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Promoting vermiculture for waste management

By Ernest Chitechi

Cities across the globe generate about 1.3 billion tons of solid waste a year, an amount that is expected to reach 2.2 billion tons by 2025, the low-income countries will contribute a significant portion, according to the World Bank.

For Kenya, as we strive to achieve economic growth and poverty reduction, this will mean we shall have more people moving to cities and towns and these people will continue to generate waste.

Situated in the East of Nairobi is Kenya’s biggest dumpsite, Dandora. The current state of Dandora dumpsite exemplifies the neglect at which as a country we have reached when it comes to waste management and environmental neglect of our society. The rising tide of garbage is threatening a very fundamental right for every Kenyan to a clean and healthy environment.

It is in this context that the vision 2030 recognized that efficient and sustainable waste management systems are required as the country develops into a newly industrialized state by 2030. In this regard, the vision 2030 set flagship projects for the five cities namely; Mombasa, Kisumu, Eldoret, Nakuru and Thika to have fully functional and compliant waste management systems by developing strategies towards achieving sustainable waste management and a clean healthy environment for all.

According to the Nairobi City County Solid Management bill 2014, solid management means the activities, administrative and operational that are used in the handling, packaging, treatment, conditioning, reducing, recycling, re-use, storage and disposal of solid waste so as to protect the environment against the possible resultant adverse effect.

The private sector has seen an opportunity in the waste and have come up with ways of earning a living from what others consider an eye sore. One of the way is through vermiculture which is also known as vermicomposting, a process of using red worms to decompose organic waste into nutrient rich matter which is beneficial to the soil. Vermiculture in now being used for the mass production of earthworms with the multiple objectives of waste management, soil fertility and detoxification and vermicompost production for sustainable agriculture.

An earthworm promotes the growth of beneficial decomposer bacteria in waste biomass and acts as an aerator, grinder, crusher, chemical degrader and a biological stimulator. Sustainable Energy Systems are a good case that adopted this technology. Since 2010, Sustainable Energy Systems, a local company, has been building biogas digesters for farmers in Kiambu County and has set rolling a process that is bound to change the socio-economic fabric of the community.

With support from the Kenya Climate Innovation Centre (CIC), the company carried out a pilot for vermiculture. Vermiculture allows farmers to use earthworms, the liquid manure that is the byproduct of the biogas generation process along with other farm waste to create high quality organic fertilizer — vermicompost.

Sustainable Energy Systems estimates that farmers carrying out mixed agriculture on one-acre of land have the capability to produce at least one ton of vermicompost per month. The vermicompost would then be sold to the local horticulture industry where it is in high demand. Going by current market rates, these could earn small-scale farmers as much as KSh100,000 on a monthly basis.

“Vermicompost is the real black gold,” said Mr David Karanja, Sustainable Energy Systems’ Director. Mr Karanja also plans to expand biogas to reach at least 10,000 farmers in the region. Since the vermiculture pilots proved successful, he has made it part and parcel of the biogas units he constructs for farmers.

He reckons that in addition to selling vermicompost, the 10,000 farmers should also be able to grow their own organic produce, add value to it and sell it to a growing market of Kenyans who are increasingly demanding healthier foods.

A retired economist, Mr Karanja registered Sustainable Energy Systems in 2008. He imported his technology from India, spent 33,000 Euros training local masters and carrying out pilot projects. Since then, his company has grown by leaps and bounds. He partnered with financial services firm, Micro Africa, to provide farmers with loans to fund the KSh95,000 biogas generation units.
Waste management in Uasin Gishu County “Taka ni mali”

By Sarah Makena

The effects of climate change in Kenya are as diverse as the regions are. There is no single right response or strategy towards responding to the effects of climate change. With every region facing different challenges from water scarcity, food shortage, pollution among other things, the response strategies are unique to every situation.

With this understanding, various county governments have come up with tailor made strategies to respond to climate change challenges faced at the county level. Individual counties have a responsibility to build on the national strategies and goals on climate change.

Waste management is one of the agenda under climate change. The Clean Development Mechanism (CDM) and the Joint Implementation (JI) of the Kyoto Protocol have stated that the emission of methane could be reduced significantly by the reduction of waste in landfills. This is with the understanding that emissions from landfills account for up to 5% of the total greenhouse gases emission and 12% of the world’s emissions is methane. This goes to show waste management cannot be ignored in the climate change agenda.

Uasin Gishu county has been in the forefront in developing strategies responding to climate change. One of the main challenges the county has faced has been waste management and water recycling.

