

Cashew Gardens A Model Community: A case study of Community Waste Management (CWM) in Trinidad and Tobago

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**Keywords: Plastics; recycling; waste management; composting, carbon footprint;
Trinidad and Tobago**

Abstract

The Cashew Gardens Community Council (CGCC) is a community of concerned citizens living in central Trinidad and Tobago, whose goal is to educate the community about becoming more climate resilient and to make eco-friendly choices. Recognizing that methane gas and plastic pollutants are also biggest contributors to the negative impact on landfills in Trinidad and Tobago, the CGCC has always been concerned about pollution and ways in which we, as a community, can reduce our carbon footprint by sending less recyclable waste to the landfill.

In order to address our community's waste, the CGCC implemented two important projects. Firstly, the Cashew Garden Community Recycling Programme, which was established in 2016 and by 2021 has shown a 90% increase in recyclables collected. This project is still ongoing and to date has successfully diverted over five tonnes of plastic, cans, glass and tetra packs from entering our landfills. According to our National Recycling Policy 2015, these four waste types account for almost 40% of the waste that goes to our landfills. Additionally, the project has also evolved from two hundred households that were part of the initial study, to three other communities around us, with a total of over six hundred households now included. The items collected are sent to the Solid Waste Management Company (SWMCOL), where they are bailed and shipped to recycling facilities outside of Trinidad and Tobago.

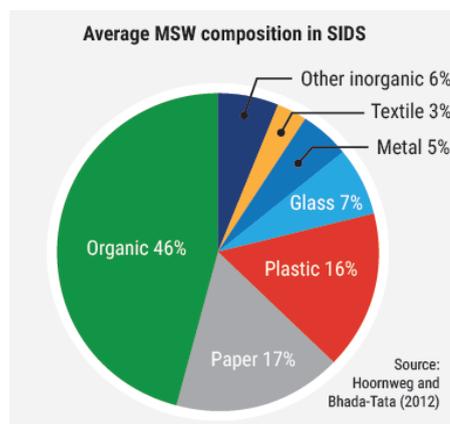
Secondly, the most recent project is the Cashew Gardens Community Composting (CGCC) initiative, which involves community collection and processing of organic waste to create fertilizer, which is used in the community garden. Organic waste contributes to the highest amounts in the nation's four landfills at 22%. The community composting project, which began in August 2020, is the first of its kind in the country and was introduced as a pilot project involving 16 households in order to reduce greenhouse gases in landfills. On average, the project diverted over 490 kg of organic waste from the landfills which has yielded over 68 kg of compost material in a nine month period with a 20% increase in household participation in 2021.

This paper aims to review the recycling activities of the Cashew Gardens community and its contribution towards reducing waste by 1% in the Beetham landfill. It will also explore the change in behaviour which has been ongoing over the past 5 years and how this change has positively contributed to the achievement of environmentally friendly waste management practices in this community.

Introduction

Waste management is an important consideration for most small island developing states (SIDS) since they produce on average 2.3 kg municipal solid waste (MSW) per person, 48% higher than the world average. Within SIDS, even though landfilling space is an issue, more than 90% of the municipal waste is recyclable (Figure 1).

Figure 1. Average Municipal Solid Waste (MSW) composition in SIDS. Taken from Seadon & Giacovelli (2019).



The Caribbean ranks second of the three SIDS regions in terms of its waste generation (Seadon & Giacovelli 2019). Ewing-Chow (2019), in a Forbes article states that “Caribbean Islands Are The Biggest Plastic Polluters Per Capita In The World” and claims that “The biggest culprit is Trinidad & Tobago, which produces a whopping 1.5 kilograms of waste per capita per day—the largest in the world”.

The National Integrated Waste Management Policy (NISWMP) 2014 establishes the plan for managing Trinidad and Tobago’s waste in accordance with a hierarchy that minimizes land-filling, with an increased focus on reduction of toxicity and volume of waste, through reuse, recycling and source separated organic waste management (Government of the Republic of Trinidad and Tobago 2015.) Additionally, waste management in Trinidad is handled by the Municipal Corporations while the Solid Waste Management Company Limited, a state-run limited liability company, manages, collects, treats and disposes of all wastes. In Tobago, the Tobago House of Assembly (THA), through the Local Health Authority, is responsible for the collection and disposal of solid waste. (Government of the Republic of Trinidad and Tobago, 2015).

