AGAPE RESTORATION COMMUNITY SOCIETY

-ARCS-

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RESTORING HOPE

Acknowledgements

This Project was developed as part of many other activities realizing by ARCS (Agape Restoration Community Society) organisation, designed to provide humanitairing help to meet the needs of the local community.

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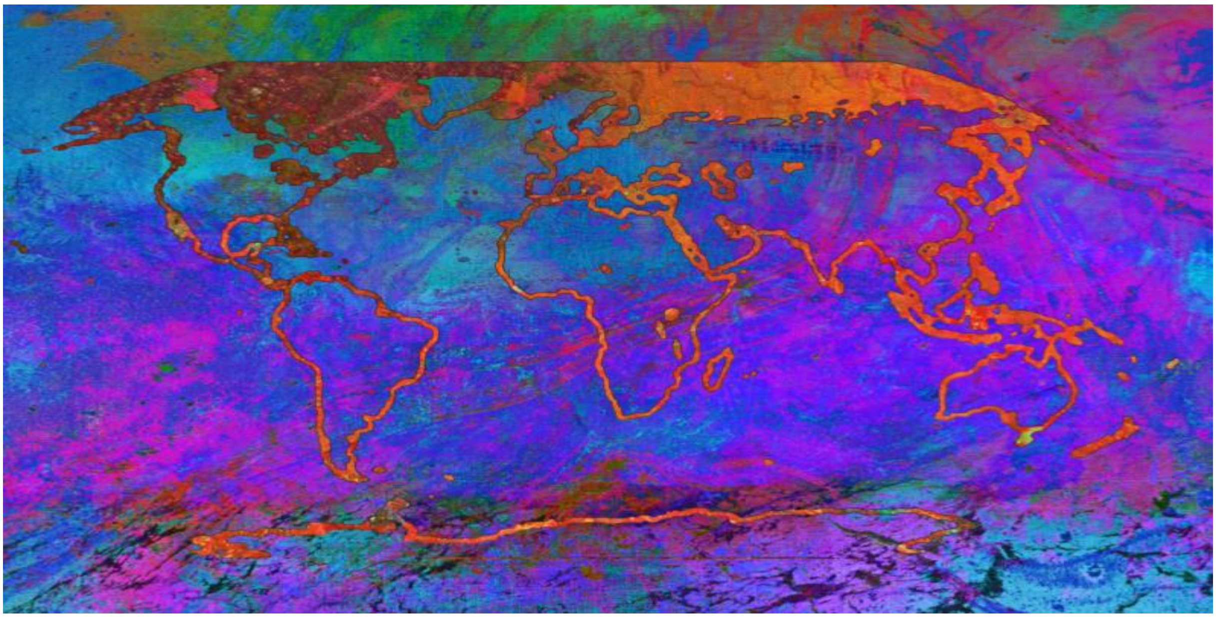
The United Nations Framework Convention on Climate Change (UNFCCC) defines climate change as:

“*A change of climate which is attributed directly or indirectly to human activity that alters the composition of the global atmosphere and which is in addition to natural climate variability observed over comparable time periods’*



The main cause of recent climate change is the release of greenhouse gases, particularly carbon dioxide, into the atmosphere as a result of human activities such as fossil fuel combustion and land use change.

Climate change has the potential to increase food insecurity. Existing threats to food security and livelihoods will be exacerbated by climate change due to a combination of factors that include; the increasing frequency and intensity of climate hazards, diminishing agricultural yields and reduced production, rising sanitation and health risks, increasing water scarcity, and intensifying conflicts over scarce resources. These impacts of climate change on food insecurity will lead to new humanitarian crises as well as increasing displacement.

In April 2020, Across Tangaanyika Lake,in BUJUMBUA the capital city of BURUNDI and in UVIRA a small city of South-Kivu province in DEMOCRATIC REPUBLIC OF THE CONGO, water from Tanganyika lake destroyed more than 2800 houses, making more than 4000 families interior desplaced refugees and now 8465 Children are suffrering from malnutrition.

Regions already vulnerable to food insecurity and societies that depend on natural resources or practice climate sensitive activities, such as rain fed agriculture is particularly vulnerable to the impacts of climate change and at an increased risk of food insecurity as a result.

Owing to an increase in extreme weather events and variability of weather patterns, climate change is expected to negatively affect food security outcomes, potentially affecting all four dimensions of food security

Greenhouse gases released by human activities trap outgoing infrared radiation within the Earth’s atmosphere, enhancing the natural greenhouse effect and resulting in anthropogenically induced global warming. This increase in temperature leads to other observable effects on the climate system, such as more frequent, intense and protracted extreme weather events, with increasingly detrimental impacts upon societies

Burundian and Congolese’s population is highly dependent on subsistence agriculture, which is sensitive to climate conditions, making agriculture one of the most vulnerable sectors to the impacts of climate change. As a result, the region suffers chronic food insecurity due to the combined impacts of high levels of poverty, low human development and unfavourable climatic and weather conditions.

