



MINISTRY OF ENVIRONMENT AND FORESTRY

**GUIDELINES FOR MAINSTREAMING WASTE
MANAGEMENT IN CURRICULA AT ALL LEVELS
OF EDUCATION AND TRAINING**

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GUIDELINES FOR MAINSTREAMING WASTE MANAGEMENT IN CURRICULA AT ALL LEVELS OF EDUCATION AND TRAINING

PREFACE

These guidelines are intended for curriculum developers and implementers, in learning environments. It provides information on how waste management education may be arranged to promote progressive change of behaviour and attitude about waste from the lowest to the highest levels of education. The guidelines have been developed by experts across relevant national sectors and they explore sustainability in both present and future in an effort to prepare the learner to design and implement actions for the present with consideration to the future. In this way, these guidelines will lead to learners developing capacity to contribute to a more sustainable future in terms of environmental safety and healthy citizens (Klarin, 2018). The guidelines will prepare students to act, individually and collectively, to explore and evaluate contested and emerging issues on environmental waste, conduct research, and create solutions for a sustainable future. Education for sustainable development enables learners to become effective citizens and active change agents by helping them to deal with complex and undefined global and local development issues. It will also help them appreciate the reality of continuous environmental changes and various viewpoints that exist on waste management (Amasuomo and Baird, 2016).

INTRODUCTION

This section explores the context leading to development of the waste curriculum guidelines and explains the background, situational analysis, rationale objectives and scope.

1.1 Background

Sustainable Waste Management (SWM) offers an opportunity to decouple economic growth from environmental degradation by transitioning to green economies that promote the wellbeing of people and the planet.¹ The goal of SWM is to reduce the amount of natural resources consumed while ensuring

¹ UNEP at: <https://www.unenvironment.org/explore-topics/resource-efficiency>

that any materials taken from nature are used as many times as possible and that any waste created is kept to a minimum. However, generation of municipal waste has been rising and is expected to nearly double by 2025 from 1.3 to 2.2 billion tons per year globally. This rise in waste production does not only cause serious environmental degradation, but also leads to depletion of scarce resources and loss of value. Therefore, policy measures and interventions that promote sustainable waste management can play a critical role in enhancing resource use efficiency through waste prevention, reuse of materials, recycling, and recovery in order to achieve a circular economy.

Education and sensitization has been identified as one of the key tools that can be used to promote sustainable waste management. Other approaches include cleaner production, extended producer responsibility (EPR), responsible design and consumption, source separation, and the use of incentives. The final report on the Decade for Education for Sustainable Development,² conclude that “there is now an increased recognition at the international policy level that education is essential to the advancement of sustainable development, with many countries committed to continuing to work to advance ESD at the national and local levels”. Agenda 21 emphasizes the importance of promoting education, public awareness and training with a focus of reorienting education systems towards sustainable development.³ Environmental education enables a learner to acquire ecological knowledge and skills necessary for effective participation in the implementation of the waste management system.⁴ The development of new knowledge on waste and the building of new values and promotion of activities in preprimary, primary, secondary, and tertiary levels of education is a key factor required in setting up efficient resource use systems and transitioning to inclusive green economies where waste generation is reduced or eliminated while regenerating and growing our natural wealth.⁵

In 2017, the government of Kenya launched the Competency Based Curriculum (CBC), which orients learners towards gaining competencies on matters that affect the environment. The curriculum development process which involves all stakeholders is ongoing and dynamic. The Pre Primary 1 and 2 , and Grades 1-3 Curriculum have established an Environmental Learning Area as an

² UNESCO 2014

³ See chapter 36 of UNCED Report available at:
<https://sustainabledevelopment.un.org/content/documents/Agenda21.pdf>

⁴ Sanja K et al Education in Waste Management. 2015

⁵ UNEP Resource 2019; Efficiency 2020+

independent subject. At Grades 4-12 environmental issues are embedded in all the subjects (KICD, 2017).