Hanns Seidel Foundation conducted a sensitization workshop for officials of the county government charged with environmental issues. This was followed by a mentorship workshop. Each mentorship workshop was followed by a site visit that was proposed by the county itself. Uasin Gishu chose the sewerage and water treatment sites because they demonstrate what they have been doing to prioritize environmental issues.

“When I visited Uasin Gishu and saw the work they have been doing on waste management my desire was to hear them make a little more noise and let others learn from them,” says Sylvia Lanyasunya from Hanns Siedel Foundation.

The county has taken steps and “owned” their waste. The residents in some parts of Uasin Gishu are making a living from the waste under the tag line “Taka ni Mali”.

“In my maiden visit to the county, I visited the California/Kipkenyo dumpsite. They are not only organized but are focused on making money from the waste,” adds Lanyasunya.

The residents who live around the dumpsite have realized one man’s waste is another man’s goldmine. They have gone into the dumpsite to sort the waste for recycling. At the dumpsite, you will find men and women all trying to make a living from waste.

The county government is planning to buy garbage compactors and move the waste to landfills in designated areas. The construction of a recycling plant is also under the priorities of the county. Right now there are no structures of recycling the waste. What the dumpsite has done is create a sense of ownership of waste amongst the surrounding community and beyond...
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that is creating a system for economic empowerment for the community.

The county government also has a sewer treatment plant under the Eldoret Water and Sanitation Company (ELDOWAS). The plant treats sewerage from Eldoret town and its environs. Another initiative to manage what would be referred to as waste water is the Kapsoya Water Treatment Works that treats and supplies water to Eldoret town and its environs. Water shortage is however rampant in the region and is one of the priorities of the county government to increase the supply of water.

Despite the efforts by the county government to manage waste in a sustainable way, various challenges are faced by the county in regard to waste management. There is lack of expertise in waste management which makes it difficult for the county to understand and run processes of recycling waste. There is need for the county government to receive technical assistance in regard to experts who would help the county manage waste in a more effective and efficient manner.

There are other challenges like the lack of protective and safety gear at the dump sites where the sorting of garbage is done. When one thinks of what may be found in a dumping site then safety is one of the elements that cannot be overlooked. There is need to avail safety gears at the dumpsite to ensure the health and safety of all those working at the dumpsite is taken care of.

Training on sorting and managing the waste would also be crucial for the community even as they involve themselves in sorting waste at the dumpsite and also as the source of the waste. The residents need to be trained and sensitized on the importance of sorting the waste at source and also creating awareness on the value of waste at various levels.

Uasin Gishu county is playing its part but this would need to be complemented by efforts of the national government to create awareness on the role of the citizen in responding to climate change through various mitigation and adaptation strategies.
Eco-friendly technology spearheading innovation in building construction
By Michelle Mung’ata

Straw bale building is a smart way to construct. This technology was first established in Germany by Marcel Breuer, a German-American architect. It is more than just a wall building technique that has yet to become popular. Straw bales can be used as a relatively cheap and ecological building material. They are highly insulating, from noise and extreme weather conditions such as heat and cold.

Straw bales are made from agricultural waste product. Once the edible part of the grain has been harvested (such as wheat or rice), the disposal of the stalks becomes a challenge to the farmers. By baling the straw, a new life is given to the material. This is better than burning the straw which leads to the emission of harmful carbon gases.

Straw bales are 100% biodegradable and homes constructed using the material can last over 100 years if properly maintained. However, it is important to note that straw bale buildings should not be covered in non-breathable material because the straws will rot. For bale rendering, it is advisable to use clay or wood as opposed to plastic, cement or any other material that is water proof.

STRAWTEC Building Solutions has been in operation in Kigali, Rwanda since October 2015. They are paving the way for low cost sustainable housing and contributing to the achievement of Sustainable Development Goal (SDG) on Industry, Innovation and Infrastructure.

Farmers often burn straw once wheat has been harvested and this pollutes the environment but instead they can sell to straw bale manufacturing companies such as STRAWTEC, to earn more income. Farmers from wheat and rice growing regions in Kenya like Nakuru, Trans Mara, Uasin Gishu, Nyandarua, Narok, Meru Central, Trans Nzoia, Mwea, Keiyo and Laikipia, can greatly benefit from the extra source of income.

The blocks manufactured by STRAWTEC have been classified as zero carbon building blocks. The technology used in the manufacturing ensures that they cannot burn. Therefore with no fire, there are no carbon emissions.

