental Education, defined the objectives of environmental education as follows:

"To develop a world population that is aware of, and concerned about, the environment and its associated problems, and which has the knowledge, skills, attitudes, motivations and commitment to work individually and collectively toward solutions to current problems, and the prevention of new ones."⁷

Further, the UN Educational, Scientific and Cultural Organization (UNESCO) sponsored the Intergovernmental Conference on Environmental Education in 1977. The conference issued the Tbilisi Declaration, officially confirming that the world would promote environmental education with the above objectives.⁸

Achieving the objectives of environmental education requires long-term ongoing education. Environmental education has three incremental targets: 1) interest, 2) understanding, and 3) action. Rather than pressing individuals to action, it is important to gradually develop interest and understanding.⁹



Fig. 4 Incremental targets of environmental education


Applying the incremental targets of environmental education to waste issues yields the following:




Fig. 5 Incremental targets for waste issues

(2) Environmental Education in Japan

Environmental education in Japan started as education on pollution. In 1960s Japan, amidst rising social movement, environmental education came to be recognised as one means of resolving the serious pollution and natural destruction that was occurring at the time.

In the mid-1970s, the focus was then expanded from pollution to environmental education. From the mid-1980s, the need for environmental education increased even further as the battle against **global environmental issues**  began in earnest. Taking this cue, in 1992, the then Japanese Ministry of Education, Science and Culture, created environmental education instructional materials with the aim of promoting environmental education in school education. This year also saw the creation of Agenda 21 at the UN Conference on Environment and Development (Earth Summit), held in Rio de Janeiro. This document called for pollution education, which was mainly taught in schools in Japan, to be expanded to environmental education and also taught outside of schools. The guiding principle at work was to think globally and act locally.¹⁰

In the legislative sphere, Japan enacted the Basic Environment Law in 1993 and the Act on the Promotion of Environmental Conservation Activities through Environmental Education in 2003. Through these laws, the Japanese government implemented various measures for promoting environmental education and required all citizens, businesses, and groups to actively strive to protect the environment in efforts to develop sustainable society.

At the 2002 World Summit on Sustainable Development (the Johannesburg Summit), the assembly adopted the UN Decade of **Education for Sustainable Development (ESD)** , as proposed by the Japanese delegation. Subsequently, in the decade starting in 2005, environmental education linked to the ESD program has been promoted internationally.¹¹ The Basic Policy for Promoting Environmental Protection Initiatives and Motivation, Environmental Education, and Collaborative Action, a Cabinet Office decision made on June 26, 2018, lists the following points as important:

- Independent (self-driven) participation in sustainable development
- Developing human resources everywhere, each according to their stage of development and lifestyle, to dedicate themselves to lifelong action
- Two-way communication incorporating participant realizations and collaborative experiences
- ‘Experiential or hands-on learning’- Fostering a willingness to express and share the meaning and values discovered from the hands-on activities to the others¹²



.....
A few global environmental issues would include climate change, ozone layer depletion, rainforest depletion, desertification, and acid rain. As their environmental impacts transcend national borders, these issues require international frameworks to tackle with.
.....



.....
ESD (Education for Sustainable Development) refers to teaching people to perceive global issues such as the environment, poverty, human rights, peace, and development as their own issues, think what they personally can do about these issues, and develop the ability and attitude to act. In this way, ESD develops leaders for sustainable development.
.....

(3) Hands-on Learning

The proverb that proves the importance of hands-on learning is the words "I hear and I forget. I see and I remember. I do and I understand." Rather than just listening to the lessons, seeing and experiencing remains in the memory and leads to a deep understanding.

Hands-on learning generally proceeds through a loop of four steps: 1) do, 2) look, 3) think, and 4) grow. From here, the process transitions to the next experience. More specifically, in the learning cycle, students first 1) experience something (do), then 2) observe others experiencing, mutually sharing their experiences and insights (look), then 3) analyse the causes for the experience and the circumstances leading to these causes (think), then 4) confirm the experience itself and details gained from analysing the experience, and hypothesize what to do next (grow).

This learning cycle was introduced to Japan circa 1990 and has formed the basis of numerous environmental education programs designed since.¹³

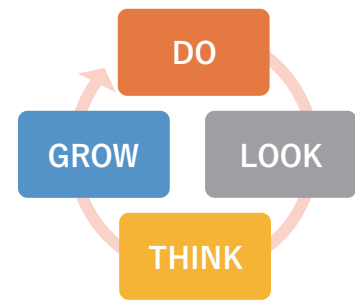


Fig. 6 Hands-on learning cycle

(4) Priority in the School Curriculum: Japanese Case Studies

"Environmental education" is not a standalone subject in Japanese primary and secondary schools. Rather, environment-based units are included in multiple subjects, with environmental education in moral education, special activities and, from the 2002 school year, in **integrated studies**.¹³ In this manner, Japanese schools adopt an integrated education approach, utilizing the environmental knowledge base acquired in moral education, special activities, and integrated studies to develop an investigative, problem-solving learning style.

In most Japanese elementary schools, waste issues are addressed in social studies class in the third or fourth grade. The students examine how household waste is processed and where it goes, then learn specifically how to sort and recycle waste. The children are also taken on tours of local facilities such as waste incineration plants, landfills, and recycling centres to see how waste is processed and learn exactly how much recycling costs.¹⁴

1.3 Determining Local Circumstances

When considering the content to include in an initiative, it can be useful to determine the state of the local community, economy and waste management from existing data. In addition to various indicators and statistics tabulated by your country or city, various social, economic, and environmental indicators, as well as the state of waste management in different African countries, can be found on the websites of organizations such as the World Bank, UN Development Programme (UNDP), UN Children's Fund (UNICEF), UN Environment Programme (UNEP), and African Clean Cities Platform (ACCP).¹⁵ The following social, economic, and SDG indicators should be of particular reference to readers of this guidebook.






Integrated studies is a compulsory class from third grade through high school in Japanese school curriculum. With the goal of developing problem-solving skills, each school offers creative educational activities for cross-disciplinary and comprehensive learning based on the student's interests, according to local and school-dependent situations.



See the ACCP website.
<https://africancleancities.org/>

Table 1 Various indicators to help you understand the target countries

| | |
|------------------------------|---|
| Economic Indicators | National income (GDP, per capita GDP) |
| | Employment figures (unemployment rates, etc.), poverty rates |
| | Economic growth rates, inflation rates |
| Social Indicators | World Development Indicators (WDI)  ¹⁵ , Human Development Index (HDI)  ¹⁶ , Gender Development Index (GDI) |
| | Education indicators (literacy rates, graduation rates, etc.) |
| | Education indicators (literacy rates, graduation rates, etc.) Health, nutrition, and sanitation indicators (infant mortality rates, child nutritional deficiency rates, safe drinking water and toilet proliferation rates) |
| | Population growth rates |
| Waste-related SDG Indicators | Sustainable Development Goals (SDGs)  : Goal 11 (Sustainable Cities and Communities), indicator 11.6.1 Proportion of urban solid waste regularly collected and with adequate final discharge out of total urban solid waste generated / Goal 12 (Sustainable Consumption and Production), indicators 12.4.2 Hazardous waste generated per capita and proportion of hazardous waste treated and 12.5.1 recycling rates |
| Other | Meteorological data (temperature, humidity, precipitation, etc.) |



WDIs are comprehensive socioeconomic developmental indicators for the world's countries, published annually by the World Bank.



HDIs, published annually by the UNDP for countries worldwide, are an indicator expressing human development in terms of three factors: health, education, and standard of living.



SDGs are 17 global development targets to be achieved by 2030.

Head-to-head comparisons are an effective means of better understanding the meaning of these numbers. For example, try comparing the basic data of the country or city being considered for an initiative with that for a country or city you are familiar with (somewhere you have lived or worked before, etc.). The comparison may allow you to understand the poverty or literacy rates in the target country or city, which can be useful when discussing content for your initiative.

1.4 Chapter Key Points

- Africa's waste issues should be treated as a crisis and addressed on the global scale with a sense of urgency. With so many issues surfacing all at once, the highest priorities are the basics of waste management: first collect waste to keep the city clean, and then properly dispose of the collected waste to minimize environmental impacts.
- In Japan and around the world, environmental education developed over the course of history. The eventual goal will be behavioural change (step 3), preceded by building interest (step 1) and understanding (step 2). Environmental education in Japan stresses awareness and hands-on activities that lead to action in all situations and fitting the audience's stage of development.
- It is effective to first collect basic information and data on the target country or city and compare it with other countries or cities to better understand the local circumstances.

Case Study: Environmental Education in Japan (Hamamatsu City)

After working in environmental education at the local government in Japan (Hamamatsu City, Shizuoka Prefecture), I took a volunteer position with JICA in Kenya. I'd like to introduce Hamamatsu city's environmental education program as a Japanese case study.

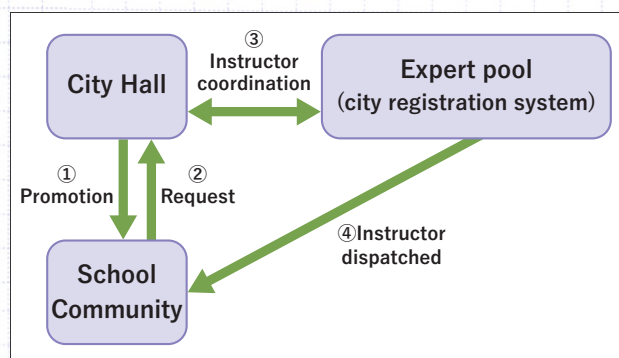
Hamamatsu city promotes environmental education to make our community sustainable by training people to be eco-friendly of their own volition. We emphasize raising awareness to change behaviour over simply acquiring knowledge. Our environmental education catch phrase is "E-switch". The 'E' is the first letter in each of the words "Enjoy Environmental Education for Eco-life"; 'switch' signifies how we want residents to switch over to eco-friendly lifestyles and business styles after we raise their environmental awareness through environmental education using local and natural features in Hamamatsu. Below is a detailed 5-point explanation of environmental education in Hamamatsu.

1 Learning Opportunities

In order to create more opportunities for residents to learn about the various environmental issues and their solutions, we travel to schools and communities to give classes. Given the number of requests received, a registration system has been established to register individuals and groups with environmental expertise. Thus, some classes are taught by city employees, whereas others are taught by registered parties selected from the registrant pool. (See figure).

To raise more awareness in the classes, we have crafted an E-Switch Program with more participatory hands-on learning and experiential activities to use in place of one-sided lectures. The E-Switch Program is an environmental education program produced by Hamamatsu city that incorporates local features and nature, which are used systematically to fit the development levels for audiences of all ages. One of the key features of the program is the detailed program guide, which lists a program outline (learning objectives, required time, required materials, etc.) and details (initial introduction, development, review). This program guide allows the city to maintain a certain program quality even with different instructors, as well as allowing the participants to understand what is covered in the program before submitting a request. Participants are also permitted to coordinate with their instructor beforehand to rearrange program content.

The waste sector program includes various lessons, including waste collection with a collection vehicle, rubbish sorting, eco-friendly shopping, recycled manufacturing from milk cartons and other recyclables, and composting with cardboard boxes, to name a few. Actual waste samples are used in each of the programs. The use of real-life waste samples help deepen the audience's understanding of waste disposal and the 3R's, inspiring participants to change their behaviour.



