



Project Imifino

Ibhayi Brewery – South Africa



WATERLEAU

protecting the 4 elements



Effluents

Impact on surrounding Environments

- Pollution and environmental degradation
- Need to be treated before discharge or re-use
 - High energy consumption
 - Production of waste sludge
 - Produce carbon and impact climate change
 - Costly process



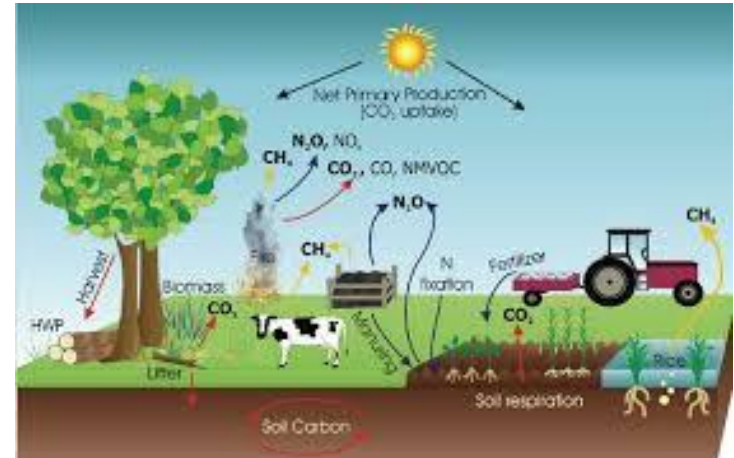
➤ **However**

However

- Contain nutrients and carbon
- Carbon used to generate methane- Fuel
- Nutrients can be used to cultivate plant biomass
 - Sequester carbon.

➤ Agriculture

- Large use of potable water
 - Used for human consumption
- Negative environmental impacts associated with fertiliser
 - Associated with production and transport
 - Leaching and soil degradation



Combine agriculture and Effluent Treatment !!!!

- Water security
- Food security
- Reduce environmental impact
- Climate adaptive technology



Project Background – 13 years of research through project Eden

OBJECTIVE Converting Brewery waste streams (water, heat, anaerobic sludge), through sustainable technologies, into value-added products and outcomes

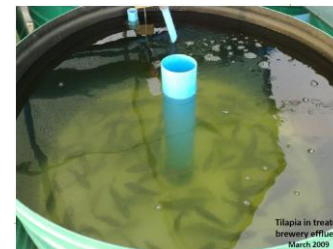
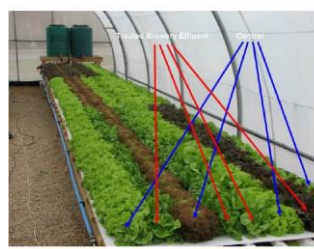
Wetlands & Research tunnel – completed in 2008

- Collaboration between **Ibhayi Brewery** & **Rhodes University's Department of Ichthyology and Fisheries Science**
- Research began in **2008** - Research funded by WRC & SAB invested R1mio into Eden Wetlands
- Research Team recovered water from Brewery effluent using **high rate algal ponding and constructed wetland technology** (i.e. Aquaculture, Hydroponics Algal biomass production and agriculture)
 - Cultivated tilapia, barbell, ornamental fish
 - Wide range of crops
 - Soils hydroponic systems

Produced three PhD and seven Masters Students as part of Project Eden!

Successful proof-of-concept = Opportunity to commercialize!

Introducing - **PROJECT IMIFINO!**



Wetland Project at Ibhayi brewery

Wetland constructed in 2020

Project Eden

- Produce 200 m3/day of effluent for onsite
- Cultivate wetland plants
 - Utilise normal wetland technologies
- Did not produce water for re-use standers
 - Aeration system



➤ Developed aeration system in 2021

➤ Allow the cultivation of crops

Project Imifino

Integrate agribusiness with effluent treatment

- Project Started in 2021 funded by SAB's as part of it's water stewardship goals
 - CAPEX & OPEX requirements for 12 months
- Build and develop 2000 m² raised beds – soil-based agricultural system
- Received support from SAB's Supplier Development Program (technical & business coaching)
- Provide income to cover O&M of constructed wetland system
 - Improve treatment performance
 - Supply Ibhayi brewery with treated effluent
 - Onsite reuse

