

Planning For Zero-Waste At Schools

- A toolkit



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Planning For Zero-Waste At Schools

- A toolkit

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Introduction

Solid waste management (SWM) is a universal issue affecting every single person in the world: everywhere, tremendous challenges are faced to cope with the growing amounts of waste produced daily, as a result of population and urbanization growth. While sound waste management is key to protect the environment and human health, nowadays 2 billion people still lack access to solid waste collection service, while 3 billion people lack access to controlled disposal facilities [9]. This results in tremendous amounts of waste being littered, dumped or openly burnt, contaminating water, groundwater and the world's oceans. Such practices are causing floods by clogging drainage systems, attracting pests, rodents and other disease vectors, increasing respiratory problem, greenhouse gas emissions, enhancing climate change, while impacting negatively on biodiversity and increasing resources depletion.

Sustainable SWM is key to achieve the Agenda 2030 for Sustainable Development. Indeed, among the 17 Sustainable Development Goals (SDGs) adopted by all United Nations Member States in 2015, 4 are directly linked to waste management (Goal 1, 6, 11, 12) and 8 indirectly (Goal 2, 3, 7, 8, 9, 13, 14, 17), as shown in Figure 1 with stroke and dotted line respectively.

Urgent actions are needed at all levels of the society [5, 10], to tackle what can be considered as “one of the biggest challenge of the urban world” [11]. As SWM is closely linked to people and people's behavior, a shift of paradigm is needed to consider solid waste as potential resource and not as trash. Such a shift in the society requires awareness raising, pragmatic approaches and concrete actions that, we believe, can be best transmitted through education.



Figure 1: SWM-related SDGs [4]

Education has long been recognized as a critical factor to address environmental and sustainability issues and ensuring human and nature well-being [12]. Following the recommendation of UNESCO for Education for Sustainable Development (EDS), education should aim at “empowering and equip current and future generations to meet their needs using a balanced and integrated approach to the economic, social and environmental dimensions of sustainable development” [12]. These are the very same precepts of this toolkit, which aims at developing innovative solutions, which maximize on the synergies between water, sanitation, waste management, food production, health, environment and energy generation in schools. By using schools as model unit, it targets learning, application and practice so that students become agents of change and ambassadors for sustainable behaviour and a cleaner world under a circular economy.

We are all in this together, so it is up to each one of us to be more responsible with what we throw away and how our waste is managed.

How to use this toolkit

This toolkit aims at providing step-by-step guidance accompanied by tools to develop and implement “Action Plans” to close the loops of material and resources at any school level, considering a system approach and focusing on low-tech options that could be applied in any low- and middle-income settings.

This toolkit was built on existing proven methodologies from the sanitation and solid waste management sector (see Part 1 - Key concepts). They were used and adapted in schools in Nepal and Peru between 2018 and 2022 through pilot projects.

Scope and target audience

This toolkit is for individuals or organizations, such as:

- **School community members** (teachers, students, non-teaching staff, etc.) who want to improve SWM in their own institution;
- **Non-Governmental Organizations (NGOs) and civil society organization** who want to support educational institutions in implementing a Zero-Waste approach.

Navigation through this guide

This toolkit is structured as follows:

Part 1: Introduces the key concepts and guiding principles of the developed methodology presented in the toolkit.

Part 2: Describes each steps of the planning approach towards Zero-Waste at schools, with detailed activities:

- Step 1: Mobilize
- Step 2: Baseline
- Step 3: Planning priorities
- Step 4: Identify and evaluate options
- Step 5: Develop an Action Plan
- Step 6: Implement the Action Plan
- Step 7: Monitor and evaluate

Part 3: Presents technical resources covering all the aspects of solid waste management.

Part 4: Contains summary briefs for each tool.

Part 5: Contains technical factsheets.

Additional resources and references are listed at the end of the document.

Throughout the text, you will come across the following icons, which indicate milestones, tools, technical resources and factsheets as well as access to further resources.



Milestones



Key stakeholders



Tools



Technical resource & Factsheets



Additional literature



Video resources



Webpage resources

Key issues and concepts are highlighted in numbered colored boxes.

