

CONTENT



Message from Our Managing Partner

4



Overview of Mandala Capital

8

How We Invest

Our Strategy

Mandala's Portfolio



Impact Reporting Principles

14

Definition and Calculation of Impact



Eight Primary Areas of Social Impact

16

Snapshot of Impact across Our Portfolio

Snapshot of Overall Aggregated Social Impact



Details of Each Impact Metric

22

Health and Nutrition

Case Study: Godavari Biorefineries Ltd

Strengthened Food Safety

Water Savings

Employment

**Case Study: Contract Farming and
Farmer Support at Jain FarmFresh Foods Ltd**

Rural Community Development

Reduced Food Wastage

CO₂ Emission Savings

Case Study: Jain Tissue Culture Park

Improved Soil Health



Looking Ahead

44

MESSAGE FROM OUR MANAGING PARTNER



It seems that these days “Impact Investing” has become a ubiquitous topic in any conversation around investment, whether this takes place in a Board room or at a cocktail party. However, “Impact” can mean different things to different people, and save for a shared desire to “do good”, the definition of the word can vary greatly among individuals.

At Mandala, our focus is on making scalable and sustainable investments across the food value chain in India and South East Asia. Our geographical and sector focus makes our investments inherently high Impact with a significant multiplier effect as they touch the livelihoods of rural and poor communities by the hundreds of millions: they affect rural women who are the major source of farm labour; they have a direct impact on the environment given the use of pesticides, fertilisers, water, and fuel; and they affect health and nutrition of the society as a whole. This Impact is enhanced and differentiated further by our focus on the scalability and sustainability of the changes, our ability to make incrementally meaningful gains throughout the life of our investments, and our quantitative approach to measure Impact as a Social Return on Investment (SRoI).

The theme of our Impact Report this year is Building A Circular Impact Economy. A Circular Economy can be defined as a model of production and consumption which involves sharing, leasing, and refurbishing and recycling existing materials and products for as long as possible. It is based on the principles of designing out waste and pollution, keeping products and materials in use, and regenerating natural systems.

The current food system has supported a fast-growing population and fuelled economic development and urbanisation for the last several decades; but this has come at a great cost to society and the environment and today’s model is no longer fit to meet tomorrow’s needs. The current linear food system is ripe for disruption into a Circular Economy. I would argue that changing our food systems is one of the most impactful things we can do to address climate change, improve health and nutrition, rebuild biodiversity, and lift hundreds of millions of people out of poverty.

Our SRoI analysis has so far been limited to be a measurement of first-order Impact – and we will continue to follow this methodology to be conservative; but in fact, there is Impact of second and third order which in some cases can be greater than the first order one. Second and third-order Impact can be hard to quantify and often depend on external factors for which we cannot take full credit; nevertheless, creating Impact that is multi-layered and which will affect the livelihoods and quality of life of current and future generations must be one of the goals of Impact investing. For us, this is reflected in the “sustainable” part of our investment strategy. Moreover, if a Circular Impact Economy is created in scale, these second and third-order benefits can become exponential.

In some of our investments such as Godavari Biorefineries, defining the Circular Impact Economy is straightforward. Godavari has developed a truly closed loop system within its business starting with researching and developing higher yielding sugarcane for its farmers, purchasing and processing the

cane, utilising leftover bagasse to generate power, and recycling water and wastewater. Godavari has used Mandala's investment in their R&D efforts to enhance this closed loop by generating greater value from by-products such as speciality chemicals from ethanol, fibreboard and cellulose derivatives from bagasse, and other such innovations. The net result is an increase in the value per ton of cane and eliminating virtually all waste from the entire sugarcane value chain. The second and third order benefits to the farmers, to the environment, to the consumers and to the country are significant. (See our Case Study – Godavari Biorefineries Ltd – A Circular Impact Economy for more details.)

In some cases, the Circular Impact Economy does not fit the classic definition, but we nevertheless feel that each of the investments mentioned below facilitates the flow of goods in the most efficient manner across the value chain, while preserving the environment and the livelihoods of the people involved. Continuous improvements along the value chain have resulted in industry leading numbers on profitability per unit.

Mandala invested in Jain Irrigation Systems (JISL), Jain FarmFresh Foods (JFFFL) and SAFL to help them expand their respective capacities. Our investments have allowed SAFL to provide financing to farmers to purchase irrigation equipment and greenhouses from JISL, as well as better quality seedlings from

JFFFL and other value-enhancing inputs. JFFFL has used our capital to expand its capacity in mango, onion and spice processing to become one of the largest players in the world. This scale has allowed the company to purchase raw materials under contract from the same farmers that have taken loans from SAFL, thus providing them with contractual off-take at scale.

JFFFL has also introduced recyclable packaging for its new retail spice products, and the company's sustainability credentials allow it to extract the most value from its processing plants, reduce spoilage and waste from farm to processing, invest in solar driers for its plants, and encourage its farmers to avoid using excess pesticides and fertilisers in the growing process. With adequate financing and more certainty of offtake, farmers in turn have been able to purchase drip irrigation from JISL to increase their horticulture yield, leading to higher incomes. The use of drip irrigation has led to better soil health and lower ground water depletion, benefiting future generations of farmers. This closed loop system has ensured that best-in-class processes are used for farming, processing, and waste management.

Impact investing will always mean different things to different people. It took us a while to define what it means for Mandala. There are three questions we always ask ourselves to help us think through this:



What is the Impact we are trying to make?
Sustainable and scalable Impact across the food value chain.

Why are we choosing this type of Impact?
Because we feel that Food and Agri is the most impactful sector to influence the things we consider important, such as climate change, rural development, soil health, water conservation, health and nutrition.

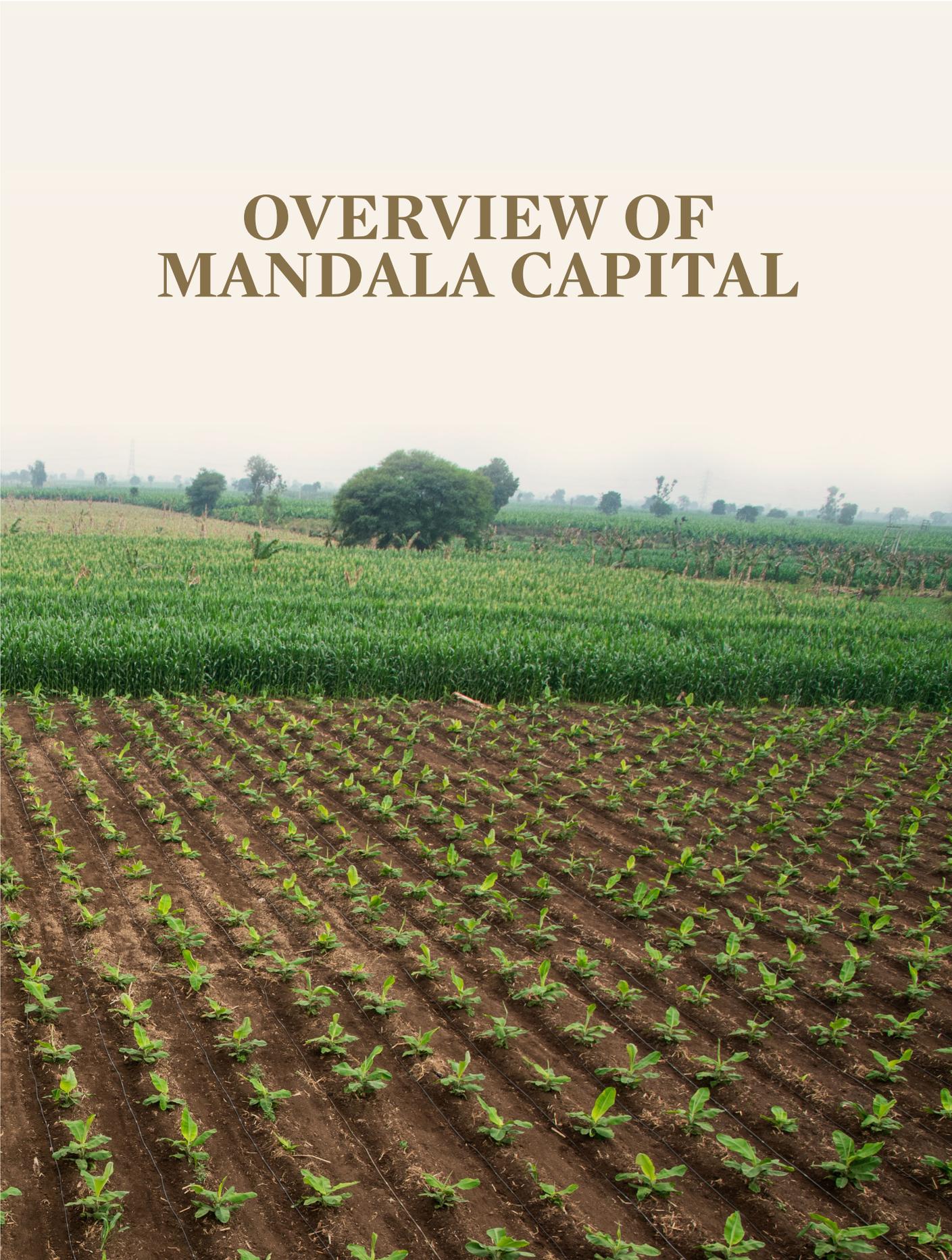
How are we making or contributing to this Impact?