The biggest threat in using straw bale is humidity. Rain can be handled with proper design so even the wettest climates can accommodate straw bale structures. Humidity, on the other hand, cannot easily be designed out of a structure. It saturates and gets into everything. A bale house can stay dry from rain and still be saturated with moisture inside the plaster due to the acclimation of the bales to the area’s relative humidity.

Building houses using straw bale is still a fairly foreign concept to Kenyans. Increasing awareness on straw bale will give Kenyans a better understanding on the benefits of its use and the ecological value.

Another challenge with straw bale housing is in its approval. Straw bale building codes are not part of Kenya’s building codes, and therefore it may take a bit more work and time to get building plans of straw bale houses approved.

Hopefully straw bale technology will get more recognition in the Kenyan construction and real estate industry. Straw bale houses deliver excellent levels of energy efficiency in use for the home-owner and provide a genuine sustainable solution by using a cheap and widely available agricultural co-product that is a rapidly renewable resource. By doing so, we will be able to achieve SDG 11 on Sustainable Cities and Communities.
Community Solid Waste Management Initiatives

By Bob Aston

Community-based solid waste management initiatives like waste recycling can help to promote sustainable income generating opportunities for the youth. Such initiatives can also help in tackling the socio-economic and environmental challenges of vulnerable communities. In 2007, Joseph Macharia quit his job as a mechanic and together with 20 youths formed Dajopen Waste Management Community Based Organisation (CBO). The CBO adopted a community-based waste management strategy that has seen them collect, and produce recycled items using more than 6,000 tons of solid waste.

Since its formation, the organisation has been making products using solid waste emanating from households, hotels, slaughterhouses and maize stovers from farms within Kitale, in Trans Nzoia County. The organisation has also strategically placed garbage bins targeting organic waste.

As part of the waste management and recycling initiative, the members of the CBO rely entirely on the re-use of locally available materials. The members either collect the waste or pay street families to do so.

Macharia started by investing KSh.300,000 in the business. The group used the investment to pay rent for their leased office and hire tractors to collect waste around Kitale town.

The group, later on, bought a piece of land at Industrial Area in Kitale town, where waste is delivered and sorted by the members.

The organisation has trained more than 35,000 people in solid waste management and organic farming since 2009. In addition, more than 420 students from local and international institutions have learned about solid waste recycling through internships at the CBO.

They make products that include organic fertilizer made from biodegradable waste and biological insect repellents made from weeds. Others include briquettes made from pulp papers and dry leaves, water filters made from sawdust mixed with clay; necklaces and earrings made from old calendars and floor tiles.

The CBO also ventured into making roofing tiles, and fencing posts made from high-density plastics due to the high demand by farmers in Kitale. They do this by heating up plastic waste in a large furnace.

The female members of the group mainly produce baskets and interior décor from plastic bags, which they sell between KSh.20- KSh.800. A 50 kg bag of organic fertiliser retails at KSh.1,500 while liquid fertiliser retails at KSh.150 per litre. The organisation's briquette retails at KSh.20 for five pieces weighing 40 grams each and can burn for four to five hours.

The organisation is able to sustain its operations through annual renewable registration fee of KSh. 500 and proceeds from their sales. At the end of the year, the 34-member group share around 20 percent of the profit while the rest is ploughed back into the business.

In 2014, the organisation won the third prize in the Community Based Organisation category during the National Environment Trust Fund (NETFUND) Green Innovations Awards. Although the organisation has achieved a lot since formation, they are facing technical challenges in scaling up their activities, patenting their products, and limited access to finance. Their focus now is to buy a machine that will increase their output of manure, briquettes, roofing materials and poles.

Waste management makes an important contribution to the reduction of extreme effects of climate change. Recycling saves energy hence, fewer fossil fuels are burned and less carbon dioxide is emitted to the atmosphere. Capturing and utilizing organic wastes from landfill reduces the methane released when these materials decompose, contributing significantly to the reduction of greenhouse gas (GHG) emissions.

Dajopen Waste Management is a good example of how to tackle environmental problems and urban waste challenges while considering the socio-economic issues facing communities.
Waste Management in Nairobi City County: The unanswered questions

By Sarah Makena

Nairobi is currently choking with garbage. A walk down any street will give you a clear picture of the mess the city is in. When the current county government came into power last year, top on their agenda was having a cleaner city. Article 42 of the Kenyan Constitution states that each person has the right to a clean and healthy environment. The reality of waste management as one of the main challenges in Nairobi was brought out by a social audit done by The Institute of Social Accountability (TISA) in 2017. In their ‘Status report on Budget Implementation in solid waste management in Nairobi City County. An assessment of the challenges and opportunities around waste management was brought out.

