The Coffee Gardens
Natural Capital Impact Report

Executive Summary

This report offers a valuation of The Coffee Garden's natural capital impact over the period 2021-22, and also projects equivalent figures for impacts at the new processing site for 2022 onwards. The company demonstrates a net positive impact to society at both sites, but champions an impressive decoupling of profitability and sustainability at the new site; here, production is modelled to increase by 250% yet the company increases its net positive standing by over 360% in the same period. This means that one container of product from the new site has a lower impact than at the old, despite the increased use of inputs such as fuel and land. This avoided impact is primarily driven by the on-sight solar generation, investment in water processing and increased composting capacity. The addition of valuation has offered some context and a clear return-on-investment for how these efforts benefit local people. The Coffee Gardens are an inspirational case of how growth does not have to be synonymous with greater negative impact, and we hope they will go on to gather further natural capital data and insights as this business model grows.

The Coffee Gardens is a Ugandan-based coffee processing business, located in Kyambogo Village, Sironko. They process coffee beans grown by local farmers and distribute internationally. Activities include the fermentation of green coffee cherry, running of a small office, and maintaining good working conditions for 35 employees.

This study applies a natural capital impact assessment to The Coffee Gardens' operations to understand where the largest impacts are occurring over the period of June 2021 to May 2022. The results of this assessment can help to assist decision making and assess the contribution of the company's existing efforts. This report is a first step to enabling data-based approaches to achieve internal sustainability goals. This report is delivered by the Capitals Coalition, GIST Impact and students at the African Leadership University.

Methodology

GIST's approach to measuring and quantifying impacts captures all significant outcomes generated by an activity - planned and unplanned - and values the total, avoided and net economic impacts on society. GIST adopts a granular, location-specific approach to calculate the environmental impacts across the natural capital KPIs. The larger societal context – in terms of ecological parameters, human health implications, socio-economic and demographic compositions of the adjacent locations are factored into the overall impact calculations.

GIST follows the Driver-Outcome-Impact (DOI) approach where business activities are bifurcated into 6 KPIs and are mapped to their corresponding outcomes. Each outcome carries various impacts for society which are valued as shown in Table 1 below.

November 2022

Drivers	Outcomes	Impacts
GHG Emissions	Increase in concentrations of GHGs (i.e. CO2, CH4, N2O, SF6, HFCs, PFCs and other gases defined by IPCC).	Impacts on net agricultural productivity, property damage from increased flood risks, human health, change in value of ecosystem services
Air pollution	Increase in concentration of air pollutants (i.e. NOx, SOx and particulate matter)	Increase in morbidity and loss of life expectancy from increased incidence of disease
Water consumption	Freshwater unavailability	Productivity loss from increased malnutrition due to unavailability of water for agriculture and energy used for water provisioning
Water and land pollution	Increase in concentration of toxic and nutrient pollutants	Impacts on human health from increased incidences of cancer, human health and climate change impacts from water treatment
Waste Generation	Increase in concentration of pollutants in different Earth spheres (i.e. air, water, and land) dependent on disposal or treatment method.	Impacts on human health and climate change due to increased air pollution, water and land pollution and GHG emissions
Biodiversity	Change in land use land cover (LULC) over periods of time	Loss of ecosystem services

Table 1. GIST's DOI Framework

Natural Capital Impacts

	GHG Emissions	Air pollution	Water consumption	Water and land pollution	Waste Generation	Biodiversity
Impact	**$270**	**$66**	**$19**	**$12**	**$-870**	**$0**
Intensity (USD / Mn USD Revenue)	630	150	43	28	-2000	0
Benchmark	2900	81	88	103	368	0

Table 2. Impact valuation

Interpreting the impact valuations

- The impact dollar value represents cost to society caused by changes across the six KPIs
- Aggregated impact represents a net positive figure of $503 avoided impacts, see below for the disaggregated impacts within this.
- Intensity refers to the impact per million dollar of revenue, so offers a comparable unit between companies
- The benchmark shows the average intensity for a company operating within the same industry. For The Coffee Gardens the industry of comparison is packaged food manufacturing, taken from a global peer group of approx. 3000 other companies of similar revenue. This is not a tailored benchmark so should be interpreted as an indication only.

