

WASTE MANAGEMENT



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- Raise awareness of the main aspects of solid waste and solid waste management, as well as the impacts of poor management.
- Propose a diagnosis or audit of the school's solid waste to improve awareness and encourage good management.



SOLID WASTE

Material discarded after it has fulfilled a purpose or mission, but that could be used later, reused, recycled. Any waste can be put back into use with good management. Waste can be organic or inorganic. Inorganic waste includes: bottles (plastic or glass), cardboard boxes, paper, etc.

Solid waste is currently seen as one of the most serious global problems. According to a World Bank report¹²⁶ solid waste management affects everyone, whether individuals manage their own waste or governments provide citizens with waste management services. Waste generation is estimated to increase from 2 billion tonnes in 2016 to 3.4 billion

tonnes in 2050 as nations and cities urbanise, develop economically and populations grow. Worldwide, at least 33% of this waste is being mismanaged, left in open dumps or burned.

URBAN SOLID WASTE

is generated in urban spaces and their related areas. This kind of waste is produced by households, offices, warehouses, shops, businesses, etc.

¹²⁶ The World Bank Group. (2021). What a Waste. <https://datatopics.worldbank.org/what-a-waste/>

Basic concepts:



HAZARDOUS WASTE

poses a risk to society or nature. It includes e-waste, batteries, old phones, etc.

INTEGRATED SOLID WASTE MANAGEMENT (ISWM)¹²⁷

It is the dynamic interactions between institutional, sectoral and regional actors to find an efficient and equitable waste management solution. Public policies are required to strengthen waste management processes in urban spaces, following an important series of steps starting with the importance of people sorting the waste they generate, followed by the waste collection and transport process, followed by a process that includes classification, use, possible treatment and final disposal.

Special care is required during final disposal to ensure that these sites do not become polluting spaces, as in the case of open dumps, which are home to all kinds of waste, including hazardous waste, dumped without prior treatment, and cause serious problems. Here, it is particularly important that we consider our consumption of products and goods in the light of sustainability criteria, and promote re-use. An important principle, known as the 5Rs, is being promoted to support this:

¹²⁷ Rondón Toro, E., Szantó Narea, M., Pacheco, J. F.-C. E.-G. A., Contreras, E., & Gálvez, A. (2016, 1 July). Guía general para la gestión de residuos sólidos domiciliarios (General Guidance on Solid Household Waste Management). Economic Commission for Latin America and the Caribbean. <https://www.scribd.com/document/399926480/Guia-General-Para-La-Gestion-de-Residuos-Solidos-Domiciliarios-Cepal>

THE 5 R'S PRINCIPLE

This principle emphasises the need for everyone to perform five (5) fundamental tasks: reduce, reuse, recycle, refuse, repair.

- **Reduce:** rethinking our purchases by asking do I really need this to avoid buying unnecessary products and limit our consumption to the essentials.
- **Reuse:** extending a product's useful life by giving it a new purpose (for example, an old T-shirt can be re-purposed as a kitchen towel, glass bottles as food storage containers).
- **Recycling:** is the process of treating waste as a raw material that can be turned into something new (for example, Plastic bottles, paper, aluminium and glass can be processed to create new plastic, paper, aluminium and glass).
- **Refuse:** means saying no when offered a product that has negative impacts on the environment.
- **Repair:** making the necessary changes and fixes to an item in poor condition to allow it to continue to be used.

ZERO TRASH

This movement is both a principle and a comprehensive approach to waste management that aims to gradually reduce solid urban waste to zero waste. Various measures are considered at each stage, from production to consumption and disposal. It also includes designing products with a long service life, and the production of materials that are easily reinserted or recycled.

Our connections with waste

Human beings should have a relationship with solid waste that reflects the natural world. In nature, everything can be reused, everything rotates in cycles that feed back into each other. At some point in human history, this natural relationship worked: we made careful, moderate use of nature's resources and our activities left few impacts. However, accelerated changes emerged.

