

Part 4 –

Tools



Summary: When mobilizing your team to start a Zero-Waste project, it is important that everyone involved understands the key Zero-Waste principles and agrees on the main project steps and activities. This will ensure transparency over the process and lay a solid foundation for the project to run smoothly.

Description

The Zero-Waste approach is based on the following principles:

1. Waste hierarchy, where the focus is on preventing waste generation in the school compound to reduce the amount of waste generated;
2. Circular economy, where the aim is to close the loops of material and resources as close as possible to the source of waste generation so that more material and resources can be recycled inside and/or outside the school;
3. Behavior change and learning by doing, where the aim is that the whole school community can experience sustainable practices and that students are encouraged to adopt such practices in their daily lives;
4. Participatory strategic planning, where the aim is to involve a broad variety of school stakeholders to come up with an Action Plan towards Zero-Waste tailored to the school context, and which follows a structured approach allowing to take data-driven decisions.

Presenting these key principles to the school audience (being the Zero-Waste Committee or the school officials) is key to ensure that everyone understand and agrees on these principles.

Furthermore, the key project steps and activities should be presented and adapted according to the needs so that the key stakeholders can agree on them. A pre-defined presentation can be found in Tool 1.B1. General information about solid waste management and related impacts mentioned in the technical resources can be added to the presentation when needed.

Resources

Tool 1.B1 Zero-Waste principles & overview of planning process

Additional resources:

Waste hierarchy:

 *Wilson, D.C., 2015. Global Waste Management Outlook [5]*


Circular Economy:

 *Ellen MacArthur Foundation (2013) [3]*


 Youtube video – [Explaining Circular Economy and How Society Can Re-Think Progress](#) (Ellen MacArthur Foundation)

 [Ellen MacArthur Foundation](#)

Behavior change and learning by doing

 *UNESCO, 2014. Shaping the Future We Want [1]*

 *UNESCO, 2018. Issues and trends in Education for Sustainable Development [10]*

 *Mosler Contzen, 2016. Systematic behavior change in water, sanitation and hygiene. A practical guide using the RANAS approach [13]*

 *Cavin, 2017. Behavior Change Manual [15]*

 MOOC module – [Triggering Community Participation with the RANAS approach](#) (Eawag/Sandec)

 [Ranamosler.com](#)

Strategic planning:

 *Lüthi et al., 2011. Community-Led Urban Environmental Sanitation Planning: CLUES [11]*

 *Wilson et al., 2001. Strategic Planning Guide for Municipal Solid Waste Management [12]*

 Online course – [From Data to Tangible Impact: Achieving Waste SDGs by 2030](#) (UN-Habitat)

Summary: Waste audit aims to determine the amount and the composition of the waste produced. Such information will serve in particular to identify potential for waste reduction/minimization, treatment and recovery options and waste management optimization (segregation, collection and disposal). Waste audit usually takes place over a week in a defined area.

Description

A waste audit consists in collecting waste on a daily basis, over a week, and each day: weigh the waste, characterize the waste (i.e. separate the collected waste in different waste fractions, weigh each fraction separately), and report the gathered information on a document. At the end of the week, an average of waste production per day can be obtained. It is advised to repeat such audit at different times of the year to capture seasonal variations.

Waste audit should (i) provide consistent information/data, (ii) be simple, convenient and repeatable and (iii) the information/data must be collected and reported in a manner that permits an effective evaluation of waste reduction opportunities and management optimization.

Key steps are described in the table below.