The guidelines to curriculum developers is designed to embed sustainable waste management in the teaching and learning experiences at all levels of education thus making it an essential part of learning. The environment and development education should deal with the dynamics of both the physical/biological and socio-economic environment and human development in order to be more effective. Therefore, strengthening of curricula should be continuous to ensure a multidisciplinary approach. Environment and development issues and their socio-cultural and demographic aspects and linkages should be covered while giving due respect to community-defined needs and diverse knowledge systems, including science, cultural and social sensitivities.

1.2 Situational analysis

Currently, about 1.3 billion metric tons of municipal solid waste are produced annually worldwide. The World Bank estimates that overall waste generation will increase to 2.40 billion metric tons by 2025. Only an estimated 13.5 % of today's waste is recycled and 5.5% is composited. The rest 85% needs some sort of sustainable management.

Waste generation in Kenya has been increasing with rapid urbanization. The amount of waste generated in Kenya per year stand at 8 million tons, and is predicted to double by 2050. In Nairobi for instance, about half (1,500 tons per day) of the solid waste produced is not collected and remains in the environment. Waste management challenges are common in all urban centres in Kenya posing environmental pollution and impacting negatively on human health.

Improper management of waste poses a threat to Climate Change and eventually compromise the achievement of Sustainable Development Goals. Waste being one of the contributors of greenhouse gases, affects climate change and it is for this reason that as a country, we should develop sustainable waste management technologies and initiatives to curb this growing global challenge. There exists no formal framework/curriculum guideline to address issues of waste management in the learning institutions in Kenya.

1.3 Rationale for Developing Guidelines for Curricula Developers

The Country suffers from an increasingly accumulation of waste in all urban centres which needs to be sustainably managed. Efforts have been put in place to address the waste menace in Kenya through various policies and legislation. Education and training are critical tools for mindset and behaviour change to assist learners towards environmental literacy and stewardship. The curriculum development and implementation processes are dynamic, enabling room for improvement. These guidelines provide a framework to enhance the transfer of relevant knowledge, skills, and competencies in waste management to learners. Additionally strategies that promote transiting to green and inclusive economies while monitoring, evaluating and reporting progress will be embedded in the curricula at all levels of education.

Environmental programs and studies have been captured in some curricula at different levels of education. There is need to develop a harmonized approach to integrating sustainable waste management into all teaching and learning experiences based on the waste management hierarchy. The role of these guidelines will therefore strengthen capacity and guide curriculum developers and implementers to provide a common approach towards sustainable waste management.

1.4 Purpose and Objectives

These guidelines seek to provide a harmonized and standardized approach to mainstreaming waste management at all levels of learning. The main objective is to promote a standardized approach to designing and implementing practical waste management curricula that integrates needs of learners at different levels for sustainable development.

The guidelines will address the following specific objectives;

- (i) To guide curriculum developers and implementers in integrating and strengthening sustainable waste management in curricula at all levels of education;
- (ii) To promote behaviour change in waste management.
- (iii) To provide a framework for enhancing transfer of relevant knowledge, skills and competencies to address needs of learners at different levels;

- (iv) To harness innovative strategies to facilitate improvement of curricula that promotes transitioning to green growth, circular economy and wealth creation; and
- (v) Provide modalities for monitoring, evaluating and reporting progress on the implementation of curricula that address sustainable waste management.

1.4 Scope of the guidelines

The guidelines emphasize the application of the whole institutional approach in teaching and learning processes, while addressing the prevailing knowledge, skills, attitudes and values gaps. The scope of these guidelines therefore applies to all curriculum developers, implementers, learners, parents and communities inclusive of state and non-state actors, while embracing the whole school approach. The guidelines builds on waste management policies, build on the on-going interventions that seek to attain full compliance and ensure a clean and healthy environment devoid of waste in Kenya. Monitoring, Evaluation and Learning processes and Governance will constitute critical aspects of these guidelines.