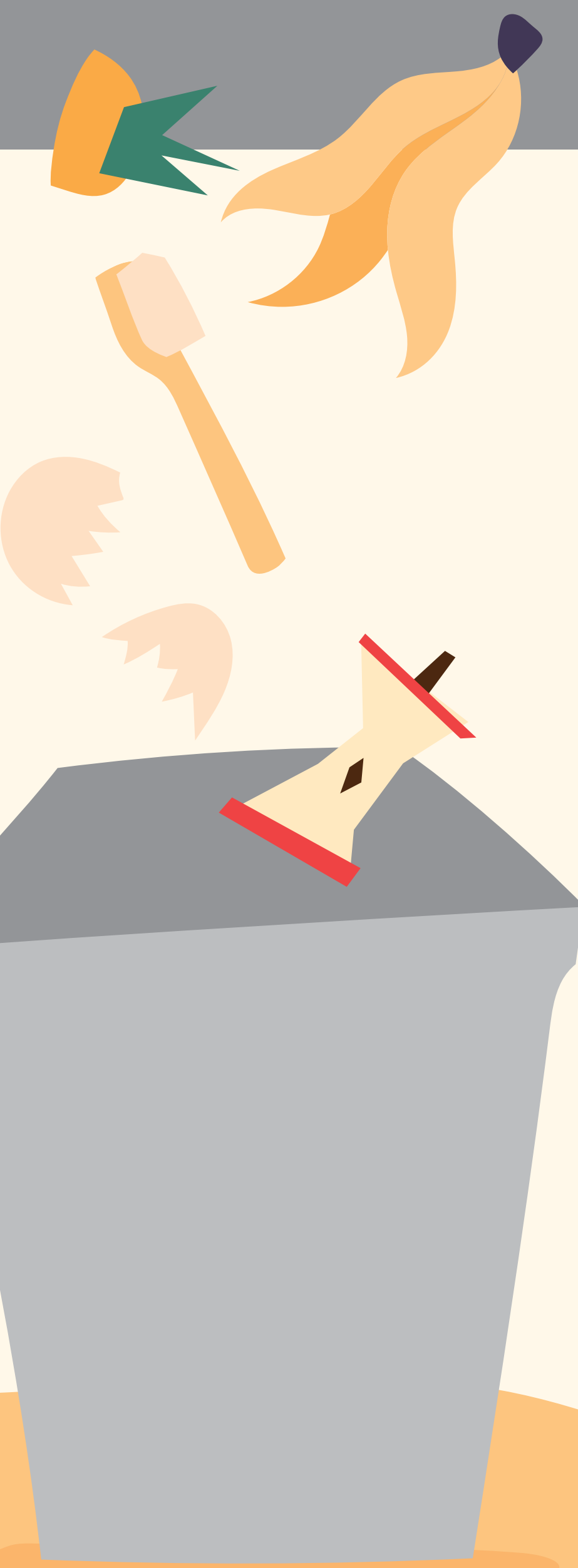
With the beginning and development of the Industrial Revolution towards the end of the 18th century and in the beginning of the 19th century, a transcendental economic change took place. Urbanisation and industrialisation increased, leading to very visible, notorious new situations related to what was then considered to be development. Although this revolution is seen as an important moment in our history, due to the technological, economic and sociological changes it brought about, it is also worth highlighting its close relation to the environmental problems that arose as industrial processes expanded. **These problems include the consequences of excessive solid waste and the lack of appropriate waste management.**

It is now clear that the emergence and enormous growth of solid waste are related to prevailing social and economic processes, where its potential impacts have not been fully, seriously and efficiently considered. And the importance of sustainable development has not been taken into account. However, significant efforts are currently being made in this direction.

