



PAVITR

Natural & Advanced Technologies for Wastewater Treatment and Reuse in India

**Pitch
Case Study:
wfSRC**

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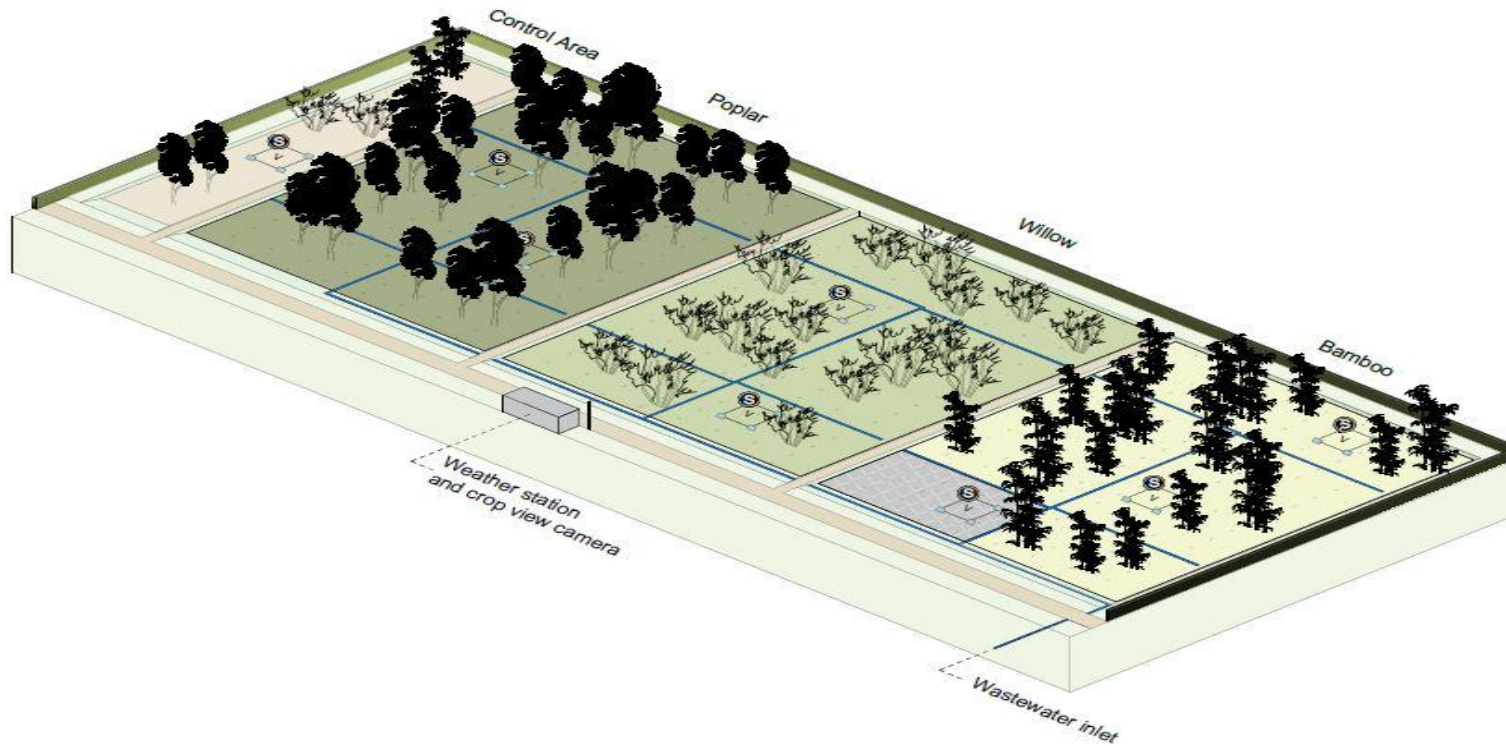
Problem/Need









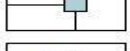
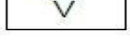


- Lack of treatment facilities, especially in rural areas
- Water and nutrient scarcity – **Need for reuse!**



wfSRC systems- Solution



-  Bamboo
-  Willow
-  Poplar
-  Soil filtration
-  Earth wall
-  Pathways
-  Irrigation system/pipes
-  Soil humidity, pH and salinity Sensor
-  Water trap
-  Vacuum collector

Nature-based system treating wastewater through microbial decomposition, respiration, filtration, plant uptake, nitrification/denitrification, adsorption.