2.0 LEGAL, POLICY AND INSTITUTIONAL FRAMEWORKS ON WASTE MANAGEMENT

Kenya is a signatory to various treaties and conventions which form part of the law by virtue of Articles 2(5) and (6) of the Constitution of Kenya. There are several intentional conventions and treaties on waste management. In addition, these conventions have been domesticated into policies and legislation as discussed in this chapter. The key conventions and treaties are described in the following sections.

2.1 Sustainable Development Goals (SDGs), 2030

The 17 Sustainable Development Goals (SDGs) adopted in 2015 cannot be met unless waste management is addressed as a priority. Failing economic models treat resources as if they were infinite and consumption patterns favour the disposable. Solid waste management is key to delivering the following SDGs:

SDG 1 Jobs in waste collection and recycling. 1% of the global urban population make their living from recovering recyclable materials from waste

SDG 2 reduced food wastes and more use of organic waste

SDG 3 less diseases caused by open dumping and burning.

SDG 4 Environmental and health training and awareness including SDG 4.7 which seeks to promote sustainable development through Education for Sustainable Development and Sustainable lifestyles

SDG 5 Women often bare most of the impacts of poor waste management. Women in particular can benefit hugely from improved waste management, through independent earning opportunities

SDG 6 Better solid waste management goes hand in hand with better Water, Sanitation and Hygiene (WASH). If we want clean water and sanitation we need to be looking at waste. It's a key vector of disease, and provides abundant breeding grounds for mosquitoes.

SDG 7 Bioenergy opportunities from organic waste

SDG 8 Waste management is the world largest industry

SDG 9 Recycling innovation is growing and scalable

SDG 10 Poorest are harmed the most by poor waste management

SDG 11 Better solid Waste Management is vital for healthy and resilient communities

SDG 12 Need to shift from waste to resource management.

SDG 13 Reduced methane and carbon dioxide from dumping and burning

SDG 14 Less plastic pollution in the oceans and sea life. (marine litter and plastics).

SDG 15 Less pollution on the land, healthier environments.

SDG 16 Producer responsibility and governance

SDG 17 Working together: formal and informal, wealthy and poor

There are more than 7 billion people globally, who produce an average of 0.5 kg of waste every day. A staggering half of that waste isn't collected, treated or safely disposed of, and it's causing a global waste crisis. In order to achieve the

Global Goals, there is need to recognise waste management as a powerful driver in achieving sustainable development goals.

2.2 Multilateral Environment Agreements on Waste Management

- i. Stockholm Convention on Persistent Organic Pollutants (POP) 2001, aims to eliminate or restrict the production and use of POPs.
- ii. Aarhus Protocol on Persistent Organic Pollutants (POP) calls for elimination of any discharges and emissions and losses of POP. The convention bans the production and use of products that release the POP into the environment.
- iii. Bamako convention of 1998, prohibits the importation into Africa of any hazardous (including radioactive) waste into Africa.
- iv. Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and their Disposal, aims to protect human health and environment against the adverse effects of hazardous wastes.
- v. London Convention on Prevention of Marine Pollution seeks to ban all sorts of dumping in the sea.
- vi. Oslo Convention and Protocol, 1994 recognizes the measures taken by different countries to reduce Sulphur emissions under the 1985 Helsinki Convention and Protocol.
- vii. United Nations Framework Convention on Climate Change (UNFCCC), provides for mitigation benefits and co-benefits of policies, practices and actions for enhancing mitigation ambitions and implementation of circular economies which a focus of waste-to-energy technologies and on industrial waste reuse and prevention solutions.
- viii. Kyoto Protocol of 2005 prioritizes greenhouse gas emission reductions.
- ix. Minamata Convention on Mercury is designed to protect human health and the environment from anthropogenic emissions and releases of mercury and mercury compounds.
- x. Montreal Protocol on Substances that Deplete the Ozone Layer aims to protect the ozone layer by phasing out the production of numerous substances responsible for the depletion of the ozone.
- xi. Vienna Convention for the Protection of the Ozone Layer, aims to promote cooperation among nations by exchanging information on the effects of human activities on the ozone layer.