Some indigenous peoples and rural communities maintain a more balanced and harmonious relationship with nature. This means that they do not generate abundant waste, instead using their waste in a balanced way as part of structured planting and cultivation processes. They have not been unaffected by external influences, but their actions maintain a sustainable approach and go hand in hand with a caring and respectful vision of Mother Earth. We need to learn from this wisdom, as an essential part of returning to our essential selves, and as a contribution to a sustainable world.



Context in Latin America and the Caribbean



Latin America is the source of approximately 10% of the waste generated globally.¹²⁸ Although waste collection and management systems are considered to have been gradually improving in recent years, more than 40 million people lack access to basic waste collection services, and about one third of the waste generated (some 145,000 tonnes per day) ends up in open dumps, causing serious impacts on health and the environment. Waste recovery is still very low at only 10% - so many valuable material and energy resources are wasted.

Other key figures show the current situation: every inhabitant in the region generates 1 kg of waste per day, which represents a total daily waste generation of 541,000 tonnes of municipal waste. It is estimated that this figure will increase 25% by 2050. However, approximately 50% of the municipal waste generated in the region is organic, providing a significant opportunity for reduction. Currently 90% of this waste is not reused, and separation at source and segmented collection of dry and organic waste is a major challenge.

¹²⁸ UNEP. (2018) Waste Management Outlook for Latin America and the Caribbean

As are open dumps, which still operate in the region and receive approximately 145,000 t/day. These landfills create health risks for the people who work in them, and for the population in the surrounding areas. They also produce other environmental impacts by polluting water and soil, emitting toxic gases and GHGs, with consequences for various sectors.

The waste collection service needs improvement, to make it available to all urban dwellers, as it is estimated that 35,000 tonnes of waste go uncollected in the region every day. **A key recommendation is to formalise and recognise informal recycling, as many people work to recover waste without a formal contract or recognition.**

A fundamental approach is needed to improve the situation of integrated solid waste management in the region: publicity and promotion are required to ensure the effective participation of everyone in society. The role of environmental education is therefore of the utmost importance, in connection with the promotion of more and better political and regulatory measures, at government and municipal level.

Context in Ecuador



The Proyecto de Gestión de los Residuos Sólidos y Economía Circular Inclusiva del Ecuador - GRECI (Project for Solid Waste Management and Ecuador's Inclusive Circular Economy) run by¹²⁹ the Ministry of Environment, Water and Ecological Transition aims to implement integrated waste and/or solid waste management in the public and private sectors, with a focus on circular economy and inclusive recycling, supported by technology and innovation.

Research on solid waste management conducted between October 2014 and June 2015 in 221 Gobiernos Autónomos Descentralizados - GAD (Decentralised Autonomous Governments) by the Instituto Nacional de Estadística y Censos - INEC (National Institute of Statistics and Census) in coordination with the Asociación de Municipalidades Ecuatorianas - AME (Association of Ecuadorian Municipalities) shows that the urban population in Ecuador produces an average of 0.57 kilograms of solid waste per day, while this figure rises to 0.72 kilograms in the Insular Region.¹³⁰

¹²⁹ Proyecto de Gestión de los Residuos Sólidos y Economía Circular Inclusiva del Ecuador - GRECI (Project for Solid Waste Management and Ecuador's Inclusive Circular Economy) (2021). Proyecto de Gestión de los Residuos Sólidos y Economía Circular Inclusiva del Ecuador - GRECI (Project for Solid Waste Management and Ecuador's Inclusive Circular Economy) Información Técnica y Estadística de la gestión integral de residuos y desechos sólidos no peligrosos municipales (Technical and statistical information on the integrated management of municipal waste and non-hazardous solid waste). Ecuador.