Key Indicator	Total Impact	Avoided Impact	Net Impact
GHG Emissions	0.28	-0.0024	0.27
Air Pollution	0.066	-	0.066
Water Consumption	0.019		0.019
Water & Land Pollution	0.012	-	0.012
Waste Generation	0.00033	-0.87	-0.87
Biodiversity and Ecosystem Services	0	-	0
Total	0.38	-0.87	-0.50

Figure 1. Net impact (thousand $)

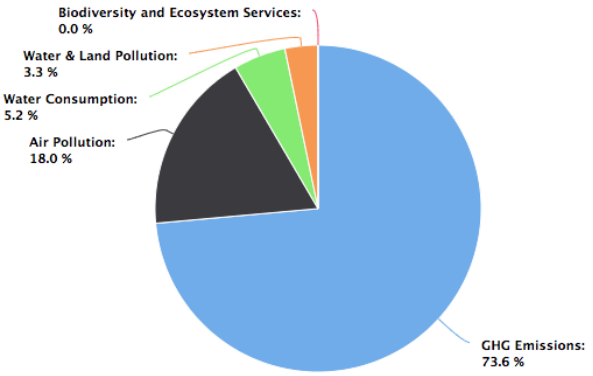

Figure 2. Relative contribution

Off the six KPIs under study, greenhouse gas (GHG) emissions represent the largest negative impact at $270 net total, or 74% of the total impact profile. This KPI considers all fuels burnt (in this case LPG and petrol), distance travelled by the company vehicle, electricity consumption from the mains and any solar generation. The primary source of emissions is the vehicle. Solar generation at this site has helped to offset approx. 0.05 tonnes of CO2, subtracting $2.40 of impact from the total.

The second largest negative impact at $66 or 18% of the total. This KPI considered particulate matter, sulphur oxides (SOx) and nitrogen oxides (NOx). The primary contribution is the NOx emissions from the company vehicles. Nitrogen Oxides are poisonous and highly reactive gases that can contribute to smog, acid rain and respiratory disease[1,2,3]. Diesel engines can produce more NOx than petrol ones. Note that the air pollution impacts are highly dependent on population density, which might be the reason that the impact is still comparatively small at only $66 over the reporting year.

Water consumption contributes 5% of the company's impact, or $19. The company consumes approximately 664 m3 of water annually for both coffee processing and staff use. The Coffee Gardens treat all waste water in line with national standards, resulting in a negligible pollution impact of $12.

Waste shows another net positive impact, meaning that the small volume of plastic shopping bags sent to landfill (approx. 48 kgs) is significantly outweighed by the composting of wet cherry pulp (approx. 120 tonnes).

For the purposes of this assessment, we have assumed the impact on biodiversity to be net zero as all development projects have taken place on poor quality land. We recognize there have been significant investments in improving the biodiversity of the site, such as reforesting the riverbank with native shrubs, however this software unfortunately cannot currently value positive impacts online and is thus, not considered in this scope of assessment. We can therefore only acknowledge this positive contribution qualitatively, where it is referenced in the SDG section.

Sector Benchmarking

The Coffee Gardens has a PIE Score of -0.33; 'PIE' stands for Profile of Impact on the Environment and reflects the company's environmental impact performance compared to its industry peers globally. GIST has developed sector-specific benchmarks and an extensive review of publicly available data. If the PIE score is more than 1, it

[1] https://www3.epa.gov/region1/airquality/nox.html
[2] https://www.epa.gov/no2-pollution/basic-information-about-no2
[3] https://azdeq.gov/nitrogen-oxide-nox-pollution

means that the company is performing worse than its competitors, and in case it is less than 1, it implies that the company is performing better than its peers. For its revenue, The Coffee Gardens is performing commendably better than average.

Development of a new site

As of 2022, the Coffee Gardens have relocated to a new processing site with newer infrastructure and increased processing capacity. This scenario projects the likely natural capital impact of this new site when it will be running at its maximum 5-container capacity, this is therefore a hypothetical exercise and we recommend adjusting with accurate numbers when they become available. The new site includes upgrades such as a high-performing water treatment plant to restore and eject used water, increased harvesting of rainwater, increased composting and more solar generation. Our assumptions in this scenario are listed in the appendix.

Below are the estimated impacts the new site will have on the environment.

Total impact	Container output	GHG	Air pollution	Water consumption	Water and land pollution	Waste Generation	Biodiversity
Old site	2	$270	$66	$19	$12	$-870	$0
New site	5	$250	$67	$39	$0	$-2200	$0

Table 3. Comparison of total impact across sites

Despite the increase of production from two containers to five, the company not only maintains but extends its net positive contribution, from the previous $503, to now $1844 positive. When contextualized against revenue via the PIE score, impact dives fourfold from an aggregate -0.33 to -1.2.