By investing in companies with a shared philosophy, by finding investments that enhance the Impact we are trying to achieve, by tracking and monitoring our Impact effect, and by encouraging better Impact standards post-investment.

I am encouraged by the iterative process we have followed so far to arrive at our current understanding and definition of Impact and excited about the years ahead as we continue to learn from what others are doing in this space, while continuously evolving our own thinking on the best way to define and implement Impact investing.

Uday Garg
Managing Partner, Mandala Capital

OVERVIEW OF MANDALA CAPITAL





MISSION STATEMENT

We aim to create Impact along the entire food chain line that is both sustainable and scalable.



CORE VALUES

Sustainability

All our investments and our investee companies' operations are planned and executed in a manner that meets the needs of the present without compromising the ability of future generations to meet their own needs. We also ensure that all our activities strike a balance between economic, environmental, and social impact so that they can be maintained in the long run.

Scalability

We seek to build ventures with solid foundations and business models that have the ability to grow rapidly to manage growing market demands, in order to create the maximum Impact in the most cost-effective manner and within the shortest amount of time.

HOW WE INVEST

The investment team at Mandala Capital prides itself in adopting a structured and comprehensive approach to evaluating investments in agriculture, food, and food-related businesses. This approach has been developed and continuously refined for more than a decade, building upon more than 200 years of combined experience within the team.



OUR STRATEGY ENCOMPASSES 4 KEY STEPS:



Thesis Driven

We are focused in our research, assessing the company against an expansive rubric through which we dive into a sub-sector level of detail, analyse industry trends and potential disruptions, and identify Mandala's unique value-add to the company. This results in stronger conviction, a better diligence process and greater understanding of the right business valuation.

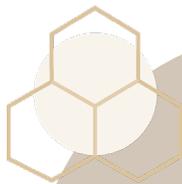
1



Deal Creation

We forge strong relationships with the people behind the companies before we invest in them. This allows us to appreciate the nuances behind their strategic and operational decisions that are not captured in spreadsheets, empowering us to become better business partners.

2



Deal Structuring

We are innovative and creative in deal structuring, providing solutions that are non-typical of private equity firms. Our ability to invest across the capital structure also ensures that we can meet the unique needs of the companies while ensuring stable returns for our investors.

3



Value through Operations

We are committed to adding value to every company's operational capabilities post-investment, with a focus on efficiency, capacity and governance. Our networks of industry thought leaders and our knowledge of new frontiers empower us to do so effectively.

Backed by this rigorous approach, we are confident that every deal we create is beneficial to our companies, our investors, and our world.

MANDALA'S PORTFOLIO



Arcadia Biosciences develops and commercializes agricultural traits and products that bring value to growers, processors and consumers, while benefitting the environment and enhancing human health.

www.arcadiabio.com



Gati Kausar, a cold chain solutions vertical of Gati Ltd., offers temperature-controlled logistics solutions with its extensive fleet of 180 refrigerated vehicles and a growing network of cold warehouse facilities across India.

www.gatikausar.com



Godavari Biorefineries produces sugar, other foods, biofuels, chemicals, power, compost, waxes, and related products using sugarcane as the primary feedstock.

www.somaiya.com



SAFL is the first private sector NBFC in India providing agri-loans with a wide and diverse range of financing options for almost every need of agricultural activity.

www.sافل.in





Jain Irrigation Systems is the largest company in Asia in drip irrigation, and the second largest globally. Its subsidiaries are also engaged in food processing, tissue culture, and solar appliances.
www.jains.com



Jain FarmFresh is the subsidiary of Jain Irrigation Systems engaged in food processing, including fruit pulps and concentrates, and dehydrated products.
www.jainfarmfresh.com



Efrac is one of the largest integrated food testing and research facilities in India.
www.efrac.org



Keventer is a leading food processing business based in eastern India engaged in multiple segments in dairy products and beverages.
www.keventer.com

IMPACT REPORTING PRINCIPLES

Measure and Report Outcomes, Not Simply Output

Beyond stating the activities done or the type of investment portfolio we have, we seek to measure the extent to which value has been added and how the well-being of people, the society, or the environment has been affected through our investments.

1

Measure with Context

We design every metric based on a deep understanding of our investees' context and experiences, which is derived from the strong, long-term relationship we have with the companies and our extended interactions. Having the benefit of context ensures that our assumptions are sound and that our metrics are relevant.

2

Measure the Difference Made

We strive to measure accurately the incremental contribution Mandala's investments bring to the table; as such, in every metric, we take into consideration the extent to which the outcomes are as a result of other factors (Attribution), what would have happened anyway (Deadweight), and any unintended negative consequences or displaced benefits (Displacement).

3

Keep Impact Reporting Accessible and Universal

We translate all the Impact created into a familiar, monetary unit and ratio that can be easily understood by all investors, regardless of background and depth of technical knowledge. We believe this will lower the barrier to entry for the Impact investing space, encourage more investment, and create even more Impact within a shorter amount of time.

4

Report Impact with Transparency

We openly share the calculations for each metric and make explicit the assumptions made. This allows all stakeholders to better evaluate the robustness of our Impact measurements and hopefully, find the report more useful.

5

Constantly Learn and Improve

We maintain a posture of learning and openness to feedback, so that Mandala's Impact reporting methodology can constantly improve, and its credibility can be established over time.

6

DEFINITION AND CALCULATION OF IMPACT

Based on the principles laid out above, this is how we define and measure Impact in monetary terms:

$$[Impact] = [Outcomes - Deadweight - Displacement] \times [Attribution]$$

The social return on investment (SRoI), which is the ratio of the Impact created to every dollar invested, can thus be calculated using this formula:

$$[Impact \text{ per } \text{dollar invested}] = [Impact] / [Total \text{ investment adjusted to current values}^*]$$

This model does not distinguish between the effects of equity and debt.

* Based on c. 2% p.a. inflation

EIGHT PRIMARY AREAS OF SOCIAL IMPACT

Through Mandala’s investments and the efforts of its portfolio of companies, we have identified these eight primary areas of social impact:



Each of the eight areas is also strongly connected to at least one of the 17 SDGs

Therefore, an alternative way of measuring and reporting Mandala’s impact would be the amount of social impact contributed towards each of the SDGs. This can then be compared against UNDP’s estimated funding gap required in the developing world to achieve the SDGs, which is USD \$2.5 trillion.

SNAPSHOT OF IMPACT ACROSS OUR PORTFOLIO



SNAPSHOT OF OVERALL AGGREGATED SOCIAL IMPACT



The cumulative aggregate social value created by Mandala's investments to 31st December 2020 is calculated to be at least

US\$ 773,565,399

or 0.03% of the funding needed to achieve the SDGs.

Mandala's cumulative SRol ratio stands at

3.4X

In other words, for every US\$ 1 invested, approximately US\$ 3.4 of social value has been created over the years across categories including Water, the Environment, Food and Nutrition, and Livelihoods.

The breakdown of Impact created across the 8 primary areas can be seen in Figures 1 and 2 below.