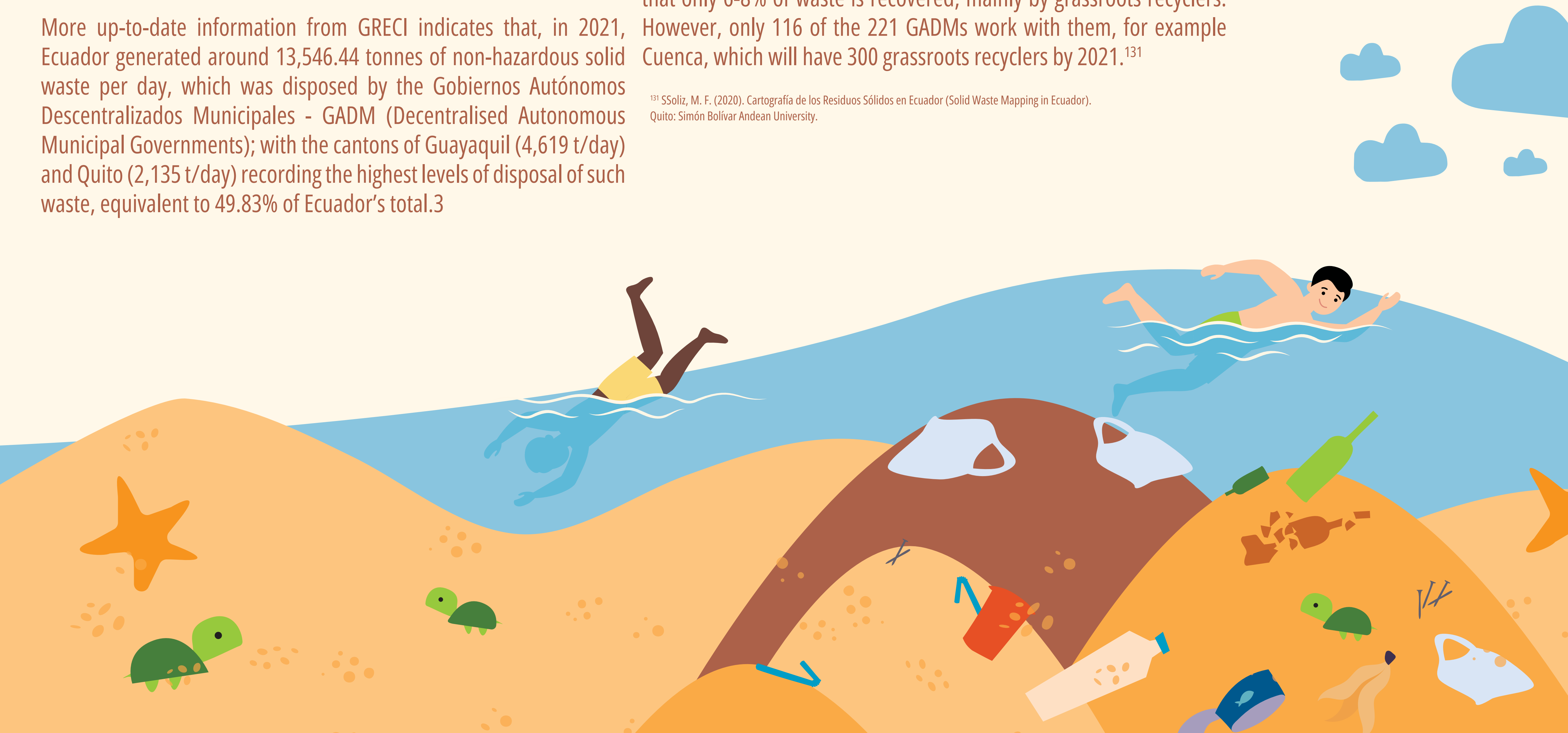
¹³⁰ Instituto Nacional de Estadística y Censos (National Institute of Statistics and Census). (2015). Los ecuatorianos producen 0,57 kilogramos de residuos sólidos diario (Ecuadorians produce 0.57 kilograms of solid waste daily). <https://www.ecuadorencifras.gob.ec/los-ecuatorianos-producen-057-kilogramos-de-residuos-solidos-diario/>

The study also states that, in 2014, Ecuador collected 11,203.24 tonnes of solid waste per day, with the coastal region of la Costa collecting most, at 6,229.92 tonnes per day.