Part 1 -

Key concepts



Zero-Waste approach at school

Zero-Waste is an approach based on two key principles:

- **Waste management hierarchy**, as it aims at reducing the amount of waste produced and send to final disposal (see Box 1) ;
- **Circular economy principle**, as it aims at closing the loops of material and resources as close as possible to the production source (See Box 2);

Implemented at school level, a Zero-Waste approach will thus allow to plan and implement efficient strategies to reduce, reuse, recycle and recover waste, while at the same time raise awareness and good practices of the school community members; it targets learning, application and practice, so that students become agents of change and ambassadors for sustainable behavior and a cleaner world under a circular economy.

Figure 2 visually represents the Zero-Waste concept, where all materials and substances generated inside the school compounds, such as solid waste, water, wastewater, grey water or faecal sludge, are reused and materials exiting the school compound are reduced to a minimum, while all of this is embedded in an environmental education component.



Figure 2: Zero-Waste approach - Schematic overview

Box 1: Waste management hierarchy

The waste management hierarchy provides a generalized priority order for waste management options and technical approaches. Highest priorities should be set on preventing waste and thereafter “encouraging treatment options that deliver the best overall environmental outcome, taking into account life-cycle thinking” [5].

Applying this concept at school level, this translates into innovative school policies regarding use and consumption of materials at the school (e.g. by limiting/prohibiting the use of single-use items, reducing food waste, etc.), making sure to stop harmful practices for the environment (e.g. stop littering, stop open burning of waste, uncontrolled dumping, etc.), while fostering recycling practices.

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

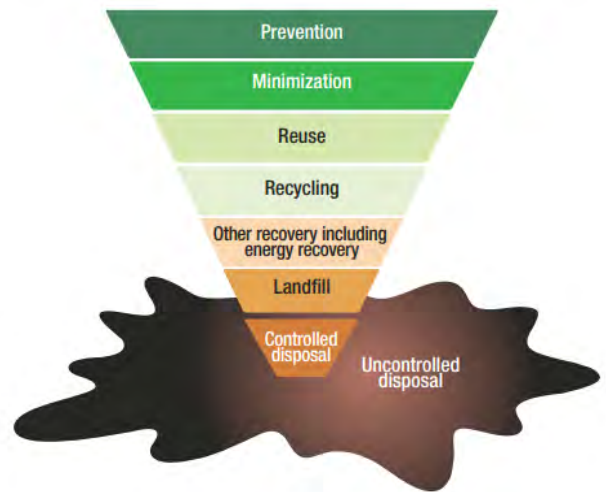


Figure 3: Waste management hierarchy [5]

Box 2: Circular economy principle

Since the industrial revolution, our economies have followed a linear growth in the use of natural resources, consisting of take – make – use – discard, based on the false premise that resources are infinitely available and accessible. Such a model simply cannot be sustained by the earth system: sources of materials are limited, and there are limits to the resilience of terrestrial ecosystems due to habitat degradation and pollution by various hazardous chemicals.

Nature, on the other hand, follows a circular logic, where each element produced/created serves the next. Circular economy envisages a similar system, where after the make and use stages, materials are recovered and transferred to a new production and use cycle.

Applying this concept at school level, this would emphasize the need of managing waste as resources and enhancing recycling activities inside and outside the school.

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

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

 [Ellen MacArthur Foundation](#)

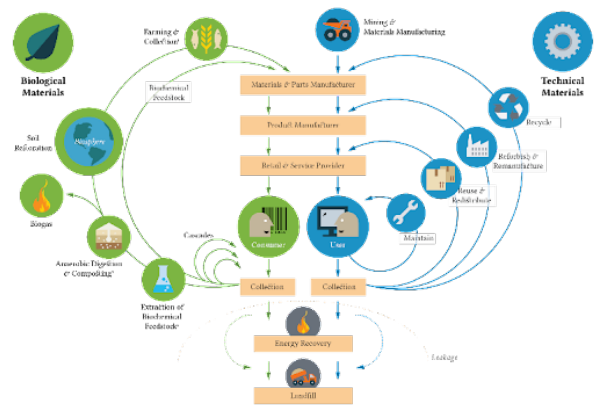


Figure 4: Circular economy principle [3]

Strategic planning – Data-driven decisions & Participatory approaches

This toolkit follows the principle of data-driven decisions and participatory approaches, which are two fundamentals of strategic planning. Its structure is inspired by the CLUES participatory planning approach [13] and the seven steps of City Strategic Plan mentioned in the online course of UN-habitat “From Data to Tangible Impact: Achieving Waste SDGs by 2030” [4].