Steps

- Step 1.** Adapt waste audit process to school settings and priorities (see Guide 2.A1)
- Step 2.** Define time and location of waste audit
- Step 3.** Prepare the team and the logistics (waste audit team and period, schedule and location of the measurements) (2 days)
- Step 4.** Get the necessary equipment (1-2 days)
- Step 5.** Train people who will conduct the waste audit (1 day)
- Step 6.** Conduct the waste audit (6-8 days)
- Step 7.** Complete the data and analyze the results (3 days)

Resources

Guide 2.A1 Waste audit at school – Procedure


Tool 2.A1.1 Recording sheet for waste audit

Tool 2.A1.2 Recording sheets for waste composition analysis

- A. Kitchen/canteen
- B. Other

Additional resources:

 *UN-Habitat, 2021. Waste Wise Cities Tool (Step 2)*

 *Wasteaid, 2017. Making waste work: A toolkit – How to measure your waste*

 *MOOC module – [Conducting a Waste Generation and Characterization Study](#) (Eawag/Sandec)*

Summary: The Wasteaware Benchmark indicators (WABIs) comprises quantitative and qualitative indicators used to evaluate and assess the physical components and governance aspect of solid waste management systems. They were developed by Wilson et al. (2015) to benchmark solid waste management services of different cities across the globe and were adapted for school settings.

Description

The WABIs uses a set of quantitative and qualitative indicators covering the aspects of:

- **Waste collection** – Percentage of waste collected and quality of waste collection
- **Waste treatment and disposal** – Percentage of waste treated and disposed of on site and quality of environmental protection from treatment and disposal methods
- **Resource management** – Recycling rates and quality of the 3Rs – Reduce, Reuse, Recycle
- **Stakeholder inclusivity** – To which extend are stakeholder involved in SWM service
- **Financial sustainability** – To which extend SWM service is financially sustainable
- **Sound institutions and policies** – School institutional capacity for appropriate SWM

The required information is gathered through observation, estimation and interviews and entered into an Excel file (Tool 2.A2). Each indicator is scored on a scale of 5 options, from very low, to very high. Guidance on how to assess each indicator is provided in Tool 2.A2.

Results are automatically calculated using a “traffic lights” color system, which helps to visualize where improvements are needed in order to achieve a safer SWM system that protects the environment and human health.

Steps

- Step 1.** Get familiarize with Tool 2.A2 (1/2 day)
- Step 2.** Conduct interviews with key stakeholders and field observation and fill out Tool 2.A2 (~3-5 days)
- Step 3.** Check consistency of the results with key stakeholders (1/2 day)

Resources

Tool 2.A2 WABIs for school

Additional resources:



Wilson, et al., 2015 “Wasteaware’ benchmark indicators for integrated sustainable waste management in cities”



MOOC module – [Comparing cities’ performance](#) (Eawag/Sandec)

Summary: Going toward a Zero-Waste school goes beyond waste management only. Assessing all the resources and material produced and consumed at the school in terms of water supply, sanitation system and energy will help identifying potential rooms for improvement and synergies on material recovery options.

Description

In order to close the loop of all resources and material, water supply, sanitation systems and energy sources and consumption of the school should also be looked at. The main information of interest are:

- **Part 1 - Water:**
 - How much water is consumed at the school and from which water sources?
 - Is drinking water always accessible or not?
 - Is there any water treatment system?
 - Does the water quality meet WHO guidelines for presence of residual chlorine, E.Coli, Arsenic, Lead? (see values in Tool 2.A3)
 - Is there any storage system and how well it is maintained?
 - What kind of practices are done at the school to apply the 3R concept to water?
- **Part 2 - Sanitation:**
 - What kind of toilets type is used at school?
 - What kind of collection, storage and/or treatment system is used?
 - Is there any wastewater treatment system in place or is it connected to a sewer?
 - How many (usable) toilets are there?
 - In which state are these toilets?
 - Does the sanitation system works properly or is there any issues of smell, overflow, etc?
- **Part 3 - Energy:**
 - How much energy is consumed at the school and in which form? (electricity, cooking fuel, etc.)
 - What are the main electricity/energy sources?
 - Is energy always accessible/available or not?
 - What kind of practices are done at the school to apply the 3R concept to energy?

To access this information, you can use the pre-made questionnaires of Tool 2.A3. Note that the questionnaires might need to be adapted to your specific context.