More up-to-date information from GRECI indicates that, in 2021, Ecuador generated around 13,546.44 tonnes of non-hazardous solid waste per day, which was disposed by the Gobiernos Autónomos Descentralizados Municipales - GADM (Decentralised Autonomous Municipal Governments); with the cantons of Guayaquil (4,619 t/day) and Quito (2,135 t/day) recording the highest levels of disposal of such waste, equivalent to 49.83% of Ecuador's total.³

Non-hazardous solid waste is disposed of as follows: 22.62% to landfills, 31.67% to rubbish dumps and 22.62% to temporary deposits. It is estimated that 94% of waste ends up in waste disposal systems and that only 6-8% of waste is recovered, mainly by grassroots recyclers. However, only 116 of the 221 GADMs work with them, for example Cuenca, which will have 300 grassroots recyclers by 2021.¹³¹

¹³¹ SSoliz, M. F. (2020). Cartografía de los Residuos Sólidos en Ecuador (Solid Waste Mapping in Ecuador). Quito: Simón Bolívar Andean University.



Thematic contributions



Mathematics:

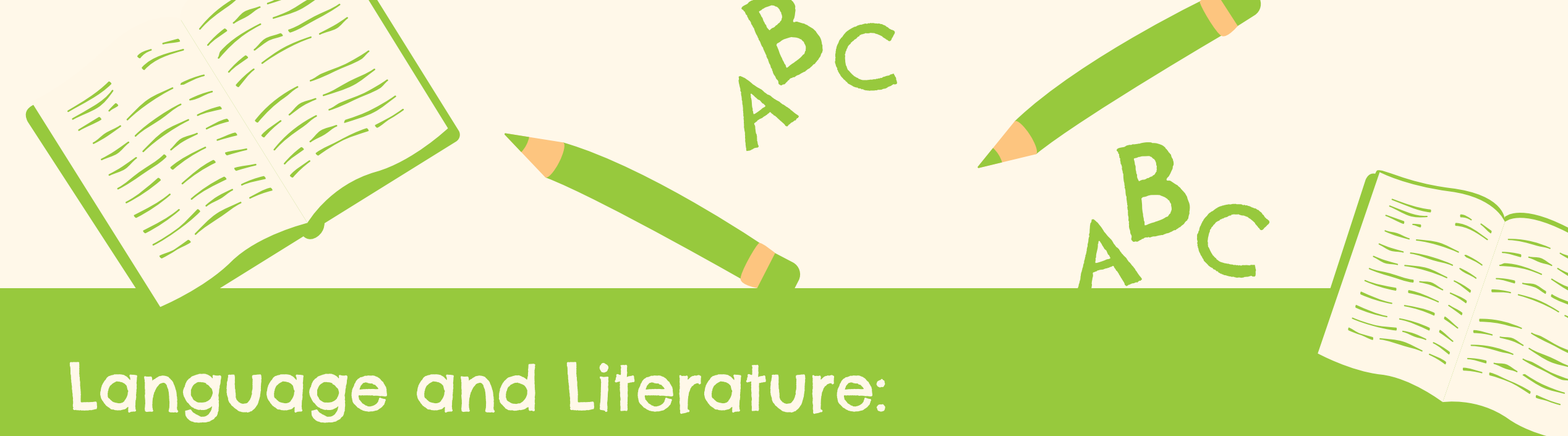
- Explain how long¹³² it takes for various materials to decompose naturally, and do some calculations using common materials.
- **Remind students of remainders in maths, in an inexact division. Underscore the importance of not leaving behind waste that will affect the life of the planet.**

¹³² Example: Organic waste: 3 weeks to 4 months; Cotton and/or linen clothing: 1 to 5 months; Woollen socks: 1 year; Leather shoes: 3 to 5 years; Paper: 3 weeks to 2 months; Tin cans: 10 to 100 years; Aluminium cans: 350 to 400 years; Plastic materials: 500 years.