Hamamatsu city's environmental education program

2 Trainers' Training

The local administration can only create so many environmental education opportunities. In order to increase the opportunities for residents to learn about and protect our environment in the course of their lives and broaden their view on environmental protection, the city needs to arm more people with the expertise to explain it to the people in simple terms. In Hamamatsu, the city works to raise the next generation of leaders to work alongside those currently active. For residents who want to be active in environmental education and/or protection, the city collaborates with local environmental education activists and businesses to hold multiple classes to impart environmental knowledge and the attitude needed as an environmental education leader. Those who complete the training course are then dispatched as E-Switch Program instructors and for other activities.

3 Places

It is also important to build centres for environmental education and protection activities for communicating information to residents and teaching them about the environment. The waste disposal centres (incineration plants) in Hamamatsu have attached environmental awareness facilities with exhibits for residents to tour and interact with to learn about sustainable living and waste issues. The city also holds flea markets for residents to give away their unwanted clothes, books, toys, and kitchenware, as well as resource collections for all to bring in their used newspapers, magazines, aluminium cans, bottles, and other recyclables.



Awareness raising activity on garbage reduction

4 Information Sharing and Collaborations

Promoting environmental education and protection at all levels is a tall order for the local government alone—ties with the relevant players are essential. In Hamamatsu, we have established a network connecting various entities, including the residents, citizen groups, businesses, schools, and government institutions. On the network, parties can share information and collaborate on events and other activities.

5 The ESD Perspective

In recent years, the essence of Education for Sustainable Development (ESD) has been integrated with environmental education to make training more practical. As background, modern environmental issues manifest as part of more complex social issues, making resolution with a singular approach from any one field difficult. This is where the need for the ESD perspective in environmental education comes in. This is why Hamamatsu city runs programs and projects that combine comprehensive learning and practical activities in its schools and communities.

Yusuke ISHIKURO
JICA Volunteer to Kenya

Composting in Waste Management for Developing Countries

For food and other organic waste, composting is a far less expensive option than incineration. As much of the urban waste in developing countries is organic, composting offers a promising alternative for waste reduction. Particularly if done by individual households, composting can reduce both waste disposal and collection amounts, greatly reducing waste management costs.

What is Composting?

Composting is an old biological method for dealing with organic waste. Compost can also be used in gardening and farming to enrich the soil. Depending upon whether aerobic or anaerobic bacteria are used to biologically decompose the organic waste, the composting process can either be aerobic or anaerobic. In the more common aerobic composting, decomposition proceeds in an oxygen-rich aerobic atmosphere. The organic matter is decomposed by microbes and, just as with incineration, ends up as carbon dioxide and water.

Composting Process

Organic waste is comprised mainly of carbohydrates, proteins, lipids, and dietary fibre. Of these, carbohydrates degrade fastest, followed by proteins and then lipids. Given that decomposition requires an aerobic atmosphere to progress, oxygen is required. Thus, the compost needs to be stirred or turned, or have a blower to induce air into the compost. This process will make the compost temperature quickly rise, sometimes to over 60° C. Once the temperature falls, this will signal that the first phase of composting is complete.

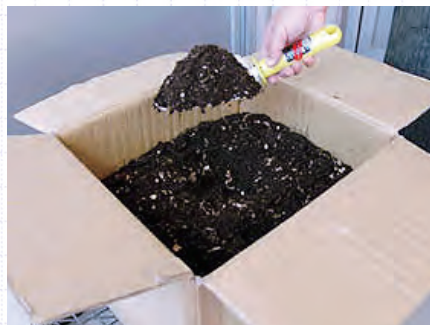
When the first phase is completed, decomposing organic matter will still remain in the compost. If scattered on your garden or fields at this point, the compost will use up all the nitrogen your plants need to grow as it continues to decompose, adversely impacting growth of your plants or crops. Thus, once the first phase is complete, let the compost age until stabilized.

How to Compost

Composting methods will vary depending upon the type and amount of the waste used, and purpose of the compost. If composting at the source at home, a hole can be dug in the yard to bury the waste, or any bottomless compost bin can be placed on the soil with waste being deposited directly. If a yard or garden is not available, aerated cardboard boxes can be used as a compost bin. There are also composting methods using cultured bacteria (the Takakura method)¹⁸ or worms in place of microbes.



Bottomless compost bin



Cardboard compost bin

Promoting Composting

In an ideal world, organic waste at all sources would be composted, and none of it would need to be collected or disposed. Dense urban populations make this ideal quite difficult to materialize. Many cities are collecting their organic waste in efforts to compost it collectively. The key here is waste sorting. If non-compostable waste is mixed in with the compost, it will leave residue. This residue leads to inefficient decomposition and, if involving hazardous materials, can render the compost unfit for use. The understanding and cooperation of each and every resident is essential to making the compost a success.




Takakura method composting

Reference: Institute for Global Environmental Strategies (IGES) (2009)¹⁸

02

How to Start Activities

2.1 Confirming Available Resources

Outlining a plan of action with overall direction and scale for activities requires knowing what resources are locally available. These resources could include manpower, materials, funds, places, time, or expertise. Some resources may take time and effort to utilize (e.g.; obtaining funds requires approval upon application). For these resources, it is necessary to understand all the requirements and conditions for use .



The Activity Handbook for Environmental Education Volunteers lists numerous examples of resources for activities. See Figure 2-1 on Page 25.

Table 2 Available Resources

| Resources | Confirmation Items |
|-----------|--|
| Manpower | How many colleagues can work on your activities? Their titles? What other local people/organizations can work with you? e.g. : NGO, community organization, school club etc. |
| Materials | What material resources are available? e.g.: Stationery, cleaning tools, rubbish cans, computers, printers, recyclables, existing teaching materials/programs, etc. |
| Funds | How much is available and from what sources? e.g.: Budget of assigned agency, subsidy, donation, etc. |
| Places | How much space and what kind of locations are available? e.g.: Schools/in or around campus, community centers, landfill site, waste treatment plants, etc. |
| Time | How much time is available for activities? For how many days or hours can environmental education programs be implemented? |
| Expertise | What kind of special skills can you and your colleagues share, such as knowledge, and experience of? e.g.: Singing, instruments, drawing, etc. |

2.2 Examining Issues to Address

If there are too many issues in the target area, you may need to pick up one priority issue to tackle. In such cases, take the following steps with stakeholders to find what issue should be addressed and utilize your limited resources determined in the Section 2.1 accordingly.

(1) Problem Analysis

First, it is recommended for you and the stakeholders to sit together and analyse the issues. If you have a complex issue or many stakeholders, it is advisable to repeat the analysis process with the different stakeholders.

Table 3 5W1H Analysis

| | |
|--------|------------------------------------|
| Who? | Who are the stakeholders 🔑? |
| What? | What is the problem? |
| When? | When does the problem occur? |
| Where? | Where does the problem occur? |
| Why? | Why does the problem occur? |
| How? | How does the problem occur? |

Getting all the stakeholders engage brainstorming, focusing on “what” and “why” mentioned in the table 3 together will help them to share and understand the issue. In conducting analysis, process of getting participation to draw out a result is just as important as the result itself. **Problem tree analysis** 🔑 is a helpful tool that can be introduced to aid in the thinking process.

Problem tree analysis is a tool for clarifying the relationship between cause and effect. The key steps to using this tool are as follows:

- Ask your colleagues and the stakeholders for their cooperation.
- Gather all the stakeholders and brainstorm about the issues. Write down each single issue on a separate card.
- Define one issue as the central issue. Then, starting from that central issue, connect the causes and effects. Stick the cards to the wall so that everyone can see them.
- Position what the group believes are direct causes immediately below the central issue card, and the believed direct results immediately above it.
- Where possible, noting the answers to the other 5W1H questions (when, where, etc.) will help define the issue more clearly and concretely for the problem tree.



The stakeholders are those individuals and/or groups who can influence or will be influenced by a specific issue.



Problem tree analysis is a tool that can be used to brainstorm to think about and analyse the cause and effect of an issue.



A central issue is the temporary starting point in a problem tree analysis. When deciding the central issue, no need to be too careful; there will be chances to rethink the selection by looking at the entire completed problem tree. However, if no connections can be drawn between central issue and the causes and effects, it is advisable to select a different central issue and restart.

The following example is a problem tree analysis with a **central issue** of “children throwing rubbish on the floor”.

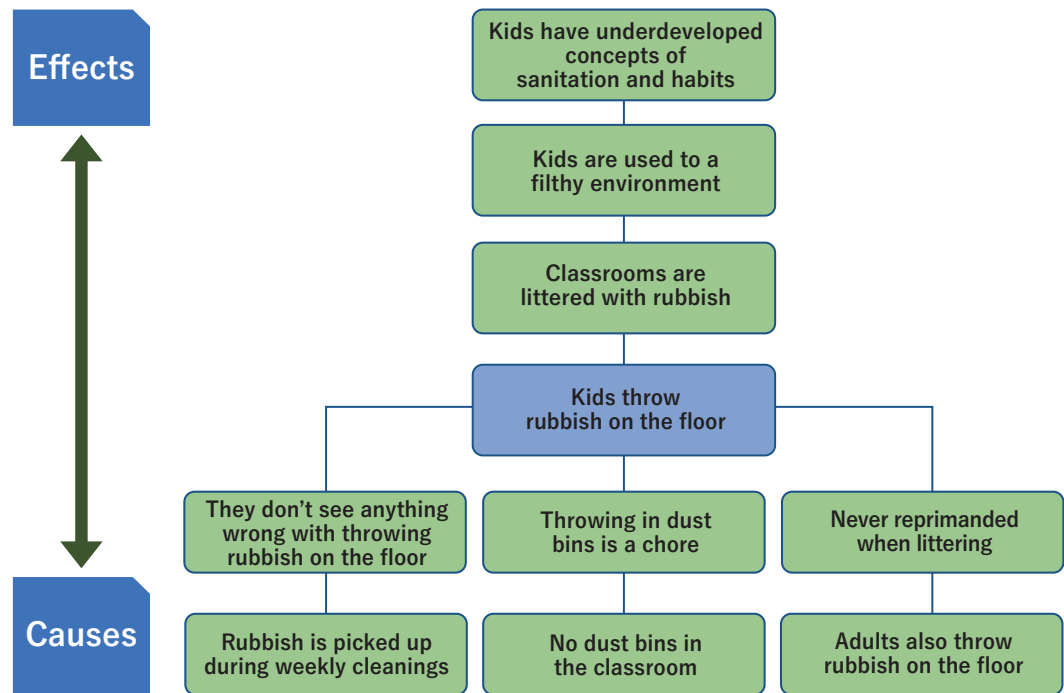


Fig. 7 Example problem tree analysis for elementary school

Next, the following is a problem tree analysis of a city-level issue. In this case, “Residents throw away rubbish in an arbitrarily decided location” is assumed as the central issue.