Figure 1 Summary of Impact created by Mandala up to 31st December 2020

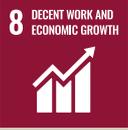
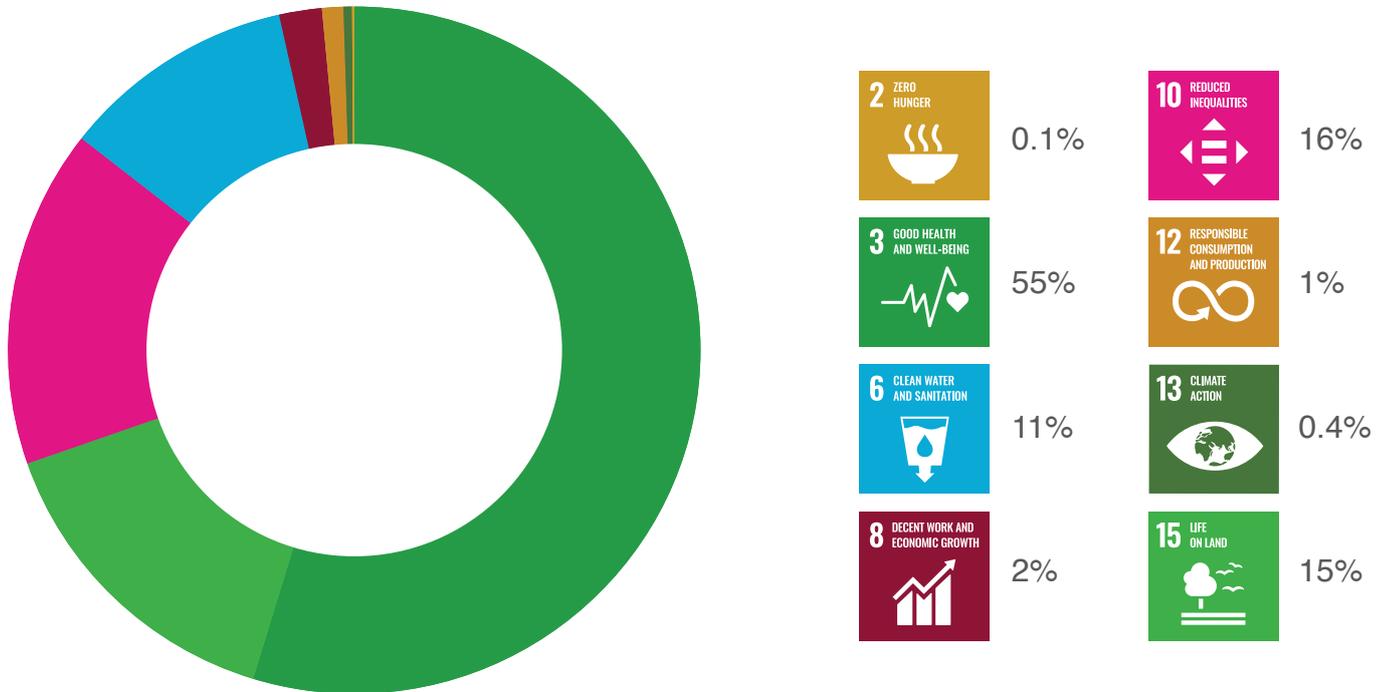
Primary Area of Impact	Jan – Dec 2020		Cumulative	
	Total Impact (US\$ million)	Impact per \$ Invested (SRoI) (US\$)	Total Impact (US\$ million)	Impact per \$ Invested (SRoI) (US\$)
 Health and Nutrition	0.1	0.0003	0.6	0.002
 Strengthened Food Safety	50.5	0.2	427.3	1.9
 Water Savings	7.8	0.04	84.6	0.4
 Employment	2.2	0.01	16.0	0.1
 Rural Community Development	9.3	0.04	125.8	0.6
 Reduced Food Wastage	0.4	0.002	3.9	0.02
 CO ₂ Emissions	0.1	0.0003	3.0	0.01
 Improved Soil Health	0.01	0.0001	112.4	0.5
Total	70.4	0.3	773.6	3.4

Figure 2 Portfolio Breakdown by SDGs



These monetary values were calculated based on the definition of Impact described in Definition and Calculation of Impact and rely heavily on the data collected by Mandala’s investee companies. Where estimates or assumptions were required to serve as proxy or quantify Impact, these are described in the subsequent pages to provide full disclosure and transparency behind the reported figures.

Despite efforts to be as accurate as possible in these calculations, as the measurement primarily focuses on tangible outcomes, many other benefits such as the improved well-being of individuals who gained employment, or whose communities were developed, and the second-order benefits to their families and children have not been quantified yet.

This suggests that the Impact calculations are likely to underestimate the true social value created by Mandala Capital and its portfolio of investees. The case studies under Impact Spotlights provide a more comprehensive understanding of the full Impact Mandala’s portfolio of companies have created.

The team at Mandala Capital will constantly improve its Impact measurement and reporting methodology, and continue to bring all stakeholders an increasingly reliable and meaningful report in the coming years.

The subsequent pages will cover each area in more detail, including how the Impact figures were measured and calculated.



HEALTH AND NUTRITION

Cumulative Total Impact
US\$553,639

Impact per \$ Invested
US\$0.002

How We Measure Impact

This metric measures the value added to the nation in terms of healthy fruits and vegetables sold to people due to Mandala’s investees’ operations. This metric measures the monetary value of the food that is sold.



$$\text{Impact per year} = \text{Tons of fruits and vegetables sold} \times \text{Average value of per ton of food} \times \text{Average \% equity stake and \% debt share}$$



Key Assumptions

Based on inputs from the investee companies, the average value of 1 ton of food is taken to be Rs 500 (c. US\$ 7.1).

Impact Analysis

As there is no practical way to measure the differential impact of the consumption of specific foods on a person's health and well-being, it was not immediately feasible to calculate impact in terms of healthcare costs saved or stronger economic productivity due to avoided illnesses. Consumption of the food sold on the market cannot be tracked reliably as well. Hence, this metric simplifies the impact calculation to an aggregate of the market value of the healthy foods that are sold as a baseline proxy of the social impact of providing quality food to people. As more literature and research is conducted, a more compelling and comprehensive calculation for this metric will be developed.

Attribution of the impact is accounted for via the portion of Mandala's equity stake and share of debt in the companies. Deadweight and Displacement are both considered negligible here as it is unlikely that the amount of fruits and vegetables in people's diets are hitting a saturation point or that there is an over-supply of fresh, healthy produce that would lead to wastage.