Natural Sciences:

- Indicate the problems arising in soil, water and air caused by solid waste and its poor disposal. The impacts of hazardous waste, such as batteries. Analyse the impact of e-waste.
- **Explain what happens to seas, lakes or rivers when waste, especially plastic bags, is dumped. Impact of microplastics and how they affect marine life.**



Language and Literature:

- Explain the differences between the words “waste” and “rubbish”. Analyse the ways in which these words are used, and their respective connotations.
- Invite the students to come up with acrostics based on the words: recycle, reuse, etc.
- Analyse and design positive environmental messages, emphasise the power of language in bringing about behavioural change.
- **Analyse the use of language in creating awareness-raising campaigns. Ask students about their best environmental videos and campaigns. What kinds of messages are the most convincing?**



Social Sciences:

- Point out that it is everyone's responsibility to care for the planet, and highlight the simple actions we can all perform to avoid waste generation.
- Investigate how other communities or cities managed solid waste. Analyse the strategies and techniques used in ancient times, as well as waste management in other countries.
- **Observe or comment on the historical processes that have led to the increase of solid waste in the world, and the need for social and economic changes.**

The Arts:

- Make paper creations, using origami and other paper-folding techniques, to illustrate the potential uses of paper recycling.
- Teach simple ways of making paper out of recycled newspaper, or the use of dough to make dolls, puppets, etc.
- Create homemade recycled paper.
- Encourage the reuse of materials for school activities.
- **Create a collection centre for forgotten or old stationery, papers, etc. for classroom use or donation.**





Physical Education:

- Highlight the importance of not contaminating sports areas, such as gymnasiums, athletics tracks, swimming pools and others, with solid waste.
 - Create a five-minute litter pick-up rule for outdoor activities, for example sport in parks, beaches, protected areas. Encourage this practice, and organise clean-up championships or marathons at local beaches or green areas.
- Point out the importance of solid waste management at physical exercise centres, as water bottles are always needed for hydration, and it is important to know where to put the empty containers. Emphasise the importance of replacing plastic bottles with non-polluting packaging.**



Potential interdisciplinary activities

Once teachers have made their subject contributions for classroom use, the Interdisciplinary Committee meets to design and agree on a common Desirable Scenario. For example:

“Students carry out an initial green-school diagnosis to become aware of the importance of proper solid waste management and improve their attitudes and behaviour”.

Once some of the details, approaches and scopes of the Scenario have been drafted and specified, organise interdisciplinary activities to celebrate and educate people in this subject at the educational centre and/or with the community.



“GREEN SCHOOL SOLID WASTE MANAGEMENT DIAGNOSIS”

Main theme and focus:

Understand, assess and improve solid waste management at the school. To this end, students could carry out an initial green school diagnosis, in this case focusing on solid waste, in order to promote better and greater knowledge of this field, as well as to encourage the improvement of students' knowledge, attitudes and behaviour.

A green school diagnosis is an educational process that aims to improve environmental management at education centres by gaining an understanding of internal processes, including various managed processes such as: water use, energy use, green spaces (school gardens, etc.) and solid waste.

To make it easier to distinguish the various aspects, such diagnoses can be referred to as GREENWATER, GREENENERGY, GREENSPACE and GREENWASTE (as in the present case of solid waste). Systematically articulating all of these processes and any others the students suggest, will enable a more complete green school diagnosis, capable of helping to improve environmental management at the school.

Fases y actividades principales:

1. Preparatory phase: It is important that the school has recycling bins to enable the correct separation of solid waste. If there are no such bins at present, the first task is to build some using simple materials.

Waste separation varies from country to country, as do the distinctive colours for each waste category. For example, containers for glass are often green; paper and cardboard - blue; organic waste - orange; plastic bottles or cans - yellow; hazardous waste - red; other waste - grey. Students could make containers for the school out of cardboard, adding the respective names and colours.