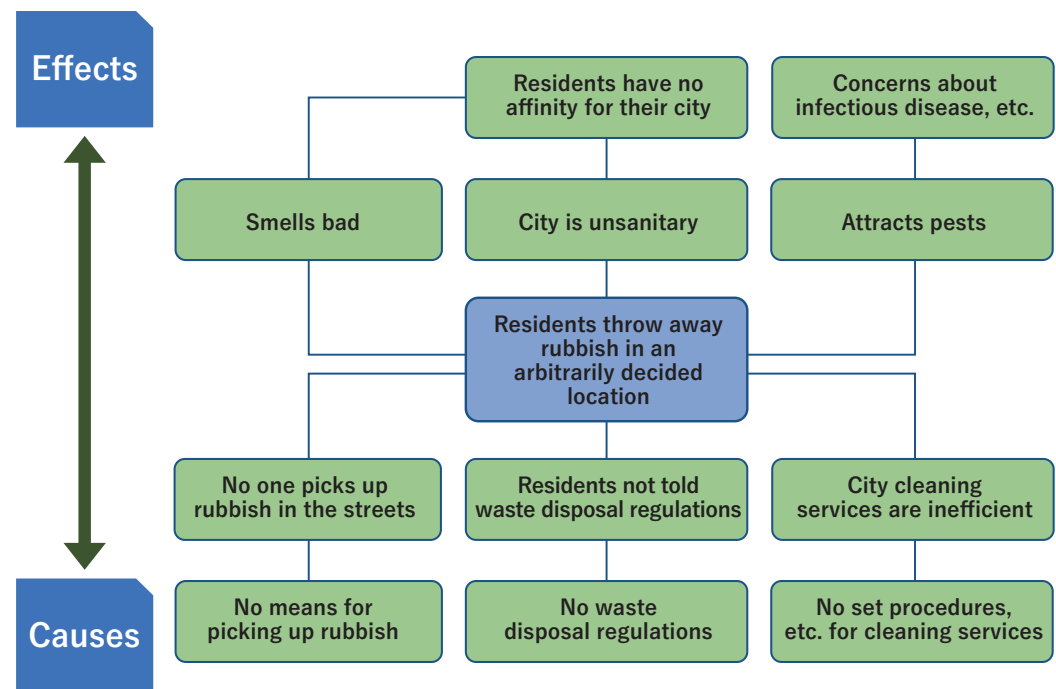


Fig. 8 Example problem tree analysis for a city

(2) Stakeholder Analysis

When conducting a problem analysis, consider who are stakeholders (individuals and organizations) and how they are related to the issues and what is their standpoint. This step corresponds to the “who” in the 5W1H.

There is no one singular method (perspective) for the stakeholder analysis. For example, in the case presented for the above problem tree analyses, the following stakeholder analysis is one possibility.

With a central issue of rubbish on classroom floors, there are four possible main stakeholders: students, teachers, school officials, and parents of students. The stakeholder analysis will mainly involve analysing 1) the position and thoughts of the stakeholders to the issue to be addressed and 2) the connections among the stakeholders (see Table 4).

What do the results of analysis show us? For one, none of the stakeholders are expected to object to the idea that “eliminating rubbish on the floors will make the classrooms cleaner” (No stakeholders will be troubles if the activity outcome is achieved). This point will support tackling the issue.

Further the position and interests of the students’ parents are unclear on many points. This serves to illustrate that, if an initiative is undertaken to combat rubbish on classroom floors, this stakeholder (i.e. parents of student) will need to be surveyed in order to determine their position and interests. Also, a stakeholder analysis can reveal various traits, such as how most of the stakeholders are in the position of instructing/supervising the students.

Table 4 Sample Stakeholder Analysis (Elementary School)

| Stakeholder Analysis | Relation to student | Thinks littering is wrong? (Values) | Wants the school/ classroom to be clean? (Values) | Predicted position on efforts to stop littering | Predicted position if littering is stopped and classroom is clean |
|------------------------------------|-----------------------------------|-------------------------------------|---|--|---|
| Student | Self | ? | ? | May participate if made fun | Positive |
| Teachers | Instructing/ supervising position | ? | Yes | Will support if their workload does not increase | Positive |
| School officials (Principal, etc.) | Instructing/ supervising position | ? | Yes | Will support if it does not cost anything | Positive |
| Parents of students | Instructing/ supervising position | ? | ? | ? | ? |

If performing a stakeholder analysis for waste management issues, the roles and functions of the stakeholders can also be analysed in line with the waste flow (See Fig. 9). Such an analysis can be beneficial in considering the issues of a city, as shown in Fig. 8. If waste management is privately outsourced, the private operators are another important stakeholder. The city and private operators will not always agree on the benefits, and some stakeholders may even decline handling the issue.

Walking through the flow process from waste generation to disposal will help identify any



As with problem analysis, all parties will ideally be asked to participate in a **stakeholder analysis**. However, it can be difficult to get a representative from all stakeholders under analysis to participate; there will always be an element of prediction involved. Be sure to account for this in the analysis.

issues in the waste flow. For example, if rubbish is scattered around the collection point, this indicates that either waste discharge or collection causes the problem. If there is littering in empty lots or by riverside, it is likely a problem with waste discharge. Analysing according to the waste flow will help identify where the issues are and allow for digging deeper (discharge rules not being followed, no regular collection schedule, etc.), revealing the issue causes.

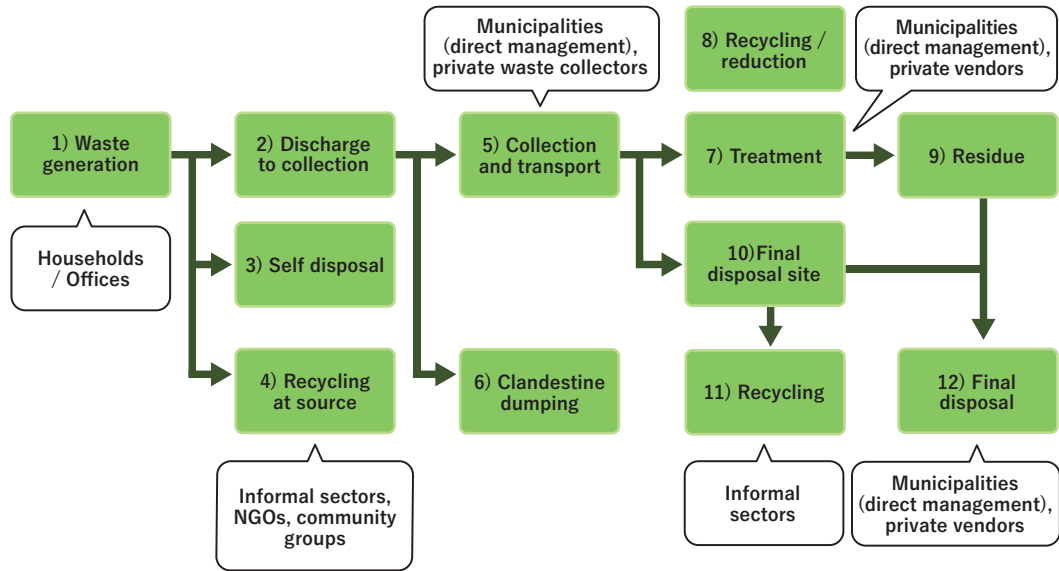


Fig. 9 Waste flow

Following the waste flow, the roles of the different stakeholders can be sorted as given in Table 5.

Table 5 Example of sorting stakeholder roles along the waste flow order

| Stakeholder Analysis | Generation/ storage/ discharge | Collection/ Transport | Intermediate treatment/ recycling | Final disposal | Central administration, etc. |
|----------------------|-------------------------------------|---|------------------------------------|---------------------------------------|---|
| Households/ offices | Dispose of waste according to rules | — | — | — | Do not litter. Pay waste collection fee. |
| Public sector | Set/inform the public of the rules | Set the rules and teach/ supervise | Set the rules and teach/ supervise | Set the rules and teach/ supervise | Operate waste management systems to keep litter off the streets |
| Private sector | — | Collect waste according to rules | Collect waste according to rules | Dispose of waste according to rules | Do not drop rubbish during collection/ transport |
| Informal sectors | — | Collect valuable resources according to rules | Recycle waste according to rules | Dispose of residue according to rules | Do not dump nonrecyclable residues in the streets |

A sample stakeholder analysis for a city can be organized as given in Table 6.

Table 6 Sample Stakeholder Analysis (City-level)

| Stakeholder Analysis | Relation to Residents | Thinks rubbish lying around at waste disposal sites should be fixed? (Values/motivation) | Wants to introduce fixed time and fixed point collection system? (Values) | Predicted position on promoting fixed time and fixed point collection system | Predicted position on promoting fixed time and fixed point collection system if it eliminates rubbish lying around at waste disposal sites |
|--------------------------------|---|--|---|--|--|
| Residents | Self | Yes | ? | Will support if it does not cost and waste is properly collected. | Positive |
| Community leaders | Represents residents | Yes | Yes | Wants it actively promoted and will actively support | Positive |
| Waste Management Dept. staff | Not directly related. Only interacts directly for waste collection. | Yes | ? | Will do it if own workload is not increased/it makes waste collection more efficient | Positive |
| Waste Management Dept. Manager | — | Yes | Yes | Actively promotes it | Positive |

(3) Data Collection

The next step is to collect the data required for tackling the selected issue.

A central issue of rubbish on classroom floors, for example, would likely require the data outlined below. Collecting the relevant information will clear up the scale and realities of the issue to be undertaken and be useful in discussing what measures would be effective. Conducting a simple waste survey (see Box 2) is also recommended for collecting data on waste management.

- About how much rubbish is thrown on the classroom floor each day?
- What kind of rubbish is thrown on the floor?
- Who cleans the classrooms, and who discards the rubbish?
- Who collects school rubbish, and when/how often is it collected?

Based on the above analyses and discussions, proceed to the problem analysis tree and narrow down the scope to be addressed by the activities. In the example shown in Fig. 11, focusing on the issue of “Residents throw away rubbish in an arbitrarily decided location”, the causes and effects surrounding this issue are circled in red to show the initiative scope.

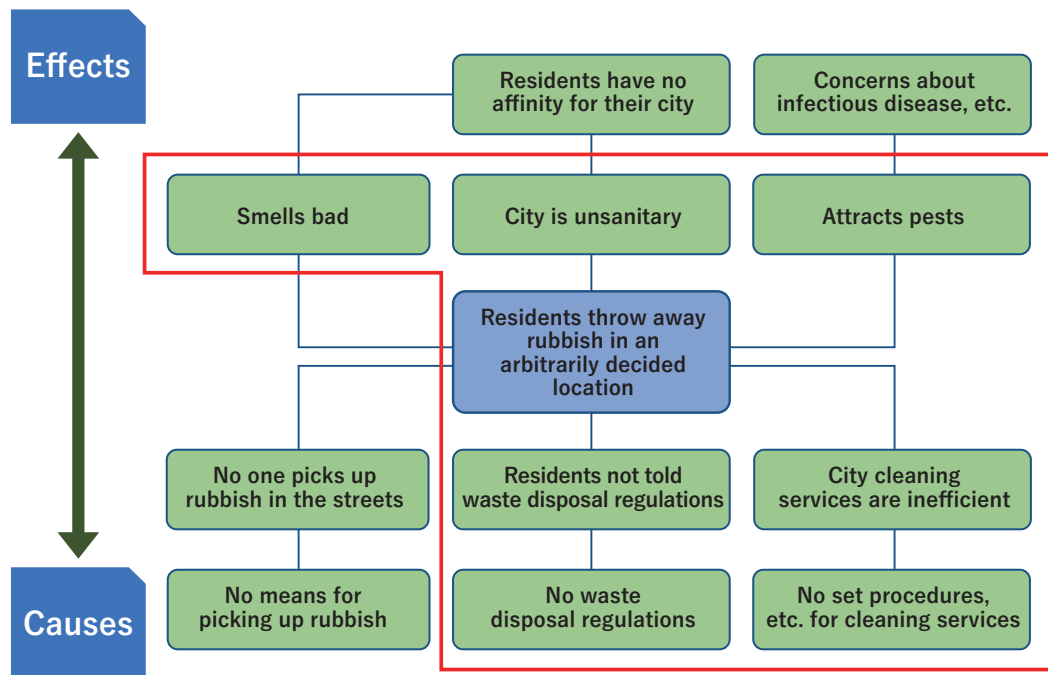



Fig. 11 Example problem tree analysis for a city

2.3 Chapter Key Points

- Outlining a draft plan of the activities and determining their orientation and scale requires first knowing what resources are locally available.
- A problem analysis and stakeholder analysis performed together with the stakeholders are recommended in order to identify what priority issue(s) to address with the limited available resources.
- Getting stakeholder participation with the tools of a problem analysis tree and stakeholder analysis will serve both to produce results and build a common understanding among the stakeholders.