However, little is known about the impacts of climate change on household food security, and in particular, the ability of households to adapt to climate change over time. This has resulted in gaps in food security and resilience programming.

The objective of this project is therefore to contribute to, and facilitate, efforts in mainstreaming climate change adaptation into broader resilience programming initiatives and to identify appropriate adaptation policies and programmes that support the most vulnerable and food insecure communities in the region, to reach our goals, we prpose three ations or solutions to reduce climates changes consequences due to creat a GREENER FUTURE:

- **Use of Renewable Energy (BIOGAS PRODUCTION FOR DOMESTIC USE)**

- **Each one is Own tree (PLANTING TREES PROGRAM)**

- **Zero plastic waste in Area (RECYCLING PLASTIC WAST PROJECT)**

FIRST ACTION

I. BIOGAS PRODUCTION FOR DOMESTIC USE

1. INTRODUCTION

As you well know, energy plays a significant role in all our lives. We use energy for cooking, lighting, drying and warming. For a long time, wood fuel has been the main source of energy, especially in rural African homesteads. However, over reliance on wood fuel has depleted forests and endangered the environment. In addition, smoke inhalation, soot and ash have been found to cause ill health among users of wood fuel. The other alternative source of fuel has been fossil sources such as crude oil, lignite, hard coal, natural gas. These are fossilized remains of dead plants and animals, which have been exposed to heat and pressure in the earth's crust over hundreds of millions of years. For this reason, fossil fuels are non-renewable resources whose reserves are depleted much faster than new ones are being formed. This has led to a search for other sources of energy such as wind, solar, and biogas. Of all these sources biogas has been found to be the most suitable for domestic use. This is because it is a renewable, simple and cheap to generate

2. What is Biogas?

Biogas is a mixture of gases produced during the anaerobic digestion of biological or organic materials. Anaerobic means oxygen free while aerobic means with oxygen. In a small farm, biogas can be made from the anaerobic decomposition of organic material such as livestock waste (urine, dung) and waste feeds. Biogas is produced when bacteria known as methanogen bacteria ferment or breakdown the organic material in the absence of oxygen. Methanogen bacteria prefer certain conditions and are sensitive to the microclimate within the digester. Methanogen bacteria develop slowly and are sensitive to sudden changes in temperature. For example,a sudden fall in the slurry temperature by even 2oC may significantly affect their growth and gas production rate.

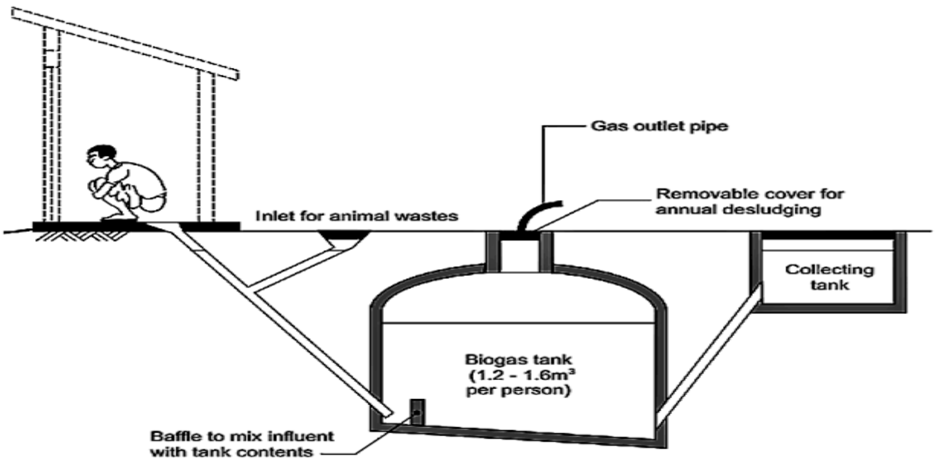
Biogas consists of methane (40-70%), also known as marsh gas or natural gas (CH_4), 30 to 40% carbon dioxide (CO_2), and low amounts of other gases such as hydrogen, nitrogen and hydrogen sulphide. Biogas is about 20% lighter than air and has an ignition temperature in the range of 650° to 750° C

3. What is a bio digester?

This is a covered vessel in which anaerobic digestion of organic or biological matter occurs. It is commonly known as a biogas plant. Since various chemical and microbiological reactions take place inside the bio digester, it is also known as a bioreactor or anaerobic reactor. The main function of this plant is to provide anaerobic conditions for biogas production. A bio digester should be air and water tight. It comes in different shapes and sizes and can be made of various materials. Figure below illustrates a bio digester or biogas plant.

