

IMPACT REPORT 2020



MANDALA CAPITAL





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Uday Garg
Managing Partner,
Mandala Capital



MESSAGE FROM MANDALA CAPITAL'S MANAGING PARTNER

Our deep specialisation in the food and agribusiness sector means we are acutely aware of the heightened importance of sustainability, especially as growing populations, changing diets and urbanisation put increasing strains on our agriculture value chains to provide feed, energy, health and food. These strains have led to depleting resources and resulted in long term secondary lasting effects, often overlooked and not easily measured, such as climate change, degrading soil health, water pollution, seafood sustainability, chemical runoffs human health problems, and infant nutrition deficiencies.

We are committed to achieving the UN Sustainable Development Goals (SDGs) through our investments. In particular, our current investments are focused on SDG 2: Zero Hunger, SDG 3: Good Health and Well-Being, SDG 6: Clean Water and Sanitation, SDG 8: Decent Work and Economic Growth, SDG 10: Reduced Inequalities, SDG 12: Responsible Consumption and Production, SDG 13: Climate Action, and SDG 15: Life on Land.

To be honest, these SDGs were not defined by the United Nations before we started investing so this has been a

“Our mission is to create Impact along the entire food chain that is sustainable and scalable.”

post-fact classification exercise. I have often wondered if it would be more effective to focus on a single SDG and drive towards maximising our impact in that area. However, given our geography focus –India, and sector focus –Food and Agri, it is natural for our investments to directly impact such a wide range of SDGs.

Our portfolio company in the Dairy sector, Keventer Agro, made significant strides last year by launching East India’s first UHT milk plant, which sells fortified milk with added vitamins and minerals. Another company, Jain Farm Fresh, has successfully launched a spice processing plant with integration across the value chain from working with small holder farmers and providing them drip irrigation for spice production, to steam sterilization and cold milling of the spices, to using recyclable packaging for retail consumers. In the Sugar Biorefinery space, Godavari Biorefineries has successfully managed to become the first company in India to produce fuel ethanol from sugarcane juice – bypassing molasses as an interim step. This allows greater productivity of fuel ethanol, reducing the import of crude oil and providing a green fuel for consumers. In all of these projects, the direct benefit to small rural farmers, their families, the environment and the larger group of stakeholders is both scalable and sustainable – making them a win-win in our books.

Impact and sustainability are at the core of our personal philosophy and have been carried over to our investment philosophy. We have gotten better at incorporating Impact at every stage of our investment process and more importantly, we are now better at identifying ways to improve, track and monitor the Impact of our investments. We have maintained an integrated team for this exercise and the entire investment team has contributed towards the data, case studies, photos and commentary in this report.

I hope you enjoy reading our second annual Impact report and look forward to hearing from you.



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.

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.

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.

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.

IMPACT REPORTING PRINCIPLES

01

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.

02

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.

03

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).

06

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.

05

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.

04

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.

DEFINITION AND CALCULATION OF IMPACT

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

$$\text{Impact} = \frac{[\text{Outcomes} - \text{Deadweight} - \text{Displacement}]}{\text{Attribution}} \times$$

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:

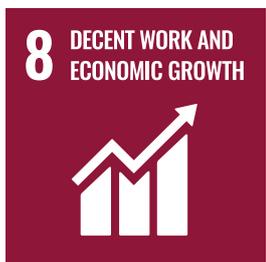
$$\text{Impact per dollar invested} = \frac{\text{Impact}}{\text{Total investment adjusted to current values}^1}$$

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

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:


Employment



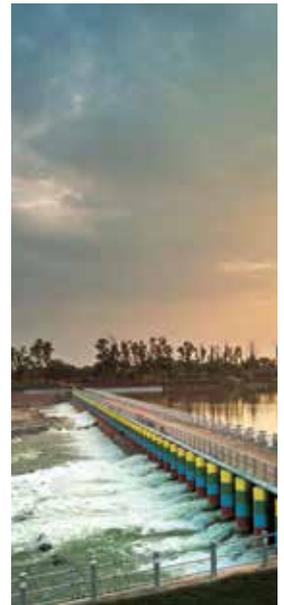

CO₂ Emission Savings




Improved Soil Health




Water Savings



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.