In 2021, the Government of Trinidad and Tobago launched its new Waste Management Rules aimed to establish a legal framework to improve national waste management, including hazardous and non-hazardous waste, by requiring generators and handlers of waste to apply for and obtain permits prior to carrying out their waste-related activities (Government of the Republic of Trinidad and Tobago 2021).

According to our National Recycling Policy (2015), a 2010 waste characterization study that was commissioned by the Ministry of Local Government shows that 60% of recyclable materials were being disposed of in the four (4) major landfills (Table 1). The top two waste types were organics and plastics which account for almost 42% of the waste that goes to the four landfills. Overall, the state of waste management in Trinidad and Tobago is in desperate need of innovative ways to deal with recyclables in order to have significant positive impacts on the capacity of the existing landfills to meet the final waste disposal needs of the country.

Table 1: 2010 Waste Character study for the nation’s 4 landfills (Sourced from the Waste Recycling Policy, 2015)

Type of waste	Beetham	Forres Park	Guanapo	Guapo
Organics	32.0 %	22.4 %	21.7 %	10.5 %
Paper	21.4 %	13.7 %	18.0 %	18.7 %
Glass	8.7 %	11.6 %	10.3 %	23.0 %
Metals	2.8 %	4.0 %	6.3 %	3.5 %
Plastics	16.0 %	26.0 %	19.1 %	17.0 %
Textiles	8.2 %	7.8 %	6.6 %	8.6 %
Other	1.8 %	2.7 %	5.2 %	5.5 %
Total	90.9 %	88.2 %	87.2 %	86.8 %

Plastics in Trinidad and Tobago

Trinidad and Tobago is one of the top 10 global polluters per capita in the world (Pic 1 and 2). In 2010, the average plastic waste was 0.29 kg per person per day with 1.75 million tonnes per day generated in the country (Ritchie and Roser 2018; Ewing-Chow 2019). According to a 2019 report by researchers from the Rochester Institute of Technology (RIT), Trinidad and Tobago discards up to 26,000 tonnes of PET plastics per year (Millette et. al. 2019).



Picture 1 & 2: Marine pollution in Trinidad and Tobago (right is the Diego Martin River)
Source: (Institute of Marine Affairs, 2019; Newsday, 2019)

According to a 2011 report by the Ministry of Planning and Development, organics account for over one-third of the waste dumped at the Beetham Landfill (GoTT 2011). Furthermore, the four landfills are beyond their capacities and are not designed to decompose food or other waste material (picture 3). The decomposition of organic waste produces greenhouse gases such as methane which is 72 times over that of carbon dioxide (The UWI 2012).



Picture 3: Forres The Forres Park Landfill in Claxton Bay. Photo: Trevor Watson
Source: (Express, 2019)

The Cashew Gardens Community Council (CGCC)

The CGCC is concerned about pollution and ways in which this community can reduce its carbon footprint by sending less recyclable waste to the landfills, in educating the community and endorsing waste management systems that reduce the volume of noxious greenhouse gases emitted into the atmosphere, thus contributing to a cleaner and healthier environment

The goal of this paper is to examine Community Waste Management by looking at the CGCC, a cluster-based case, within the local Trinidad and Tobago context, and to assimilate whether the findings lead to a circular economy.

This case study evaluates the impact of the CGCC's projects on waste reduction in landfills and addressing plastic pollution in the environment and climate change from landfill gases. The following will be reviewed in this discussion:

- Overview of plastic and organic waste flow locally, which will identify all the key players in this case study and where they fit into the life cycle;
- Summary of the services provided by CGCC as a driver in the plastic and organic symbiotic cluster;
- Summary of the environmental, social and economic impacts of the cluster in the following ways:
 - Environmental impact of tonnes diverted from landfill;
 - Economic impact of product and sales
 - Social impact of change of habits, youth involvement and jobs created

