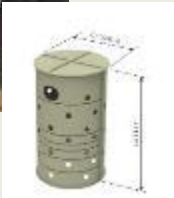


Commercialisation and scaling up the Tiger Bio-Filter technology in India



Core Vermifiltration
technology

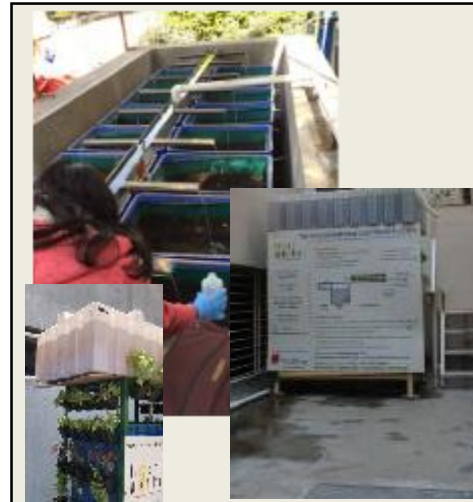
1. Household toilets



2. Municipal sewage treatment plant



3. Onsite sewage treatment system



4 Fecal sludge treatment plant





TBF
Environmental
Solutions Pvt. Ltd.

- TBF Environmental solutions Pvt Ltd is a company based in Pune
- In the business of Waste water and Fecal sludge treatment, using a technology developed and commercialised by promoters of Primove a company which has been in water sanitation consulting business in India for 2 decades

Winners of The prestigious
Sarphati Sanitation Award 2019
for promising Entrepreneur at
the Amsterdam International
Water Week (AIWW 2019)



Bringing zero waste sanitation within reach of EVERYONE

To be the number one company in onsite waste management

Vermifiltration:

Nature's most powerful waste treatment system

The “Tiger worm” (*Eisenia fetida*) is an earthworm species long-known for digesting organic material



Local subspecies found in most parts of the world, especially in tropical climates

These worms thrive in moist soil, rotting vegetation, manure and fecal waste, consuming pathogens and converting the waste into gas and compost

Worm ecosystem operates on self-regulating basis: population increases and decreases based on resources available

Vermifiltration based Onsite/Offsite waste management systems



A wastewater and fecal waste management solution

Core vermifiltration technology



Tiger Toilet Digester

- Rapid and complete waste neutralisation
- 99% pathogen reduction
- No smells, No need to desludge
- Connects to any toilet
- Can be retrofitted to latrines
- 4500 toilets installed

2. Onsite sewage treatment system



Tiger Bio Filter and FSTP

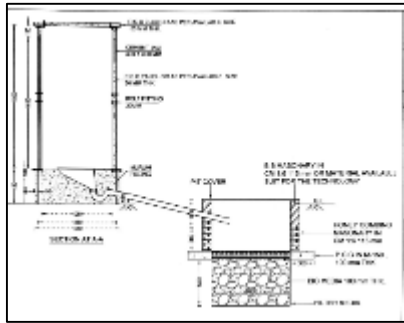
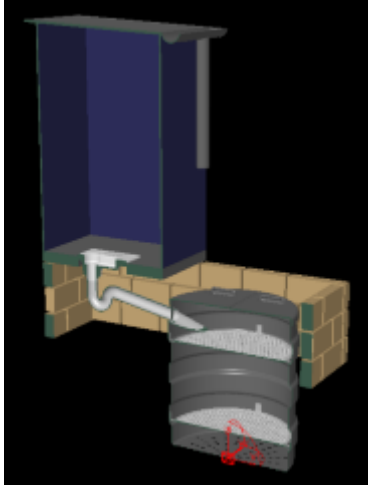
- Modular arrays treat waste at any scale - Few families to municipalities
- No sludge to be removed, no odour
- Compost and water can be reused
- Very low energy consumption
- 10 STPs and 3 FSTPs executed and commissioned
- 4 STPs and 5 FSTPs ongoing

To be the number one company in onsite waste management

Some key requirements for scale up

- Effective Technology – Effluent to meet criteria, optimal cost, easy O&M
- Certifications, academic recognition
- Strong IP and IP protection
- Creating a niche market – where your product can dominate
- Strong team
- Favorable environment
- Partnerships
- Funding

Technology - Functioning of Tiger Toilet



Vermifilter - waste & compost

- Creates a complete ecosystem in the pit allowing rapid waste digestion
- Uses nature's bio-degradation system by providing a complete soil food chain
- Maintains completely aerobic environment - no odour

- Worms active around faecal solids in the digester converting faecal solids into compost
- Worms System operates on self-regulating basis – population increases & decreases on the basis of resources