Strategic planning serves to improve the efficiency and effectiveness of services by taking a broader view and addressing the problems based on setting priority. Plans are usually best if they are “evidence” led, meaning where data has been used to take decisions. A structured step-by-step approach, allows to understand the current situation, generate key data and information and plan improvement options accordingly.

Ensuring stakeholders participation throughout the strategic planning process ensures that the planning reflects priorities and interests of the stakeholders, as well as building trust and ownership, which in turn foster their commitment, role and responsibility in translating planning into actions.

Evidence-based decision making and participation principles are already well established in sanitation and solid waste management planning and were adapted for the school context in the present toolkit.

Box 3: Planning steps – Towards Zero-Waste at schools (adapted from [4])

The planning steps suggested in this toolkit are:

- 1) Mobilize** → Assemble your team, agree on principles and process, confirm school commitment, identify stakeholders;
 - 2) Baseline** → Establish a baseline on the current situation, identify key issues and validate the baseline;
 - 3) Planning priorities and principles** → Agree on principles priority order, set goals and targets, identify priorities based on key issues;
 - 4) Identify and evaluate options** → Identify and evaluate options, discuss and agree on options, revisit goals and targets;
 - 5) Develop an Action Plan** → Develop an Action Plan, identify roles, responsibilities and set targets;
 - 6) Implement the Action Plan** → Start the implementation process, communicate priorities, objectives and targets to all stakeholders;
 - 7) Monitor and evaluate** → Monitor and evaluate progress against targets set, identify opportunities for improvement, updates the Action Plan accordingly
- During each of these steps, engaging stakeholders is a high priority task.

Stakeholder Engagement -
takes place during each step of the plan



Figure 5: Planning steps - Towards Zero-Waste at school, adapted from [4]

 Lüthi et al., 2011. *Community-Led Urban Environmental Sanitation Planning: CLUES* [13]

 Wilson et al., 2001. *Strategic Planning Guide for Municipal Solid Waste Management* [14]

 Online course – [From Data to Tangible Impact: Achieving Waste SDGs by 2030](#) (UN-Habitat) [4]

Behavior change

Most solid waste management improvements require a change of practices by different stakeholders; the waste generators, that must stop littering, start segregating waste at source, or use a collection service, and also the waste handlers, that must increase efficiency of the service delivered, or the local authority that need to prioritize waste management issues and allocate sufficient human and financial resources towards waste management improvements. Yet, it is important to remember that even if it might sound trivial on paper, asking for changing a current practices is to ask for a behavior change.

Various methods exist to incite and promote behavior change. Rather than promoting one method or another, this guide hopes to raise awareness about the multitude of factors affecting behavior and behavior change. It uses the RANAS Systematic Behavior Change approach developed at Eawag (see Box 4) to outline the possible behavior-steering factors

Box 4: RANAS behavior-steering factors

The RANAS behavior-steering factors are [15]:

- **Risk:** Person's understanding and awareness of health risk
- **Attitude:** Person's positive or negative stance towards a behavior
- **Norms:** Perceived social pressure towards a behavior
- **Ability:** Person's confidence in her or his ability to practice a behavior
- **Self-regulation:** Person's attempts to plan and self-monitor a behavior and to manage conflicting goals and distracting signals

Different behavior change techniques can be used to trigger specifically the factor of concern. The RANAS factors and related behavior change techniques are presented in Figure 6.