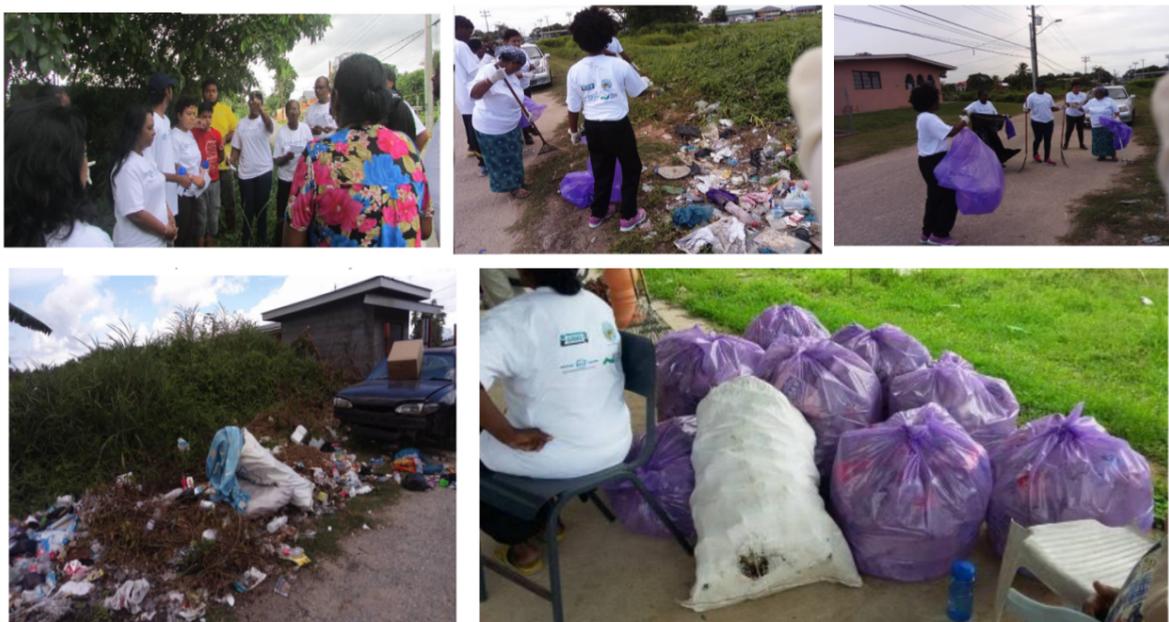
In order to address community waste, the CGCC implemented two important projects:

1. **Cashew Gardens Community Recycling Programme (CGCRP)**
 - i). Water Quality Testing
2. **Cashew Gardens Organic Waste Project**

Cashew Gardens Community Recycling Programme

Firstly, the Cashew Garden Community Recycling Programme (CGCRP) was established in 2016 after a river cleanup initiative. Prior to the river cleanup in 2016, the CGCC partnered with the Social Justice Foundation and the Adopt a River Programme, in conducting water quality testing for two years at the Caparo watershed and 20 youths were trained. The water testing is currently ongoing on a monthly basis under the CGCRP which has been running from 2016 to present. In 2020, the programme received funding for expansion from the Green Fund Execution Unit, Ministry of Planning and Development, Trinidad and Tobago.

The river cleanup for World Rivers Day 2016 (picture 4) highlighted large amounts of waste present in the waterways, with solid waste (PET bottles) being the major contributor. The presence of this waste in the river was directly linked to flooding in the Chaguanas area and environs as seen during Storm Bret. The CGCC took the initiative and developed the country's first community based recycling programme in order to change the culture with respect to solid waste disposal, especially relating to recyclables.



Picture 4: World Water Day 2016 cleanup at Caparo river, Ravine Sable

CGCC recycling initiatives collection

The Cashew Gardens community is part of the industrial symbiosis process and this is shown by the community collecting the recyclables and providing them to the companies that process namely Carib Glassworks Ltd, Recycling in Motion and Solid Waste Management Company (iCare collected and transported to SWMCOL). The community recycling project started with a community meeting in order to engage stakeholders. Once the community was educated, the CGCC received 8 bins which were donated by Carib Glassworks Limited (CGL) and were distributed throughout the community, mainly along street corners. The CGCC designed recycling stickers which were placed on the bins in order to make the recycling bins distinguishable.