Rural
Community
Development



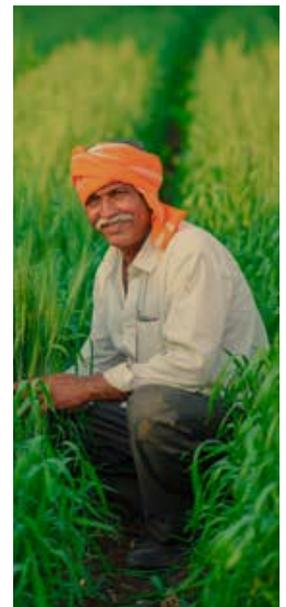
Strengthened
Food Safety



Reduced
Food Wastage



Health and
Nutrition



12 RESPONSIBLE CONSUMPTION AND PRODUCTION



3 GOOD HEALTH AND WELL-BEING



10 REDUCED INEQUALITIES



2 ZERO HUNGER



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.safl.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

SNAPSHOT OF IMPACT ACROSS OUR PORTFOLIO



	8 DECENT WORK AND ECONOMIC GROWTH	13 CLIMATE ACTION	15 LIFE ON LAND	6 CLEAN WATER AND SANITATION	2 ZERO HUNGER	12 RESPONSIBLE CONSUMPTION AND PRODUCTION	3 GOOD HEALTH AND WELL-BEING	10 REDUCED INEQUALITIES

SNAPSHOT OF OVERALL AGGREGATED SOCIAL IMPACT





The cumulative aggregate social value created by Mandala's investments to 30th September 2019 is projected to be at least **US\$ 680,581,340**, or 0.03% of the funding needed to achieve the SDGs.

Mandala's cumulative SRoI ratio stands at 3.0 – in other words, for every US\$ 1 invested, approximately US\$ 3.0 of social value has been created over the years across categories including water, the environment, food and nutrition, as well as livelihoods.

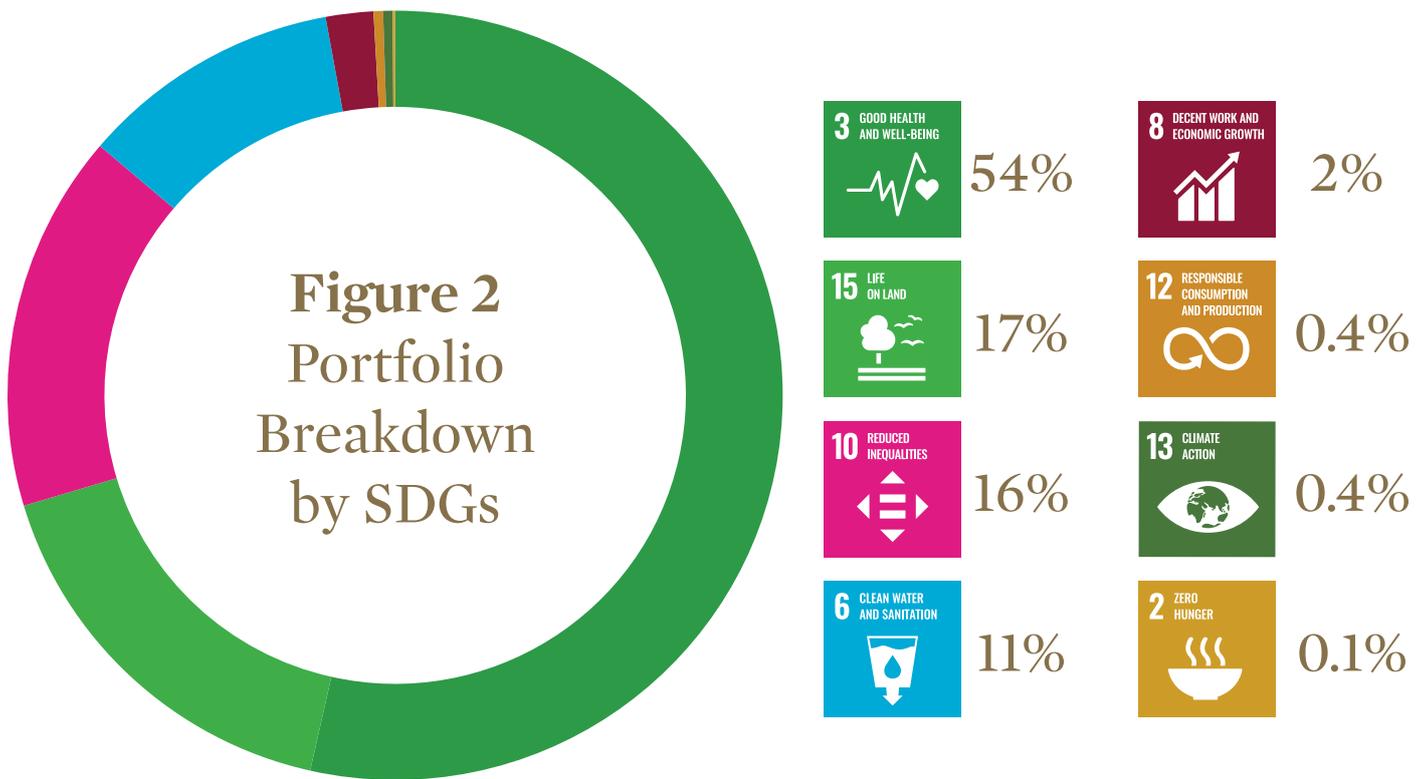
The breakdown of Impact created across the 8 primary areas can be seen in Figures 1 and 2