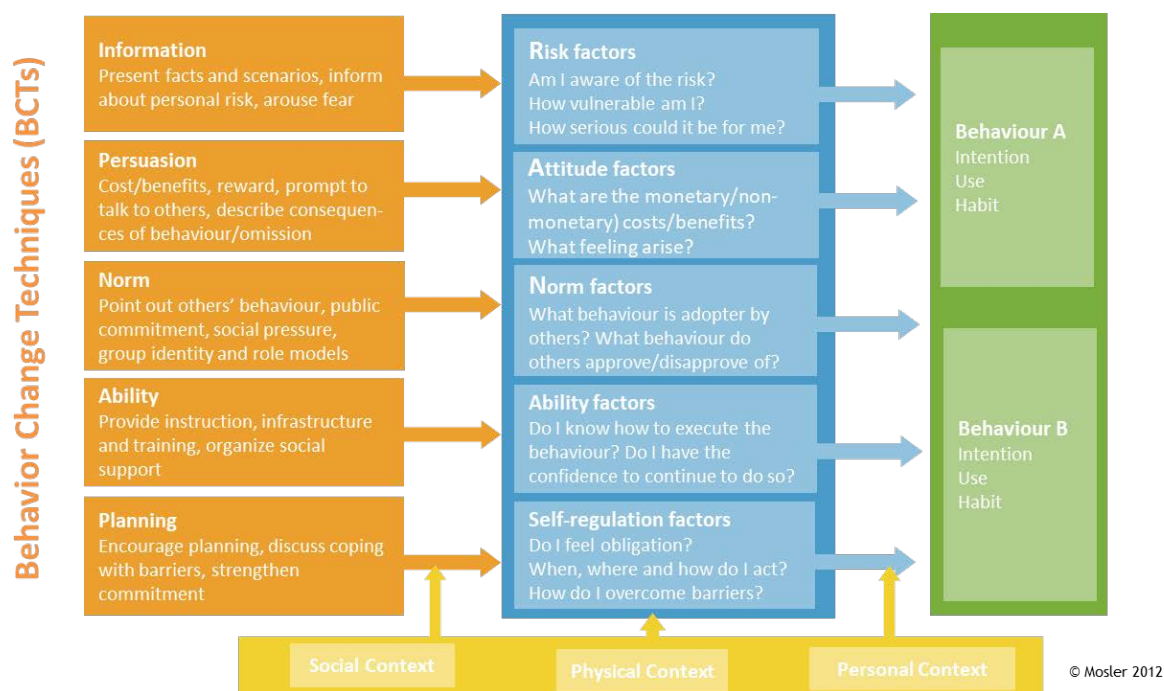






Figure 6: Behavior Change Steering Factors (RANAS, [16])

While typical behavior change interventions related to SWM often target the risk factor (providing information on why doing a certain behavior is good or bad for the environment) it is important to realize that alternative and innovative behavior change techniques, which target other behavior-steering factors, could be more effective.

If time and resources allows, researching on key driving behavioral factor before implementing a behavior change intervention would be best, so that a targeted campaign could be performed. For more information on RANAS please consider the resources listed hereafter.

-  Mosler Contzen, 2016. *Systematic behavior change in water, sanitation and hygiene. A practical guide using the RANAS approach* [15]
-  Cavin, 2017. *Behavior Change Manual* [17]
-  Ranamosler.com
-  MOOC module – [Triggering Community Participation with the RANAS approach](#) (Eawag/Sandec)

Learning by doing - Education for Sustainable Development

As mentioned in the introduction, this toolkit is in line with the Education for Sustainable Development (ESD) principle of UNESCO, which is commonly understood as “education that encourages changes in knowledge, skills, values and attitudes to enable a more sustainable and just society for all” [12].

As such, ESD is recognized by UNESCO at the heart of the 2030 agenda for sustainable development. According to UNESCO, schools should “see themselves as experiential places of learning for sustainable development” and the “institution itself [should] function as a role model for the learners” [1]. Following the motto “living what we learn,” UNESCO promotes the so-called “whole-institution approach” (see Figure 7), where governance, policy & capacity building, together with community, partnership & relationships, curriculum, teaching & learning and facilities, school operation all converge towards sustainable development. The key elements of the “whole-institution approach” are summarized in Box 5.

According to UNESCO, ESD is about “empowering and motivating learners to become more active and critical” and as such, action-oriented transformative pedagogy is required. The key pedagogical approaches in ESD promoting “learning by doing” are summarized in Box 6.