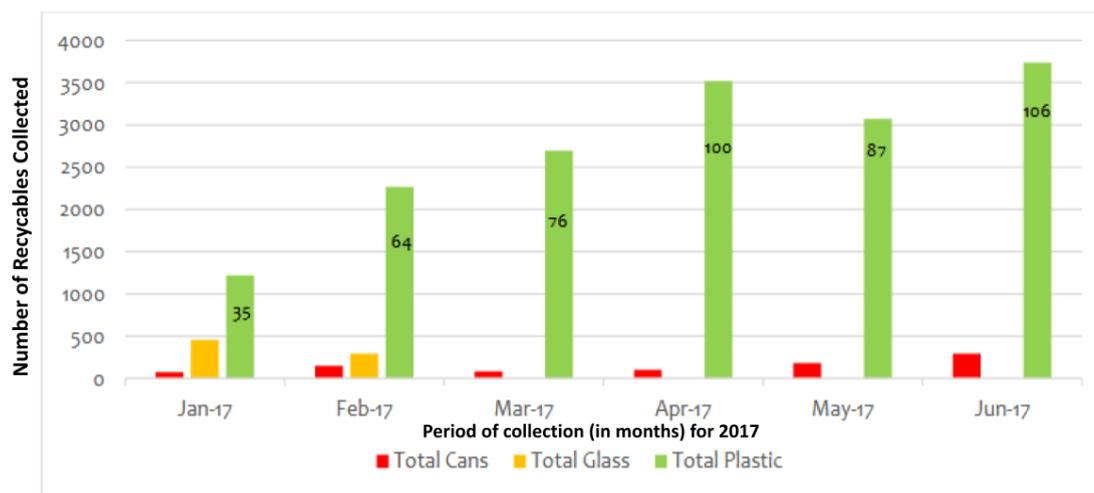
Bags were provided by Recycling and Waste Logistics (RWL) Limited, a recycling company specializing in plastics and cans and assisted in easily distinguishing recyclables from general waste, as the bags were clear and purple in colour (picture 5). The Adopt A River Programme provided transportation, as well as, technical support in terms of how to collect the data. The bins were emptied by community members, mainly youths and members of the CGCC on a weekly basis or as deemed necessary. Over 20 volunteers came out weekly to assist, with a combination of 60% youth involvement and 40% adults of which 75% were women. The process involved the volunteers taking the bags back to the community centre, emptying them and sorting based on brands, type and colour (picture 6).



Picture 5: Bins donated by CGL, purple bags by RWL and recyclables collected by volunteers

Picture 6: Youths and CGCC members assist in community recycling, 2017

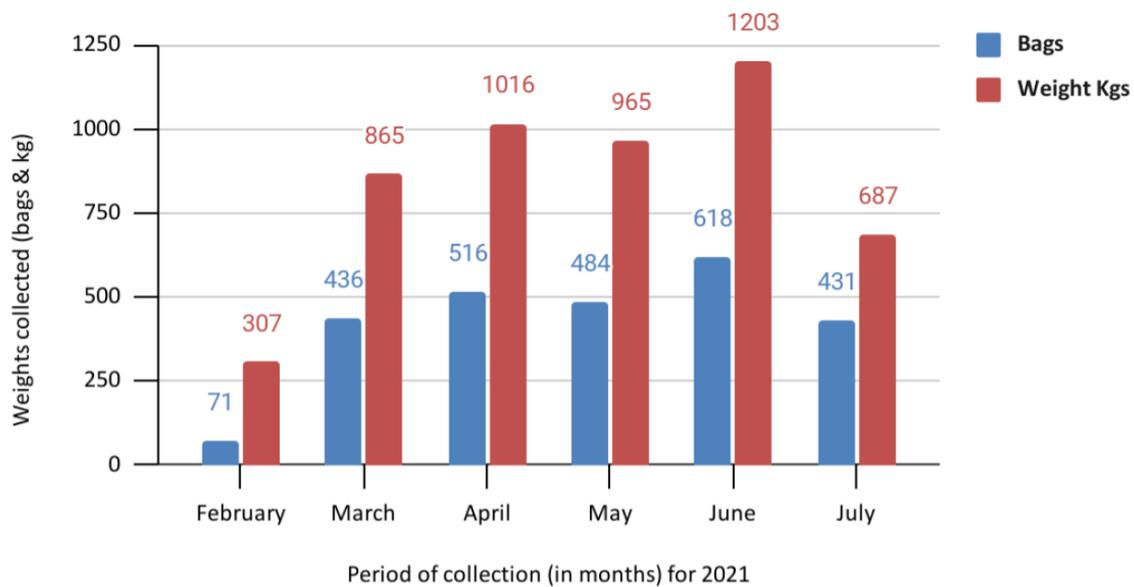
The different brands were then counted and recorded and the data compared for six months, from January to June of 2017 (Graph 1). The total number of plastic bottles and their weights increased more than twice within the six months and then leveled off gradually. **In total, within the six months, the programme was able to remove 468 kg of plastics from the environment.**