2.3 Regional agreements

Waste management requires the participation of all stakeholders from government, private sector, public and all these stakeholders should have the requisite capacity or knowledge to deal with waste issues. Regional interventions are needed to bring about spatial coordination of interventions at local and national level.

African Ministerial Conference on Environment (AMCEN), 2019 recommended that the AU commission, UNEP, and the Regional Economic Communities and other partners to support the contextualization of the circular economy to the needs and resource profiles of African countries and prepare the necessary tool kits for building the capacity for those countries. In addition, AMCEN recommended that circular economy includes a comprehensive approach to address plastic pollution based on the full life cycle of materials.

African Union (AU) recognises that the responsibility of waste management should be left to the countries if the trend has to be reversed and waste has to be more efficiently and effectively managed and controlled. Agenda 2063 calls for African countries to participate in global efforts for climate change mitigation that support and broaden the policy space for sustainable development on the continent. In addition Africa shall continue to speak in one voice and unity of purpose in advancing its position and interest on climate change. Continental Education Strategy for Africa (CESA) reiterates the need to re-orient Africa's education and training systems to meet the knowledge, competences, skills, innovation and creativity required to nurture African core values and promote sustainable development at the national, sub-regional and continental levels.

Convention on the Protection, Management and Development of the Marine and Coastal Environment of the Eastern African Region, was initiated in 1985 as a partnership between the government, civil society and the private sector, working towards a prosperous western Indian Ocean region with healthy rivers, coasts and oceans. In addition, the convention strives to harness resources and expertise from a wide range of stakeholders and interest groups to contribute to solving inter-linked problems of the region's coastal and marine environment. East African Regional Commission has recognized the urgency of addressing waste as a key component of addressing sustainable development.

2.4 National policies

Diverse policies and legislation have prioritized the need to improve waste management and enhance education, training, capacity building and public awareness on the same as discussed below:-

2.4.1 The Kenya Constitution, 2010 –:

- Article 42 states that every person has a right to a clean and healthy environment and it should be protected for the benefit of present and future generation through legislatives and other measures.
- Schedule 4 has transferred refuse/waste collection, transportation and disposal to county governments.

2.4.2 Environmental Management Coordination Act, Cap 387:

- Section 9(m) states that agencies should cooperate and develop programmes intended to enhance environmental education, public awareness and public participation.

2.4.3 The National Environment Policy, 2013:

- Recommends the integration of Environmental Education in the curriculum at all levels.

2.4.4 Draft National Sustainable Waste Management Policy, 2019:

- Requires the government to develop and implement a module on sustainable waste management for learning institutions at all levels.

2.4.5 Draft Waste Management Bill, 2020:

- Recommends the Cabinet Secretary Education and Environment to develop modules on sustainable waste management and to include waste management in education reforms and curriculum at all levels.

2.4.6 The National Waste Management Strategy, 2015:

- The strategy promotes the principle of zero waste, where the resource needs to be harnessed to create wealth, employment and reduce environmental pollution.

2.4.7 Waste Management Regulations, 2006

- The regulations provide standards and procedures for managing different types of waste.

2.4.8 National Policy on Education for Sustainable Development, 2014

- Enhancement of education and learning for equitable, efficient and sustainable utilization of the country's resources;
- Promotion of quality education through diverse learning and public awareness processes for an improved quality of life and productive livelihoods; and,
- Support to teaching and learning processes that promote values, behavior and lifestyles for good governance and sustainability.