Figure 1 Summary of Impact created by Mandala up to 30 September 2019

Primary Area of Impact	Current Period ¹		Cumulative	
	Total Impact (US\$ million)	Impact per \$ Invested (SRoI) (US\$)	Total Impact (US\$ million)	Impact per \$ Invested (SRoI) (US\$)
Employment	5.7	0.03	12,582,852	0.1
CO ₂ Emissions	0.7	0.003	2,876,196	0.01
Improved Soil Health	0.2	0.001	112,340,685	0.5
Water Savings	26.1	0.1	72,830,200	0.3
Health and Nutrition	0.2	0.001	441,716	0.002
Reduced Food Wastage	0.9	0.004	3,056,085	0.01
Strengthened Food Safety	138.8	0.6	365,252,270	1.6
Rural Community Development	37.3	0.2	111,201,337	0.5
Total	210.0	0.9	680,581,341	3.0

¹ From April 2018 to September 2019



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.

EMPLOYMENT

Cumulative Total Impact
US\$12,582,852

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.

Impact per year = (Total employee spend per year – Employee spend on urban employees – 25% × Employee spend on male, rural and low-income employees – 17.5% × Employee spend on female, rural and low-income employees) × Average % equity stake and % debt share



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 dwellers². 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 wages³. 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>

CO₂ EMISSION SAVINGS

Cumulative Total Impact
US\$2,876,196

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.

Impact per year = [(Additional installed capacity of cogen plants × %CO₂ emissions savings of cogen plants + Additional installed capacity of solar plants and equipment × %CO₂ emissions savings of solar plants) × (Social costs per ton of CO₂ avoided during the period + Trade value per ton of CO₂ saved)] × 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.

IMPROVED SOIL HEALTH

Cumulative Total Impact
US\$112,340,685

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.

Impact per year = (Acres of soil tested – Healthy soil – Severely damaged soil) x Extension of soil like in years x Crop value per acre per year x 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.

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.

⁸ 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-high.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

WATER SAVINGS

Cumulative Total Impact
US\$72,830,200

Impact per \$ Invested
US\$0.3



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.

Impact per year = (Meters of drip irrigation sold x Average annual water savings per meter lateral + Cubic meters of water recycled or reused for gardening + Cubic meters of rainwater harvested) x Cost of water per cubic meter x Average % equity stake and % debt share



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 fallowing 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.