One significant contributor is the increased solar capacity to nine higher capacity panels, now representing 0.17 tonnes of CO2 equivalent (tCO2e) and the avoided social cost of carbon that is achieved with it[4]. This effectively offsets the increased consumption of petrol required by the higher operating capacity. The other major contributor is the increased capacity for composting which avoids costs to society associated with landfill; the more compostable wet pulp is produced, the more the "avoided" impact is amplified.

Water consumption has increased due to increased use, but over 20% will come from rainwater which keeps the total impact low. While wastewater will also increase in line with production (from 664 m3 to 1381 m3), the upgraded water treatment plant negates any associated impact down to zero as all pollutants will be removed before release back into the environment. This analysis assumes that the electricity required for the treatment of wastewater will come from the solar panels.

Development of the new site has already included planting of native species on either side of the riverbank, designed to minimize soil erosion and flood risk while increasing biodiversity. Unfortunately the SME360x methodology is not equipped to quantify positive impacts so we have again left this indicator at zero and will discuss below in the SDG section.

Building on the total impact, we wanted to compare impact per container between the old and new sites, see Table 4 below.

[4] https://www.whitehouse.gov/wp-content/uploads/2021/02/TechnicalSupportDocument_SocialCostofCarbonMethaneNitrousOxide.pdf

Impact per container	GHG	Air pollution	Water consumption	Water and land pollution	Waste Generation	Biodiversity
Old site	$135	$33	$9.5	$6	$-435	$0
New site	$50	$13.4	$7.8	$0	$-440	$0

Table 4. Comparison of impact per impact

One container of product from the new site has a net positive impact of $369; $117 less impact per container than the old site. Considered against the 250% increase in production between sites it is a testament to the company's investments in sustainable infrastructure that net positive impact has not only been maintained but also increased.

This scenario is of course a projection and should be reviewed as and when the updated operational data becomes available from the new site. For example, vehicle use has been modelled as consistent across both sites but the company will soon be updating their older car to a newer, more efficient model which may reduce fuel use further.

SDG Representation

The Sustainable Development Goals (SDGs) represent 17 goals adopted by all UN Member States in 2015 that offer a blueprint to achieve sustainable development by 2030. This SDG impact assessment maps the cumulative impact of the company's direct operations to these 17 Goals (SDGs). For more information on specific indicators, see https://unstats.un.org/sdgs/metadata.

Figure 4. The global goals

The company's investment in the new site translates positively towards the SDGs. As discussed above, we acknowledge that the company converted approximately 150m^2 of brownfield land to build the new processing site, after which approximately 390m^2 of riverbank at the new site was restored with native species and the company estimates to have planted over 8000 trees. The quantification of the positive impacts on biodiversity is beyond the scope of the current analysis, however these investments are in line with Uganda's progress towards SDG 15: Life on Land. The company's investment in onsite solar generation compliments SDG 13: Climate Action.

Social and human capital were out of scope for this analysis, but through its employment and training of local people the company is making a significant contribution to the SDGs as well.

Risks and Opportunities

The Coffee Gardens is already demonstrating how, with the right investments, growth and sustainability can be decoupled. Increased processing and profitability does not have to equate to an increased cost to the environment and society. The Coffee Gardens is leading the sector into new opportunity for greener market premiums and, with more cases such as this, we hope that sustainable business practices can be scaled further within Uganda through payments for ecosystem services schemes or subsidies for sustainable infrastructure.

Our recommendation is for the company to continue gathering and recording relevant data to build an increasingly comprehensive picture of the interaction between operations, the local environment and people. We hope this case provides a benchmark onto which further exploration and refinement can be built, both to inform internal decision making and to inspire other small businesses that sustainable growth can be achieved.

Appendix 1

	Unit	Baseline	New site
LPG (Cooking gas)	tonnes	0.059	0.059
Petrol (Generator)	m3	0.042	0
Petrol (Pulping machine)	m3	0.23	0.58
Vehicle mileage	km	20825	20825
Electricity consumption	Mwh	3.81	0
Solar generation	tco2e	0.05	0.17
Point source PM	KG	0.4	0.83
Point source SOX	KG	0.33	0.69
Point source NOX	KG	6.53	13.56
Line source PM	KG	8.83	8.83
Line source SOX	KG	8.26	8.26
Line source NOX	KG	125.55	125.55
Freshwater consumption	m3	664	1381
Wastewater	m3	664	1381
COD concentration	mg/l	70	0
TN concentration	mg/l	10	0
TP concentration	mg/l	5	0
Landfill (Polythene bags)	tonnes	0.048	0.048
Compost (Wet cherry pulp)	tonnes	120	300