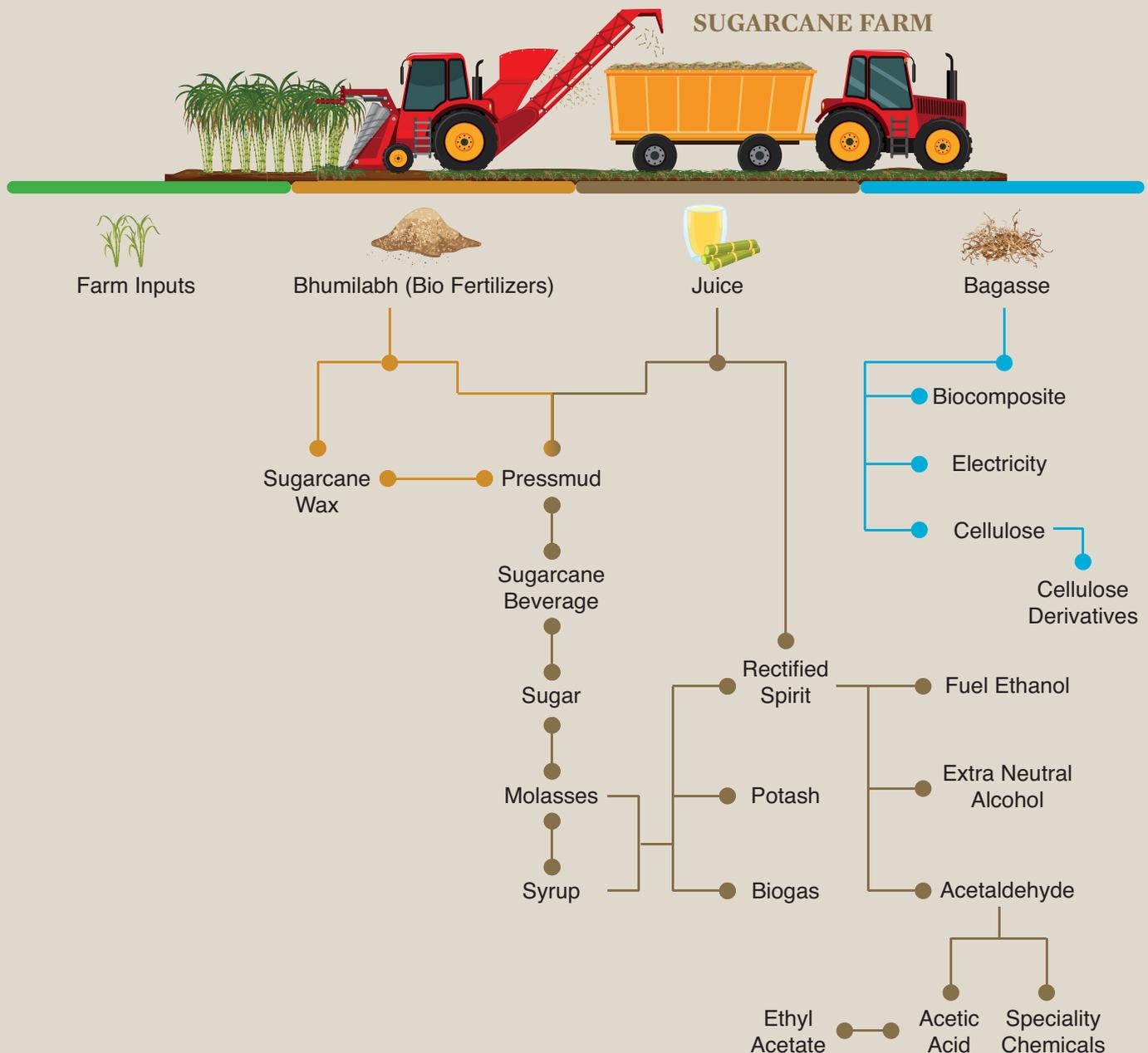
CASE STUDY

GODAVARI BIOREFINERIES LTD A CIRCULAR IMPACT ECONOMY

Godavari Biorefineries Ltd (Godavari) is a leading, integrated Indian sugarcane processing business with an 82-year operating history, which manufactures products ranging from sugar to high-end chemicals. Over the last few years, the company has been transforming itself from a sugar mill with a traditional business model of sugar-molasses-bagasse to a fully integrated, cascading and circular biorefinery, with a presence across

the bio-chemical value chain. The objective is to generate value from by-products or waste through process optimisation and product innovation, while simultaneously promoting green chemistry, sustainable farming, and energy and water conservation practices. Godavari has won numerous awards and recognition for its impact and sustainability efforts and practices.

Figure 1 Godavari's Cascading and Circular Bio-refining Value Chain



Energy Conservation

Godavari has focused on improving processes through reducing energy consumption, while also building a large range of products with applications in energy, biofuels, biochemicals and foods. The company can generate more than 100,000 tons of dry bagasse and exports more than 100 million units of surplus power from this bagasse to the grid, providing much needed power to the community and nearby villages. This process has resulted in carbon credits under the United Nations Framework Convention on Climate Change (UFCCC).

Ethanol Blending and Green Chemistry

As part of its efforts to encourage companies to incorporate green practices, the Indian government has introduced the Ethanol Blending Program, which seeks to promote the use of alternative and environment-friendly fuels and to reduce import dependency for energy requirements. Godavari was one of the first companies to associate with the program – the company has increased its ethanol manufacturing capacity to 400,000 litres of ethyl alcohol per day and is targeting 40% diversion of sugarcane to produce ethanol.

Figure 2 Godavari's Distillery with a capacity of 400,000 litres per day



Sustainable Farming

Godavari works with over 30,000 farmers to impart knowledge on how best to increase their sugarcane yields while maintaining a healthy and fertile soil. For example, the company's Geographic Information System

(GIS) mapping uses satellite imaging to analyse crops and identify good quality soil, water sources and vegetation. Godavari also works with farmers to help them intercrop and improve their economics. The company is currently developing sugar cane varieties that use less water, have higher yields, and work over a longer season.

Water Sustainability

Sugar cane is 70% water, which is generally treated as waste product after the extraction of sugar and bagasse. Via its integrated distillery system, Godavari has created processes to recycle and utilize this wastewater to minimise the use of fresh water from the adjoining river. Furthermore, the distillery is designed for minimum steam consumption (further reducing the amount of water required) while producing rectified spirit and ENA directly from the fermented wash. The company's Zero Liquid Discharge (ZLD) system ensures no discharge of wastewater to the environment.

Research

Godavari funds the agriculture research institute KIAAR, where research is being conducted to develop new varieties of sugarcane or even energy canes, soil testing and agronomy, intercropping, and other practices. The company also has a state-of-the-art research facility in Mumbai and field pilot plants to carry out reaction tests and develop commercial feasibility, overseen by over 30 experienced scientists and chemists.

Figure 3 Godavari's Research Laboratory in Navi Mumbai





STRENGTHENED FOOD SAFETY

Cumulative Total Impact

US\$427,318,834

Impact per \$ Invested

US\$1.9

How We Measure Impact

This metric measures the value added to the consumers in terms of illnesses or deaths avoided relating to foodborne diseases as a result of Mandala’s investees’ activities that strengthen food safety.

There are 2 primary activities involved in reducing consumers’ exposure to contaminated food: cold chain technology and testing of processed foods. This metric measures the healthcare and economic cost savings of the avoided illnesses and deaths.



$$\begin{aligned}
 & \text{Estimated Indian population consuming packed or processed foods} \times \\
 & \text{Annual average healthcare spending on FBDs} \times \\
 & \text{x Average \% equity stake and \% debt share}
 \end{aligned}$$

Impact per year =

$$\begin{aligned}
 & \times \\
 & \text{(Market share of cold chain capacity owned and leased x \% Contamination risk avoided due to cold chain + Market share of reefer trucks owned and leased x \% Contamination risk avoided due to reefer trucks + Market share of food tested x \% Contamination risk avoided due to testing)}
 \end{aligned}$$



Key Assumptions

1. The proportion of the Indian population consuming packed or processed foods is assumed to be 75%, based on estimates provided by the investees.
2. The contamination risk avoided due to cold chain technology, taking into account the contributions of each component in the cold chain process, and the contamination risk avoided due to testing of processed foods is estimated based on findings from international research studies¹².
3. The cost of illness/death is calculated via the human capital approach; total healthcare costs for foodborne diseases (FBDs) in India in 2010 amounted to USD\$1.8 billion for 100 million cases¹³.

Impact Analysis

Attribution of the impact is again accounted for via the portion of Mandala's equity stake and share of debt in the companies. Deadweight and displacement are considered negligible. Deadweight could occur in the form of consumers being their own "guards" against eating spoiled food and hence avoiding contamination anyway; but this difficult to estimate. By implementing cold chain technology and setting up a food testing lab, there are no expected negative impacts created since food safety can only be improved.

One limitation of this metric is that it does not quantify the full societal impact of food testing. For instance, the economic costs of foodborne diseases and the losses in the agricultural and food sectors and the trade impacts are not accounted for in this calculation.

There are also other food safety initiatives, such as food safety clinics, conducted by Mandala's investees which are challenging to include in the impact calculation. The impact that these could achieve in conjunction with testing and refrigeration would be much higher.

¹² Microbiological testing. (n.d.). Retrieved from <https://www.meatpoultryfoundation.org/fact-sheets/microbiological-testing> and Easter, M. (2015, June 15). What do microbiology test results really mean?. Retrieved from <https://www.foodqualityandsafety.com/article/what-do-microbiology-test-results-really-mean/> and The International Institute of Refrigeration. (2009). 5th informatory note on refrigeration and food. France.

¹³ Wageningen University & Research. (2017). The economics of food safety in India – a rapid assessment. Netherlands: Kristkova, Z., Grace, D. & Kuiper, M.