2.4.9 Education for Sustainable Development (ESD) for the Education Sector, 2017

- Recommends for mainstreaming of sustainable programmes and perspectives into the planning and decision-making processes of the local municipalities and communities.
- Provides an opportunity to integrate ESD in urban and local communities and to address local implementation of the SDGs through ESD.
- Provides competency-based education and training to promote employability skills and opportunities for career growth.
- Align education sector target-setting processes with national and global targets.
- Mainstream environment and sustainability concerns into higher education institutions.
- Recommends for mainstreaming ESD in training programmes for educators, administrators, policy makers, managers, curriculum developers and school managers.
- Reorienting education towards sustainable development through reorientation of educational approaches on curriculum and content, pedagogy and assessments to address sustainable development.

2.4.10 Vision, 2030:

- Kenya aims to provide its citizens with a clean, secure, and sustainable environment using various strategies for achieving these goals such as promoting environmental conservation, improving waste management practices through the design and application of economic incentives.

2.4.11 Third medium term plan 2018-2022

- Public works programmes including re-afforestation, environmental waste management and other green projects.
- Formulation of a national strategy for coordinating research in renewable energy; and promoting the use of municipal waste for energy production.
- Development Food Waste Management Policy and solid waste collection and disposal;
- Solid Waste Management Infrastructure to include solid waste separation at source; solid waste treatment plant; collection network infrastructure and capacity improvement; transfer stations development; intermediate treatment; final disposal; and security lighting along the collection network.
- Development of flagship Projects in Waste Management and Pollution Control:
- The National Government in collaboration with County Governments to establish at least two proper waste management systems in each county and provide incentives to investors to establish waste to energy infrastructure in the majors cities
- Development of National Solid Waste Management Bill;

2.4.12 Sessional Paper No1 of 2019 on Education and Training

- Recommends for Integrating Technology and Vocational Education and Training in the curriculum at all levels of education;
- Aligning the curriculum to address the aspirations of Vision 2030,
- Ensure environmental, integrity and life skills education are embedded on the curriculum across all levels;

2.4.13 National Education Sector Strategic Plan, 2018-2022:

- Implement greening and waste management technology curricula in TVET

2.4.14 National Curriculum Policy, 2019:

- Provide for relevant capacity building in delivery methods for the curriculum implementers; and
- Harmonize curricula to be in tandem with regional and global trends;

2.4.15 Basic Education Curriculum Framework (BECF) KICD, 2017.

Establishes the Competency Based Curriculum (CBC), with the slogan “nurturing every learner’s potential”. It incorporates environmental education as a key learning activity area in the Early Years of Education (Preprimary 1 and 2 and Grades 1-3), and embeds environmental studies across the learning areas from Grades 4-12).It recommends for responsible disposal of waste to limit risks to self, others and environment across the levels of education including teacher training.

3.0 MAINSTREAMING WASTE MANAGEMENT IN CURRICULA

The government of Kenya has developed several policies, plans and strategies to manage waste. Current trends are focused into ‘waste’ as a resource for recycling or re-using rather than an environmental menace in what may be called ‘waste circular economy’ (Bolton, De Mena, & Schories, 2015). These guidelines recommends for mainstreaming of waste management in curricula at all levels of education through implementation of several interventions as discussed below.

3.1 Understanding waste and its management.

Effective ‘waste’ management in terms of control of production, storage, assemblage, transportation and processing of garbage, sewage, and other industrial and domestic byproducts is a global concern (Ibro, 2015). The current situation in Kenya indicates need to sensitize the citizen on behavioral change toward more sustainable use of products and best by-product management practices (Haregu, Ziraba, & Mberu, 2016). In this context, the teaching / training curricula should engage more emphasis on the learner / trainee attitude change toward waste as a resource and best practices in product utilization than the historical concept of waste and waste disposal.