Hold a meeting with a group of teachers and school administration staff to review the situation of solid waste management at the school, along with teacher, administrator, student and staff habits, etc. The school may have already started a campaign on sustainable use and disposal of waste; if so, this diagnosis can be a continuation of the process.

Carry out a “waste audit” over one to two weeks. Assess the type (organic waste or inorganic waste) and the amount of waste (weight) generated at the school. Locate the recycling collection centres

near the school and identify the types of materials they receive (glass, paper, etc). Note their conditions for receiving this waste.

Lead a series of introductory and explanatory classroom talks to make students aware of the type of separation to be carried out, to ensure they know which containers are for which materials, and to underline the importance of placing the corresponding waste in the right containers.

2. Organisational phase: Invite a group of volunteer teachers and students to share ideas on the best ways to carry out a green solid waste management diagnosis, in such a way as to motivate their active participation in the process. Subsequently, explain the importance of surveying the entire school to gain a solid foundation for diagnosis:

3. Survey design phase: Define the questions to be included in the survey as a group, and according to the characteristics of the school. Questions may include the following:

- Do you know why solid waste management is important? Yes/No/A little (Explain)
- What kind of waste should be placed in the coloured bins?
- Green? Blue? Black, White? Red? Grey?
- Why is it important to place the right kind of waste in the right containers?
- When you need to dispose of rubbish in the classroom, what do you do?
- Do you try and find a bin for your rubbish in the playground? Yes/No/Sometimes
- Do the toilets have different containers for different types of waste? Yes/No
- Do you think that all schools/educational centres try and ensure people dispose of their waste properly? Yes /No/ Sometimes
- Do you find litter in areas around the school? Yes/No
- Do you think the school should also consider what happens around it in terms of waste management? Yes /No/Maybe
- Does the school recycle some of its waste? Yes/No
- Do you think it should? Yes/ No
- If yes, please tell us your ideas about how this should be done:

4. Analysis of the survey outcome: Once the list of survey questions has been defined and revised, it is handed out to all the students in the school during class so that they can answer them on the spot. The respective teacher collects the results, which will then be shared in a meeting with the other teachers and student volunteers involved.

This meeting processes the survey results, highlighting the most salient issues, the majority answers and the suggestions made. This will provide a first version of the participatory green waste management diagnosis, and can serve as the basis for subsequent tasks.

5. Conclusions and proposals: A series of conclusions based on the analysis of the various issues is reached, and those considered to be of greatest importance under two priorities are highlighted:

- Those concerning levels of knowledge and awareness of the issue.
- Suggestions expressed.

On the basis of these two working guidelines, an initial action plan is drawn up to improve knowledge and awareness of the issue and to implement some of the main suggestions. This action plan will be presented at an extended school meeting to share the survey results, the conclusions and actions proposed. This meeting also allows the volunteers to listen to the community's opinions and additional or complementary ideas so that the meeting can arrive at a shared and approved plan.



ACTIONS TO IMPROVE SOLID WASTE MANAGEMENT AT SCHOOL LEVEL



2. Example of an interdisciplinary activity on solid waste

Based on the contents and results of the previous activity, an initial action plan is implemented to improve knowledge and awareness of solid waste management at the school, considering the results and suggestions obtained through the survey.

This first plan should be simple, easy to implement and monitor. Like any plan, it will include the following components: Objectives, strategies, tasks and deadlines (timeline), responsibilities, implementation, monitoring, follow-up and evaluation. Once the main actions have been designed and implemented, along with their monitoring and follow-up, results are assessed within approximately two to three months (in accordance with the planned time frame) in order to evaluate the plan and refine the themes and approaches, with a view to designing a second, more detailed and elaborate plan.