Graph 1: Total recyclables collected by the Cashew Gardens Community Council between January to June 2017

Collection continued from 2017 to 2021, however due to weight issues at the delivery site, the quantities could not be recorded until early 2021. The CGCRP has successfully diverted plastic, cans, glass and tetra packs from entering our landfills with **over 5 tonnes being recorded from February to July 2021** (Graph 2). According to our National Recycling Policy, these four waste types account for almost 40% of the waste that goes to our landfills.

Additionally, the project has also evolved from **two hundred households** that were part of the initial study, to three other communities around us, with a total of **over six hundred households** now included. **Essentially, Cashew Gardens is contributing towards the reduction of this type of waste in landfills.**



Graph 2: Recyclables collected by the CGCRP for the period February to July 2021

The items collected are sent to the Solid Waste Management Company (SWMCOL), where they are baled and shipped to recycling facilities outside of Trinidad and Tobago (picture 7).



Picture 7: Recyclables collected by the CGCRP and taken to SWMCOL

Water Quality Testing

The youths of the CGCC conduct monthly water testing at 3 sites of the Caparo river watershed (picture 7). The areas covered are Ravine Sable (Site 1), Edinburgh 500 (Site 2) and Chaguanas (Site 3). This activity was initially started in 2017 with over 20 youths in the community who were trained in carrying out water quality testing by the Adopt a River Programme (AARP). The AARP aims to build awareness concerning issues impacting local watersheds and to facilitate the participation of public and private sector entities in sustainable and holistic projects aimed at improving the status of rivers and watersheds throughout Trinidad and Tobago (AARP, n.d).

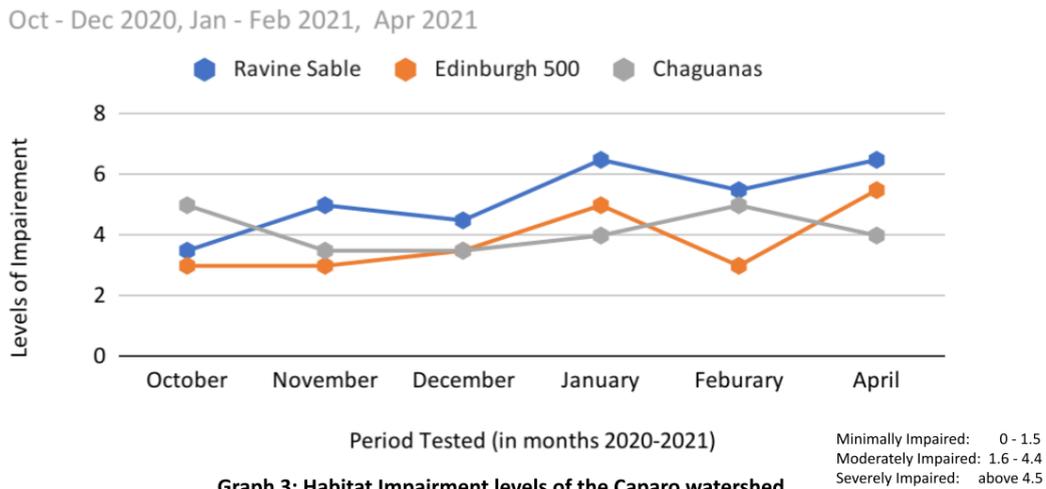
The monthly data is uploaded on the AARP app which is shared with the Water and Sewerage Authority. Prior to 2020, the entire activity was carried out by volunteers however, upon receipt of funding by the Green Fund, **these volunteers are now integrated into CGCRP and continue to conduct testing on a monthly basis.**



Picture 7: Members of the CGCRP team conducting water quality testing at the Caparo River

Based on the data shown on Graph 3, the habitat impairment levels at Site 1 were severe while Site 2 and Site 3 were at moderate levels. This data was taken over a period of six months and started between the wet season into the dry season. It should be noted that there was insufficient data to analyze the reasons for the severe impairment levels at the Ravine Sable area and testing was restricted due to pandemic constraints.