People able to answer these questions at the school are typically:

- School administrator (for bills and payment on water and energy supply)
- School technicians or school caretaker

Key steps are described in the table below.

Steps

- Step 1.** Adapt the questionnaire to the school context (1/2 day)
- Step 2.** Fix appointment for interviews and field observation and send the questionnaire to the interviewee (1/2 day)
- Step 3.** Fulfill the questionnaire (1-4days)*
- Step 4.** Preliminary analysis of the results (1 day)

- Time needed depends on the information already available

Resources

Tool 2.A3 Water, sanitation & energy assessment questionnaires

Additional resources:

 Schelbert et al., *Facility Evaluation Tool for WASH in Institution (FACET)*

Summary: The Zero-Waste approach in schools is best supported if educational strategies are in place allowing students to experiment Zero-Waste practices inside and outside the classrooms. Reviewing the school curricula helps analysing possibilities of integrating and/or adding Zero-Waste related topics in curricular and extra-curricular activities.

Description

The Zero-Waste approach in schools targets learning, application and practice so that strategies to reduce, reuse, recycle and recover waste can be experienced by students inside and outside the classrooms. Ideally, Zero-Waste education should be incorporated into different subjects of the curricula, going beyond science subjects only. Following the recommendation from UNESCO on Education for Sustainable Development (ESD) (UNESCO, 2018), practical teaching should be preferred over theoretical teaching targeting knowledge and comprehension only.

Reviewing the school curricula will help analysing the status-quo in terms of Zero-Waste teaching, as well as identifying rooms for improvements so that Zero-Waste-related topics can be successfully integrated into curricula and extracurricular activities.

To do so, we recommend to:

1. Check national strategies and policies from ministries of Education and of Environment to see if any education strategy is in place which could support the implementation of the Zero-Waste approach;
2. Check the current school curricula to see if environmental and/or SWM topics are covered or not and how;
3. Discuss with teachers and headmaster during workshop to see if there would be any ideas on how to integrate Zero-Waste concept in classroom teaching and extracurricular activities, and what would be the main challenges to be overcome to do so.

Typical objectives of a curricula assessment workshop are:

1. Review existing environmental and waste-related curricula at all age levels
2. Analyze possibilities of integrating/adding relevant topics in the curricula
3. Consolidate ideas to integrate Zero-Waste-related topics in relevant school subject in classroom teaching
4. Develop plans to include Zero-Waste-related activities in extracurricular activities

Steps

- Step 1.** Review national educational strategies and policies (3 days)
- Step 2.** Check the current school curricula to see if environmental and/or SWM topics are covered or not and how (2 day)
- Step 3.** Conduct a workshop on curricula assessment with teachers & headmaster* (1/2 day)
- Step 4.** Consolidate ideas to integrate environmental and/or SWM topics in classroom (2 days)

- You can use the Tool 2.A4.1 to help you defining Zero-Waste topics


Resources

Tool 2.A4.1 List of Zero-Waste-related education themes

Tool 2.A4.2 Curricula assessment matrix

Additional resources:

 UNESCO, 2014. *Shaping the Future We Want*

 UNESCO, 2018. *Issues and trends in Education for Sustainable Development*

Summary: Stakeholder analysis is the process of identifying who has an interest in, is important to, or is influencing a specific process or project (CLUES, 2011). The present tool suggests a procedure for analysing stakeholders and helps determining appropriate stakeholder involvement.

Description

Identifying all the stakeholders and understand their needs and position towards changes in the SWM system will help the planning process. For this, it is important to consider the following elements:

- Role in SWM: In which step of the SWM do they play a role?
- Impact: How would a Zero-Waste Action Plan affect them? (from low to high)
- Influence: How much influence they have on the implementation success? (from low to high)
- Priority: What is important to this stakeholder?
- Contribution: How can they contribute to the Zero-Waste implementation success?
- Opposition: How could they block the implementation success?
- Engaging: How will they be engaged in the Action Plan development and implementation?