⁹ Gonsalves, O. (2018, Apr 5). India's industrial water rates and supply. Retrieved from <https://www.india-briefing.com/news/industrial-water-rates-india-supply-16547.html/> and Merchant, T. (2014). To save water, pay for it. Forbes India. Retrieved from <http://www.forbesindia.com/blog/life/to-save-water-pay-for-it/>





IMPACT SPOTLIGHT – WATER SAVINGS

Drip Irrigation Technology in Rice Cultivation

India is the world's second largest producer of rice. It is cultivated over an area of 44.2m ha, or c. 50% of the total irrigated agriculture area in the country¹⁰. Ninety percent of global rice cultivation is carried out under the low land rice system¹¹, where seedlings are first raised in a nursery and then transplanted in a puddled field. The crop is raised under inundated conditions until a few days before harvest. Water consumption for this wet rice can reach 2295 mm/ha, and 3000-5000 litres are utilized for every one kg of grain¹². The unsustainable use of irrigation water for rice production is a major socioeconomic, environmental and health concern.

In light of this challenge, **Jain Irrigation Systems (JISL)** has proudly introduced a unique and innovative method of paddy cultivation with precision farming using drip irrigation systems, which not only dramatically reduces water requirement, but also ensures optimised use of fertilizer and energy while increasing yield substantially. And the benefits are not limited to rice crops – JISL has carried out extensive field trails on more than twenty five economic and cash crops using drip

irrigation and fertigation technology. Under drip irrigation, the water requirement of traditionally water-intensive crops such as rice, sugarcane, banana and cotton, was reduced to 45-50% when compared to flood irrigation, and yields increased by 25-30%.

Encouraged by the promising results of trails carried out in JISL's farms in Maharashtra and Tamil Nadu, further trials on this drip irrigation and fertigation technology in rice were carried out by Government Agriculture University farms and other R&D farms in seven different states, during the two main seasons and under varied ecosystems. The study established the efficacy of drip irrigation and fertigation technology in increasing the yield of grains over the conventional flood irrigated system¹³.

Once adopted, drip irrigation and fertigation would benefit millions of farmers globally, provide enhanced nutrition to consumers on a major stable, support conservation efforts of an ever more-scarce resource –water, and lower green-house gas emissions associated with methane generation from the paddy fields.

¹⁰ Anon (2016) Agricultura Statistics at a glance-Directorate of Economics and Statistics, Government of India, New Delhi

¹¹ Dawe D. (2005) Plant Production Sci. 8-221-230

¹² Rajwade Y. A., Swain D. K. and Tiwari K. N. (2013) Agriculture: Towards a New Paradigm of Sustainability, 293-300

¹³ The full study and findings can be found in the research Article Effect of Drip Irrigation and Fertigation on the Performance of Several Rice Cultivars in Different Rice Ecosystems in India; by Soman P. Prasad M. S., Balasubramaniam V. R., Singh Sarwan, Dhavarajan C., Patil V. B. and Jha Sanjeev; International Journal of Agriculture Sciences, ISSN: 0975-3710, E-ISSN: 0975-9107, Vol. 10, Issue 14, 2018, pp.-6672-6675s

HEALTH AND NUTRITION

Cumulative Total Impact
US\$441,716

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.

Impact per year = Tons of fruits and vegetables sold x Average value of per ton of food x 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.

REDUCED FOOD WASTAGE

Cumulative Total Impact
US\$3,056,085

Impact per \$ Invested
US\$0.01



How We Measure Impact

This metric measures the value added to the nation in terms of food waste 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.

Impact per year = [(Cold chain capacity owned and leased + Reefer trucks owned and leased x Average reefer truck capacity – Portion of food double counted) x % Food wastage avoided due to cold chain + Tons of processed food x % Food wastage avoided due to processing] x Average value per ton of food x Average % equity stake and % debt share



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 sources¹⁴.

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 vegetables¹⁵. 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.

¹⁴ 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.

¹⁵ Asian Productivity Organization. (2006). Postharvest management of fruits and vegetables in the Asia-Pacific region. Italy: Rolle, R.