6 Months Habitat Impairment Levels at the Caparo Watershed (3 sites)

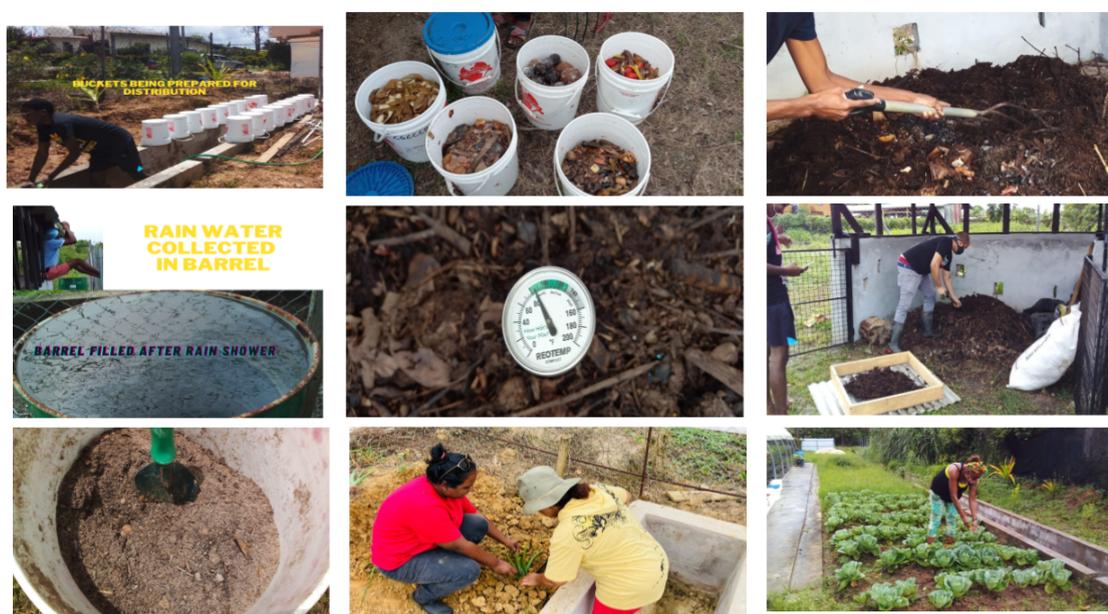


Graph 3: Habitat Impairment levels of the Caparo watershed

Cashew Gardens Organic Waste Project

The second project addresses organic waste (OW) which is the largest waste type that is sent to the four landfills at 22%. The Cashew Gardens Community Composting initiative involves community collection and processing of organic waste to create fertilizer, which is used in the community garden (Picture 8). This project was funded by the GEF Small Grants Programme, which began in August 2020, and is the first of its kind in the country. It was introduced as a pilot project involving 16 households with an average collection of over 160 kg of organic waste in a 3 month period, from October to December 2020. This yielded an average of 22.5 kg of compost for this period.

The composting programme involved a train the trainer model where five CGCC members were trained in composting at Wa Samaki Ecosystems. Initially, the training was planned with 16 participants on a face to face basis but this changed due to the Covid-19 pandemic and Government restrictions on gathering in public spaces in large numbers.



Picture 8: Volunteers and members of the CGCRP team engaging in community composting activities