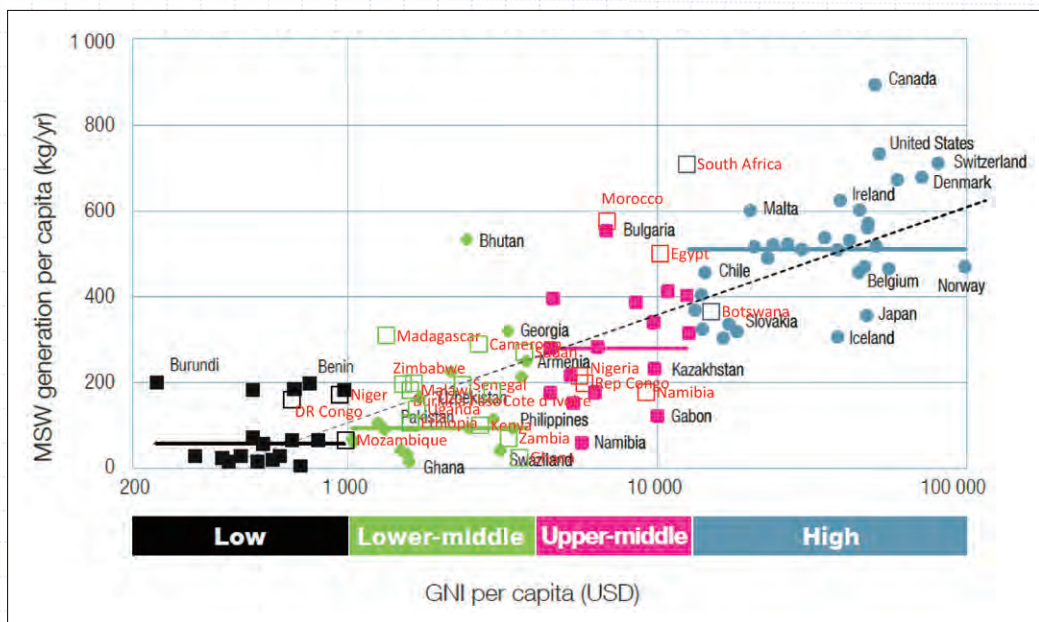
Conducting a Simple Waste Amount and Composition Survey

Understanding the volume and types of waste being generated is highly useful for developing waste issue measures. A simple waste amount survey consists of using a simple spring scale to measure how much waste is generated per day per person, every day for 1 week. If you have the resources, a **waste composition analysis**  can also be performed.

If taken by colleagues or stakeholders as an opportunity to form teams, this can also help to train supporters before the activities start in earnest. Once collected, the data will suggest what activities might improve waste management in each area. Furthermore, the data itself can be used in environmental education and awareness raising materials. For example, data for the target city could be plotted in a chart, like the one below for the gross national income and per-capita waste generated around the world. If the target city is above the line, the lifestyle is arguably wasteful; if below the line, the city is arguably conservative.



The 10 standard categories for a waste composition analysis are: 1) food waste, 2) papers, 3) fabrics, 4) plastics, 5) grass/wood, 6) rubber/leather, 7) metals, 8) glass, 9) ceramics/stone, and 10) other. Actual categories may be adjusted depending on objectives.



Source: Yoshida (2018)¹⁹, Modified from UNEP-ISWA (2015)²⁰ and plotted African data.

Fig. 10 National income (GNI/capita) vs. waste generated (kg/year/capita)

Environment Picture Diary Initiative in Africa

Taking advantage of the African Clean Cities Platform (ACCP), the Yokohama City Recycle Resources Association ("Association"), Yokohama Resources and Waste Recycling Bureau ("Yokohama City"), and JICA volunteers teamed up in an initiative to have African children create an Environment Picture Diary.

The Association has worked on its environmental diaries in Yokohama since 2000. They have children use these diaries to freely express their own thoughts on topics they discuss at home and environmental issues and conservation in a combination of pictures and words. Entering its 19th year, 18,975 children submitted diaries in 2018. In recent years, the children have also proposed solutions for social issues through their work on environmental diaries, presenting a high affinity with the 17 Sustainable Development Goals (See Section 1.3 of this handbook for more on SDGs).

The environmental diaries are about more than just drawing nice pictures and writing nice things—they are a means of environmental education. In their diaries, children draw the future they want to live in. This is their opportunity to candidly express the kind of future they want. And conversely, it also serves as a message that the current situation is not the future they imagine.

Furthermore, the environmental diaries are environmental education for more than just the children. They serve as a tool to get the children to talk with their families and friends about the environment. Adults also have much to learn from the children's environmental diaries. Hopefully, by writing their environmental diaries, the children will think about environmental issues with their families and learn correct knowledge and develop awareness of the environment.

With the ACCP framework, JICA volunteers engaged in environmental education in Africa (environmental diaries) had the African children's diaries mailed to Japan by JICA. The diaries were then exhibited in the Environment Picture Diary Exhibitions, run by Yokohama City and the Association. Messages from Yokohama children at the diary exhibitions were then collected to send back to Africa via JICA.

Environmental diaries are an initiative that can be set up in African regions as a tool for sparking conversations between children and adults on the environment. We hope that, by continuing and growing this initiative, children will grow up into adults with a wider perspective of the world and enable them to mould the townscape into their ideal future.



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In an elementary school at the Cameroon town of Kribi, after having the kids discuss the topic with their families beforehand, we had them draw pictures on the theme of "Creating a clean and healthy city together".

The kids were ecstatic to have their very own drawings on display in Japan and worked enthusiastically. As kids love drawing, pictures are a great way to let them express themselves while having fun. To respect their individual ideas, we did not give any examples by the JICA volunteers, teachers, or other adults out of the classroom so that they could focus on their own themes. The kids responded: when we collected all the environmental diaries, there were many opinions with a childness and authenticity, and many opinions well thought out with their families. There were also quite a few kids showing us pictures of the Japanese flag alongside the Cameroon flag—for a brief moment, their visions of the ideal town brought two nations together.

"Creating a clean and healthy city together" will require much effort. Still, these kids and their drawings are an emphatic statement that making it happen is not impossible.



Kazumi KATO
JICA Volunteer to Cameroon

Building an Environmental Education Program

3.1 Developing Action Plans

(1) The PDCA Cycle

Once issues are identified, the next step is to formulate a concrete action plan. Among many ways to make an action plan, the method introduced here is the **PDCA cycle**: consisting of four(4) recursive steps for continuous improvement of a task. The PDCA cycle steps are plan, do, check and act.



The PDCA cycle is a method for continuous improvement, originally proposed for quality control of production technology.

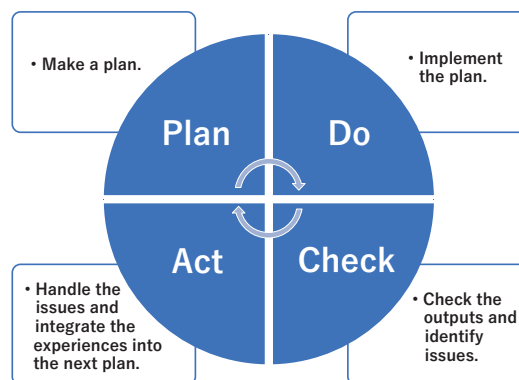


Fig. 12 PDCA cycle

The PDCA cycle can be applied to projects regardless of their duration; either long-term projects and actions measured daily. Recursing through smaller PDCA cycles with daily actions will continuously improve the action. At the same time, larger PDCA cycles can be used to track overall progress for all actions.

(2) Planning Activities Based on the PDCA Cycle

Generally, the term “project” refers to a series of actions conducted 1) with limited resources and/or under external conditions and 2) for a specific goal or objective. Accordingly, when planning a project you need to set realistic goals take the various existing restrictions into account, and discuss consistent action plans in consistent with steps for achieving these goals.

a) Project duration

Discuss how long it needs to resolve the central issue identified through the problem tree analysis and stakeholder analysis in Section 2.2. For smaller PDCA cycles, the duration can also be set to a period convenient for the stakeholders (e.g. ‘a semester’ in the case of schools).

b) Goals

Next step is setting goals to be achieved within the project duration. The goals should be achievable with the resources explained in Section 2.1, including manpower, materials, funds, places, time, and expertise.

c) Specific activities

Discuss specific activities for achieving the goals. It is critical that the connection between goal and activity is clear. Try to organize logical path for achieving the goals with accumulating several activities.

For example, if the goal is to eliminate rubbish on all floors in the school, possible activities might be: a) hold classes to discuss rubbish and littering, b) run an anti-litter campaign, and c) put dust bins in the classrooms. In planning activities try to maximize use of local resources.

d) Sequence and timing of activities

In the littering example above, a possible sequence would be to (1) hold discussions at a class (a) above), (2) have everyone make dust bins together for the classrooms (c) above), and then (3) run a campaign urging everyone to toss their rubbish in those dust bins (b) above). The timing of operating activities also needs consideration of factors such as long holidays, school events, and class schedules. Try to organize a sequence and periods for achieving the goals efficiently.

e) Monitoring indicators

Discuss indicators for regularly monitoring the progress of activities, as well as how to measure these indicators. It is important to get stakeholders' consensus on reasonable indicators that do not require too much effort or money to gather data. In the school rubbish example, easily obtainable data would be recommended, such as taking photos of the classrooms, counting the places with rubbish, or interviewing the children to observe changes in awareness. For more details on monitoring, please refer to Section 4.2.

For all the planning activities described above, try to get your colleagues and the stakeholders involved to ensure a common understanding.

3.2 Notes for Building a Program

(1) Set Proper Behaviour Based on Actual State

With the issue of rubbish littering the school, just urging the students to quit littering and throw rubbish in the dust bins will not resolve the issue unless enough numbers of dust bins are installed in the school and rubbish in the bins is collected regularly and disposed of properly. Similarly, it would be pointless to call on residents to sort rubbish to promote recycling unless the sorted recyclables are properly collected and delivered to a recycling company. As Fig.13 shows, as a precondition to introduce new behaviour to resolve the issue, the functional waste management systems must be in place. To decide the behaviour to be newly introduced, proper understanding of the actual situation is crucial. When necessary, improving local waste management systems is also important through interventions such as installing dust bins or ensuring a route for delivering recyclables to recycling companies.