Our type of mixt metal-plastic bio digester

Floating drum digester



Fixed dome digester

4. Benefits of Biogas Technology

One of the main attractions of biogas technology is its ability to generate biogas out of organic waste that is abundant and freely available. The main output of a biogas plant is the methane gas which is valued for its uses in cooking and lighting, and the slurry for its soil nutrients or fertilizing properties

Biogas has a number of benefits as follows:

- As an Energy source
- Environmental benefits
- Economic benefits
- Benefits to agriculture
- Benefits to women

4.1 **Biogas as an Energy Source**

As we mentioned earlier, biogas is used as a source of energy for cooking, lighting, refrigeration and biofuels. Let us look at each in turn.

a. **Cooking:**

Cooking with biogas is the most commonly used application and the sturdiest one. It has a number of advantages over traditional cooking with firewood. These are:

• It has 5 times higher stove efficiency than traditional firewood stove

• Cooking with biogas saves the time spent gathering firewood

• It does not produce smoke and therefore women and children are not prone to eye irritations and respiration-problems;

• Unlike firewood stoves, biogas does not soothe the pans and so there is less work to clean them • It cooks faster and the flame can be regulated

• Cooking can be done in an up-right position

• Cooking can easily be done inside the house

• It is safe to use and there is less chance of children getting burned as is the case with open fire, or stoves.

b. **Lighting**

In villages without electricity, lighting is a basic need as well as a status symbol. The bright light of a biogas lamp is the result of incandescence, that is, the intense heat-induced brightness of special metals like thorium at temperatures of 1000-2000°C. If the lamp hangs directly below the roof, it can cause a fire hazard. It is therefore important that the gas and air in a biogas lamp are thoroughly mixed before they reach the gas mantle, and that the air space around the mantle is adequately warm. The mantle of a biogas lamp resembles a small net bag. A binding thread made of ceramic fibre thread is provided for tying it onto the ceramic head. When heated at a temperature of more than 1000 o C, the mantle glows brightly in the visible spectrum while emitting little infrared radiation. The fabric of the mantle, when flamed for the first time, burns away, leaving a residue of metal oxide. The mantle shrinks and becomes very fragile after its first use. In general the mantle does not last long because of insect damage and high gas pressure. Therefore, regular maintenance and mantle change is needed. Since thorium is a radioactive material it should be handled with utmost care.

c. **Refrigeration**

Biogas can be used for the absorption type refrigerating machines which operate on ammonia and water and are equipped with automatic thermo-siphon. Since biogas is the refrigerator's only external source of heat, the burner itself has to be modified. Refrigerators that run on Kerosene flame can be adapted to run on biogas.

d. **Biogas fuelled engines**

Raw biogas from a digester cannot be used in that form to fuel engines. It must undergo some purification to upgrade it to the level of natural gas. This process entails removing carbon dioxide, hydrogen sulphide, ammonia, particles, trace components and water so that the gas has a methane content above 95%. A number of biogas upgrading technologies, such as, water absorption, chemical absorption, and Pressure Swing Absorption (PSA) have been developed for the treatment of biogas. The use of biogas as fuel for vehicles such as buses, taxis and communal vehicles makes economic sense and has evident environmental advantages.

e. Electricity generation

Biogas can be used to generate electricity using a reciprocating engine, steam turbine, or gas turbine. When a reciprocating engine is used, the biogas must have condensate and particulates removed. In order to move fuel gas into a gas turbine combustion chamber, the biogas must be free from visible moisture and any particulates and it should also be compressed.

4.2 Benefits to the Environment

Biogas production significantly reduces carbon dioxide emission and helps to preserve natural resources such as forests. Biogas production by anaerobic digestion also reduces emissions of greenhouse gases from the storage and utilisation of untreated animal manure as fertilizer. Biogas is a clean source of energy as it does not produce smoke or soot during combustion. Another benefit of biogas technology is its ability to improve management of waste by transforming it into a valuable resource. It also reduces offensive odours which come from overloaded or improperly managed manure storage facilities. These odours impair air quality and may be a nuisance to nearby communities. Lastly, biogas reduces the surface and ground water pollution.

4.3 Economic Benefits

Biogas is a cheap source of cooking energy. A two cubic meter biogas plant can produce the equivalent to 26kg of LPG, or 37 litres of kerosene, or 88kg of charcoal, or 210kg of firewood per month. Thus, by producing energy from livestock and farm waste, a farmer saves money that would otherwise have spent on purchasing electric and gas suppliers. It also helps to create jobs related to the design, construction and maintenance of biogas technology.