In a school setting, typical stakeholders groups are: students, teachers, school officials, non-teaching staff, parents of students, SWM company (if any), formal/informal waste recyclers (if any).

The stakeholders impact, influence, priority, contribution, opposition and engagement options can be mapped in a so-called stakeholder matrix (see Tool 2.A5).

Key steps are described in the table below.





Steps

- Step 1.** Make a list of all the stakeholders you should consider
- Step 2.** Build a stakeholder matrix by listing them and identifying the different attributes
- Step 3.** Think about when, how and for what purpose you could involve them in the planning process (last column of the stakeholder matrix)

Resources

Tool 2.A5 Stakeholder matrix

Additional resources:

-  Lüthi et al., 2011. *Community-Led Urban Environmental Sanitation Planning: CLUES, Tool T5*
-  Wilson et al., 2001. *Strategic Planning Guide for Municipal Solid Waste Management, Annex 1.1*
-  JICA, 2019. *Guidebook for Environmental Education on Solid Waste Management in Africa, Chapter 2.2, (2)*
-  Online course – *From Data to Tangible Impact: Achieving Waste SDGs by 2030*, Module 1.3 (UN-Habitat)

Summary: Problem tree analysis (also called situational analysis or problem analysis) is a method to identify and understand the main issues around a specific local situation and to visualise cause-effect relationships using the symbolic of a tree (CLUES, 2011).

Description

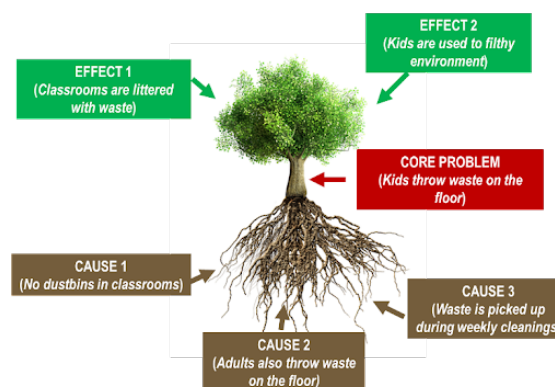
Problem tree analysis helps stakeholders to establish a realistic overview and awareness of the problem by identifying the fundamental causes and their most important effects. The main output of the exercise is a tree-shaped diagram in which :

- Trunk: represents the focal problem
- Roots: represent its causes
- Branches: represents its effects.

Such a problem tree diagram creates a logical hierarchy of causes and effects and visualizes the links between them. It creates a summary picture of the existing negative situation and allow prioritising objectives by breaking down the problem into manageable units.

Problem tree analysis is best carried out by a group of stakeholder in a workshop setting (1/2 day is usually sufficient to come up with a coherent problem tree).

Key steps to create a problem tree are described in the table below.





Steps

- Step 1.** Identify existing problems
- Step 2.** Define the core problem
- Step 3.** Formulate the causes of the core problem
- Step 4.** Formulate the effects
- Step 5.** Draw a tree-diagram
- Step 6.** Review the logic and verify the diagram

Resources

Guide 2.B1 Problem tree analysis – Procedure

Additional resources:

-  Lüthi et al., 2011. *Community-Led Urban Environmental Sanitation Planning: CLUES, Tool T8*
-  JICA, 2019. *Guidebook for Environmental Education on Solid Waste Management in Africa, Chapter 2.2, (2)*

T 3.C1

Priority identification per cluster

Summary: The cluster priority matrix helps you to define what are the priorities for each area of the school based on the results of the baselines assessment. By using a scale from “no specific improvement required” to “major improvements required”, it allows you to visualize where attention should be paid.

Description

Once the general goals and targets towards Zero-Waste are defined, it is important to define the priorities and what needs to be fixed urgently for each school waste generation source referred hereafter as “cluster”.