Another continuity exercise could include finding out about and contacting the original members of the Científicos de la Basura (Garbage Scientists)¹³³ initiative created in Chile in 2007. This group promotes the Red Latinoamericana de la Basura (Latin American Garbage Network) involving several countries in the region, especially Pacific Ocean areas. They have also developed and share interesting educational materials, including stories and research guides.

¹³³ Red Nacional de Investigación Escolar (National School Research Network). (2017). Garbage Scientists. <http://www.cientificosdelabasura.cl/en/>

Evaluation of the activities carried out



The **Desirable Scenario** designed in the **Interdisciplinary Roundtable** is taken as the main reference for evaluating the activities carried out. In the case of solid waste this was: “Students carry out an initial green school diagnosis in order to promote better and greater knowledge of this field, as well as to encourage the improvement of students’ knowledge, attitudes and behaviour”. For evaluation purposes, two main objectives can therefore be considered to have been pursued:

- Raise students’ awareness of the importance of proper waste management.
- Improve students’ attitudes and behaviour in this regard.

Four general criteria could be used to evaluate the activities carried out. These can be developed into specific indicators at the educational centres, according to the various educational levels/ages, different subjects and based on the established pedagogical approaches.

EVALUATION CRITERIA	MAIN FOCUS	CENTRAL THEME: SUSTAINABLE CONSUMPTION						COMMENTS AND PROPOSALS
		ACTIVITY 1. Green school diagnosis on solid waste management			ACTIVITY 2. Actions to improve solid waste management at school level			
KNOWLEDGE <i>Waste, solid waste, hazardous waste, integrated waste management, 5R principle.</i>	<i>Level of participatory process, motivation and commitment</i>	LEVELS			LEVELS			
		HIGH	MEDIUM	LOW	HIGH	MEDIUM	LOW	
PARTICIPATION, INTEREST <i>Involvement of teachers and students in the survey design and implementation.</i>	<i>Achievement of visible, concrete results</i>							
OUTPUTS OBTAINED <i>Survey design, Concrete survey results. Plan.</i>	<i>Achievement of visible, concrete results</i>							
FOLLOW-UP PROPOSALS <i>Implementation of the plan. Initiatives.</i>	<i>Presence of new ideas, projects and suggestions</i>							

Rationale for the Guidelines

Environmental education is transversal. As an effective and transformative tool, it is key to the fulfillment of the Sustainable Development Goals. The Environmental Education Guide is presented as part of the 2021- 2022 Work Plan and at the request of the member countries. The guide contains ten thematic environmental booklets designed to be reference material for primary school teachers and environmental trainers to support the inclusion of environmental themes and concepts in the formal and informal education sector. They were developed to generate collective reflection that helps people identify ways to solve environmental challenges.

The Environmental Training Network is an intergovernmental platform, coordinated by the United Nations Environment Program (UNEP) and comprising eighteen environmental education focal points within the Ministries of Environment. The network aims to strengthen and share knowledge and experiences in environmental education in the region, and defines itself as a community that promotes action, cooperation, and the exchange of experiences and knowledge in environmental education, both face-to-face and online.

The Network reports to the Forum of Ministers of Environment of Latin America and the Caribbean. The Environmental Education Decision was adopted in Cartagena, Colombia, 2016, consolidating regional commitment to environmental education as a key element to transform values, behaviours and visions. During the XXI Meeting of the Forum of Ministers of Environment of Latin America and the Caribbean (Buenos Aires, Argentina, 2018), in the Declaration of Buenos Aires, the countries agreed: “To strengthen environmental education as a cross-cutting issue and provide more support to the Environmental Training Network of Latin America and the Caribbean to promote cooperation in the exchange of experiences among the countries of the region, generating synergies with other initiatives and Rationale for the Guidelines networks that promote environmental education”. It also responds to the UN Decade on Ecosystem Restoration: Action 3. Take ecosystem restoration into schools with the inclusion of a notebook focused on Ecosystem Restoration in Latin America.