4.4 Benefits of Biogas to Agriculture

A Biogas plant does not only produce fuel, it also produces a high quality and valuable organic soil fertilizer. The fertilizer is rich in nitrogen, phosphorus, potassium and micronutrients, which improve the yield of plant production. Organic matter plays an important role because of its beneficial effects in supplying plant nutrients, improving soil aggregation, increasing water holding capacity of soils, stabilizing its humid content and increasing its water holding capacity. Compared to Farm Yard Manure (FYM), the digested slurry has slightly more nutrients, because in FYM, the nutrients are lost due to exposure to heat from the sun as well as by leaching. Fertility trials carried out in Nepal and elsewhere have revealed that optimum results can be achieved through the combined application of both chemical and organic fertilizers. In countries like China where biogas technology is well developed, for there are evidence that supports the fact that productivity of agricultural land increases remarkably with the use of slurry produced from biogas plant.

4.5 Benefits of Biogas to Women

It is worth mentioning that the first design of the biogas plant developed in 1956 in India by Jashu Bhai Patel was named "Greeha Laxmi" (housewife). This shows its relevance to the well-being of women. In view of the traditional role that a female member plays in a family, the following are some of the prominent aspects of biogas that help women in particular:

• Reduction of in-house pollution in general and that of kitchen in particular. The Biogas flame does not leave black soot on pots. Cleaning is easy, cleaning time is reduced while the life of the pots is prolonged

• It reduces the time required for cooking as well as time spent fetching firewood. The time saved can be used for other useful purposes.

• It contributes to a healthy environment free from flies and mosquitoes. Most of the pathogens are destroyed in the process of anaerobic digestion.

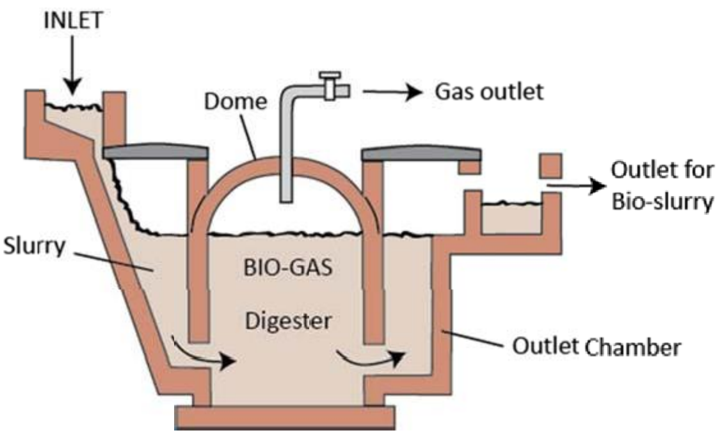
• In remote villages where there is no electricity, biogas lighting facilitates education and income generating activities. Generally, it is the housewife who is more involved in operating and maintaining a biogas plant.

This has forced all development workers in the biogas sector to focus their activities to the female members of a family. In other words, use of biogas technology has been instrumental in enhancing the role of women not only in matters of family decisions but also in planning and implementation of other development activities.

5. Biogas Production Process

5.1: Components of a Biogas System

A biogas production plant normally has five major components. The required quantity of substrate or feedstock is mixed with water and fed to the digester through the inlet tank. Once the mixture is digested, gas is produced and collected in the dome, also known as the gasholder. The digested slurry flows to the outlet tank through the manhole and eventually ends up in the compost pit where it is collected and composted. The gas is supplied to the point of application through the pipeline. Figure 2.2 below illustrates the components of a biogas system.



6. Inputs for Biogas Production

In principle, any biodegradable organic material can be used as substrate for processing inside the bio digester. If you purchase or transport the inputs for biogas production over a large distance, then the economic benefits of biogas production would be adversely affected. If however, the inputs are easily available within the homestead, then biogas production has great economic value

In domestic settings, the input material or substrate for biogas production includes:

- Remains of agriculture or food production such as feed remains, chaff from rice and wheat
- Organic household waste
- Fresh plant material such as maize, grass, water hyacinth. For example, one kg of pre-treated crop waste and water hyacinth has the potential of producing 0.037 and 0.045 m3 of biogas, respectively
- Human excrements or night soil
- Animal excrements such as slurry or manure. The potential gas production from animal dung is given in Table below.