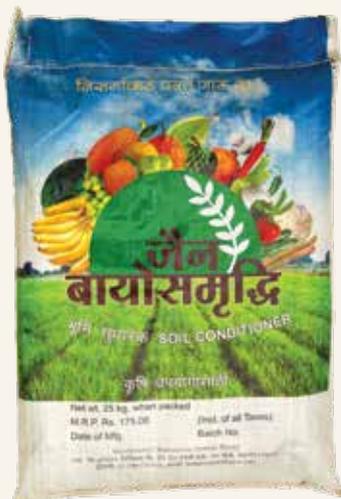
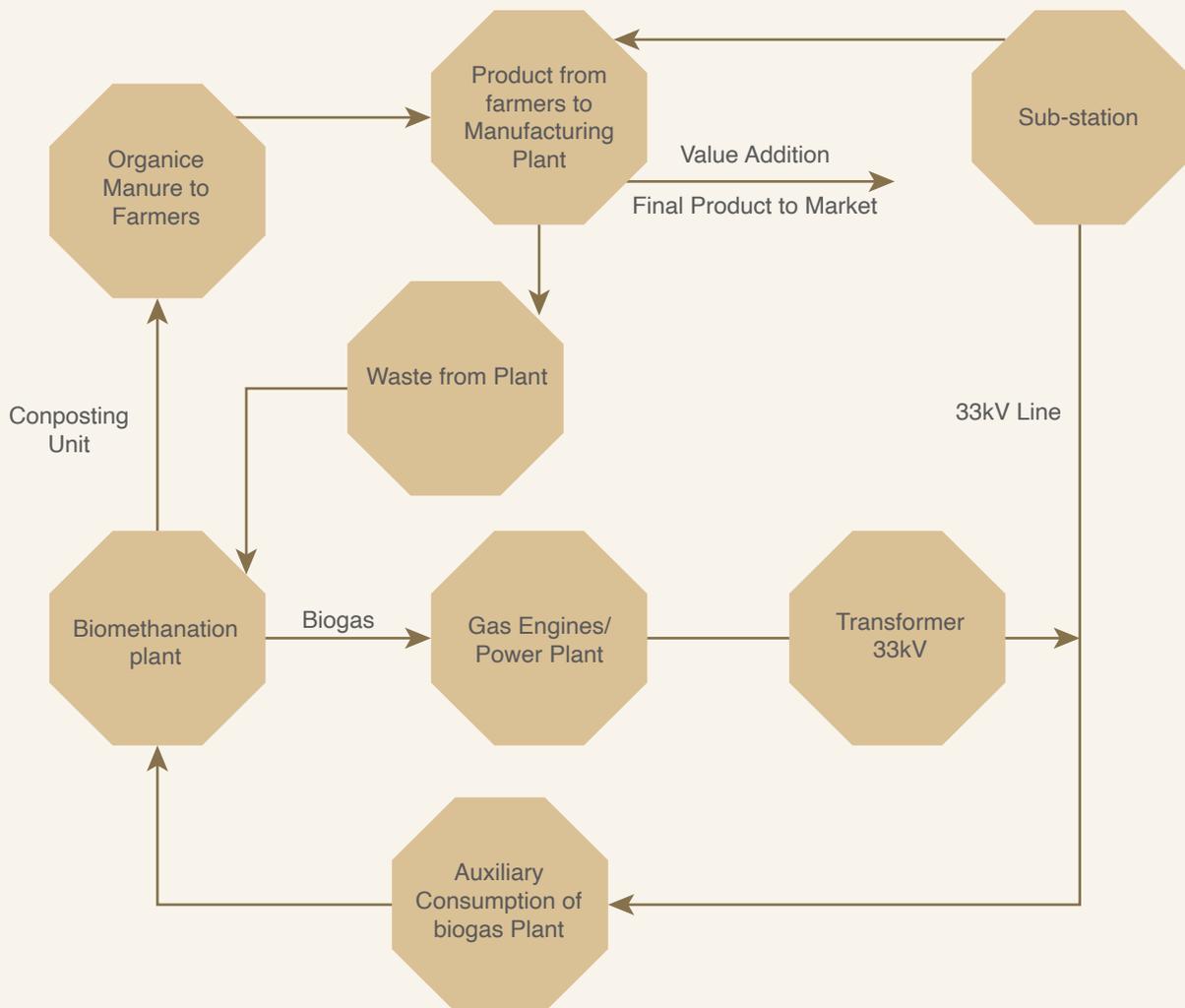
IMPACT SPOTLIGHT – ENVIRONMENT AND FOOD WASTAGE