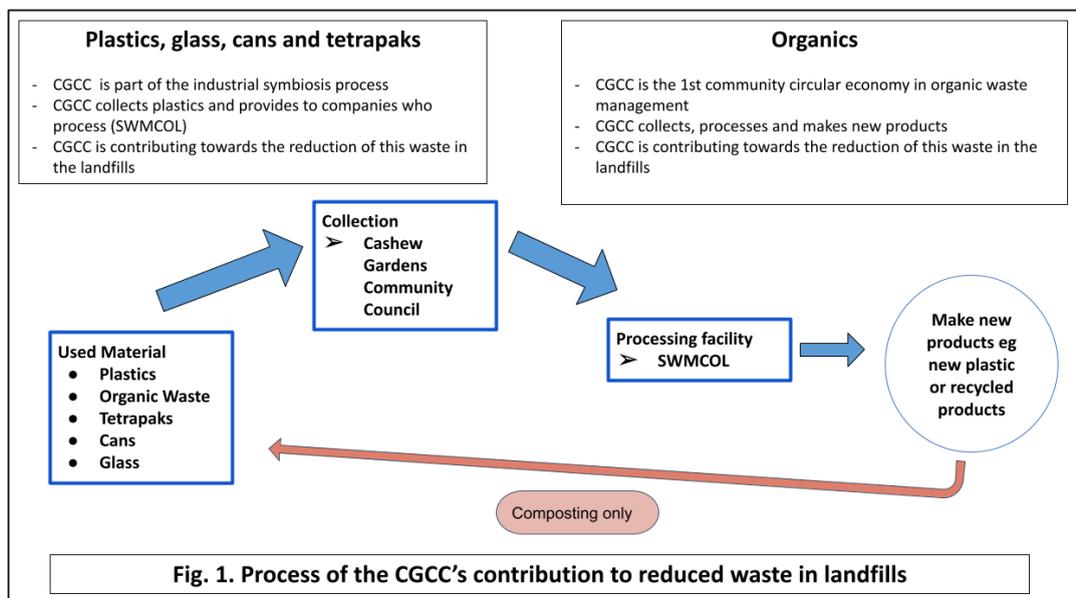
By utilizing social media tools such as Whatsapp and Facebook, the CGCC was able to successfully engage 16 households in sorting their organic waste at the household level. The funding for the project ended in December 2020 but the CGCC continued with the aid of volunteers. The volunteers consisted of youths and adults with the former being between the ages of 11 to 22. Female volunteers were significantly higher at 70%. In 2021, the project grew to over 20 households and collected an average of **490 kg of organic waste for a period of nine months**, from October, 2020 to June, 2021. This yielded compost material for use in gardening of approximately 66 kg. **The CGCC is contributing to the reduction of this type of waste in the landfills.**

The key points in the success of both recycling programmes were the easy accessibility of bins and the weekly collection of recyclable waste. In 2021, a sample survey of 20 households was conducted with an average of **80% of respondents confirming that they recycle and compost which shows a significant increase of 90% from 2017.**

Observations were made by participants that persons outside the Cashew Gardens and environs have dropped off recyclables in the community bins while others reported that more households needed to join the recycling effort.

The survey conveyed that an average household had four to five persons who were aware of the recycling and composting programmes with participation at 90% and 75% respectively.

Evidence has shown that the combination of community recycling and composting has contributed to a 1% reduction of Cashew Gardens waste in landfills. Subsequently, the replication of this project in other communities can result in a measurable reduction of recyclable waste in the landfills (Figure 1). As a SIDS, land for landfilling is limited and hence, this is an important contribution for this reason as well.



Social, Economic and Environmental benefits of the CGCC

According to the World Bank's *What a Waste 2.0: A Global Snapshot of Solid Waste Management to 2050* report, without urgent action, global waste will increase by 70 percent on current levels by 2050. Plastics are a major problem and without proper management they will contaminate waterways and ecosystems for hundreds, if not thousands, of years (World Bank 2018). A review of the economic, social and environmental impacts of the CGCC's programmes is explained in relation to reduced waste being sent to the nation's landfills.