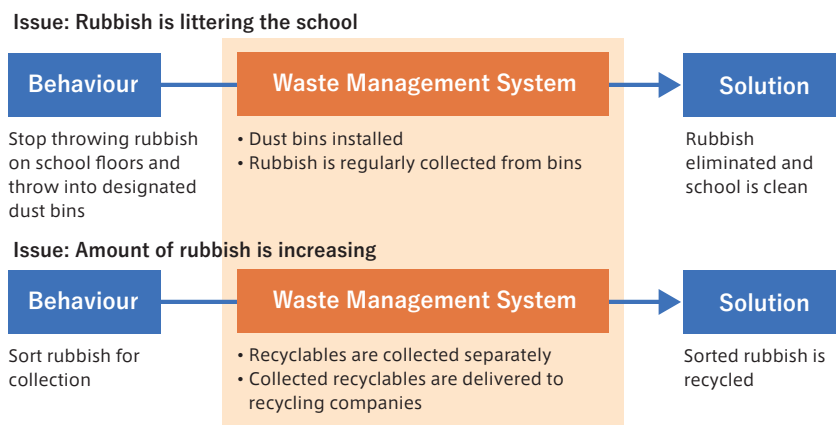


Fig. 13 Local waste management systems

(2) Set Aims and Opportunities Appropriate for Each Stage of Development

a) Appropriate target setting

It is important to adjust the aims according to age and developmental stage. Generally, using the senses and hands-on activities will be effective for preschool children, whereas hands-on and communication activities are effective for lower grades of elementary schools. The higher the target grade gets, the more skills in finding and solving issues, or thinking and judgment skills through action may be emphasized.

Table 7 Aims for target audience's stages of development

| Audience | Aims |
|---------------------------|--|
| Preschool/kindergarten | Learn and Enjoy by experiencing nature, etc., not teaching knowledge |
| Elementary/ middle school | Hands-on learning, active participation, communication |
| Adults | Behavioural changes to solve the actual issue |


b) Different opportunities for target audience's stages of development

As Table 8 shows, the opportunities for environmental education should also be adjusted to the audience's stage of development. It is important to design programs that meet the audience and actual situation.

Table 8 Opportunities for target audience's stages of development

| Audience | Example opportunities |
|---------------------------|---|
| Preschool/ kindergarten | Day-care hours, parent meetings, parents' observation day, outdoor activities, excursions |
| Elementary/ middle school | In class, after school, extracurricular activities |
| Adults | Community meetings/networks, church/mosque/ temple, community centres, etc. |

(3) Create Quick Wins

Getting a response is important in keeping people motivated. Any new endeavour requires effort, so repeated successes are important to feeling that something is worthwhile. In project management, these are called **quick wins** . A quick win is a small victory over a short timeframe, as opposed to finally achieving some result after a multi-year project completes. Piling up quick wins will make your stakeholders sense value in the endeavour, keep them motivated, and increase their sense of ownership. Conversely, failure due to external factors outside of their control can leave stakeholders feeling rejected and betrayed for their efforts. Such losses run the risk of deflating their motivation all at once.

For example, trying for a citywide cleaning campaign from the beginning would take a lot of time and money. However, limiting the campaign to a limited area where people gather anyway, like parks or beaches, could get a quick win. The participants notice how clean it gets in a short timeframe, feel that sense of accomplishment, and may even be motivated to try it out somewhere else.



 Taking before/after pictures when cleaning up the classroom and pointing out the difference or giving out awards in a “clean the classroom” contest to score a quick win can be great ways of building confidence and sense of achievement.

3.3 Elements to Include

As mentioned in Section 1.2, objectives for environmental education can be set in stages: interest, understanding, and behavioural change. To achieve these objectives, it can be effective to incorporate seven elements into the programme: 1) fun, 2) sense of crisis, 3) responsibility, 4) effectiveness, 5) feasibility, 6) cost benefit, and 7) normative awareness.

Table 9 illustrates roughly how effective these elements are in building interest, understanding, or behavioural change.

Table 9 Elements to include in Environmental Education Programmes

| | Interest | Understanding | Behavioural Change |
|-------------------------|----------|---------------|--------------------|
| (1) Fun | ◎ | | ○ |
| (2) Sense of Crisis | ◎ | ◎ | ○ |
| (3) Responsibility | ○ | ◎ | ○ |
| (4) Effectiveness | ○ | ◎ | ○ |
| (5) Feasibility | | ○ | ◎ |
| (6) Cost benefit | | | ◎ |
| (7) Normative awareness | | | ◎ |

(1) Fun: “That class on rubbish was interesting!”

The word “rubbish” generally carries a negative connotation. Rubbish is dirty and smells. Thus, making it fun and giving a positive impression can be effective in raising interest in the issue of rubbish. You could try putting your talking points in a quiz, skit, or picture show, or build a friendly character, or compose an original song. Alternately, make a game of tidying up rubbish with awards for team effort. Students may remember the experience as being fun or being happy for getting praised, nurturing both interest and a positive attitude on the issue of rubbish.

Particularly children are more likely to talk about the environmental education program with their parents and family if they felt it was fun. This ripple effect from children to families is called **intergenerational learning**.

(2) Sense of Crisis: “We can’t go on like this!”

Environmental risks refer to the possibilities of environmental issues adversely impacting human health, our living environments, and the natural environment. As explained in Section 1.1, unsanitary living conditions due to illegal dumping and littering increase the risk of spreading diseases like gastroenteritis and cholera, and improper treatment of waste in landfills increases the risks of water pollution, offensive odours, and fire. It is important at all stages of interest, understanding and behavioural change to understand the environmental risks and think of the dire consequences if we continue littering or treating our waste improperly.

The sense of crisis that most resonates will depend on the audience. Taking the spread of cholera for example, the explanation can be tailored to the audience. With children, one might emphasize that getting cholera would make your stomach hurt, whereas with adults, presenting country-level patient and fatality figures, with special focus on high paediatric case rates, can convey a sense of crisis.

However, the objective is not to make the audience feel insecure. Take care not to incite panic by exaggerating the risks. Both the content and its delivery must be appropriate to the audience.

(3) Responsibility: “I’m responsible, too.”

For example, even knowing that rubbish is littering the streets, some people may think that cleaning it up is the government’s responsibility, or that the city hires people to clean and so they can go on littering. A number of approaches can be used to make the audience aware that each individual shares responsibility in waste issues. Some educational approaches include explaining in a class or briefing session, or promoting slogans like “Let’s join hands to keep our school (or streets) clean!” Other approaches are more introspective, such as encouraging people to investigate the volumes and types of waste they or their family produce and reflect on exactly how much waste they produce.



A cleaning campaign with the slogan “Discard rubbish where it belongs” (Cameroon)



Have fun while learning about waste and the 3R’s by having recycled craft time or making instruments from plastic bottles, or by playing environmental puzzles and games. Refer to examples of teaching materials 1-5 in the appendix.



See Box 3 for more on intergenerational learning.




Seeing impactful pictures and videos can also invoke a sense of crisis, such as giving a picture show using pictures of plastic waste found in the stomach of a dead bird. Refer to Examples of Teaching Materials 6 in the appendix.



In elementary school, hold a contest to see who can find and pick up the most rubbish, then map out where the most rubbish was found and discuss specific solutions as a group. See Examples of Practical Activities 4 in the Appendix.


(4) Effectiveness: “I can make a difference”

It will be hard to convince people to stop littering if they think the rubbish in the city will still pile up even if they stop. Perceived effectiveness, the feeling that they can make a difference, is important in terms of building both interest and behavioural change. A cleaning campaign illustrates this well: seeing the school or street get cleaned in such a short time gets a quick win (see Section 3.2) and builds perceived effectiveness in participants.

If, despite the implementation of awareness programs promoting waste separation and **fixed time and fixed point (FTFP) collection** , collection staff load the sorted rubbish in the same collection cart, or the collection trucks do not arrive at the designated time or location, residents will feel



Briefing community leaders on waste collection improvements from before to after introducing FTFP collection (Sudan)

their efforts are a waste and be less cooperative. A properly functioning waste management system that the residents understand and trust is essential to perceive the effectiveness of their efforts. In addition, there needs to be a complaint desk for receiving resident complaints, and complaints need to be dealt with properly to restore trust. The departments in charge of resident awareness and waste collection should be working together .




Fixed time and fixed point (FTFP) collection is a method to collect waste efficiently and hygienically by having the residents put out trash at a designated time and location.



When introducing FTFP collection, it is effective to take before and after pictures of streets and measure how much it shortens collection times to share the results with residents.

(5) Feasibility: “We can do that!”

Promoting specific behaviour entails explaining the desired behaviour clearly and having that explanation understood. For example, with a practical composting program for food waste at home, families will not actually practice it if they find composting very difficult. Feasibility can be increased by posting clearly articulated steps in handouts and manuals and by holding demonstrations to show them how. If introducing waste separation into two categories: food waste and others, they may not be sure how to sort chicken bones or hard coconut shells. Playing sorting games or having them actually try it can be effective in getting residents to understand correctly. Doing it once will do wonders for feasibility, and resistance will fade with repetition, even if the first time is difficult .



Practical class with a sorting card game (Kenya)



Feasibility can be enhanced by explaining the separation rule in an easy-to-understand manner using a flyer or a sorting game. Refer to Examples of Teaching Materials 7 and 8 in the Appendix.

(6) Cost Benefit: “Is this good or bad for me?”

In plain terms, for the individual, cost versus benefit means whether something will help or harm them. For example, if waste separation requires them to purchase an expensive dust bin, they will likely see it as being bad for them individually and not want to do it. However, if waste separation allows them to exchange recyclables for cash, they will see it as being good for them individually and might be more proactive in sorting. There are several different kinds of costs other than the economic cost of money, including time cost, mental cost (bothersome/considerations), and physical cost (labour/effort).

What can be done to reduce the costs and increase the benefits to drive behavioural change, you ask? For one, sell the benefits. For example, if the residents understand that cleaning the streets with a cleaning campaign will benefit them by preventing infectious disease, feeling good, and allowing children to play in the empty lots once littered with rubbish, it will dictate interest and behaviour. Another strategy might be to create additional benefits with a fun event or by handing out drinks to participants after the campaign. Conversely, cost can be reduced by coming up with methods that are cheap, easy, and take less time ✓.



At Japanese cleaning campaigns, rubbish grabbers are frequently used. Grabbers are easier to use, reducing the effort and bother of picking up rubbish by hand. While hard to find in Africa, one factory in Niamey, Niger did make grabbers locally upon request. See Column 3 for more details.

(7) Normative Awareness: Group Behaviour and Expectations

Normative awareness is the feeling of need to conform to social norms, or rules. Those with high normative awareness will follow the rules even if those around them do not. In contrast, those with low normative awareness will believe that everyone else is littering so they can too, even if littering is prohibited.

The way to effectively build normative awareness is to get everyone involved in the initiative. If all students in the class stop littering in the classroom, the individual students will not want to be the only one littering. Similarly, with families and neighbours, individuals will abide by the rules if everyone else is.

Another approach is to make them sense that others expect them to conform. Particularly with children, if they sense that their teachers or families expect them to, children will make more of an effort not to betray that expectation. One more effective method is the commitment: have them commit to not littering by making an oath or signing a written statement ✓.



Secondary school students make a No Littering commitment before a cleaning campaign (Niger)

It is not necessary for every environmental education program to incorporate all seven elements. Keep these elements in mind and develop each program to fit the objectives and audience. A program for increasing interest might emphasize fun and sense of crisis, whereas a program targeting behavioural change in a group with low normative awareness might be designed to focus on changing those aspects.



Before a school cleaning campaign, having all the students commit to a zero rubbish or no littering policy will increase normative awareness.

Intergenerational Learning

'Intergenerational learning' takes place when children talk to their parents and pass on the lessons they learn in school. While the primary objective of environmental education for children is to increase the children's knowledge and interest in the environment and change their behaviour, children's education can also be expected to influence adult interest and behaviour thanks to intergenerational learning. The following elements have been shown to be effective in developing an environmental education program that is conducive to the intergenerational learning effect:

- Assign homework and projects to prompt parent-child communication when working to learn at home and produce an environmental educational effect in both parents and child.
- Vague material and basic information will not make an impression with children or be told to the parents. Make the children ponder over the issue and discover their own specific solutions.
- With hands-on learning, children will share their interest with the parents.
- Children may talk about activities of standalone environmental lessons at home, but such conversations tend to focus on the program activity itself more than the environmental issues addressed. The actual content of the lessons will be discussed in more detail with a continuous series of programs.
- Local issues will resonate with and raise awareness more in both parents and children.