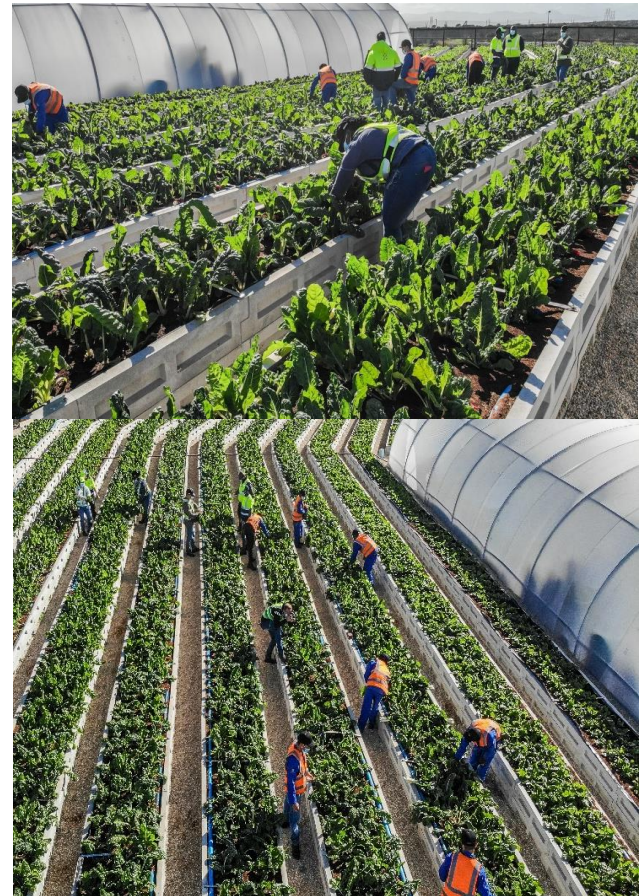


Background

- Founded by Dr Richard Taylor
- **Company Vision:**
 - **Creating sustainable agribusiness integrated with effluent treatment.**
- Commercialise research & development technologies
- Platform for future R&D
- Skills development & job creation
- Ibhayi Brewery
- Ideal site conditions
 - Land available
 - nutrient-rich effluent



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Achievements

- 8 full time jobs created from local community
- 1 x PhD, 1 x MSc, 2 x Honours student
 - Since 2021
- Spinach packed for local retail supplier
 - GAP certified farm and pack room
- 127 000 m³/yr. benefit to watershed (2022)
- Develop aeration system for constructed wetlands allowing
 - Cultivate vegetable crops
 - Treat anaerobically digested effluent
 - UF and RO feed quality
 - ±250 m³/day onsite re-use



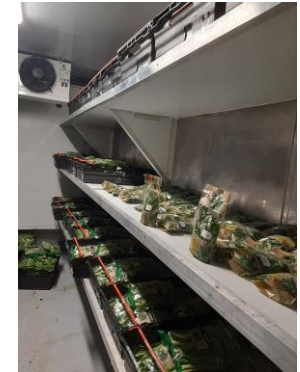
1 JULY 2021 - FIRST HARVEST LAUNCH



Project Imifino - Achievements

Achievements

- 1500 Kg of spinach produced per week
 - Instead of waste sludge from conventional activated sludge systems
 - Reduced environmental impact
 - Energy consumption
- Skills development
 - All employee's with relatively low skills
 - 2 have been taught/obtained drivers licence
 - 2 have been trained on computed literacy
 - Entire agribusiness operated by staff
 - Admin, Orders, Pest Management, General Maintenance
 - Economic benefit allows them to provide for their families