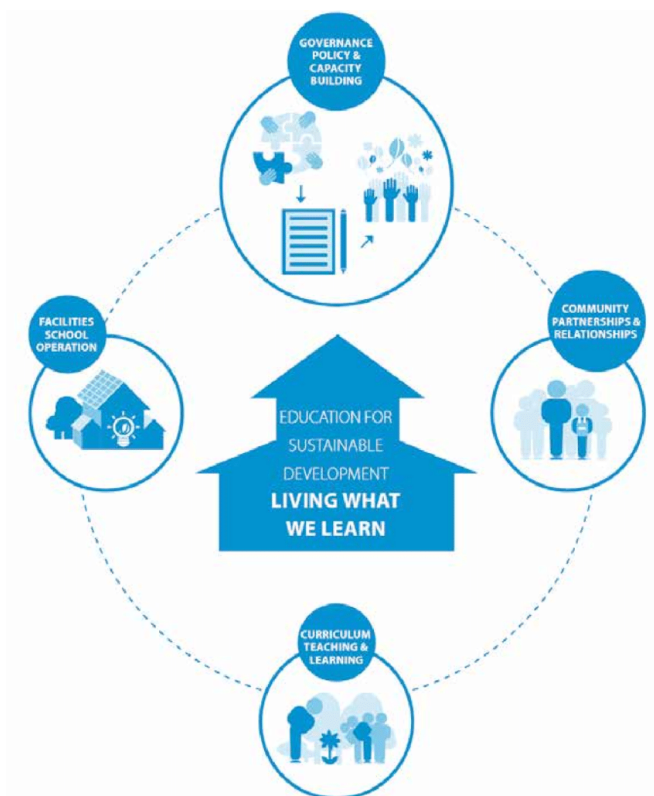


Figure 7: The whole-institution approach [1]

Box 5: Key elements for whole-institution approaches [12]

1. Institution-wide process is organized in a manner that enables all stakeholders – leadership, teachers, learners, administration – to jointly develop a vision and plan to implement ESD in the whole institution.
2. Technical and, where possible and appropriate, financial support is provided to the institution to support its reorientation. This can include the provision of relevant good practice examples, training for leadership and administration, the development of guidelines, as well as associated research.
3. Existing relevant inter-institutional networks are mobilized and enhanced in order to facilitate mutual support such as peer-to-peer learning on a whole-institution approach, and to increase the visibility of the approach to promote it as a model for adaptation.

Box 6 : Key pedagogical approaches in ESD [12]

A learner-centered approach

Learner-centered pedagogy sees students as autonomous learners and emphasizes the active development of knowledge rather than its mere transfer and/or passive learning experiences. The learners' prior knowledge as well as their experiences in the social context are the starting points for stimulating learning processes in which the learners construct their own knowledge base. Learner-centered approaches require learners to reflect on their own knowledge and learning processes in order to manage and monitor them. Educators should stimulate and support those reflections. Learner-centered approaches change the role of an educator from that of an expert who transfers structured knowledge to that of a facilitator of learning processes [18].

Action-oriented learning

In action-oriented learning, learners engage in action and reflect on their experiences in relation to the intended learning process and personal development. The experience might come from a project (e.g. in-service learning), an internship, facilitation of a workshop, implementation of a campaign and so on. Action-learning draws on Kolb's learning cycle of experiential learning, which has the following stages: (i) having a concrete experience, (ii) observation and reflection, (iii) formation of abstract concepts for generalization and (iv) application in new situations [19]. Action-learning increases knowledge acquisition, competency development and values clarification by linking rather abstract concepts to personal experience and the learners' life. The role of the educator is to create a learning environment that prompts learners' experiences and reflexive thought processes.

Transformative learning

Transformative learning can be defined primarily by its aims and principles, not by a concrete teaching or learning strategy. It aims to empower learners to question and change their ways of seeing and thinking about the world, in order to further develop their understanding of it [20, 21]. The educator acts as a facilitator who empowers and challenges learners to change their worldviews. The related concept of transgressive learning [22] goes one step further – it states that learning in ESD has to overcome the status quo and prepare the learner for disruptive thinking and the co-creation of new knowledge.