The Social Audit was conducted in Embakasi South, Kibra and Westlands Sub-Counties. The objective of the study was to assess how refuse collection is performing, assess the level of accountability in waste management and look into how the utilization of the money allocated to waste management.

That said, governments communicate their priorities through the main policy document which is the budget. A quick look at the budget for Nairobi City County across the years, one notices the budget allocation for solid waste management has been increasing between 2014 and 2017. In the financial year 2014/15, the allocation to waste management was KSh.103 million, in 2015/2016 it was KSh700 million while in the following financial year it increased to KSh1.5 billion.

With such a budget, one would expect Nairobi to be amongst the cleanest city’s in Africa. A social audit conducted by TISA states otherwise.

In the three sub counties that took part in the social audit, the structure of waste management was not well defined. There were areas where garbage collection was done by the County Government others by organized groups while in other regions private entities.

Solid waste management is one of the functions that is completely devolved and the responsibility wholly lies with the County Governments. Nairobi County enacted the Nairobi County Waste Management Act in 2015 whose aim was to give guideline on waste management in Nairobi.

This notwithstanding, Nairobi county still faces challenges in waste management. “One of the challenges in Nairobi County is the evident lack of public involvement in waste management” stated Annet Majoni of TISA. From the social audit, the residents indicated the county government has not involved the residents in waste management and this result to is the county developing solutions the residents do not embrace or are not willing to be part of.

The county government has lacked transparency in the management of garbage and this is especially evident due to the procurement process of the private firms contracted by the county to undertake garbage collection in various areas. The lack of coordination between the county government and the residents’ association is a major challenge.

House owners in Nairobi largely get into contracts with private firms for garbage collection. The challenge that has now been realized from the high level of privatization of garbage collection is the dumping of the waste after it has been collected. One of the youth interviewed during the social audit indicated they collect the garbage and dump in rivers around Nairobi in some instances.

Lack of ownership of garbage especially in the informal settlements and collection points for the waste is also a major challenge especially in the informal settlements.

From the audit, there are youth that have developed strategies to recycle some of the waste. They do this by going to the dumping sites to collect material they feel is useful for recycling.

Reports and recommendations have been developed by various stakeholders on what needs to be done on waste management in Nairobi but the implementation of the recommendations is what remains a challenge. One such is the famous JICA report on waste management that made various recommendations including setting up of a recycling plant and the relocation of the Dandora dumping site. None of this has materialized.
Engaging green businesses to supplement waste management

By Mercy Mumo

Waste disposal and management is the biggest headache of all times in Kenya. With the increase in urban population, county governments are strained to effectively collect and manage waste. According to a report by Japan International Cooperation Agency (JICA) in 2015, only 33% of the waste produced was collected and dumped at Dandora dumpsite. In most upmarket residential areas, garbage is collected twice a week while in middle income housing estates it is done once. In the informal settlements, the county government collects garbage from designated dumping areas but most inhabitants opt to throw garbage in nearby rivers, drainages, road-sides and other undesignated areas. The Nationally Appropriate Mitigation Action (NAMA) on a circular on economy solid waste management approach for urban areas in Kenya, states that poor waste management contributes to emissions of greenhouse gasses globally.

With this in mind, Kenya is failing in its role of ensuring that its people live in a clean and healthy environment as envisaged in the constitution.

In an attempt to achieve transformation in waste management, a number of entrepreneurs are making their contribution in recycling waste in various sectors ranging from energy, agribusiness, water including solid waste. Kenya Climate Innovation Center (KCIC) has supported a number of enterprises whose core business is not necessarily waste management but in one way or another they end up recycling and reusing waste either as a byproduct or as the main raw material.

In the renewable energy space for instance, Tamuwa which manufactures briquettes from sugarcane bagasse collects cane stalks from sugar cane factories and farms in Kisumu to make clean energy. This company is helping solve environmental challenges such as over reliance on wood fuel and ineffective disposal of agricultural waste after harvest. Their production process ensures that all of the by-products from cane are used.

From the agribusiness side, Bellac Limited has taken to recycling kitchen waste to produce home biogas. The company sells home biogas systems that are portable and can be used in residential and commercial enterprises like restaurants to manage waste food by converting it into energy. The byproduct from the anaerobic digester is liquid fertilizer which is used for farming.