Tiger Bio Filter STP

Our Sewage treatment plants are fully modular

Community level

Tiger Bio Filter for apartments



1500 lit per day



5,00,000 lit per day

Effluent test Summary

Sr. No.	Parameter	Unit	Average	
			Inlet	Outlet
1	pH		6.17	7.07
2	Turbidity	NTU	752.18	70.23
3	DO	mg/l	0.00	2.07
4	TSS	mg/l	250.09	42.56
5	TDS	mg/l	558.22	370.34
6	TS	mg/l	808.30	412.90
7	COD	mg/l	427.26	42.78
8	BOD 3 day	mg/l	138.31	17.11

Peer Reviewed Publications

1. Dr. Michael Templeton, Imperial College, London published paper on Tiger Toilets work at International Water Association Conference S@SMALL for Sustainable Solutions for Small Water & Waste water Systems, Nantes, France, Oct. 2017
2. Furlong et al. (2016) Technical and user evaluation of a novel worm-based, on-site sanitation system in rural India. Waterlines Vol. 35. No.2
3. Furlong et al. (2015) The development of an onsite sanitation system based on vermifiltration: the 'Tiger Toilet'. Journal of Water, Sanitation and Hygiene for Development, 5, 608-613
4. Furlong et al. (2014b) Processing of human faeces by wet vermifiltration for improved on-site sanitation. Journal of Water, Sanitation and Hygiene for Development, 4, 231-239
5. Furlong, C. et al. (2014a) Paper presented to the IWA-AIT 1st Specialist Conference on Municipal Water Management and Sanitation in Developing Countries, Asian Institute of Technology, December 2014

Technology Patents & Recommendations

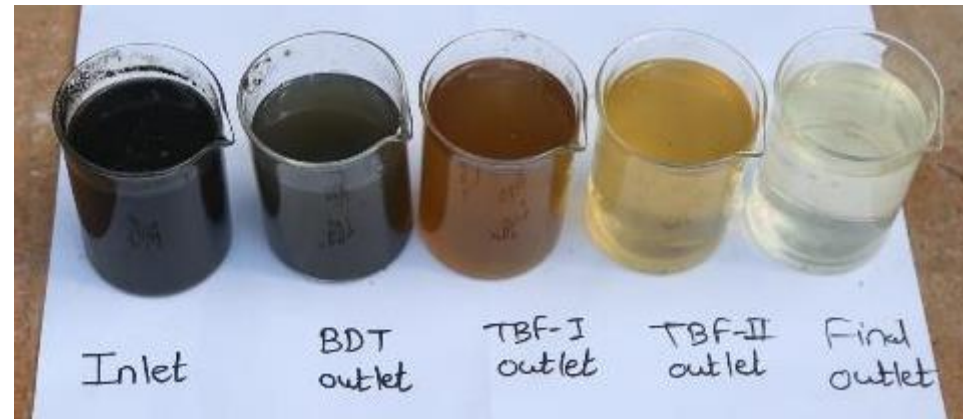
Sr. No.	Type of Technology	Name of Patent	Patent No.
1	<u>Tiger Toilet</u>	“TOILET SYSTEM OFFERING SAFE AND COMPLETE WASTE TREATMENT IN DIFFICULT TERRAIN”	WO 2018/225082 A8
2	<u>Tiger Toilet</u>	“SYSTEM OF TREATMENT OF SEWAGE WASTE FOR ON-SITE SANITATION”	WO 2017/29682 A1
3	<u>Tiger Toilet</u>	“TOILET SYSTEM OFFERING SAFE AND COMPLETE WASTE TREATMENT IN DIFFICULT TERRAIN”	201721018207 A
4	<u>Tiger Bio Filter</u>	“SYSTEM FOR TREATMENT OF SEWAGE BY VERMIFILTRATION”	201721031518 A

Tiger Toilet System is “APPROVED BY 9TH MEETING OF DR. R. A. MASHELKAR COMMITTEE HELD ON 23RD JAN 2018

Fecal sludge management Current Practices and plenty of potential to make an impact



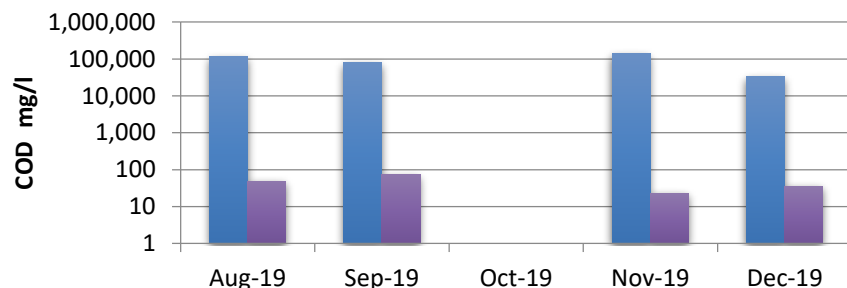
We have – what is perhaps the best Fecal sludge treatment technology available and we plan to go aggressively in this market