Type of Dung	Gas Production Per Kg (M3)
Cattle (cows and buffaloes)	0.023 - 0.040
Pig	0.040 - 0.059
Poultry (Chickens)	0.065 - 0.116
Human	0.030 - 0.050

Types of Bio digester Designs

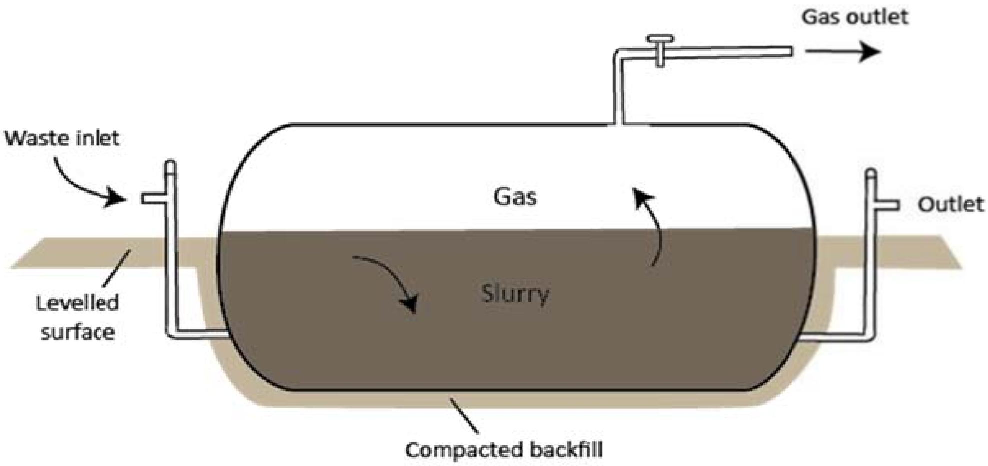
It comes in different shapes and sizes and can be built with various construction materials. The following are some of the commonly used bio digester designs for domestic use:

- Floating drum digester
- Fixed dome digester
- The plastic bag digester

7. Our Mixt Metalic-Plastic Bag Digester

For our project, We gonna build a mixt metalic-plastic bag digerstor wich can be transportable.

The plastic bag digester consists of a trench lined with a plastic tube. The trench length has to be considerably greater than the width and depth. This plant is easy and cheap to construct, especially in areas with a high water table. It's main weakness is its vulnerability. It is easily damaged by cattle and playing children. Also the UV rays in sunlight make the plastic gets brittle. Figure 1.6 gives illustration of the plastic bag digester



Plant Size (m³)	Daily Fe dstock (kilogram)	Daily Water (liters)
4	24 - 40	24 - 40
6	40 - 60	40 -60
8	60 - 80	60 - 80
10	80 - 100	80 - 100

8. DIFFERENT SIZES OF FIXED DOME DIGESTERS IN BURUNDI AS AT JANUARY, 2021. (Study making by A.R.C.S)

ITEM	Approx.cost (Ksh)	Quantity per given size and approximate cost of materials				
Size		4m3	6m3	8m3	10m3	12m3
No. of cows		1-2	3-4	5-6	7-8	9-12
Cement 50kg bags	700	12(8,400)	15(10,500)	18(12,600)	22(15,400)	25(17,500)
River sand in tonnes	1200	3 (3,600)	5 (6,000)	6 (7,200)	7 (8,400)	7(8,400)
Gravel/ Ballast in tonnes	700	1(700)	2(1,400)	3(2,100)	4(2,800)	4(2800)

Quarry stones 6'' x 9''	**30**	**200(600)**	**250 (7,500)**	**250 (7,500)**	**300 (9000)**	**420 (12600)**
Bricks pcs	**10**	**150(1,500)**	**200(2,000)**	**300(3,000)**	**350(3,500)**	**400(4,000)**
Roun d bars 3/8''(Y8)	**480**	**4(1,600)**	**4(1,600)**	**4(1,600)**	**4(1,600)**	**4(1,600)**
Roun d bars 1/4''(R6)	**180**	**1(180)**	**1(180)**	**1(180)**	**1(180)**	**1(180)**
PVC pipe 4''	**780**	**1(780)**	**1(780)**	**1(780)**	**1(780)**	**1(780)**
PVC elbow 4'' 45 degrees	**250**	**1(250)**	**1(250)**	**1(250)**	**1(250)**	**1(250)**
Dome pipe	**2500**	**1(2,500)**	**1(2,500)**	**1(2,500)**	**1(2,500)**	**1(2,500)**
Binding wire in kgs	**150**	**1(150)**	**1(150)**	**1(150)**	**1(150)**	**1(150)**
Wate r proof additive	**300**	**3(900)**	**5(1,500)**	**5(1,500)**	**7(2100)**	**10(3000)**
Plumbin g / piping fee		**5000**	**5000**	**5000**	**5000**	**5000**
Technical fee(Ksh)		**25000**	**25000**	**25000**	**25000**	**25000**
Total cost (BFc)						

9. THE PROJECT METHODOLOGY

We gonna propose every families in BUJUMBURA and all the EAST-Africa Our mixt metal-plastic bio digester and the Floating drum digester according to the number of user per familly and the quantity of food waste per day per familly. For public infrastructures like Schools, Prisons, Hospital we gonna promote Fixed dum Digester.