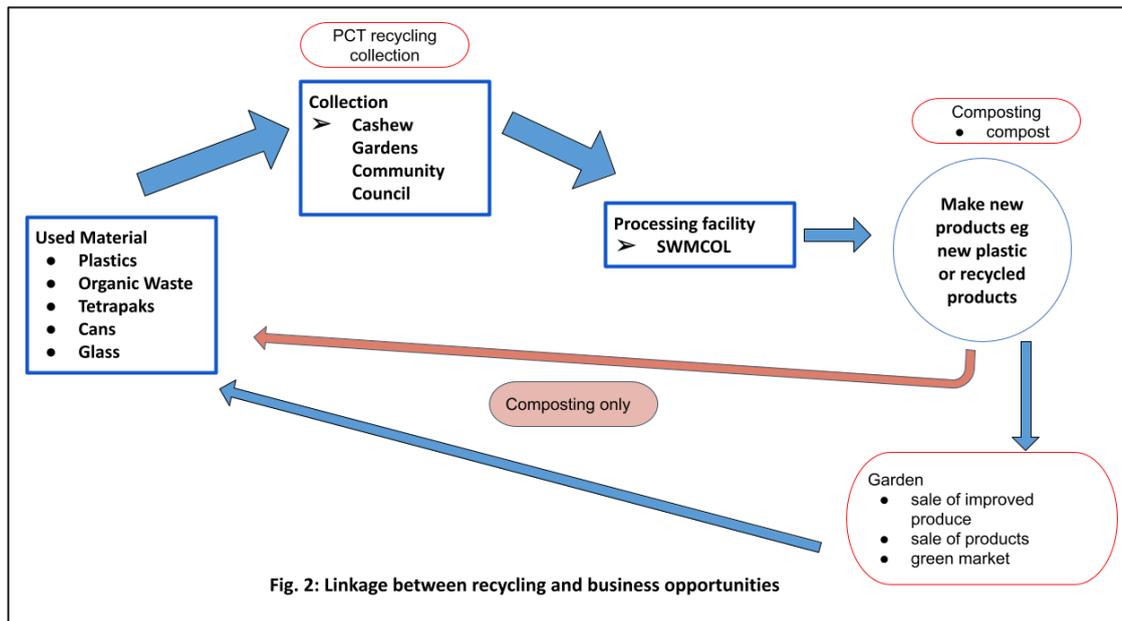
One of CGCC's purposes is to implement a good waste management system to help build a circular economy so that products are designed and optimized for reuse and recycling. On an economic purview, innovatives ways are being used to process the organic waste and create products for sale; social impact speaks of change in behaviour of communities and jobs created; and environmental impact is the tonnes of recyclable waste diverted from landfills. Additionally, the CGCC is exploring options for repurposing the recyclables collected in the community recycling programme. The following highlights smart and sustainable ways the CGCC is managing waste so that economic growth is promoted with minimal environmental impact.

The aim is to create smart and sustainable ways to manage waste that will assist in promoting efficient economic growth while minimizing environmental impact.

1. Economic:

- I. Savings in terms of organic waste being used in the garden for instance using compost as fertilizer and saving on average \$1,500 USD per year (figure 2);
- II. Producing compost for sale (\$7 USD per bag) with an average yield of 490 kg;

- III. Reduced cost of waste processing by SWMCOL of at least 1% with the possibility of increased reduction if programmes are replicated in other communities.



2. Environmental:

- I. The CGCRP grew by 90% in 2021 with over 5 tonnes of recyclables being diverted from landfills;
- II. Over 490 kg of organic waste collected by the CGCC and was prevented from ending up in landfills in a 9 month period from 20 households;
- III. Participated in over 20 environmental events, over 8 beach and river cleanups, and mangrove tree planting.

3. Social:

- I. Conducted over 10 educational and awareness session at schools and other organisations throughout the country;
- II. Participated twice in the United Nations Commission on the Status of Women (2018 and 2019) and shared recycling projects;
- III. Created an avenue for social sharing at the homework and activity centre and community climate smart garden with 10 women and 20 youths consistently volunteering;
- IV. Jobs created for more than 10 persons in the community and more jobs expected as the projects expand;
- V. The overall trend in terms of total recyclables collected indicate that there is an increase in the amount of recyclables collected per month. This is evidence that there is a change in behaviour within the community since they are not putting their recyclables in general waste and are instead, sending them to be recycled. There is strong evidence that this change in behaviour was influenced by the youths.

The CGCC is fundamental to the success of waste management in Trinidad and Tobago and is a vital part of the industrial plastic cluster. If similar projects can be replicated in other communities then a significant amount of waste can be diverted from landfills. Furthermore, the CGCC is directly contributing to the country's 2030 UN Sustainable Development Goals (SDGs) 1¹, 2², 4³, 6⁴, 13⁵.

In summary, the recycling programmes initiated by the CGCC are examples of key waste management systems that are needed in every community in Trinidad and Tobago. There are opportunities for profitable activities in recyclables (inorganic and organic waste) which can directly reduce the amount of waste for disposal, save space in landfills, and conserve natural resources. These two areas, plastic pollution and greenhouse gases in landfills, are two major environmental issues locally.

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¹ SDG Goal 1: No Poverty - End poverty in all its forms everywhere;

² SDG Goal 2: Zero Hunger- End hunger, achieve food security and improved nutrition and promote sustainable agriculture;

³ SDG Goal 4: Quality education- Ensure inclusive and equitable quality education and promote lifelong learning opportunities for all;

⁴ SDG Goal 6: Clean water and sanitation - Ensure availability and sustainable management of water and sanitation for all;

⁵ SDG Goal 13: Climate action: Take urgent action to combat climate change and its impacts.

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