10 KLD Fecal Sludge Treatment Plant (FSTP) at Kalpetta, Kerala.

Sample test Reports

Chemical Oxygen Demand



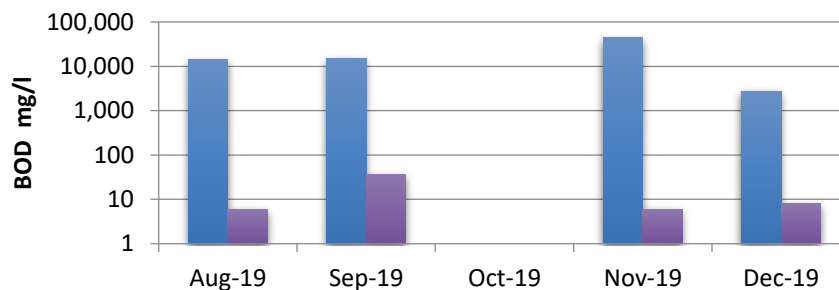
Average outlet COD values are 45.5 mg/l.

	Aug-19	Sep-19	Oct-19	Nov-19	Dec-19
Inlet	116,700	79,000	0	139,425	33,250
outlet	49	74	0	23	36

Month

Average outlet BOD values are below 10 mg/l.

Bio-chemical Oxygen Demand

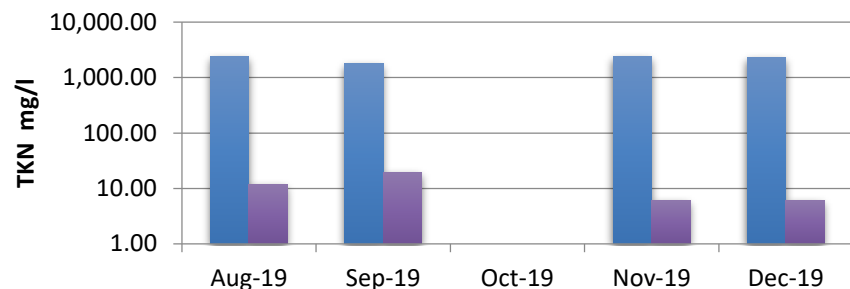


	Aug-19	Sep-19	Oct-19	Nov-19	Dec-19
Inlet	14,350	15,080	0	43,650	2,750
outlet	6	36	0	6	8