WATER SAVINGS

Cumulative Total Impact

US\$84,616,508

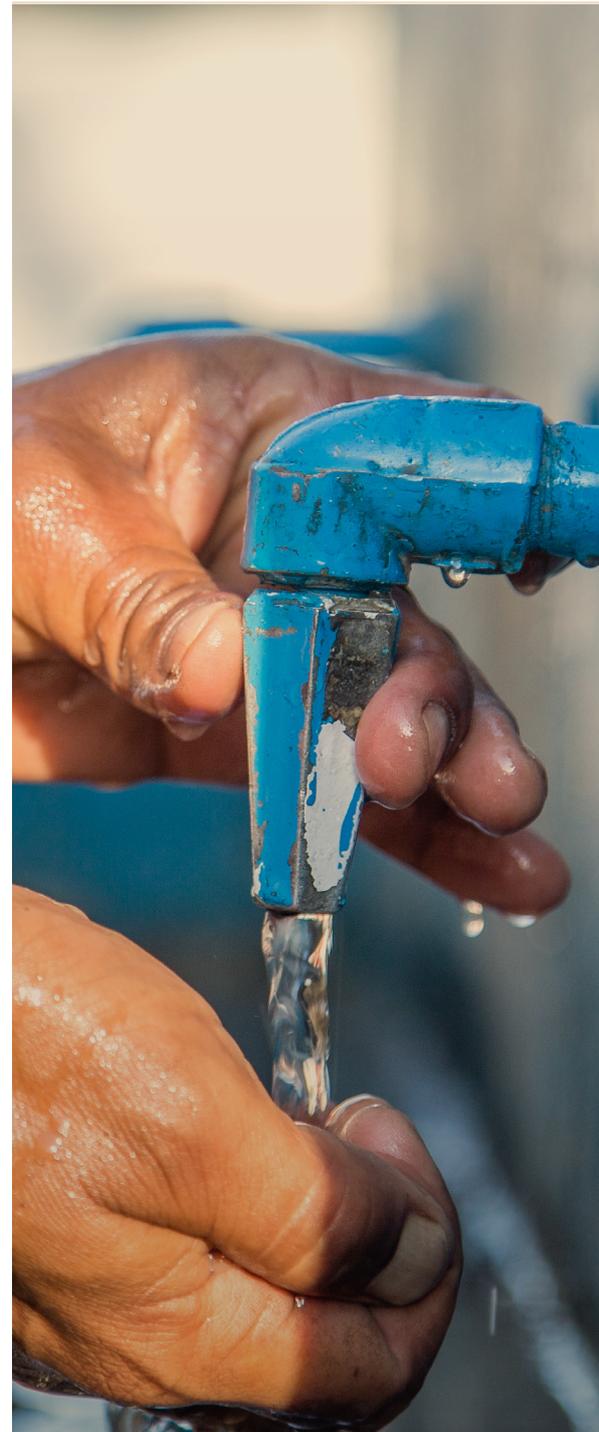
Impact per \$ Invested

US\$0.4

How We Measure Impact

This metric measures the value to the environment in terms of water savings earned by the technology utilized and activities engaged by Mandala’s investees.

There are 3 main sources of water savings across Mandala’s investees: drip irrigation technology (which uses up to 70% less water as compared to flood irrigation), rainwater harvesting, and water reuse and recycling. This metric quantifies the cost savings earned from the water that is saved.



$$\text{Impact per year} = \left(\begin{array}{l} \text{Meters of drip irrigation sold} \times \\ \text{Average annual water savings} \\ \text{per meter lateral} + \text{Cubic} \\ \text{meters of water recycled or} \\ \text{reused for gardening} + \text{Cubic} \\ \text{meters of rainwater harvested} \end{array} \right) \times \left(\begin{array}{l} \text{Cost of} \\ \text{water per} \\ \text{cubic meter} \end{array} \right) \times \left(\begin{array}{l} \text{Average \%} \\ \text{equity stake} \\ \text{and \% debt} \\ \text{share} \end{array} \right)$$



Key Assumptions

1. The average annual water savings per meter lateral is derived based on self-reported data from the investee companies, taking into account the land following period and the monsoons.
2. The cost of water is derived from the typical water price in most major states of India, which is 15 INR (or US\$ 0.21)⁹.

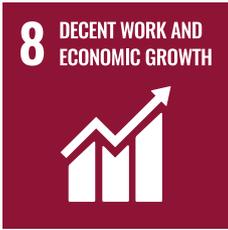
Impact Analysis

Similar to previous metrics, Attribution of the impact is accounted for via the portion of Mandala's equity stake and share of debt in the companies. Deadweight is considered negligible as there would be no water savings in the absence of the companies' irrigation projects or water conservation activities. Displacement to the environment is also considered negligible; while many irrigation systems and projects could have consequences on the local water supply and soil salinity, the use of micro-irrigation systems by Mandala's invested companies avoids these negative effects, bolstering confidence in the calculated impact figure.

In fact, the reported figure is likely to be a conservative estimate of the true impact created given that the cost of water in some cities is much higher than the typical price used. Furthermore, the positive spill-over effects of the micro-irrigation projects undertaken by Mandala's invested companies on the environment and on the farmers have also not been included in this calculation.

⁷ In "Degraded and Waste Lands of India" (2010), a report by the Indian Council for Agricultural Research and the National Academy for Agricultural Sciences, India is reported to have 141 million hectares of arable land, out of which 100 million hectares (71%) is under-going degradation. An article by Indian Space Research Organization estimates that 81 million hectares (58%) is seeing desertification.

⁹ Farming communities in India improve soil fertility and earn higher income. (n.d.). Retrieved from <http://www.undp.org/content/undp/en/home/ourwork/ourstories/farming-communities-in-india-improve-soil-fertility-and-earn-hig.html> and Sustainable land and ecosystem management in shifting cultivation areas of Nagaland for ecological and livelihood security. (n.d.). Retrieved from http://www.in.undp.org/content/india/en/home/operations/projects/environment_and_energy/sustainable_landandecosystemmanagementinshiftingcultivationareas.html



EMPLOYMENT

Cumulative Total Impact
US\$15,991,307

Impact per \$ Invested
US\$0.1

How We Measure Impact

This metric measures the value to the people who receive employment because of the companies' operations, made possible by the investment.

This metric quantifies the additional income earned by the employees, after considering the income they would otherwise have received. A discount factor equal to Mandala's equity stake in the investee is also applied to more accurately account for the incremental value creation that occurred as a result of Mandala's investments.



$$\text{Impact per year} = \left(\begin{aligned} & \text{Total employee spend per year} - \\ & \text{Employeespend on urban employees} \\ & - 25\% \times \text{Employee spend on male,} \\ & \text{rural and low-income employees} - \\ & 17.5\% \times \text{Employee spend on female,} \\ & \text{rural and low-income employees} \end{aligned} \right) \times \begin{aligned} & \text{Average \% equity stake} \\ & \text{and \% debt share} \end{aligned}$$



Key Assumptions

1. Urban employees that were hired by Mandala's investees are assumed to receive a similar wage compared to that they would receive from other employers; hence this amount is subtracted from the Impact calculation.
2. Rural and low-income workers are defined as workers employed outside Tier 1 and Tier 2 cities and are on average expected to earn four times less than urban dwellers. As such, we deduct only 25% of the spending on (male) rural / low-income employees to account for the incremental impact created.
3. According to India's Open Government Data Portal, the average agricultural daily wage rate for women is approximately 70% of men's wages. Hence, we deduct 17.5% (70% of the 25% used above) of the employee spend for low-income female workers in the Impact calculation.

Impact Analysis

Attribution of the Impact is accounted for via the portion of equity stake and share of debt Mandala possesses in the companies. To account for Deadweight, expenditure on urban employees was deducted from the impact figure and discount factors were applied on the employee spend on rural and low-income employees.

These result in a conservative estimate of the Impact figure and arguably an underestimated value, since the additional positive outcomes experienced by workers with a good employment opportunity – including but not limited to improved psychological well-being, new skills and knowledge, and stronger career prospects – have not been included in this calculation.

² Datta, P. (2004, July 3). The Great Indian Divide. *Frontline*, 21(4), 28-31

³ Open Government Data (OGD) Platform India. (2015) Average Agricultural Daily Wage Rate Rural in Rupees [Data file]. Retrieved from <https://data.gov.in/resources/average-agricultural-daily-wage-rate-rural-rupees>

CASE STUDY

CONTRACT FARMING AND FARMER SUPPORT AT JAIN FARMFRESH FOODS LTD.