References: Ballantyne et al. (1998,2001)^{21,22}, Duvall and Zint (2007)²³

3.4 Building an Environmental Education Program

(1) Steps in Building an Environmental Education Program

The steps in building a program discussed to this point are shown in Fig. 14.

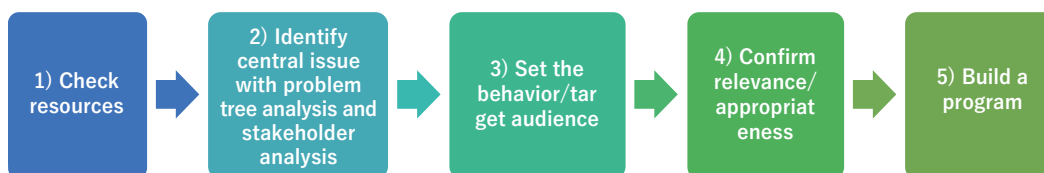



Fig. 14 Five Steps in program building

Generally, environmental education programs are designed to progress through the stages of introduction, expansion, reflection, and summary, with individual activities such as picture shows, classes or lectures, and field trips. In the introduction stage, the participants open up to one another to build trust. **Ice breakers**  are often used to get everyone relaxed at this stage. Next, in the expansion stage, the activities start to home in on the program themes and objectives. Then, in the reflection and summary stages, the participants share and summarize what they noticed and learned to make the program a more meaningful experience.



Ice breakers are activities designed for the participants to relieve their tension and relax. (Some sample ice breaking games are given in Chapter 5 of the Activity Handbook for Environmental Education Volunteers.)

(2) Points to Consider in Program Development

Table 10 shows some points to consider in building a program, with examples. In thinking about each individual program item, try to develop an achievable program in more concrete terms. By all means, solicit your colleagues and the stakeholders for their opinions during the planning process to increase ownership. Some examples of programs and materials developed by JICA volunteers and JICA technical cooperation projects are provided for your reference in the Appendix.

Table 10 Points to consider in program development

| Item | Example |
|--|--|
| Program title | Operation 'Save the sea turtles!' |
| Target audience | Students of schools near ABC beach |
| Time/duration | 3weeks |
| Number of audience | 20-30 |
| Location | Classroom, ABC beach |
| Implementer | School teachers |
| Environmental Behaviour Driving Elements | Fun, sense of crisis, responsibility, normative awareness |
| Goals | Stop littering on ABC beach, take rubbish home |
| Tools used | Observation record, transport to ABC beach (bus), rubbish bags, gloves, picture show |
| Content | <p>(1) Observation (2 weeks)</p> <ul style="list-style-type: none"> ● Take shifts each morning, keeping observation records on beach activity. Notice that rubbish increases the days after holidays and days with bad weather. ● See what kinds of rubbish are frequent; understand that many are the cans and plastic bottles we throw away. <p>(2) Classroom instruction (1 hour)</p> <ul style="list-style-type: none"> ● Use a picture show to explain the life of a sea turtle. ● Understand that sea turtles will only lay their eggs on clean beaches and so will stop coming to ABC beach if the present situation persists. <p>...</p> |



More on developing environmental educational materials is discussed on Page 48 of the Activity Handbook for Environmental Education Volunteers.



- Reference materials are browsable by keyword and category on PC Live, the media library of the Peace Corps.²⁴
- More examples are provided on the sample environmental education programs on the ACCP website and from Page 75 of the Activity Handbook for Environmental Education Volunteers.

(3) Practical Activities for Environmental Education Programs

Holding school classes on waste issues and waste separation may indeed raise children's interest in waste issues, but classes alone are not likely to get children to put their learning into practice. The following event and activity examples can be effective in bridging the gap between interest and behaviour, providing an opportunity for lessons to be put into action:

- Art contest for separate dust bins
- Cleaning campaigns joining students and neighbourhood residents
- Making flower beds out of waste tyres and growing a garden
- Classroom quiz contests on guessing decomposition times for waste
- Recycled crafts contest using school rubbish
- Eco-school competition
- Waste-based skit contest
- Environmental art contest
- Zero waste parade
- Environmentally themed display boards or wall posters
- Rubbish pick up eco-relay
- Survey of school waste (locations, types, volume)
- Environmental awareness art/murals on school grounds walls

3.5 Chapter Key Points

- The PDCA (Plan-Do-Check-Act) cycle is one basic approach to project management. In project planning, a clear connection between activities and objectives is important. Activities should progressively build up to achieving the project objectives.
- Motivation and many other elements must be accounted for in project planning. It is particularly important to look at how developed the local waste management systems are and plan to avoid betraying expectations of the target audience.
- In developing an environmental education program, it is important to set audience-appropriate aims and opportunities that fit their stage of development. Consider the following seven elements: 1) fun, 2) sense of crisis, 3) responsibility, 4) effectiveness, 5) feasibility, 6) cost benefit, and 7) normative awareness.

Recommended Environmental Education Materials: High Moon Environmental Comic

Under the pseudonym High Moon, Professor Emeritus Hiroshi Takatsuki of Kyoto University drew these manga-style comics about environmental issues and waste issues while researching waste issues himself. Authorized for free use in environmental education and advertising campaigns, these comics are used across Japan and worldwide. High Moon comics are also used in Africa to inspire group discussions in the classroom or to present environmental issues and measures pictorially.



Source: High Moon Kobo website <https://highmoonkobo.net/>

Column 3

Cleaning Campaign in Niamey, Niger

In recent years, the Niger capital of Niamey has scrambled to increase resident awareness of its waste issues amidst the road development and cleaning initiatives being promoted, including the removal of street vendors. To that end, the JICA Niger Office co-sponsored a cleaning campaign with the Niger State Ministry of Secondary Education and Ministry of Environment, Urban Sanitation and Sustainable Development in January 2019 following a similar initiative undertaken in 2018. Nordiré Secondary School in Niamey's Commune V was targeted for the campaign. As with previous installations, an awareness seminar for Nordiré teachers, students, and parent representatives was held the week before the campaign itself to spark motivation.

Then, the day before the campaign, school officials, community residents, and environmental NGOs were invited to a resident awareness seminar. This seminar consisted of introductions of waste management in other countries, an overview and videos on Niamey's waste issues, a pledge by the student representative, and a recycled art exhibit. Also, plastic bags found in the stomach of slaughtered cows were shown (picture 1), along with an explanation of how littering and use of plastic bags impact the ecosystem. Next, the principal from France-Amitié School, which held a cleaning campaign the



previous year, spoke to the audience, happily reporting that France-Amitié students and local residents have kept the school and its neighbourhood clean since the campaign (picture 2).

Then came the day of the campaign itself. At the opening ceremony, JICA presented the school with cleaning equipment and dust bins, and then the students performed a skit about littering being prohibited, much to the delight of the crowd. Next, the Niamey State Governor picked up a rake and started cleaning near the school entrance. Taking his cue, the cleaning campaign commenced with roughly 700 students in total. Representative Yamagata of the JICA Niger Office, whose aim is for Japanese waste grabbers to catch on in Niamey, also participated with his own personal grabber. While standard in Japan, these grabbers, which make picking up rubbish easier than doing so by hand, are hard to find in Africa. Just for this campaign, JICA put in a special order to a local factory to make these Nigerien grabbers (picture 3: Japanese grabber on right, Nigerien grabber on left).



In a country like Niger, with its vast deserts and many unpaved roads, dirt and sand get swept up along with the rubbish when cleaning up. Armed with tools perfectly matched to the environment that pick up just the rubbish, the students went straight to work with the grabbers.

Tacitly focused on the task and getting quite dirty themselves, the students bustled until not only the school but also the neighbouring community was also clean. As news of the cleaning campaigns gain steam year to year, the calls to “Do my place next!” increase. In terms of campaign sustainability and development, however, they are never outsourced; it is better to keep the campaigns voluntarily planned and run to let them organically spread to other areas.

In Africa’s poorest countries, which are still lacking in supplies, the average resident is still largely unaware of the issues of waste, and public littering is endemic. In such situations, such cleaning campaigns can be an effective piece of beautification education in the community and schools. Teaching people to keep their living spaces clean builds ownership as a waste producer in individuals and prompts them to get involved in basic waste issues.

These cleaning campaigns are but a small start by a small JICA Niger Office to make life in Niger just a little bit better. One of the students who participated in last year’s campaigns has told us that, since last year’s campaign, she has stopped littering. Participating just once to clean up had that much power to them. Hearing that highlighted the importance of ownership and felt like one small step in changing the world.

Mie NAGAYASU
 Researcher, EX Research Institute, Ltd.



04 Implementing an Environmental Education Program

4.1 Notes on Program Implementation

In this section, the items of note for ensuring that the environmental education program is implemented efficiently and effectively will be broken into three categories: common items, environmental education for schools, and awareness raising activities for residents.

(1) Common Items

a) Obtain location/facility owners' support

Owner and/or administrator approval and support will be required when using a community centre or other venue, or when looking to tour a landfill or recycling centre.


b) Solicit city hall, NGOs, and other groups for support

Depending on the activity, it may be an option to request a lecture to a city hall staff, private recycling company, or other party knowledgeable in waste management and treatment.

c) Gather required data

Some activities will require data on local waste management in order to flesh out the content, such as per capita daily waste discharge, waste generation in the whole target area, amount of landfill, and waste disposal costs.

d) Secure funding

Certain activities may require funding to purchase equipment and materials, such as dust bins and cleaning equipment. Some activities may be eligible for grants from various public organizations, donors, or NGOs, or even support from private companies for environmental conservation initiatives as part of **CSR** .

(2) Environmental Education for Schools

a) Activity scheduling

In many African educational institutions, environmental education activities are not included in the curriculum tend to be seen as less important than major subjects. Thus, activities will need to be scheduled not to interfere with major subject classes, as well as holidays and test periods.



“CSR” is short for corporate social responsibility. CSR represents the concept that companies are responsible for properly responding to the various demands of the all stakeholders, above and beyond merely chasing profits and compliances. See if the target country offers companies any tax incentives or other benefits for CSR activities.



More tips on school visits are discussed on Page 65 of the Activity Handbook for Environmental Education Volunteers.

b) Safety assurances

Particularly when children are involved, safety must be sufficiently considered. If you plan a tour to a landfill, for example, visit the site beforehand to confirm safety carefully and avoid any injuries or accidents. For a clean-up activity, have all the children wear gloves and masks to prevent injuries and infections, and inform all the parents and guardians in advance.

(3) Awareness Raising Activities for Residents

When running awareness raising activities for a municipality, first consider the characteristics of each target area (land area, population, number of households, type of residences, commercial density, etc.), then identify the waste issues that each area is facing and run a 4WH1 analysis: think when, where, and how to effectively raise awareness of what for whom.


a) Adjust approaches to fit area characteristics

For example, in an awareness campaign to disseminate the rules for putting out waste properly, door-to-door visits of all the households may work well in a residential area. A nearby commercial area filled with storefronts, restaurants, hotels, and businesses, however, will produce different types and volumes of waste which must be put out differently than household waste. Therefore, such areas will require a different approach, such as business-oriented briefings. Additionally, door-to-door visits during the day will be a waste of time in areas with mostly dual income households as many will be at work. In such cases, it would be better to take advantage of opportunities where people gather, such as awareness campaigns at weekend events or shopping malls.

b) Consider format and presentation

Providing too much information can make people to lose interest and result in almost no information being imparted. Think about the format and presentation of the information. Keep written paragraphs simple, and use graphs and images.