10. MISSION

Approximatively 96% of People in Burundi are using Chacaol for cookink. During the first year, we will try to meet the need of 10000 Houses and 200 public services in Providing biogas to them so that The Energy independance become a reality.

11. VISSION

Our vision is to promote renewable energy for the reason of preserving the nature.

SECOND ACTION

II. EACH ONE HIS OWN TREE

TREES PLANTING, PROGRAMMING AND AFTERCARE

Planting trees is a legacy for yourself, a loved one and the planet. Each ring of your tree stands for another year where you made a difference. We ^lant the right tree in the right places to safeguard biodiversity, protect nature and fight climat change

This will reconnecte isoleted fragments, restoring ancient migration routes and highway canopies destroyed by Human actions. WE DO THIS BY CREATING WILDLIFE CORRIDORS WITH NATIVE TREES. These trees are FRUIT TREES, NESTIONG TREES, PIONERS TREES AND SUCCESSION SPECIES.

Trees are an important part of eco-systems across the plant. Trees provide vital resources, clean our air, protect as from weather and provide enjoyment. Planting a tree with a child is a great way to help children understand the role of trees in the environment and also understand how each person can make a difference in their own community. Tree planting provide “the roots” for building future appreciation and stewardship for nature.

1. Planting guidelines:

- Dig a hole wide enough to accommodate all of the trees roots without bending or bunching. Your hole should extend outwards 4-6 inches beyond the reach of the roots. Tree roots grow horizontally, not down.
- Your hole should be just deep enough so that when the roots rest on the bottom, the crown (the joint between the rootstock and the trunk) is even with the soil level. The graft union (modest bump 2-3" above the crown) should remain above ground, or any "dwarfing" properties of the tree will be lost.
- Fill in your hole with the same soil you dug out of it. Do not fill with compost, peat, or other additives as these will encourage roots to stay within the confines of the hole, instead of spreading outward for a stronger tree base.
- Leave a shallow "watering basin" at the base of the tree so water does not run away from the trunk. Give your tree approximately five gallons of water after planting.

2. After care guidelines

Here are some important points:

Watering:

Water deeply, but infrequently. If the soil is moist 6 inches below the surface, 6 inches away from the trunk of the tree, do not water. Overwatering blocks oxygen from getting to roots.

Mulching:

Apply mulch 2-3 inches thick around base of tree – not touching trunk. Use woodchips, straw, or chopped leaves.

Pruning:

Attend a hands-on pruning workshop or invite an Extension agent to host one at your school. In Wisconsin, the best time to prune is March, while the tree is still dormant. Your first pruning should happen 4-5 years after initial planting. Prune once per year thereafter.

Thinning:

Pinch off small fruits so that only 1-2 fruits develop in one cluster. This will give larger, tastier fruits.

Pest Control:

Do I need to spray my trees? You do not need to spray, especially if you don't care much about fruit aesthetics. Fruit can have a little insect damage and still taste great. Pre-emptive insect control such as choosing disease-resistant varieties and cutting off nests or infested branches as soon as they appear can keep most insects in check. Inviting natural pest predators with native plants that attract beneficial insects is another spray-free strategy. If you do choose to spray, use organic varieties

3. Getting Students, Local council and Families Involved


Fruit trees will naturally attract students' attention, and can be excellent focal areas for outdoor lessons and activities. Here are just a few ideas to get your wheels turning:

- Picking, eating, and cooking!
- Serving fruit as a snack in the classroom or cafeteria.
- Fruit fundraiser.
- Outdoor lessons in the "tree classroom" (perennials vs. annuals, plant life cycles, cultural significant of fruit trees, etc)
- Events coinciding with blossoming or fruiting times: outdoor concerts, festivals, open houses or community nights.

4. THE PROJECT METHODOLOGY

We notice as many families will have their own Biodidester which produce a biofertilizer, We gonna propose every families in BUJUMBURA and all the EAST-Africa to plant a tree in their compound according to the number of children, so everyone will take care of its tree until it grown up. These trees will be under Local coucil of every Avenue, every comune and every strict control. For Each school, no less than 10 Fruit trees will be planting and undev contriol of Head Director.

1. MISSION

Our mission is to plant 1000000 Trees while making sure they all grown up and serving the nature in the First year. Sanzitize the new generation on the usefullness of preserving and protecting the nature.

2. VISSION

Our vision is to creat a greener City where everyone has his own tree to take care.