Jain Farm Fresh Foods Ltd. (JFFFL) procures onions for its onion dehydration facility in Jalgaon directly from over 6,000 contract farmers, c. 70% of which consist of smallholder farms with an average size of up to one hectare. Launched in 2002, JFFFL's contract farming model is built on selecting progressive, receptive farmers and providing them with high quality seeds, access to Micro-Irrigation Systems (MIS), fertilisers and saplings. Additional support is also provided in the form of agronomical training, guidance on planting, input application and other farm functions via extension services.

Furthermore, in response to concerns about food safety and increased interest in farm-

level practices and traceability, JFFFL has developed and implemented the Jain Good Agricultural Practice (JAINGAP) based on the Global Good Agricultural Practice (GLOBALGAP) standards. All farmers under JFFFL's contract farming program comply with and receive certifications under JAINGAP.

Following the success achieved with onion farmers, JFFFL has introduced direct procurement and JAINGAP for its other vegetables, fruits and spices crops.

Currently, a team of c. 70 gram sevaks (agronomy support team) stay in villages and support contract farmers in seed sowing, fertigation, JAINGAP implementation, and good harvesting practices.



Significant water consumption per hectare

30% Increase in farmers' income

Improved food safety

Key components of the project:

On average 30% increase in yields

Reduction in risks associated with the use of agrochemicals

Complete traceability of produce



RURAL COMMUNITY DEVELOPMENT

Cumulative Total Impact
US\$125,813,104

Impact per \$ Invested
US\$0.6

How We Measure Impact

This metric measures the value added to the rural community and people’s lives because of the companies’ operations and expenditures, made possible by the investment.

The metric quantifies the added income earned or credit obtained by the farmers, the additional capital expenditure investments in the rural areas, and the added CSR spending made by the companies.

$$\text{Impact per year} = (50\% \times \text{Payments made to farmers for purchases of goods} - \text{Market value of goods} + \text{Value of equipment sold to farmers} + \text{Credit extended to farmers} + \text{Capital expenditure investments in rural areas} + \text{CSR spending}) \times \text{Average \% equity stake and \% debt share}$$





Key Assumptions

1. Payments made to farmers are mostly done via the facilitation of farming contracts, where Mandala's investee companies would pay the farmer either the current market price or the pre-agreed price, whichever is higher¹⁴. Assuming that the pre-agreed price is higher than the current market price half of the time, the additional value-add to the farmers is calculated as 50% of the total payments made.

2. For many farmers, the only alternative to the loans offered by Mandala's investees are local moneylenders, whose credit terms are significantly worse: payment cycles are short, collateral and paperwork requirements are challenging to meet, and interest rates are high. Therefore, as farmers are unlikely to obtain any credit at equivalent terms otherwise, there is no deduction applied on the value of credit extended to farmers.

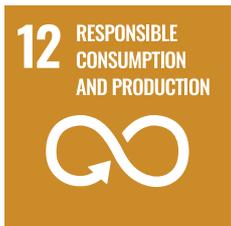
Impact Analysis

Attribution of the impact is accounted for via the portion of Mandala's equity stake and share of debt in the companies. To account for Deadweight, a generous estimate of the market value of goods was deducted from the impact figure. This however does not take into account the additional value-add of the income stability and increased profits that contract farming provides to the farmers.

Displacement from the capex investments is assumed to be negligible at present, given that the investments are greenfield projects and the factories are built on existing company-owned land or rented land – farmers are thus not displaced through this process. All environmental standards are also adhered to in these projects. The value of other small business activity that is crowded out or replaced by the capex spending cannot be estimated reliably and is thus omitted in this calculation.

The positive outcomes arising from the rural community development efforts of Mandala's investees – such as improved individual and community well-being and stronger businesses – are also not included in the impact calculation, leading to an arguably underestimated impact figure.

¹⁴ Harvard Business School. (2018). Jain Irrigation Systems Limited: Continuing a legacy. Boston, MA: Reinhardt, F., Trumbull, G. & Rao-Kachroo, M.



REDUCED FOOD WASTAGE

Cumulative Total Impact
US\$3,934,432

Impact per \$ Invested
US\$0.02

How We Measure Impact

This metric measures the value added to the nation in terms of food wastage avoided due to Mandala's investees' operations.

There are 2 primary methods used in preserving the food – cold chain technology and food processing. This metric measures the monetary value of the food that is preserved.



$$\text{Impact per year} = \left[\begin{aligned} & \text{[(Cold chain capacity owned and leased} \\ & + \text{ Reefer trucks owned and leased} \times \\ & \text{Average reefer truck capacity} - \text{Portion} \\ & \text{of food double counted)} \times \% \text{ Food} \\ & \text{wastage avoided due to cold chain} \\ & + \text{Tons of processed food} \times \% \text{ Food} \\ & \text{wastage avoided due to processing}] \end{aligned} \right] \times \begin{aligned} & \text{Average value per} \\ & \text{ton of food} \times \text{Average} \\ & \% \text{ equity stake and } \% \end{aligned}$$



Key Assumptions

1. The average reefer truck capacity is derived based on self-reported data from the investee companies.
2. Based on investee companies' inputs, the average value of 1 ton of food is taken to be Rs 500.
3. The typical wastage incurred without cold chain technology or without food processing was then derived from secondary research and based on international and regional research sources¹⁰.

Impact Analysis

Attribution of the impact is again accounted for via the portion of Mandala's equity stake and share of debt in the companies. Deadweight is not applicable here because the metric is calculated based on the food wastage avoided due to the preservation or processing technology used; in its absence there would be no measures in place to avoid such wastage.

Displacement could occur in the form of damaging nutrients in the food when undergoing processing – in that case, even though the physical form of the food is preserved, the nutritional and health value may be compromised. This is however considered to be low and severely outweighed by the increase in provision of food and food choices to consumers, especially in India which has a high (40%) postharvest loss of fresh fruits and vegetables¹¹. Given that food processors can also add nutritional value to the food through their processing methods, the net value-add is considered to be positive. To avoid over-complicating the impact calculation, both the negative and positive impacts of processing on the nutritional value of food are not considered in the measurement.

¹⁰ The International Institute of Refrigeration. (2009). 5th informatory note on refrigeration and food. France. and Asian Productivity Organization. (2006). Postharvest management of fruits and vegetables in the Asia-Pacific region. Italy: Rolle, R.

¹¹ Asian Productivity Organization. (2006). Postharvest management of fruits and vegetables in the Asia-Pacific region. Italy: Rolle, R.