Continued distribution of information is also important. It will take time for new sorting rules to take root. One enthusiastic announcement when the rules go into effect may prove effective, but things may return to the status quo without consistent follow-up announcements.

Also consider an efficient path of information. People such as a community leader or housing complex manager will know the area better than anyone. Having such individuals spread the information while also listening to resident requests can be an effective means of interactive communication with residents . You should also consider working with local volunteers, students, and NGOs.

In general, the provision of information tends to be prioritized over checking whether the information has reached the target audience. In order to disseminate information continuously and effectively on a limited budget, it is important to measure the results by interviews and questionnaires and reflect it to the next activity.



Ask opinions directly where people gather such as community meetings, union meetings, churches and mosques; conduct a questionnaire survey; or listen to the complaints of residents at government complaint desks. Such places are great sources of information on what residents want to know and will suggest how best to run the awareness campaign.

c) Share good practices and learn the success factors

We can learn the key to success from good practices such as areas where separate collection has already been introduced or areas where recycling system by community-based recyclable collection points is firmly established. It can be effective to observe good practices in the field and talk directly with the parties involved.

d) Consistently spread catchy slogans

A slogan is a phrase for unifying public awareness and guiding behaviour in a unified direction. In Japan, the slogan “resources if sorted, waste if mixed” is used to promote waste sorting. Such catchy, consistent slogans, as well as logos or mascots, can be an easy method of effectively raising resident awareness.



“Io,” mascot for Yokohama’s “3R Dream!” campaign



A sticker for Captain Tsubasa, a locally well-known Japanese cartoon, on a Japan-provided waste compactor truck in Sudan
©Yoichi Takahashi / SHUEISHA

e) Report the results to the residents

Regular feedback on the results of resident efforts are important to keep residents willing to continue an initiative. In a cleaning campaign, for example, the participants will realize their efforts are paying off if presented with clear figures, such as amount of waste collected in the campaign or recyclables collected in a month. If introduce fixed time and fixed point collection, it can also be effective to show how much the situation has improved through showing before and after pictures. In addition to sharing the positive results, negative results can build trust and a basis for thinking together with the residents, as well as supply ideas and lessons for moving forward with new initiatives.

f) Use versatile software for easy improvement of materials

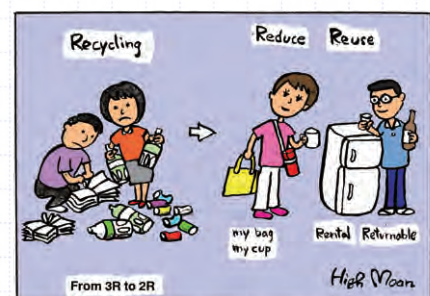
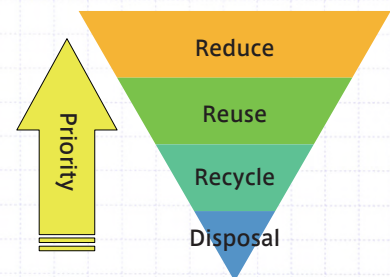
Some methods may work in certain areas but not in others. Awareness raising activities require constant improvement through trial and error based on the current state of the target area, not a one-size-fits-all approach. Given this, it is important to use versatile software such as Microsoft PowerPoint so that your successor and/or colleagues can easily update or revise content for awareness raising materials.

Box 5

Disseminating Correct 3R Knowledge

In developing and developed countries alike, recycling tends to be thought of as the best, but recycling does not contribute to reduce consumption of resources or environmental loads. We should promote a proper understanding of the 3R hierarchy: first reduce waste generation as much as possible, then reuse and recycle as much of the waste generated as possible, and then properly dispose what is left. Try to foster awareness that it is vital for everyone to live in a manner that minimize waste. Holding a cleaning campaign in the community and picking up the waste alone is not enough .

- In Japan, the Ministry of the Environment and many municipalities are promoting efforts to shift from 3R to 2R (reduce and reuse). Yet other municipalities have added refuse (do not accept things that will become waste) and repair (for extended use) to promote either 4R or 5R as their policy.



Source: High Moon Kobo

4.2 Activity Monitoring and Improvement

Monitoring is a form of checking: the 'C' in the PDCA cycle for project management. Monitoring is performed for two main purposes: 1) To confirm activity progress toward achieving the objective(s), and 2) if the activity is not making good progress, to provide clues on how to get it back on track.

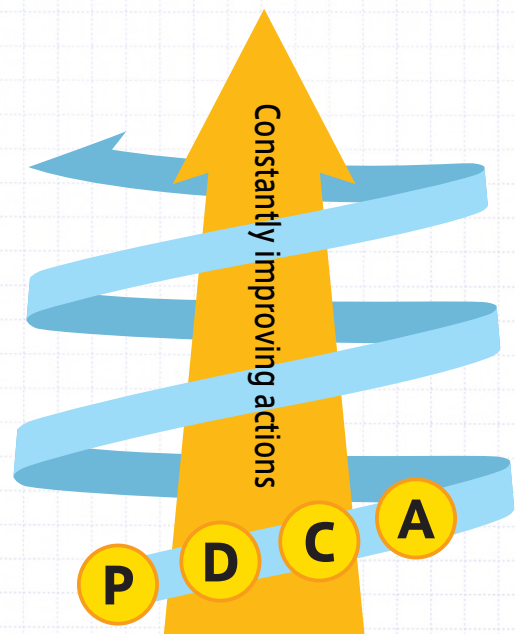
How to set monitoring indicators was described in Section 3.1 Action Plans. Target values for the indicators should be determined in the planning stage but can also be revised during the monitoring stage. Also, as explained in objective 2) above, one of monitoring's important functions is to serve as an opportunity for the stakeholders to regularly assemble and discuss possible course corrections. The trick to regular monitoring is to integrate regular monitoring chances into the action plan. For example, in the elementary school waste example, one idea might be to stage an interview rally once every three months, with the teacher using a shiny gold toy microphone to interview the students (or vice versa), asking whether they think the school is clean and recording the results. This one action serves the dual purposes of raising awareness and monitoring, all in a form of a fun event. It is also critical for the teachers and stakeholders to meet regularly to discuss activity progress and evaluate target achievement.

Box 6

Monitoring and Evaluation

The Check in PDCA also includes the meaning of evaluation. How are monitoring and evaluation related? They are normally expressed together as a paired set, monitoring and evaluation (M&E). Generally, the difference is explained with monitoring as regular daily observations and data collection, and evaluation as analysis based on the collected data to make a certain judgement.

The purpose of monitoring is to continuously discover problems based on the collected data and act (the A in PDCA) to improve those problems. Thus, the significance of monitoring would be halved if it stopped at data collection without leading to some sort of improvement. Accordingly, monitoring itself should be seen as including a certain element of evaluation. Think of the PDCA cycle as a climbing a spiralling staircase upward. The cycle is repeated multiple times: A plan is checked, acting on the findings as the action gradually improves overall, inching toward achieving the objective.



4.3 Activity Review

As a project or activity approaches completion, it is recommended to hold a general meeting with stakeholders to discuss whether the project or activity is likely to achieve its objectives. This meeting can be thought of as a scaled-up version of the regular monitoring performed to date. The objective of this meeting is not to judge the project as a success or failure based on whether the project purpose have been achieved.

Rather, this monitoring general meeting (or evaluation meeting) carries two important goals: 1) To discuss possible measures for the remaining time if activity objectives will not be met, and 2) creating an action plan to continue and/or expand the activity after project completion.

(1) Assessing Achievement of Project Purpose

To this point, each activity has been monitored to track the achievement level of the objectives. Now, at the monitoring general meeting, the stakeholders will meet to see whether the project achieved its overall objectives. Alternatively, if the achievement of objectives is within reach, you can discuss possible tweaks or assign additional resources.

(2) Creating an Action Plan for after Project Completion

It is desirable to continue or expand efforts to resolve the waste issue even after the project or activities have been completed. A shared vision over the medium- to long-term among stakeholders is important to activities being continued. The general meeting serves as a great opportunity for the stakeholders to discuss and reach consensus on that vision.

If vacating a position with an activity still in progress, try to ensure its continuation by training your successor and writing activity manuals with your colleagues and the stakeholders.

4.4 Chapter Key Points

- Implementing a project requires the support of the location/facility owner and stakeholders, data to enrich activity content, and more.
- For school projects, it is important to discuss the activity schedules and keep the children safe.
- For resident-based projects, it is important to flexibly adapt to area characteristics, adjust how data and information is presented, share good practices, spread a consistent slogan, and report results back to the residents.
- For monitoring, determine the indicators easy to collect and work regular monitoring opportunities into the activity.
- As a project approaches completion, discuss whether the project or activity objectives will be achieved and, if not, then what to do about it. It is also important to create a future action plan for continuing and/or expanding activities.

Appendix

[Examples of Programs]

Case Program 1

SORTING WASTE AT OUR SCHOOL

Year Created: 2018 | Created By: Yusuke ISHIKURO (JICA Volunteer)

| Field | Country | Language | Audience (Numbers) | Activity Time | Location | Implementer |
|---------------|---------|----------|------------------------------|---------------|-----------|-----------------|
| Waste sorting | Kenya | English | 3rd-6th grades (40 students) | 35 mins. | Classroom | Public servants |

Environmental Behaviour Driving Elements

| Fun | Sence of Crisis | Responsibility | Effectiveness | Feasibility | Cost Benefit | Normative Awareness |
|-----|-----------------|----------------|---------------|-------------|--------------|---------------------|
| ✓ | ✓ | ✓ | ✓ | ✓ | | |

Goals

- Learn how much waste households discharge each day.
- Learn and put into practice proper waste sorting methods to reduce disposed waste.

Underlying Waste Management Systems

Source separation and collection system have been introduced (or attempted).

Tools Used

- 3 types of plastic bottles of differing weights adjusted by the amount of sand contained (with 1 of the 3 bottles equivalent to the per capita daily waste discharge for the target area)
- Waste cards (14 categories/for posting)
- Waste cards (14 categories/about 8 sets for distribution)
- Cards showing waste categories and disposal methods (for posting)
- Long rope
- Paper clips
- Dust bins for sorting (same number as waste categories)

Procedure

- ① Have participants pick up and compare the differently weighted plastic bottles to experience how much the daily per capita waste discharge is.
→ Learn how much waste you throw away. Understand that the amount is large.
- ② Ask participants what kinds of waste they throw away in their everyday lives.
→ Learn the categories of waste you throw away. Understand that there are many categories of waste and pose the idea of sorting them out (in subsequent steps).

③ Hang cards with the waste categories (organic/inorganic/recyclable) and their explanations (decomposes naturally, etc.) on a rope hung up before class starts and explain the categories.

→ Teach the participants basic information on waste.

④ Waste sorting card game

Form groups of 5-6 participants, pass each group a set of 14 waste cards, and have the groups sort different waste into their respective categories. Ask them what kind of waste falls under each category to prompt the participants for responses, and then hang the 14 waste cards by waste category.

→ Makes the audience think specifically what waste fits in each waste category and try to actually sort waste.