To do so, fill out the cluster priority matrix by showing where improvements are required using a scale from “no specific improvement required” to “major improvement required”.

Best is to fill out the cluster priority matrix (see Tool 3.C1) with representatives of each cluster to come up with a comprehensive overview.

Key steps are summarized in the table below.

Steps

- Step 1.** Adapt the cluster priority matrix to the school context
- Step 2.** Fill out the cluster priority matrix with representatives of each cluster
- Step 3.** Share and discuss the cluster priority matrix results with school stakeholders

Resources

Tool 3.C1 Cluster priority matrix

Summary: The selection of solid waste improvement options requires a system approach where general as well as specific improvement option per waste fraction should be considered. Each option should be evaluate considering the 5A principles (applicable, appropriate, achievable, acceptable, affordable), as well as resources needed, level of stakeholder involvement required, need for supporting institutional policy and education strategy.

Description

Once the priorities for the school community are defined, it is important to identify and evaluation the improvement options, considering all the components required for the adequate management of the different waste fraction, from generation to disposal.

The options can be classified in two main categories:

- General solid waste management (SWM) improvement (waste segregation, collection, recycling and disposal)
- Specific improvement per waste fraction (reduce, reuse, recycle, safe disposal)

Following the 5A principles, for an option to be suitable in a given context, it should be:

- Applicable (i.e. feasible in the given context)
- Appropriate (i.e. fit the purpose)
- Achievable (i.e. have adequate resources available to be implemented)
- Acceptable (i.e. receive enough support from the school community)
- Affordable (i.e. enough monetary resources from the school to cover the associated costs)

In addition to that, for each option, the resources needed (i.e manpower, materials, infrastructure, funds, space, time and expertise), the level of stakeholder involvement, the need for institutional policy to support that option, as well as the required behavior change and possible education strategy to support it should be considered.

Tool 4.A1.1 provides a list of possible options per waste fraction. The templates provided in Tool 4.A1.2 can be used to evaluate the different options and corresponding needs for general SWM improvement (A), per cluster (i.e. waste generation source) (B), per waste fraction (C).

Steps

- Step 1.** Read through the technical resources on waste segregation, waste collection, recycling and waste disposal
- Step 2.** Select the relevant general SWM improvement options
- Step 3.** Read through the factsheets provided in the technical resources
- Step 4.** Revise the list of improvement options per waste fraction (Tool 4.A1.1)
- Step 5.** Select the relevant improvement options per waste fraction
- Step 6.** Fill out the improvement option evaluation matrix (Tool 4.A1.2)

Resources

Technical resources – Waste segregation, Waste collection, Waste recovery, Waste disposal

Technical resources – Factsheets

Tool 4.A1.1 Improvement options per waste fraction

Tool 4.A1.2 Improvement options evaluation matrix

Summary: Assessing the existing (in)formal recycling market helps to define what kind of waste material can be recovered outside the school. Depending on the situation, the recyclables can be either given to informal waste workers for free to improve their living condition, or sold to (in)formal waste recyclers to generate income for the school.

Description

In most cases, when some waste materials have a value on the local recycling market, a recycling system is already in place, being formal or informal. In order to not re-invent the wheel, whenever possible, it is important to link the recyclables waste produced at the school with the existing (in)formal recycling system.

To do so, we recommend to:

1. Identify formal and informal individuals, companies and/or organizations involved in waste recycling – This can be done by asking people involved in waste management outside the school (e.g. drivers of waste collection truck, street sweepers, waste pickers, etc.) if they know any (in)formal recyclers active in the area.
2. Evaluate the quantities and type of recyclables produced at the school by checking on the results of the waste audit – This helps to better define the exact type of recyclables to be handled and can prepare the ground for further negotiation once the most suitable waste recyclers has been identified.
3. Conduct interviews with the (in)formal waste recyclers to know what type of recyclables they collect, at what price, what kind of pre-processing is needed (e.g. cleaned, dried, compressed, sorted by colors, etc.), and under which condition (e.g. amounts required, if a contract is needed, etc.).
4. Compare the different options gathered and determined which one(s) would be most suitable in your case – For that, considers:
 - a. The objective of the school (e.g. to improve living conditions of informal waste pickers, improve recycling rate of the school, reduce the amount of waste to be managed by the school, generate income through recyclables selling, etc.)
 - a. The potential income generated
 - a. Level of efforts to be done by the school (e.g. is the recycler coming to pick up the recyclables or does the school need to deliver it to them, does the school need to clean/dry/sort the recyclables/ compress the recyclables or do any other type of pre-treatment, is a storage system required to gather enough recyclables for selling, can the recycler take most of the recyclables, etc.)

The key steps to be undertaken are summarized in the table below.

Steps

- | |
|--|
| <p>Step 1. Identify individuals, companies and/or organizations involved in waste recycling (formal and informal) (2 days)</p> <p>Step 2. Check on waste audit results to see the quantities and types of recyclables produced at the school (1/2 day)</p> <p>Step 3. Revise the recycling assessment questionnaire (Tool 4.A2) (1/2 day)</p> <p>Step 4. Conduct interviews with individuals, companies and/or organizations involved in waste recycling (3-4 days)</p> <p>Step 5. Compare the different options and determine the most suitable ones (1/2 day)</p> <p>Step 6. Discuss with school officials on which recycler(s) should the school work with*</p> |
|--|

- Note that you may need to consider different recyclers for different waste materials. Also, depending on the situation, you might consider to give the recyclables for free to waste pickers to improve their living conditions.

Resources

Technical resources – Waste recovery

Tool 4.A2 Recycling assessment questionnaire

T 5.A1

Action Plan content

Summary: The Action Plan is a plan describing what needs to be done and by whom to achieve a Zero-Waste school. It does not have to address every detail but should rather serve as a guiding document. It should be realistic in terms of cost, include a timeline for implementation and address institutional and human resources issues. The Action Plan is “owned” by the school and is a “live” document, which needs to be updated regularly.

Description

Once the decisions are taken on what will be done at the school, a concrete Action Plan needs to be formulated considering:

1. The timeframe for the Action Plan implementation (e.g. 1 or 2 school year(s), X semester(s), etc.)
2. A list of activities to be undertaken to fulfil the goals and targets set in the framework of the Zero-Waste school
3. And for each activity, define:
 - a. What the actions are – Activity
 - a. Who should take the action – Owner
 - a. When it should be taken – Timeframe
 - a. Monitoring of action implementation - Progress

It is important to remember that the Action Plan is “owned” by the school and although it may be that other stakeholders such as an external SWM expert support the school in developing the Action Plan, the school must have overall responsibility and accountability. The Action Plan should be a “live” document that is updated regularly, as such it will detail activities which are on track and those that have been delayed for any number of reasons.

Examples of an Action Plan table of content and Action Plan activity timeline are presented in Tools 5.A1.1 and 5.A1.2. Note that in the provided example, the Action Plan was developed with the help of external support and therefore the selection of alternatives was part of the Action Plan activities to ensure the school ownership over the Action Plan developed.

Steps

- Step 1.** Define the timeframe for Action Plan implementation
- Step 2.** Make a list of activities and actions
- Step 3.** For each activity, define : what, who, when and how progress will be monitored
- Step 4.** Define the Action Plan activity timeline

Resources

Tool 5.A1.1 Action Plan table of content - Example

Tool 5.A1.2 Action Plan activity timeline - Example

Additional resources:

 Lüthi et al., 2011. *Community-Led Urban Environmental Sanitation Planning: CLUES, Tool 23*

 Online course – [From Data to Tangible Impact: Achieving Waste SDGs by 2030](#) , Module 6.5 (UN-Habitat)