Waste to Energy: Bio-methanation of Organic Waste and Utilisation of Biogas for Power Production. A Unique Technology towards Zero Waste

Jain FarmFresh Foods Limited's (JFFFL) Jalgaon-based plants process over 800 MT/day of fruit during the peak season of May to July, and 200 MT/day during the remainder of the year. This generates a significant amount of waste with a yield to waste ratio of 60:40 on average. The conventional method followed by most of the fruit processors for their solid waste is to accumulate such waste in pits and await gradual decomposition, leading to bad odour and the risk of leachate seeping into the groundwater, among other environmental risks.

JFFFL has adopted a uniquely sustainable method to handle this huge waste through state-of-the-art bio-methanation technology, via which waste from its plants, as well as nearby agro-industries, are treated anaerobically in a bio-digester. The biogas generated by organic waste processing is then utilised as fuel in gas-based engines installed in the premises, generating 1.668 MW of gross power.

This unique design and method of organic waste treatment and electricity generation has been certified as first-of-its-kind in India by the Ministry of New and Renewable Energy (MNRE).



Impact Statistics:

Electricity Generation: 4000 MWh/year

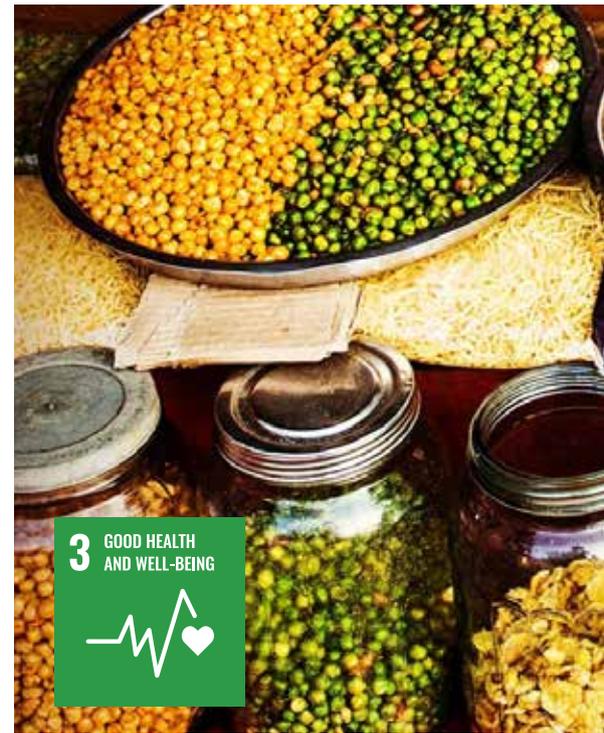
Total CO2 mitigation: 3700 tons CO2 equivalent/year

Total Green Manure Generation: 6000 MT/year

STRENGTHENED FOOD SAFETY

Cumulative Total Impact
US\$365,252,270

Impact per \$ Invested
US\$1.6



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.

Impact per year = (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) x Estimated Indian population consuming packed or processed foods x Annual average healthcare spending on FBDs x Average % equity stake and % debt share



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 studies¹⁶.
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 cases¹⁷.

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.

¹⁶ 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.

¹⁷ Wageningen University & Research. (2017). The economics of food safety in India – a rapid assessment. Netherlands: Kristkova, Z., Grace, D. & Kuiper, M.

RURAL COMMUNITY DEVELOPMENT

Cumulative Total Impact
US\$111,201,337

Impact per \$ Invested
US\$0.5



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.