⑤ Explain how each waste category is disposed or treated and hang the disposal method cards on the rope.

→ Ask them which of the waste categories is actually waste to convey the idea that organic waste and recyclable waste are resources, not waste.

→ Explain the significance of waste sorting by illustrating that all the waste categories on the rope are thrown away, but sorting would reduce the waste taken to landfills (extending the lifespan of the landfills).

⑥ Teach the waste sorting method to be used at the school (different for each area) using dust bins. (Recyclable waste can be divided into 3 categories, etc.).

→ Emphasise checking the item materials when sorting.

⑦ Review of lessons learned in the program.

Ask to and discuss with participants, such as: How much waste do we each throw away per day? / Many categories of waste we throw away / why waste must be sorted, and the importance of sorting, etc.

Choose a few participants, pass them a waste card from the rope, and have them put it in the correct sorting dust bin according to the waste sorting method to be used at the school.

Chose a few participants and have them speak about what they learned today.

Pictures



Class in progress



Experiencing waste amounts with plastic bottles



Waste sorting card game



Sorting school waste as review



Final presentations on what was learned

Case Program 2

HANDS-ON LEARNING OVER SUMMER BREAK

Year Created: 2018 | Created By: Kazumi KATO, Moe HIRATA, Sena HIROKI (JICA Volunteers)

| Field | Country | Language | Audience (Numbers) | Activity Time | Location | Implementer |
|---------------------|----------|----------|--------------------------|---------------|----------------------|--------------------------|
| 3Rs No littering | Cameroon | French | Elementary students (20) | 2 hrs. | Citizen group office | Citizen group Volunteers |

Environmental Behaviour Driving Elements

| Fun | Sence of Crisis | Responsibility | Effectiveness | Feasibility | Cost Benefit | Normative Awareness |
|-----|-----------------|----------------|---------------|-------------|--------------|---------------------|
| ✓ | | | ✓ | ✓ | | |

Goals

- To provide a fun way for children to learn about littering and the 3Rs over summer break, increase their interest in waste issues, and learn about reusing/recycling.
- To make environmental education more active and fun with a smaller class size and additional freedom of not being in a school classroom.

Underlying Waste Management Systems

Not necessary in particular

Tools Used

- Unwanted plastic bottles
- Small waste (to put in the bottles to make noise)
- Song lyrics on paper
- Harmonica (if available)
- Picture show on littering awareness
- Materials explaining the 3Rs, etc.

Procedure

- ① In preparation, the volunteers and a women's group spoke and coordinated the schedule in advance. Also solicited local children (with handouts and posters) to find participants.
- ② The 1-day program was as follows:
 1. Greetings, self-introductions
 2. Read the picture show on littering awareness, "I love watermelon" (with parts adapted for the country).
 3. Explain the 3Rs (what they are and their meaning, with questions and issues in the explanation)
 4. Make plastic bottle maracas (by putting the waste/beads in plastic bottles)
 5. Sing "Ramasser les ordures" (original song made by the volunteers) and play with instruments.
 6. Closing words (telling the children to share what they learned with their families at home)

Pictures



Picture show



Explaining the 3Rs



Making plastic bottle maracas



Singing a song

Examples of Practical Activities



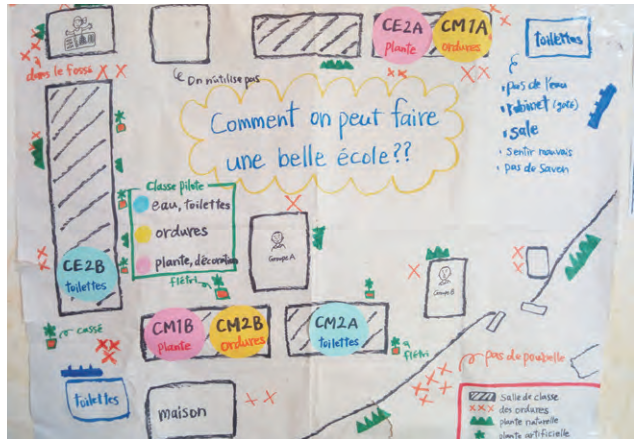
1) A cleaning campaign after a lesson on hygiene (Niger)



2) Making tyre flower beds after a class on waste issues (Cameroon)



3) A quiz on decomposition times for waste after a class for schoolteachers on building playground equipment (Burkina Faso)



4) Mapping out rubbish locations after a rubbish cleaning contest. The map was subsequently used to observe changes. (Cameroon)

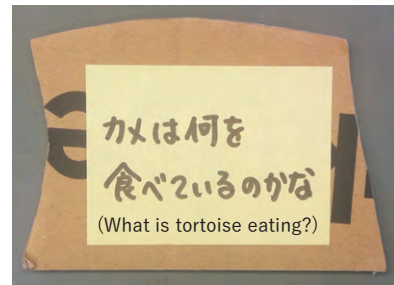


5) No littering themed skit contest (Burkina Faso)



6) Ball toss game with balls made from waste plastic water containers (Burkina Faso)

Examples of Teaching Materials



- 1) Environmental puzzle (Masakazu SUWA, Egypt): Questions related to the image on the front are written on the back each piece. Answer the questions as you put the puzzle together. Can be completed with even just 1 person.

How to make Kendama from plastic bottle

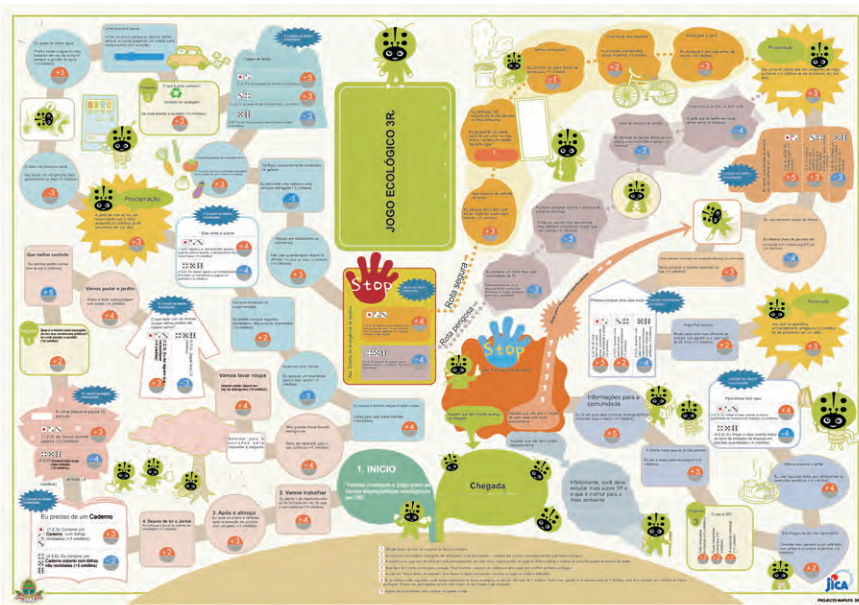
Preparation: 2 plastic bottles, Bond, Plastic bag, Cutter, Scissor, tape

1. First, cut in 2 plastic bottles by cutter like the picture 1. After that cut 2 plastic bottles by scissor like the picture 2.
2. Glue top of 2 plastic bottles by bond after you take off 2 cap and dry bond a little time.
3. Stick 2 cap like picture 5 and make a ball.
4. Cut a plastic bag like line and make a string.
5. Tape the tip of the string and the ball.
6. Tape the center of the part and the opposite side of string.
7. Aim to put in the cup!!



- 3) Pac-Pac-kun, the playful dust bin (Masakazu SUWA, Egypt): Feed Pac-Pac-kun to choose while picking up waste. Simply fix a waste bag inside a cut out cardboard box and attach eyes. ²⁵

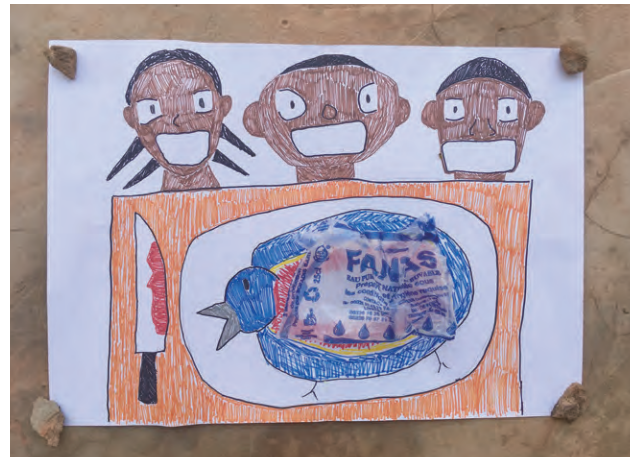
- 2) Recycled crafts manual (Tatsuro MORI, Sudan): Explains how to make toys, pen cases, and more from plastic bottles and other recyclables.



4) Environmental dice (Project for Promotion of Sustainable 3R Activities in Maputo, Mozambique):
A dice game for having fun while learning about waste management and the 3Rs.



5) Recycled instruments (Sena HIROKI, Cameroon):
Play songs about the environment using maracas made of recycled plastic bottles and waste/beads.



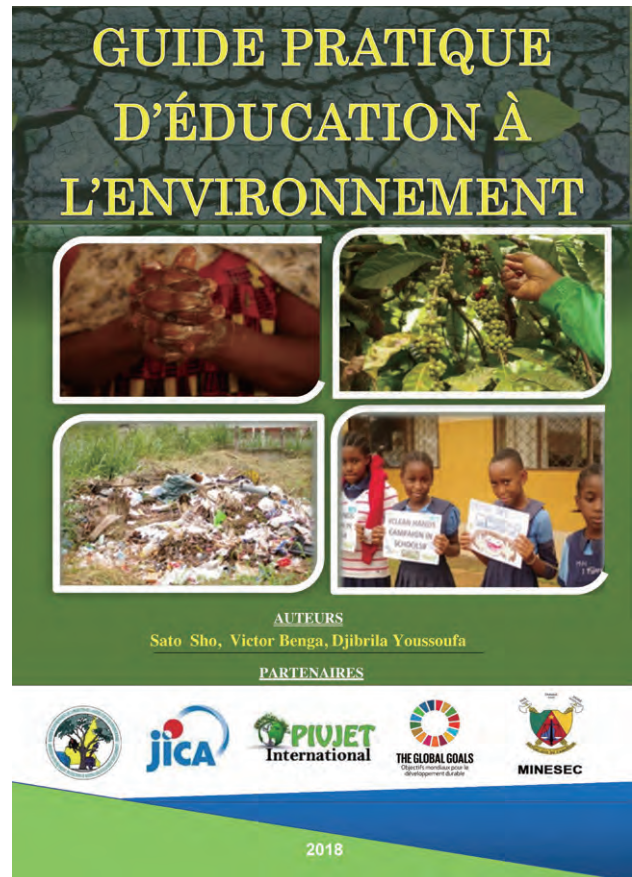
6) Homemade picture show, "Where Does Waste Go?" (Yuki EGAWA, Burkina Faso): The story of a plastic bag that gets eaten by a bird and comes out whole from the bird's stomach.



7) Waste sorting cards (Yusuke ISHIKURO, Kenya): A group game to practice sorting waste using waste cards at an elementary school.



8) Waste sorting leaflets (Project for Capacity Development of Solid Waste Management of Nairobi City, Kenya): Made for a pilot site to promote sorting into 3 categories (organic waste, recyclable waste, others).



9) Practical Manual of Environmental Education (Sho SATO, Cameroon): Addresses waste issues, nature, and hygienic issues for elementary and middle school students.

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