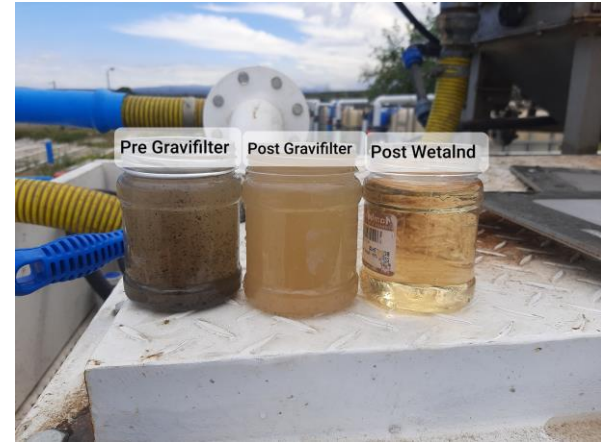
Project Imifino Challenges & Opportunities

Challenges

- Entire system relies on vegetable output: Sole income provider
- Entire system relies on functional anaerobic digestion (AD)
 - Ibhayi AD operational challenges; non-functional for 3 months in 2023
- Need for secondary source of income to sustain Agri business in the event of upstream disruptions

Opportunities

- Own ultrafiltration (UF) / Reverse Osmosis step
- Sell treated effluent back to primary user or other industries
- Greatly reduced cost compared to conventional systems
- Applied for **UNIDO** Funding to fully demonstrate business model
 - First-of-its-kind globally



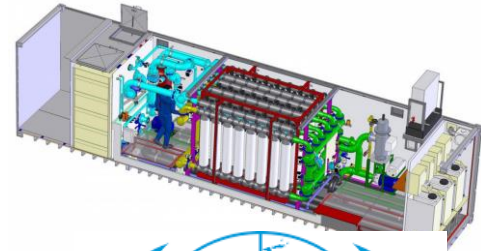
Capacity building – Waterleau partnership

UNIDO GRANT FUNDED

“Strengthened adaptation capacity for a green and resilient economy in South Africa

Partnership AB-Inbev, Waterleau, TMWS

- Current UF plant bottle neck for water recovery at Ibhayi Brewery
- Containerised UF provided by Waterleau
 - Co-funded by
 - Waterleau, TaylorMade Water Solutions AB-Inbev



Outcomes

- Wetland to produce in excess of 250 m³/day of UF feed water
- UF plant to provide Ibhayi brewery with 200 m³/day of effluent suitable for direct onsite reuse
 - Further treatment in RO
 - Steam generation



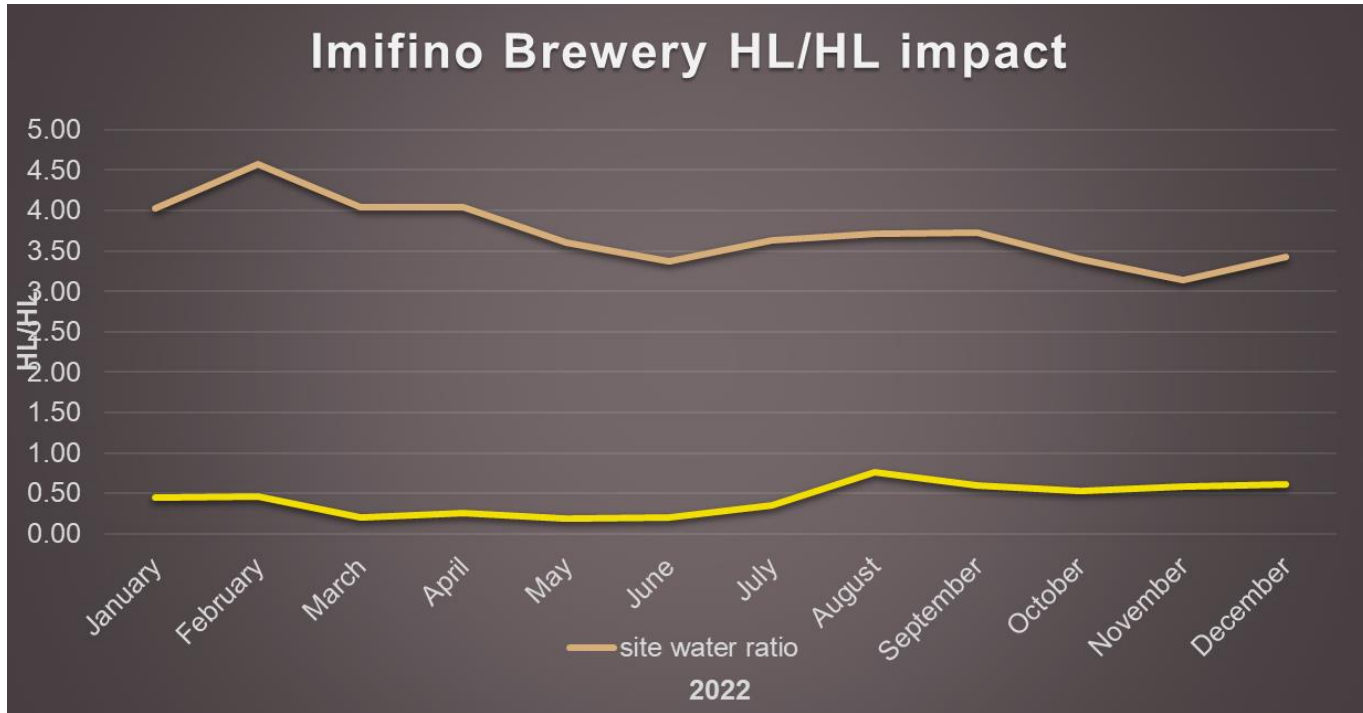
Produce full financial and business model to roll out to other breweries/ industries globally based on actual data from commercial system