ZERO PLASTIC WASTE IN OUR AREA

PLASTICS WASTE RECYCLING INTO PAVER BLOCKS

I. INTRODUCTION

Economic growth and changing consumption and production patterns are resulting into rapid increase in generation of waste plastics in the world. The world's annual consumption of plastic materials has increased from around 5 million tonnes in the 1950s to nearly 100 million tonnes; thus, 20 times more plastic is produced today than 50 years ago. This implies that on one hand, more resources are being used to meet the increased demand of plastic, and on the other hand, more plastic waste is being generated. In Asia and the Pacific, as well as many other developing regions, plastic consumption has increased much more than the world average due to rapid urbanization and economic development.

Due to the increase in generation, waste plastics are becoming a major stream in solid waste. After food waste and paper waste, plastic waste is the third major constitute at municipal and industrial waste in cities. Even the cities with low economic growth have started producing more plastic waste due to increased use of plastic packaging, plastic shopping bags, PET bottles and other goods/appliances using plastic as the major component.

Plastic waste recycling can provide an opportunity to collect and dispose of plastic waste in the most environmental friendly way and it can be converted into a resource. In most of the situations, plastic waste recycling could also be economically viable, as it generates resources, which are in high demand. Plastic waste recycling also has a great potential for resource conservation and GHG emissions reduction, such as producing fuel from plastic waste.

II. Plastics

2.1 Overview Plastics are polymers, a very large molecule made up of smaller units called monomers which are joined together in a chain by a process called polymerization. The polymers generally contain carbon and hydrogen with, sometimes, other elements such as oxygen, nitrogen, chlorine or fluorine. There exist natural plastics such as shellac, tortoiseshell, horns and many resinous tree saps but the term "plastic" is commonly used to refer to synthetically (synthetic or semi-synthetic) created materials that we constantly use in our daily lives: in our clothing, housing, automobiles, aircraft, packaging, electronics, signs, recreation items, and medical implants to name but a few of their many applications. These plastics are not just polymers which can be molded or extruded into desired shapes but often contain additives that improve their performance. According to the polymer used, the synthetic and semi-synthetic plastics can be designed with a broad variation in properties that can be modified by the addition of such additives. Some additives include the following:

- Antioxidants – added to reduce the effects of oxygen on the plastics during the ageing process and at elevated temperatures.
- Stabilizers – in many cases used to reduce the rate of degradation of polyvinyl chloride (PVC).
- Plasticizers or softeners- used to make some polymers more flexible, such as PVC.
- Blowing agents –used to make cellular plastics such as foam.
- Flame retardant –added to reduce the flammability of plastics.
- Pigments –used to add color to plastic materials.

2.1 **Most Common Plastic Types**

Plastics are classified on the basis of the polymer from which they are made, therefore the variety of plastics it is very extensive. The types of plastics that are most commonly reprocessed are polyethylene (PE), polypropylene (PP), polystyrene (PS), polyethylene terephthalate (PET) and polyvinyl chloride (PVC).

A. **Polyethylene (PE)** - The two main types of polyethylene are low-density polyethylene (LDPE) and high density polyethylene (HDPE). LDPE is soft, flexible and easy to cut, with the feel of candle wax. When it is very thin it is transparent; when thick it is milky white, unless a pigment is added. LDPE is used in the manufacture of film bags, sacks and sheeting, blow-moulded bottles, food boxes, flexible piping and hosepipes, household articles such as buckets and bowls, toys, telephone cable sheaths, etc. HDPE is tougher and stiffer than LDPE, and is always milky white in color, even when very thin. It is used for bags and industrial wrappings, soft drinks bottles, detergents and cosmetics containers, toys, crates, jerry cans, dustbins and other household articles.

B. **Polypropylene (PP)** - Polypropylene is more rigid than PE, and can be bent sharply without breaking. It is used for stools and chairs, high-quality home ware, strong moldings such as car battery housings and other parts, domestic appliances, suitcases, wine barrels, crates, pipes, fittings, rope, woven sacking, carpet backing, netting, surgical instruments, nursing bottles, food containers, etc.

C. **Polystyrene (PS**) - In its unprocessed form, polystyrene is brittle and usually transparent. It is often blended (copolymerized) with other materials to obtain the desired properties. High impact polystyrene (HIPS) is made by adding rubber. Polystyrene foam is often produced by incorporating a blowing agent during the polymerization process. PS is used for cheap, transparent kitchen ware, light fittings, bottles, toys, food containers, etc.

D. **Polyethylene Terephthalate (PET)** – PET exists as an amorphous (transparent) and as a semi-crystalline (opaque and white) thermoplastic material. Generally, it has good resistance to mineral oils, solvents and acids but not to bases. The semi-crystalline PET has good strength, ductility, stiffness and hardness while the amorphous type has better ductility but less stiffness and hardness. PET has good barrier properties against oxygen and carbon dioxide. Therefore, it is utilized in bottles for mineral water. Other applications include food trays for oven use, roasting bags, audio/video tapes as well as mechanical components and synthetic fibers.