Therefore Curriculum developers and implementers should place more emphasis on

- a) Type, sources and activities producing waste.
- b) Waste Management models (Linear model, Circular model among others)
- c) Reasons for waste Management

- d) Impact of Waste on:
 - i. Ecological, social and economic spheres
 - ii. Health
 - iii. Food
 - iv. Environment
 - v. Water resource
 - vi. Air quality
- e) Relationship between waste, greenhouse gases and climate change
- f) Behavior change and paradigm shift towards waste management

3.2 Appreciation of waste as a resource

Waste for a long time has been viewed as a menace which should be disposed as quickly as possible. However, Kenya is gradually moving from the linear economy to the circular economy approach to view waste as a resource and not just as waste. Some valuables in waste include production of secondary raw materials, energy recovery from combustible waste, recycling used papers to make fire briquettes, making of compost manure from organic waste among others. These values can be tapped when we adopt a waste management strategy that is waste segregation, waste collection, transportation, value extraction and safe disposal of the less valuable waste. The Green Economy Strategy and Implementation Plan (GESIP) provides for promotion of resource efficiency by managing waste as a resource and development of functional markets for secondary raw materials and recycled products through end-of-use waste criteria and recycled products. Alongside the prevention and recycling of waste, an important pillar of waste management approach is treating waste as a valuable resource. Some of these ways as defined in The National Sustainable Waste Management Bill, 2018, include;

- i. Promoting sustainable waste management as an income generating venture by improving waste valorization through the promotion of resource recovery from materials and energy generation,
- ii. Promoting processing activities aimed at reusing, recycling, or composting waste materials into useful products or sources of energy, with the aim of reducing the amount of waste destined for final deposition.
- iii. Creating green economy jobs in the waste management and recycling and recovery industry especially for youths, women and persons with disability

Extracting value and minimizing waste sent to landfill contributes to reducing environmental burdens and help save natural resources. Using technologies, it is possible to recover renewable energy from non-hazardous waste

Curriculum development and implementers should focus on aspects

- i. Defining waste as not waste but a resource
- ii. How to make waste a resource
- iii. Economic value of waste
- iv. Waste entrepreneurship
- v. Circular economy

Utilization of waste as a resource can therefore play a big role in solving the high unemployment rate among the youths, women and persons with disability currently witnessed in Kenya and help reduce the number of dumpsites in the country.

3.3 Demonstrate appropriate knowledge, skills and competencies in waste management

Managing waste involves preparing, planning and implementing safe waste disposal strategies, managing budgets and ensuring that all waste disposal activities comply with environmental laws and regulations.

Article 42 of the constitution provides for the right to a healthy environment for all Kenyans.

ESD principles reiterate the need for curricula to deliver teaching and training on the principles of environmental management and sustainability which involves;

- i. Incorporating environmental issues in university college teaching and training curriculum.
- ii. Allocating adequate resources to support environmental management and sustainability issues.

UN 2030 Agenda (2015) SDG Goal 12 Target 12.5 recommends to member countries by 2030 to reduce substantially the generation of waste through prevention, reduction, and reuse. In schools set up there is less education on waste separation and waste management. This creates a necessity to properly align curriculum content to the best practices of waste management.

Therefore curriculum development and implementers should

- i. Integrate waste management in all subjects and disciplines

- ii. Promote 21st Century skills that include
 - a) Critical thinking
 - b) Creativity
 - c) Collaboration
 - d) Communication
 - e) Information literacy
 - f) Media literacy
 - g) Technology literacy
 - h) Flexibility
 - i) Leadership
 - j) Initiative
 - k) Productivity
 - l) Social skills among others relevant to waste management
- iii. Promote activities that minimize the effects of waste management
- iv. Promote futures thinking in waste management
- v. Empower learners to take appropriate waste management action

3.4 Sustainable production and utilization of resources

Most of the waste is generated during the production and utilization processes. The sustainable development goals provides for sustainable production and consumption with emphasis on people to consume resources sparingly to avoid wastage. This can be achieved through reduction of waste during production and industrial symbiosis where some waste from one industry becomes raw material for another industry.