Impact per year = (50% x Payments made to farmers for purchases of goods – Market value of goods + Value of equipment sold to farmers + Credit extended to farmers + Capital expenditure investments in rural areas + CSR spending) x 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 higher¹⁸. 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. The following case study offers a glimpse of these additional benefits.

¹⁸ Harvard Business School. (2018). Jain Irrigation Systems Limited: Continuing a legacy. Boston, MA: Reinhardt, F., Trumbull, G. & Rao-Kachroo, M.



IMPACT SPOTLIGHT – RURAL COMMUNITY DEVELOPMENT

Keventer Agro's Assisted Farming

Banana farmers in West Bengal have historically faced many challenges: lack of consistent demand, lack of post-harvest management of land, price fluctuations of inputs and output, and heavy dependence on middlemen. All of these have inhibited the growth of the banana ecosystem, causing West Bengal to lag behind states like Maharashtra, Tamil Nadu and Andhra Pradesh in both production volume and yield.

As a large player in the banana value chain in West Bengal, **Keventer Agro Limited (KAL)** has facilitated a structural reform of

the banana value chain in the state, and helped banana farmers realise an increase of c. 50% in the income per kilogram of banana sold, while keeping the final price to consumers constant. The large quantities of banana procurement by KAL enable the farmers to plan their production accordingly and reduce sale volume uncertainty. Payments are made to banana farmers within 48 hours of sales, in contrast to the 7-10 working day turnaround period through other sales channels. This has significantly improved farmers' cash flow and enhanced their livelihoods.

In addition, through Keventer Assisted Farming, KAL provides support to farmers by disseminating knowledge on efficient farming and yield enhancement practices and helps liaise with sapling procurement companies for G9 tissue culture plantlets, drip irrigation, fertilizers and financial services. Through this initiative, farmers benefit from:

- Guaranteed purchase of 100% output at Minimum Assured Price
- Training and support by agronomists throughout the entire cycle
- Support in liaising with government agencies to facilitate receipt of subsidies
- Comprehensive package of agri-inputs through a network of partner companies



2,000 Tonnes

Bananas sold last year through Keventer Assisted Farming

500

Farmers benefitted from Keventer Assisted Farming

INR 13 Million

Profit realized by farmwers through Keventer Assisted Farming

120,000

Tissue culture plantlets provided through Keventer Assisted Farming

4

Drip irrigation apparatus provided through Keventer Assisted Farming

0.5 Million

Financial support intervention by Fis via Keventer Assisted Farming

Through the Keventer Assisted Farming initiative, KAL envisions to bring about a revolution in the banana value chain in West Bengal by:

- Revolutionizing the lives of farmers in West Bengal through increased yields
- Ensuring the spread of modern agronomic practices through intensive knowledge sharing
- De-risking the entire farming cycle by onboarding Financial Institutions like SBI & ICICI to provide loans and crop insurance

LOOKING AHEAD

At the time of writing last year's report, we had identified a few action items for the year ahead. We have completed some of them while making significant progress on others. On the completed list, we held our successful inaugural Food, Future, Funds Symposium in Singapore in November. We hope to repeat the event this year, again with the support of the National University of Singapore, who have agreed to work with us on this front. If you would like to contribute towards the symposium, please get in touch.

It has been recommended that we engage a recognized third-party consultant to evaluate our formulas, methodology and processes on Impact. The view was that we might be missing a large part of the Impact through our current methods. This is probably true as I have seen reports with very creative ways of capturing Impact and second level derivatives of actions, which we have shied away from. We are strongly considering the recommendation and might undertake this exercise before the publication of our next Impact report.

While this report is not the right forum to discuss our views on the markets, it is worth mentioning that any downturn in economic activity tends to affect those at the lower socio-economic end the most. This would include the large rural population within India who are typically customers, stakeholders and suppliers of most of our portfolio companies. We remain acutely aware of this exposure and continue to strive towards sustainable and scalable Impact, which can truly make a difference and outlive cycles and setbacks through which all businesses inevitably suffer.





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