Month

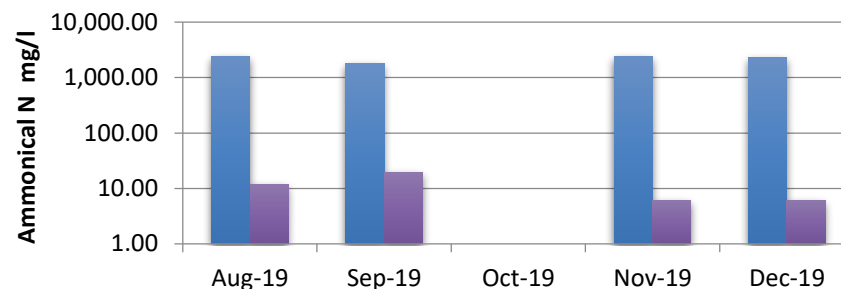
Sample test Reports

Total Kjeldahl Nitrogen



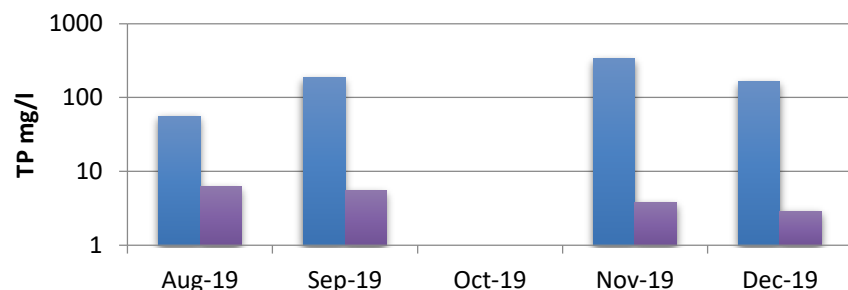
Month

Ammonical Nitrogen



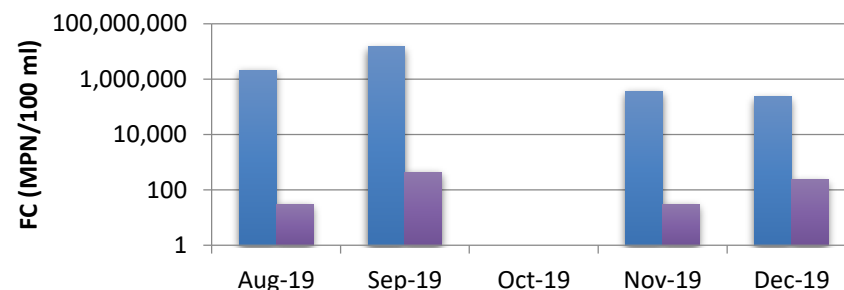
Month

Total Phosphate



Month

Faecal coliform



Month

Plant capacity and populations coverage

Sr. No.	Plant Capacity (Kilo Litres Per Day)	Population being served
1	5 KLD	20,000 to 25,000
2	10 KLD	40,000 to 50,000

Note: Calculations are based on 30% containment unit coverage and 4 years desludging period.

Proposed Funding Norms under SBMG

B. District level SLWM activities	Financial support
Plastic Waste Management Unit (one in each Block)	Upto Rs.16 lakh per unit
Faecal Sludge Management (FSM)	Upto Rs.230 per capita
GOBAR-Dhan Projects (For model project/s in each district)	Upto Rs.50 lakh per District

Ref: SBMG Guideline page 54.

Technology News and Recognitions



"Manure and water from septic waste."

ദേശാഭിമാനി

"we are using the Tiger Bio-Filter technology to make clean and odour-free water"

PuneMirror

"1 Rs. Per litre of toilet waste from Household."

ദേശാഭിമാനി

"Kalpetta municipality sets a model in faecal sludge treatment"



"These Tiger worms eat the human waste and eliminate 99% of the pathogens and bacteria inside them."

METRO.co.uk

"A \$350 toilet powered by worms may be the ingenious future of sanitation"

BUSINESS INSIDER

"Toilet waster disposal - Needed 100 plants in Kerala - UN "

ശോചനരഹിത മലമിന്ത്യസംസ്കരണം

"Tiger Toilet is expected to become a better form of sanitation for low-income families"

elciudadano.cl

"Toilet waste is not a problem anymore in Kalpetta."



"Arrival of Honey Sucking Vehicle for collection of faecal sludge from households and buildings to the plant "date-18th july 2019"

Malayala Manorama
The brand that builds brands

"a first-of-its-kind initiative by the civic administration"

THE TIMES OF INDIA

"Not attached to sewer systems, these toilets rely on biological agents to do all the dirty work"

News 18.com

"Some of the world's most inventive brains are now trying to solve the "open defecation" problem."

HUFFPOST

"India's first project where toilet water and kitchen wastewater are treated and reutilised"

hindustantimes

Potential is huge in India

- Large number of upcoming towns and villages with potential to market an aspirational alternative to pit latrines and septic tanks
- Stricter pollution norms mean potentially large number of STPs are needed – both at Utility scale and at decentralised scale
- Low capital intensive and low O&M intensive options for water recycling are needed
- Fecal sludge management is an urgent need and is recognised as such by Government – opportunities under SBM II

Achievements to Date



Tiger Toilets

- ✓ Over 4500 sold across India
- ✓ First orders executed for retrofit Digesters
- ✓ SBM Empanellment

Tiger Biofilter and FSTPs

- ✓ 500,000 l/d STP for Pune Municipality
- ✓ 10 medium scale communal STPs
- ✓ 3 Fecal Sludge treatment plants commissioned
- ✓ **First installation done in Hawaii (USA)**

Orders secured

- ✓ From National Ganga Mission for 4m l/d STP
- ✓ 5 FSTP under construction in UP and Maharashtra
- ✓ 6 private sector projects
- ✓ Pipeline value around 200m INR



Way ahead

1. Identifying partners / dealers in different parts of the country for small scale STPs
2. Looking at licensing the Tiger Toilet digester designs widely for implementation through local masons in rural areas
3. Developing partnerships with large players in STP sector for bidding projects
4. Looking at expanding in FSTP sector through bidding for Government contracts
5. Expanding the team
6. Looking for
 - A. Investment
 - B. A level playing field – especially in Government Tendering!

Acknowledgements

Organizations we've worked with on this journey

- GCC
- PATH
- ITT
- Tata Trusts
- Pune Municipal Corporation
- Unicef
- UP Jal Nigam
- Imperial College
- Toilet Board Coalition



Grand Challenges Canada®
Grands Défis Canada



Imperial College
London