Benefits - 2022

Decrease carbon footprint of Ibhayi by up to **19 tons of CO₂-C/yr.**

127 000 m³/yr. benefit to watershed

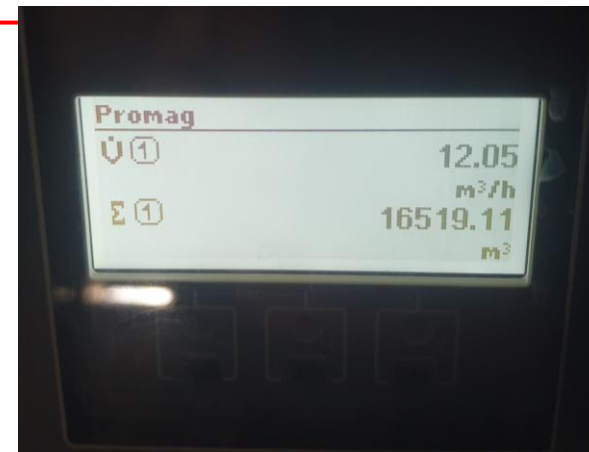


+-\$170k investment (incl. opex for 12 months to ensure successful downstream Agri business)

Waterleau / TaylorMade achievements Achievements

Achievements

- Ultrafiltration plant operation for 11 weeks
 - 16 519 M3 water sent back to Site
- **Waterquality:**
 - Turbidity 0.2 NTU
 - COD < 80 mg/l; Ammonia < 1 mg/l
 - Conductivity 2 500 – 3 000 US/mw;
 - Total dissolved Solids 1400 – 1950 mg/l



Project Imifino Impact

Impact

- Demonstrate commercially viable agribusiness linked with effluent treatment.
- Global Platform, Global Leaders
- Social and economic development from a waste stream
- Circularity in action

Replicability

- Report on energy consumption
- Cost of operation
- Circular economy
- Low capital investment
- Brewery effluent streams contains nutrients
 - Uplift the local/surrounding communities



Conclusion

- Technology does not only apply to breweries
 - Food and beverage, Sugarmills.
 - COD<600, Anaerobic digestion pre-treatment
- Effluents currently treated via aerobic technologies produce waste sludge
- Nutrient recovered into valuable biomass not sludge
- No limit to agricultural expansion and opportunity
 - Water/land and nutrient availability
 - Skills development and community benefit

Imagine having 2000 such system globally?

“Together making the world a better place”



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THANK YOU



UNITED NATIONS
INDUSTRIAL DEVELOPMENT ORGANIZATION

Progress by innovation