Therefore Curriculum developers and implementers should

- i. Take stock of the resources and production activities that contribute to waste generation.
- ii. Demonstrate cases of industrial symbiosis.
- iii. Demonstrate the benefits of efficient production and utilization of resources such as best waste management practices in an institution.
- iv. Demonstrate the benefits of circular economy in waste management.
- v. Cost benefit analysis of Efficient production and utilization of resources.
- vi. Promote needs assessment for production and utilization of resources (Don't produce excess don't buy excess).

3.5 Application of whole institution approach in teaching and learning

The whole institution approach in education is strengthened by qualities such as coherence, policies, transparency, practice and continuing professional development (Mogren, Gericke, & Scherp, (2019).

In practice, whole institution approach incorporates teaching and learning for sustainable development not only through aspects of the curriculum, but also through sustainable operations such as integrated governance, stakeholder and community involvement, long-term planning, active and participatory learning..

Whole institution approaches call for involvement of all stakeholders including learners, parents, educators and administrators, to be actively engaged in working towards a sustainable institution with ESD fully integrated into the curriculum as the driving factor (Hangreaves, 2008, Wick, 2013, KICD, 2016). The ESD ideal helps to improve learning that helps learners become responsible individuals, support school improvement processes, and involves addressing both specific issues such as climate, poverty, biodiversity, waste management and the reflexive application of appropriate methods, approaches, skills, abilities, visions and practices (Mogren, Gericke, & Scherp, 2019).

To make learning institutions zero waste centres, and sustainable, there are many facets to the whole school approach that should be strengthened in curriculum development and implementation. Therefore Curriculum developers and implementers should place more emphasis on:-

- i. Curricula to reflect our changing world such as citizenship education, embracing new concepts and competencies.
- ii. Domestic waste management plan
- iii. Redesign institutional operations and environmental management such as minimize waste generation, extract maximum value from waste, and dispose waste appropriately.
- iv. Reorient pedagogy and learning to make teaching, learning and participation in decision-making inclusive, adequate and appropriate.
- v. Strengthen community relationships to ensure the institution connects with and contribute to community initiatives in waste management and resources.
- vi. Inquiry based projects on waste management
- vii. Collaborative curriculum design, participative, action research/ learning based.
- viii. Build community partnership for teaching and learning
- ix. Develop an institutional culture of waste management sustainability

- x. Integrate waste management actions in institutional values, beliefs and expectations
- xi. Promote accountability and reporting on waste interventions through setting of targets
- xii. Promote institutional practice towards centre of excellence in waste management

3.6 Promote implementation of global, regional and local waste management policies and legislation.

The global, regional, national and local waste management goals set standards that need to be maintained and promoted. Sustainable Development Goal (SDG) 6 target 3 provides the assurance of availability and sustainable management of water and sanitation for all by 2030 through improving water quality by reducing pollution, eliminating dumping and minimizing release of hazardous chemicals and materials, halving the proportion of untreated wastewater and substantially increasing recycling and safe reuse globally.

Goal 12 target 5 aims at substantially reducing waste generation through prevention, reduction, recycling and reuse by 2030. The African Ministerial Conference on the Environment (AMCEN) in its mid-term medium term strategy 2018-2021 is promoting the sound management of chemicals and waste, and improving air quality for a better environment and improved human health.

Nationally the government has developed a solid waste management strategy that seeks to assist the public and institutions manage waste through 7R (Reducing; Rethinking; Refusing; Recycling; Reusing; Repairing and Refilling) in compliance with the Environmental Management and Coordination Act of 1999. In addition the sustainable waste management policy and bill 2019 promote progression from linear to circular model of waste management in Kenya. Therefore Curriculum developers and implementers should place more emphasis on:-

- i. Proper interpretation of the relevant the global, regional and national waste management goals, policies and targets
- ii. Integration of waste management theme in the co-curricular activities and performing arts.
- iii. Promotion of participation in waste management action projects e.g. use of recycle, reuse and reduce projects

- iv. Promote development of waste management networks, partnership and collaboration.