E. **Polyvinyl chloride (PVC)** - Polyvinyl chloride is a hard, rigid material, unless plasticizers are added. Common applications for PVC include bottles, thin sheeting, transparent packaging materials, water and irrigation pipes, gutters, window frames, building panels, etc. If plasticizers are added, the product is known as plasticized polyvinyl chloride (PPVC), which is soft, flexible and rather weak, and is used to make inflatable articles such as footballs, as well as hosepipes and cable coverings, shoes, flooring, raincoats, shower curtains, furniture coverings, automobile linings, bottles, etc.

Other plastics extensively used in our daily lives are as follow:

- ✓ High Impact Polystyrene (HIPS) – used in fridge liners, food packaging, vending cups.
- ✓ Acrylonitrile butadiene styrene (ABS) – used in electronic equipment cases (e.g., computer monitors, printers, keyboards), drainage pipe.
- ✓ Polyester (PES) – used in fibers, textiles.
- ✓ Polyamides (PA) (Nylons) - used in fibers, toothbrush bristles, fishing line, under-the-hood car engine mouldings.
- ✓ Polyurethanes (PU) - used in cushioning foams, thermal insulation foams, surface coatings, printing rollers.
- ✓ Polycarbonates (PC) - used in CDs, eyeglasses, riot shields, security windows, traffic lights, lenses.
- ✓ Polycarbonate/Acrylonitrile Butadiene Styrene (PC/ABS) - A blend of PC and ABS that creates a stronger plastic. Used in car interior and exterior parts and mobile phone bodies

1. Assessment of Waste Plastics Management System

As afore mentioned, most of the countries do not have a separate system for waste plastics management and it is usually managed under an umbrella system for solid waste management. Hence it is recommended to assess the current solid waste management system and find the gaps with reference to waste plastics management for making recommendations to make improvements in the solid waste management covering waste plastics. Solid

2. STAPE OF PLASTIC WASTE RECYCLING

1. Primary Collection and Transfer Stations: This may include the waste collection bins for segregated municipal waste and special containers for hazardous waste. Material, construction, labeling and storage of the collection containers are also important. Construction and location of transfer station is quite crucial to avoid adverse effects due to odour, breeding of vectors such as flies and mosquitoes, and entry of birds or cats and dogs. The transfer stations should be located and constructed in such a way that it is convenient for small carts to unload solid waste and for bigger vehicles to collect and transport that waste.

2. Transportation: This covers all types of vehicles under operation to transport solid waste from waste generation point to transfer station; and from transfer station to treatment and disposal site. All the vehicles in operation should be listed out including manually driven small carts, mechanically driven sophisticated transportation vehicles and special vehicles for special waste such as hazardous waste, bulky waste and recyclable wastes.

3. Treatment: This includes separation of different types of waste for materials recovery and recycling as well as for different types of treatment before final disposal. Hence at this level of solid waste, technology may cover equipment for separation of various types of materials, equipment for shredding of final disposable waste and technology for the treatment of final disposal waste. In some countries, incineration is covered at this level and ash from incinerator is sent to landfill for final disposal. Incineration is a high-tech process and negative impacts of incineration could be worse for public health as well as for environment.

4. Final Disposal: Sanitary landfill is the most common technology around the world. The conventional and environmentally unfriendly methods may still be in use. These include open-burning, open-dumping and non-sanitary landfill. However, in most of the countries these are officially banned and only sanitary landfill is recommended for final disposal. Various types or technologies of sanitary landfills are available including fully aerobic, semi-aerobic and anaerobic. The technologies may also vary in accordance with the type of final disposable waste, for example some landfills may be used for co-disposal of special wastes. The landfills for hazardous wastes could be more complicated and known as "secure landfill." The location of landfill is an important factor towards transportation costs as well as for its impacts on the urban environment.

5. Recycling and Recovery: This includes various types of activities including recycling of reusable materials such as plastic and glass containers, recycling of materials to into industrial production such as paper and iron, converting waste into a energy such as burning tires in cement kiln to produce heat, and converting waste into a resource such composting and landfill gas. Hence technology can determine the level and sophistication of recycling and recovery activities.

FROM PLASTIC WASTE TO PAVER BLOCK MATERIALS

3. THE PROJECT METHODOLOGY

We gonna put in every conner or strategic places in the City some Waste bag where people can put every kind of waste. After collecting and separeting plastic waste from others, we will direct them to the good use. More than that, we will teach people the new culture of not leaving waste on the road.

4. MISSION

Our mission is to collect every single plastic, recycling them for new use and making some pavet materials from them. This will creat Job for young people as they will be most involved in the plastic waste collection.

5. VISSION

Our vision is to live in a cleaned City where there is no plastic waste and to clean also the Lake to protect Fishes lives.