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



UNESCO, 2018. *Issues and trends in Education for Sustainable Development* [12]

Integrated Sustainable Waste Management (ISWM)

The Integrated Sustainable Waste Management (ISWM) framework is a framework that helps visualizing and understanding all the important elements for sustainable and integrated solid waste management.

As shown in Figure 8, the ISWM framework is composed of two main elements:

- **Physical components:** Linked to the waste management chain, such as waste generation, collection, treatment and disposal and the 3Rs of Reduce, Reuse, Recycle, by describing what happens to the waste;
- **Governance aspects:** Linked to the software aspect of waste management such as stakeholder inclusivity, financial sustainability and institutions and policies, addressing how things are done at governance level.

Considering all these elements is key for a sustainable and prosper waste management system decreasing environmental and health threats.

Knowing how each of these elements perform or to which degree they are included in SWM can be assessed using the “Wasteaware benchmark indicators” (WABIs). The WABIs comprise quantitative and qualitative indicators used to evaluate the physical components and governance aspects of a solid waste management system.

This guide adapts the WABIs for school settings. These can be found in Step 2 (A) and in T 2.A2

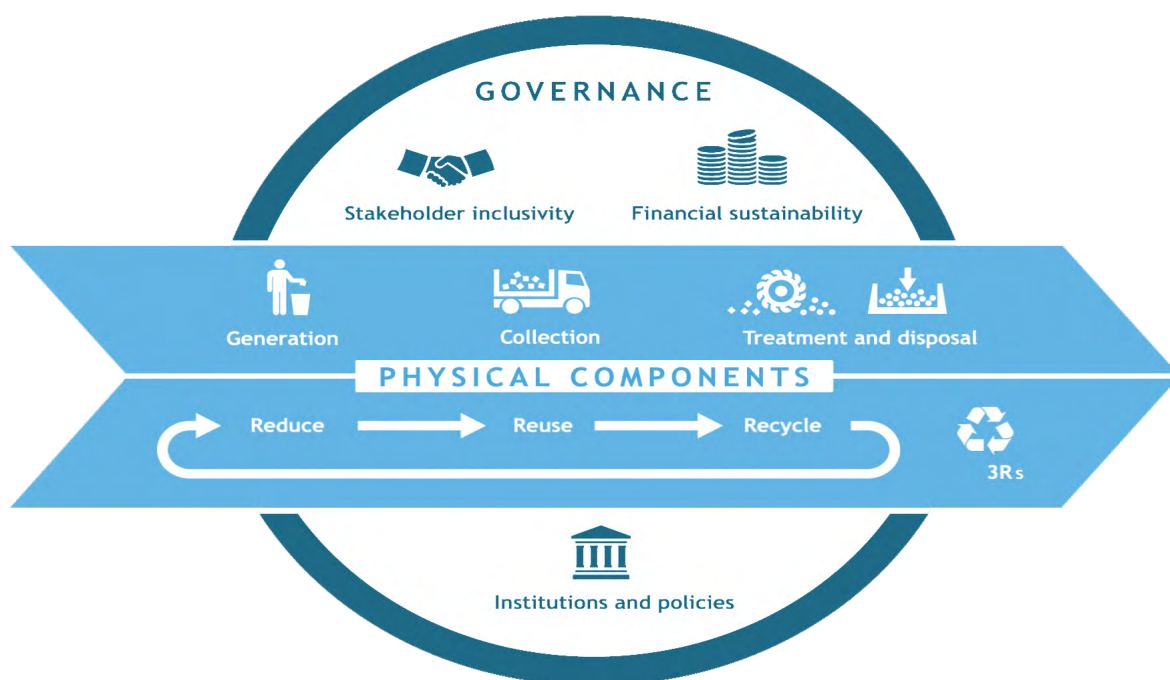


Figure 8: Integrated Sustainable Waste Management Framework (ISWM) (adapted from [23])

 Wilson, et al., 2015 “Wasteaware’ benchmark indicators for integrated sustainable waste management in cities” [24]

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