3.7 Research, Innovations and Development on waste management

Key objective of research in waste management is to disseminate scientifically based reliable information to address waste challenges. This can be done through provision of information on waste prevention, waste recycling, and recovery of energy from material residuals not suited for recycling or reuse, waste treatment, and waste disposal among other innovations. The national sustainable waste management policy 2019 provide for the enhancement of linkages between government, academia, private sector, civil society and global sustainable waste management innovation institutions. It also provide for the research institutions to develop and utilise technological innovations on waste management.

Therefore Curriculum developers and implementers should place more emphasis on:-

- i. Waste prevention, waste recycling, energy recovery, waste treatment.
- ii. Waste and climate change.
- iii. Waste impacts on various sectors like health, water and agriculture.
- iv. Waste disposal.
- v. The curriculum shall provide for the sharing and competition on innovation on waste management.

3.8 Governance and management of waste

Kenya Nationally Determined Contribution (NDC) has identified waste as a major source of emissions that contribute to climate change (GOK, 2015). This may emanate from poor waste management governance, education and training. ESD calls for the inculcation of good governance and sound management of waste in the teaching and learning process. The Kenya Institute of Curriculum Development (KICD) has ensured that Environmental Education Activities, which include waste management, are mainstreamed through the Competency Based Curriculum (CBC) across the grades, as outlined in the Basic Education Curriculum Framework (BECF), (KICD, 2017).

The Ministry of Environment and forestry, The National Environment Management Authority and related agencies have also spelt out the efficacy of waste management to go beyond the curricula content, as stipulated in the Kenya Climate Change Act No of 2016 (GoK, 2016). However, serious practise has not been visible due to minimal quality governance structures. It is therefore imperative that effective and efficient practices of waste management in the learning institutions and surrounding communities in the country are properly governed, with the participation of all stakeholders across the divide.

Therefore Curriculum developers and implementers should place more emphasis on:-

- i. An all-inclusive waste management institutional framework by strengthening existing structures with clear roles and responsibilities assigned to different stakeholders
- ii. Strong partnerships. linkages and collaborations in waste management in the education sector
- iii. Strengthening the accountability structures, communication programmes, Utilisation of ICT
- iv. Monitoring and evaluation structures and assessing the impact for improvement purposes.
- v. Involve policy makers, institutional managers, community leaders, teachers and students to work together to develop an inclusive, equitable and sustainable learning environment.
- vi. Improve institutional governance for waste management e.g. creating waste management action team.

3.9 Monitoring, evaluation and learning process

The Ministry of Environment and forestry in collaboration stakeholders that include Teachers service commission, Ministry of Education and KICD will ensure that the waste management best practices are advocated for, replicated, scaled up and disseminated promptly. This is in line with the Waste Management Policy document (GoK, 2019). The ministry will facilitate a stringent Monitoring, Evaluation and Learning framework.

They will be supported by

- i. Developing and refining an annual monitoring and evaluation framework

- ii. Developing measurable monitoring indicators (e.g Waste Management plan)
- iii. Set achievable timelines through implementation and performance indicators
- iv. Set quantifiable targets e.g. volumes of waste recycled.
- v. Set regular dissemination platforms and venues.

3.10 Sustainability and scale-up measures

Waste management is a topical concept that requires sustainability structures to be embraced and practiced by all stakeholders. Therefore reviews of the guidelines shall be scheduled to ensure accountability. The Ministry of Environment and Forestry in collaboration stakeholders shall emphasize sustainability and scale-up by including the following areas:

- i. Plan for review of the guidelines
- ii. Provide for collaborations with relevant institutions
- iii. Involvement of lead agencies
- iv. Training needs assessment (TNA)

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