CO₂ EMISSION SAVINGS

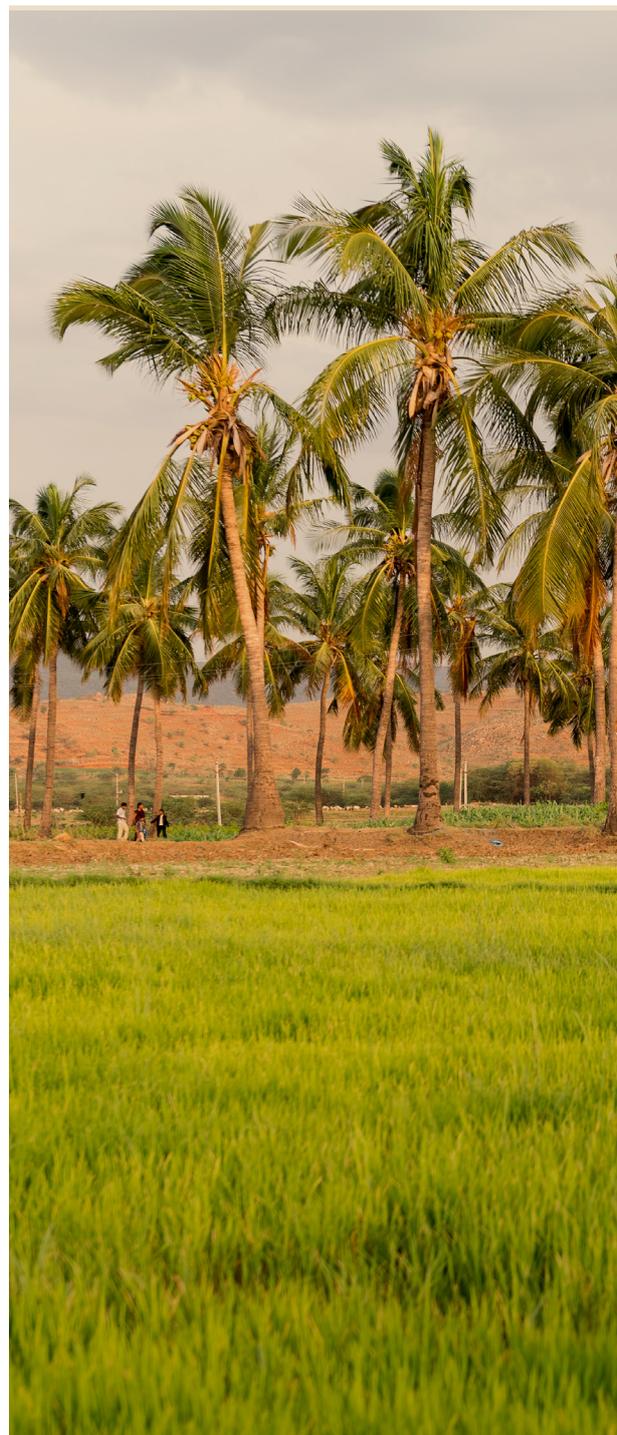
Cumulative Total Impact
US\$2,978,495

Impact per \$ Invested
US\$0.01

How We Measure Impact

This metric measures the value to the environment and the nation in terms of CO₂ emission savings earned by building and operating cogeneration (cogen) and solar plants and equipment compared to their conventional coal-fired counterparts. This metric aggregates the environmental and economic damages avoided and the added financial benefit to the nation through the sale of saved carbon on emission trading schemes.

$$\text{Impact per year} = \left[\left(\text{Additional installed capacity of cogen plants} \times \% \text{CO}_2 \text{ emissions savings of cogen plants} + \text{Additional installed capacity of solar plants and equipment} \times \% \text{CO}_2 \text{ emissions savings of solar plants} \right) \times \left(\text{Social costs per ton of CO}_2 \text{ avoided during the period} + \text{Trade value per ton of CO}_2 \text{ saved} \right) \right] \times \text{Average \% equity stake and \% debt share}$$





Key Assumptions

1. The amount of CO₂ emissions saved by cogeneration and solar plants compared to regular coal-fired plants is derived from international research studies⁴, which take into account the lifecycle of CO₂ emissions of the different sources of electricity – including the construction of the plant, its operation and maintenance, and the electricity generation (fuel combustion) process.
2. The social cost of each additional ton of CO₂ emitted is estimated to be US\$37 according to past research studies⁵, calculated on the basis of decreased agricultural yields, harm to human health, and lower worker productivity due to climate change.
3. The value per ton of CO₂ traded is estimated to be US\$20, based on the mid-case CO₂ price forecast made on existing emissions trading systems⁶.

Impact Analysis

Attribution of the Impact is accounted for via the portion of Mandala's equity stake and share of debt in the companies. Deadweight is not applicable because the metric is calculated based on the savings in CO₂ emissions due to the technology used, in its absence there would be no carbon-saving measures in place. There is also no need to separately account for Displacement for solar plants and equipment in this metric as the CO₂ emissions produced in building solar plants or equipment is already taken into consideration when calculating the difference in lifecycle emissions. For cogen plants, as there are no reliable estimates of the amount of CO₂ produced in building a cogeneration unit or heat recovery system, the Displacement component is not accounted for. However, this is not expected to be large and should not affect the impact figures significantly.

⁴ Solar Energy Research Institute. (1990). CO₂ emissions from coal-fired and solar electric power plants. Golden, CO: Kreith, F., Norton, P., & Brown, D. and Pehl et al. (2017). Understanding future emissions from low-carbon power systems by integration of life cycle assessment and integrated energy modelling. *Nature Energy*, 2, 939-945. doi: 10.1038/s41560-017-0032-9

⁵ Than, K. (2015). Estimated social cost of climate change not accurate, Stanford scientists say. *Stanford News*. Retrieved from <https://news.stanford.edu/2015/01/12/emissions-social-costs-011215/>

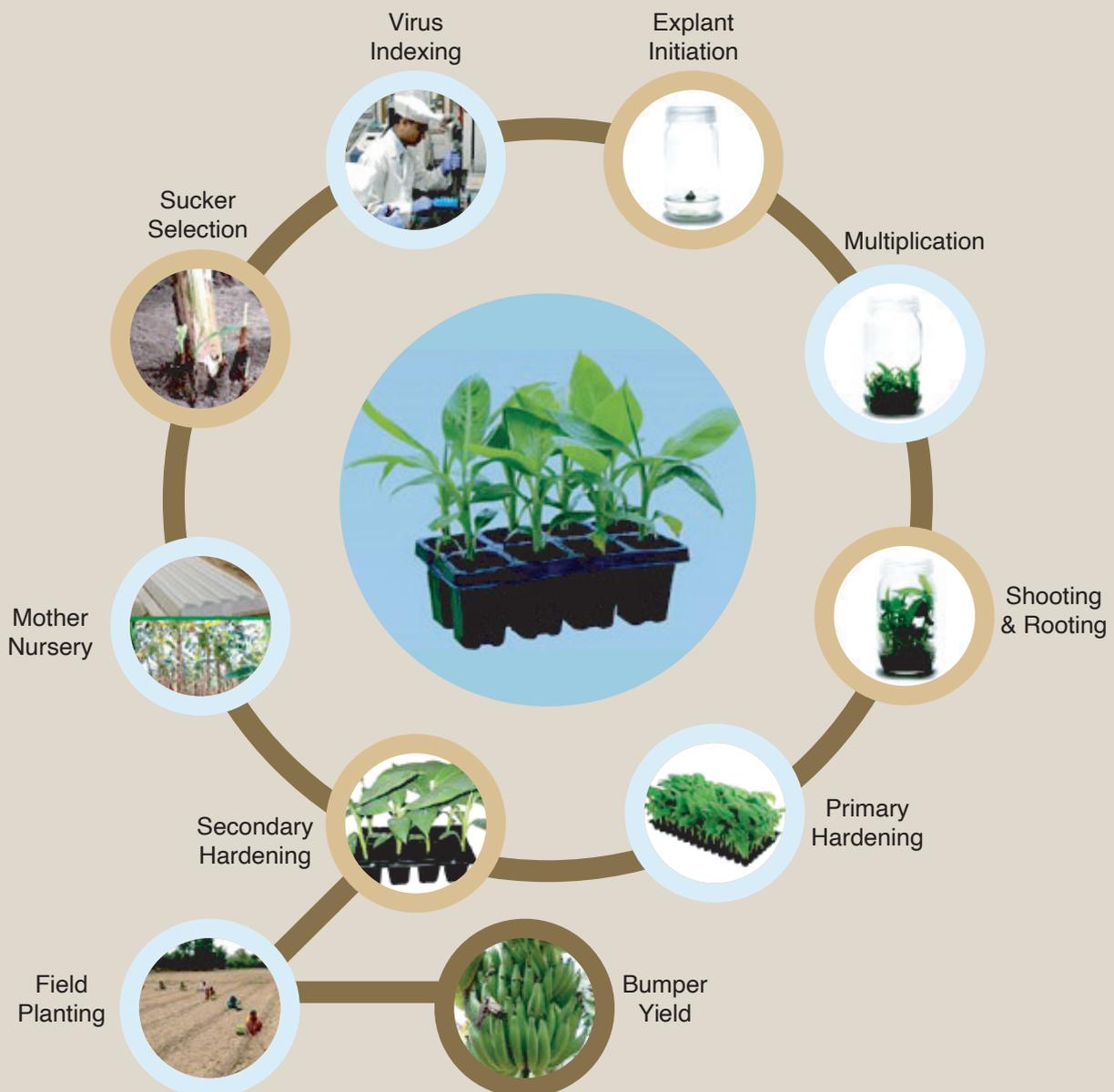
⁶ Synapse Energy Economics, Inc. (2015). 2015 Carbon dioxide price forecast. Cambridge, MA: Luckhow et al.

CASE STUDY

JAIN TISSUE CULTURE PARK

A State-of-the-art Carbon Negative and Water Positive Facility at Jain Irrigation Systems Ltd.