Fast-growing tree/plant species are densely planted and harvested in short periods.

RESULTS



Poplar after planting in January 2022



Poplar in November 2023

RESULTS



Willow section after planting August 2021



Willow section in November 2023

RESULTS



Bamboo after planting in August 2021



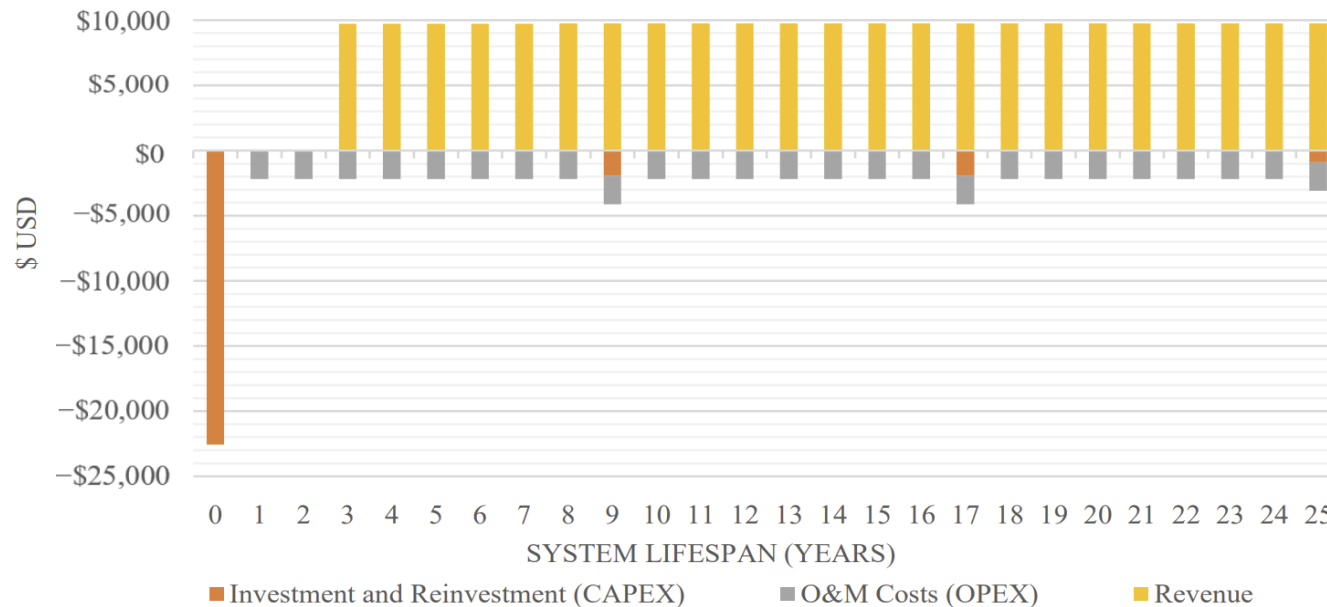
Bamboo in November 2023

RESULTS- COST OVERVIEW

Item / Activity	Unit	INR/unit	Total in INR	Total in USD
Preparation of field- 1 ha (CAPEX)				
Site and plant selection (soil analysis, ground water check)	1	50,000	50,000	600
Machine and worker for levelling and ploughing the field	1	63,600	63,600	763
Fencing the field (wire fencing)	1	150,000	150,000	1800
Per sapling (bamboo) + transport	10,000	60	600,000	7200
Cost per worker (day)	300	450	135,000	1620
Total			998,600	11,983
Infrastructure (CAPEX)				
Pond with clay lining (installed)	1	720,000	720,000	8640
Submerged pump (installed), 3 in 25 years	3	125,000	375,000	4500
Flow meter (installed), 3 in 25 years	3	85,000	255,000	3060
Water traps (extraction of percolation water)	9	1600	14,400	173
Pressure reducer, pipes and valves (3 systems 25 years)	3	271,000	813,000	9756
Cost per worker (day)	300	450	135,000	1620
Total			2,312,400	27,749
O&M (25 years) OPEX				
Maintenance-Man-days (weeding, furrows, harvesting)	2500	450	1,125,000	13,500
Chemicals (pest control)	25	4500	112,500	1350
Electricity (kw/h) pump 6 h/day (12 Rs/KWh)	6500	360	2,340,000	28,080
Equipment (maintenance/harvesting)	25	8000	200,000	2400
Analysis of water and soil samples	25	25,000	625,000	7500
Cost of supervising the system	300	600	180,000	2160
Cost of deconstruction, soil tilling	1	75,000	75,000	900
Total			4,657,500	55,890
Cost per year (average of 25 years)			318,740	3825