Takawiri Enterprises on its part has been making paper from hyacinth since 2011. The weed is converted into pulp and used to make paper products such as book covers, notebooks, seasonal greetings cards, business cards, name tags, folders, gift bags, lampshades, envelopes, hard covers and labels.

Kilifi Moringa Estate has adopted a 360 degrees’ approach to its production process. The company grows moringa trees and produces a variety of products such as moringa powder, tea, cosmetic products from the leaves and seeds. Moringa produces seed cake from pressing oil which is currently being tested for biogas. The cake can be used as fertiliser which contains nitrogen and phosphorus for improving soil fertility. After moringa oil has settled, the byproduct is a sludge or mud which the company is using to make facial masks for women. This is by far a process that has achieved zero waste in its production.

On 28th August, 2017, the government imposed a ban on all paper bags in Kenya. Five months later, drainages are still clogged while polythene bags which remain an eye sore on land and in water. From Vihiga County, Mega gas found an opportunity in polythene bags. The startup is involved in the production of clean cooking fuel from plastics.

In the sanitation sector, Sanivation which makes briquettes from human waste is making its contribution in managing waste especially for households that are not connected to sewer lines or using shared latrines. These are some of the startups in the clean tech space who are making their mark in the improvement and management of solid waste. If the right incentives are provided and the public and private sector works together to maintain proper waste collection and disposal, the country will have moved in great strides in reducing green house gas emissions and protecting the environment.
The Role of Innovation in waste management

By Benson Ireri

Heaps of uncollected garbage have remained a permanent feature and an eyesore in most parts of the countries’ urban centres, compromising both the health of the population as well as the aesthetic value of our metropolises. For instance, according to the former Governor of Nairobi Dr. Evans Kidero, the capital city produces close to 2,000 tonnes of solid waste daily, which the county government has been unable to manage. This is the similar picture across the country’s other major towns namely Kisumu, Thika, Nakuru, Mombasa and Eldoret where close to half of waste goes uncollected thus un-accounted for.

Together with Nairobi city, these towns generate about 6,000 tonnes of waste daily but only close to 4,000 tonnes are collected leaving the other 2,000 tonnes un-gathered. In addition to the health and aesthetics impact, wastes also remains as one of the contributors of greenhouse gases and greatly affects climate change. As a country keen on making its contributions to fighting climate change, addressing the waste menace remains a critical part of the exercise as captured in the National Climate Change Action Plan (NCCAP). With the growing population in the country and the rapid rate of urbanization, the situation will get worse unless immediate actions are put in place by both the national, as well as the county governments. As such, there is the urgent need to develop sustainable waste management initiatives to curb this ever-growing hazard.

The central role of innovation in this agenda cannot be over emphasized. Importantly, with facilitative policies in place, as well as proper and right handling, this sector has the potential to create employment opportunities for a majority of the unemployed youths in the country. For example, in most parts of the developed countries, many economies are creating what is called ‘waste markets’. This involves turning their waste into an economic value, thereby enriching the livelihoods of a majority of their populations.

In fact, according to the Journal of Waste Management, in USA alone, proceeds made out of waste management is expected to amount to $60 million by end of 2018, with the potential to triple the figure if well embraced by other countries around the world, with the global Municipal Solid Waste also likely to create around $297 Billion by 2020. Around the world, innovation has played a significant role in both providing a solution to the waste menace whilst at the same time creating a resource out of it. The city of Bonn for example is known to be generating a significant proportion of its energy from its waste. In fact, Bonn is known to be importing waste from other cities in order to keep the incineration and thermal plants running. Ethiopia on its part is going to be the first country in Africa to install a waste-to-energy plant. With a capacity to incinerate around 1,400 tonnes of waste per day representing 80% of the waste generated daily and a capacity of 110 megawatt thermal (MWth), the power plant will provide electricity to 30 percent of its household electricity needs. Additionally, recycling waste has also created significant business opportunities for many people, although the available opportunity is not adequately tapped into.

To adequately harness the immense potential available in the solid waste sector, legal and policy reforms will require to be undertaken at both national and county level. Political will however must precede any reforms or actions. Starting point for this will be full implementation of the National Waste Management Strategy which was developed by the national government (through NEMA) in 2015. To fully harness this, there will be the need for a structured system to ensure that there would be fair competition amongst both private sector players, as well as local organizations, including CBOs, Self Help Groups and cooperatives particularly at the county level, whilst also discouraging the monopoly that has continued to choke efficiency in the sector.

Further, establishment of an innovation fund to support concepts from individuals and small enterprises with innovative ideas (both technological innovations as well as business concepts) in the sector will help a big deal.