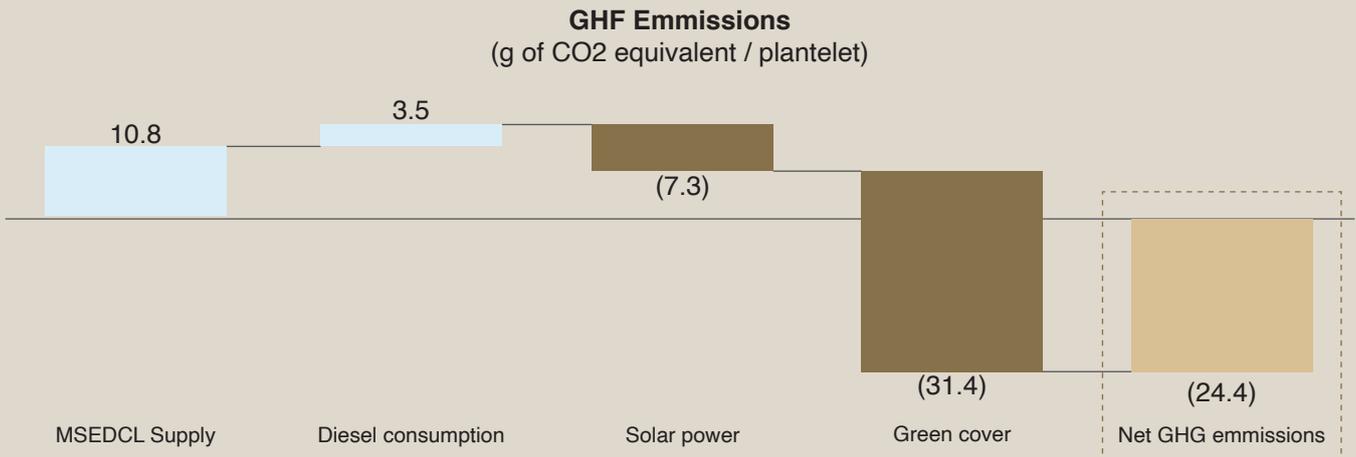
The Jain Tissue Culture (TC) Park is a unique example of a farm contributing positively to water and carbon cycles without generating any auxiliary waste streams. It is the world's largest tissue culture facility spread over close to 90 hectares near Takarkheda in Jalgaon, Maharashtra, with an annual production capacity of 100 million tissue culture plants.



Carbon Negative

In 2020, c. 40% of the facility's energy demand was met by off-grid and on-grid solar installations totalling 500 kW. In addition, a substantial carbon sink has been created over a decade with a green cover of more than 30,000 trees, which removes greenhouse gas (GHG) emissions equivalent to 2,300 tons every year. As a result, the combination of solar power and green cover has made tissue culture production at TC Park net carbon negative.

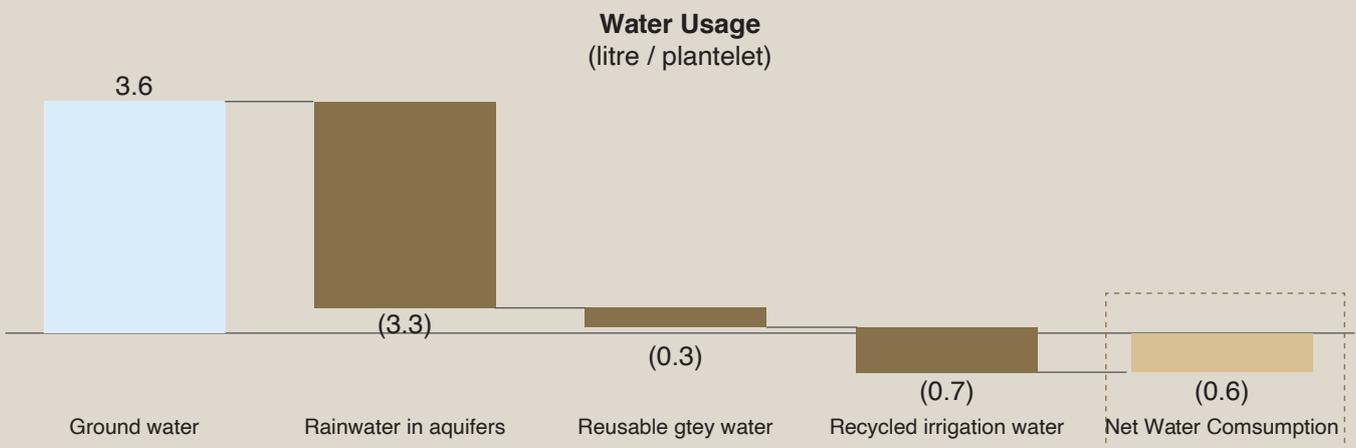
Figure1 Carbon Footprint of Tissue Culture Plant



Smart Water Use

Ground water recharge through rainwater harvesting is the main feature at TC Park, where 5% of the total area is occupied by constructed percolation ponds. Water is also replenished to aquifers through an out-of-boundary check dam. Water withdrawal for irrigation of TC plants is done through solar water pumps equipped with solar tracking panels.

Figure 2 Water Footprint of Tissue Culture Plant



Through rainwater harvesting, 24% more water than that consumed was replenished into the ground in 2020. Moreover, the water used for irrigation of plants in polyposis is recycled through pipes and filters, making each plantlet produced in TC Park also net water positive.



IMPROVED SOIL HEALTH

Cumulative Total Impact
US\$112,359,076

Impact per \$ Invested
US\$0.5

How We Measure Impact

This metric measures the value to the environment and the nation in terms of improved soil health by the soil testing activities performed by Mandala’s investees and their resulting recommendations and implementations to the tested land holdings.

This metric quantifies the incremental crop value as a result of extended soil fertility and improved health due to the soil testing services and resulting improvements in land management.

$$\text{Impact per year} = (\text{Acres of soil tested} - \text{Healthy soil} - \text{Severely damaged soil}) \times \text{Extension of soil like in years} \times \text{Crop value per acre per year} \times \text{Average \% equity stake and \% debt share}$$





Key Assumptions

1. According to national statistics⁷ provided by the Indian Council for Agricultural Research and the Indian Space Research Organization, an estimated 30% of arable land is in very good health and 58% of arable land is severely damaged and would not return to a healthy state in the short term via agricultural management efforts. Thus, we estimate that 12% of arable land are in the mild or early stages of degradation and can be easily reclaimed with proper agricultural management practices given the right information about the soil's nutrient levels.

2. Based on a previous case study of similar land management projects in India⁸, the outcome of implementing recommendations arising from soil testing can extend at least some proportion of damaged soil by 1 year. This is the value used to estimate the average life extension of the land sampled for testing.

Impact Analysis

Attribution of the Impact is again accounted for via the portion of Mandala's equity stake and share of debt in the companies. Deadweight is considered in the Impact calculation by discounting soil that is irreversibly or severely damaged and cannot be reclaimed easily, as well as soil that is already healthy and will not receive significant quality improvements. Displacement is considered negligible because the samples taken are small and have no expected negative impact on the soil health or the quantity/quality of crops produced.

There is much room for improvement for this metric to more comprehensively quantify the increase in crop value due to increase yields and improved food quality, but we are limited by the availability of data and local research to provide a reliable measure of such impact, which also differs based on the crop grown and environmental factors. The value-add of stronger food security in the country and environmental impact of reduced fertilizer usage are also excluded in this impact calculation.



LOOKING AHEAD

We have an exciting twelve months ahead as we plan for two IPOs and one trade sale within the portfolio. We are also in the process of taking a 100% stake in one of our portfolio companies which will allow us greater freedom to operate the company. Finally, we are in the midst of launching Fund III with a similar focus as that of the first two funds, albeit with greater focus on control deals. We expect these controls deals to give us greater ability to implement our policies and goals, including more meaningful tracking and monitoring of Impact, linking compensation to certain Impact metrics, improve KPIs linked to Impact, and enhance communications on sustainability with all of our stakeholders.

We were not able to follow up on our successful Food, Future, Funds 2019 Symposium in 2020 due to the COVID pandemic. Although the outlook for a 2021 event remains uncertain at this time, we hope that vaccinations and increasing immunity will allow for greater travel in the near future and look forward to welcoming returning and new attendees in Singapore very soon.







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