Business Model/Team

wfSRC Cost-Benefit Estimate



Cost-benefit estimate for a bamboo wfSRC system (1 ha) over 25 years

100 DM t/ha/year harvested
 Conservative price
INR 8000 (\$96)/t DM



Income 3rd year:
INR 800,000 (\$ 9600)/ha/year



Total costs (CAPEX & OPEX):
 INR 4,657,500(\$ 56K), 25 years
Annual costs: \$ 3825



Total annual benefit estimated:
INR 440,616 (\$ 5007)/ha/year

Market and Competition

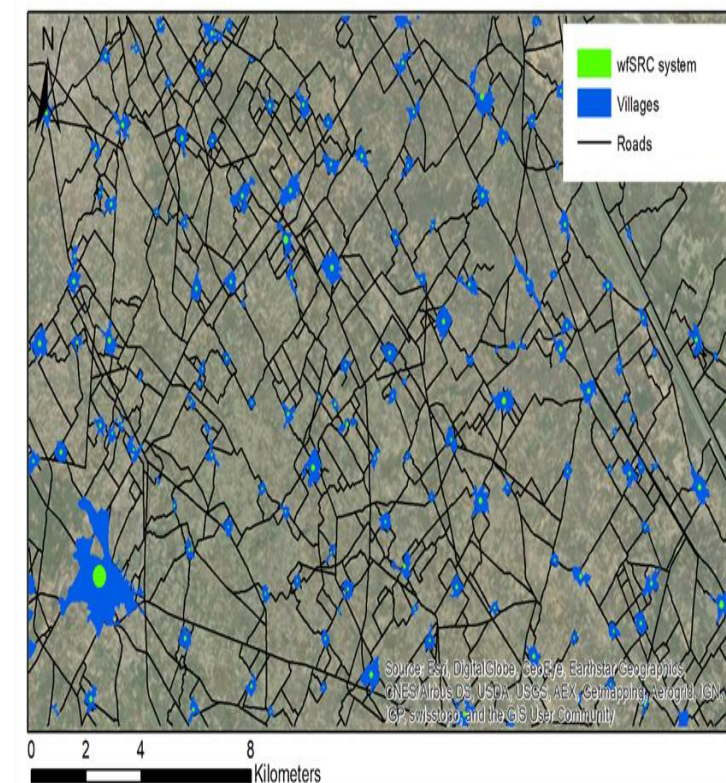


General Potential

- > 4,000 cities under 100,000 citizens
- > 650,000 villages in India without sanitation services
- SME Industries with non-toxic wastewater effluents (e.g. Food processing industry)

Regional Case Study-Aligarh

- 184 settlements, one city on 400 km²
- 218,241 inhabitants (391,324 by 2036), 100 l/day
- Area of 63 – 364 ha wfSRC bamboo systems (108 ha by 2036)
- Between 0.27 % and 2.5 % of the total area
- Costs: \$ 0.24 – \$1.4 MM/year (25 years)
- Biomass production: 6300 – 36,400 t/year (bamboo)
- Economic value: \$0.6 – \$3.5 MM/year



Market Uptake



Advantages

Efficient Wastewater Treatment Technology with low CAPEX and OPEX Costs

Reduction in costs (fertilizer, water) and enhanced biomass yield (income)

Reduction of GHG Emissions and additional ecosystem services

Business Model

- Offer to handle local wastewater for free (APEX+ Monitoring, long-term contract)
- Create local Joint-Ventures (land-owner, ESF)
- Apply a Franchise Model (design, tools, sensors) for fast market up-take
- National/International commercialisation of produced biomass

Requirements

- Positive listing of wfSRC technology
- Freedom of local communities to make “Deals”
- Reliable monitoring/control scheme

Thank You for your Attention



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