Morarka Biotechnology
For Agriculture and Environment

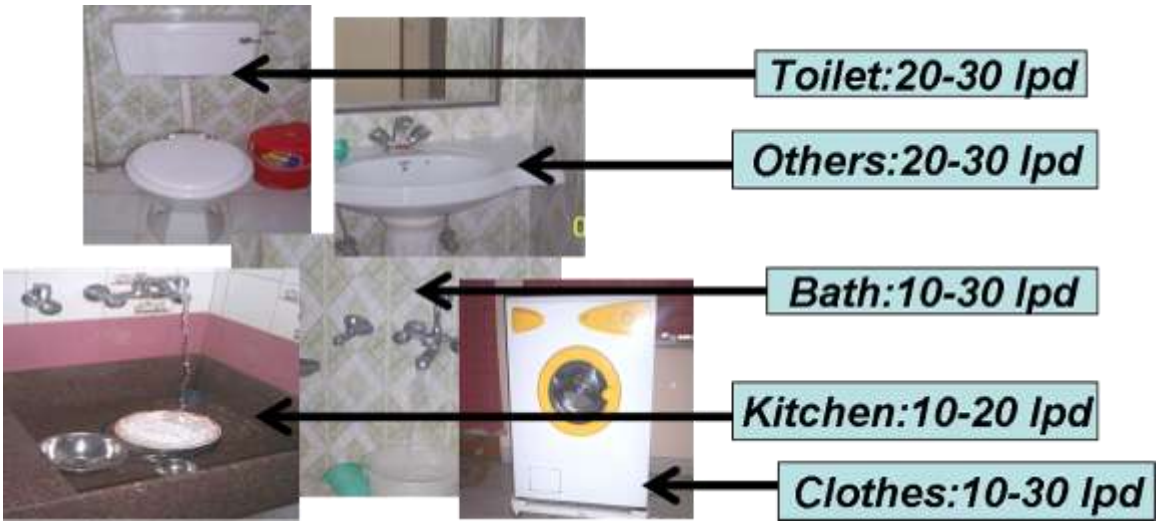
Eco Friendly Waste Water Recycling

A Scientific Approach for Management of Waste Water in an Efficient and Cost Effective Manner in Urban Areas at :
HH Level...
Residential Society Level...
Area Level...
And so on…

Biotechnology Division
M.R. Morarka-GDC Rural Research Foundation
Vatika Road, Off Tonk Road, Jaipur – 303 905, Phone& Fax: +91-141-2771100, 2771101
E-mail: info@morarkango.com, Website: www.morarkango.com

1. Waste Water Generation

1.1. Per Person Per Day

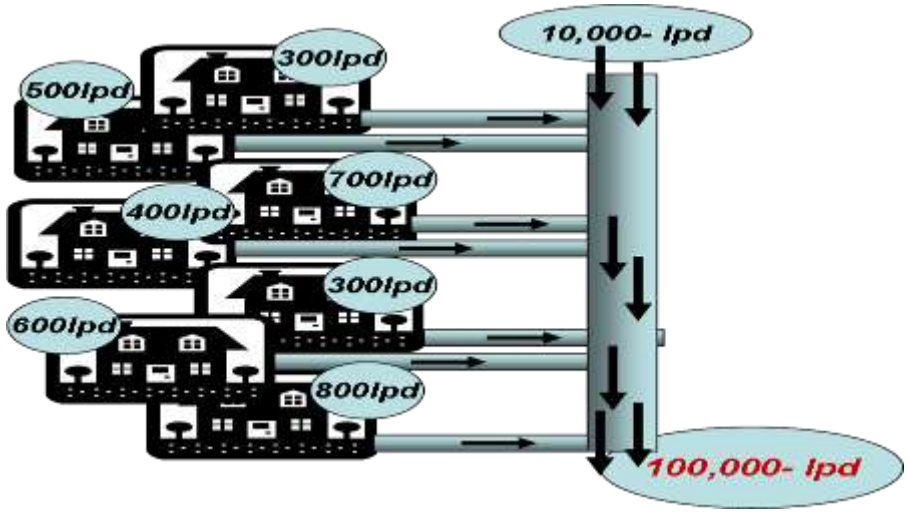


In a day, total of 70-140 Liters of Waste Water is generated

1.2. Per Family of FIVE MEMBERS Per Day

In a day, total of 300-700 Liters of Waste Water is generated

1.3. In a Residential Area of 100 HOUSEHOLDS

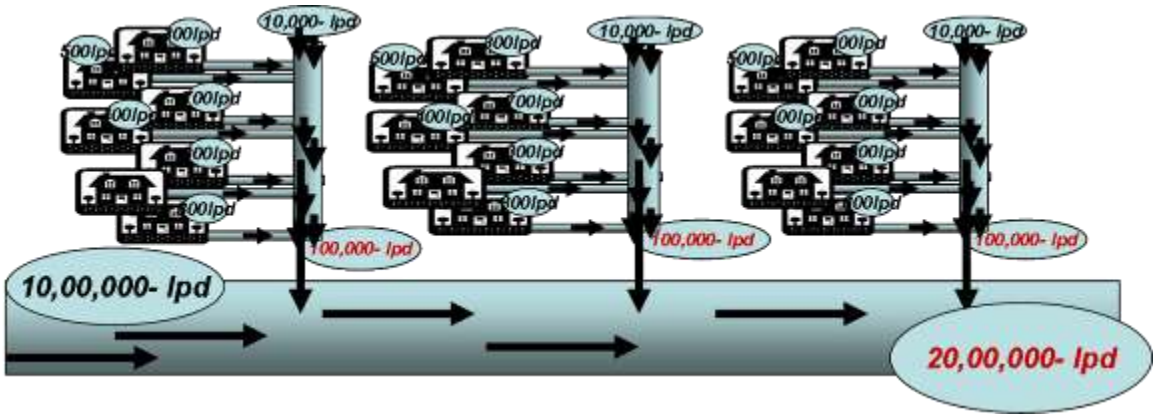


An average of 100,000 lpd of Waste Water is carried through Open -Close Drains and it travels an average of 1.5 Kilometers before it either joins Main Drains or is left to cause many more problems…

2. Waste Water Disposal Problems in Urban Areas

Present Options for Technology/Systems are either too expensive for Local Bodies that they can not afford them or the Communities are left to suffer from this problem…

2.1. At the City Level the Quantities are very large….

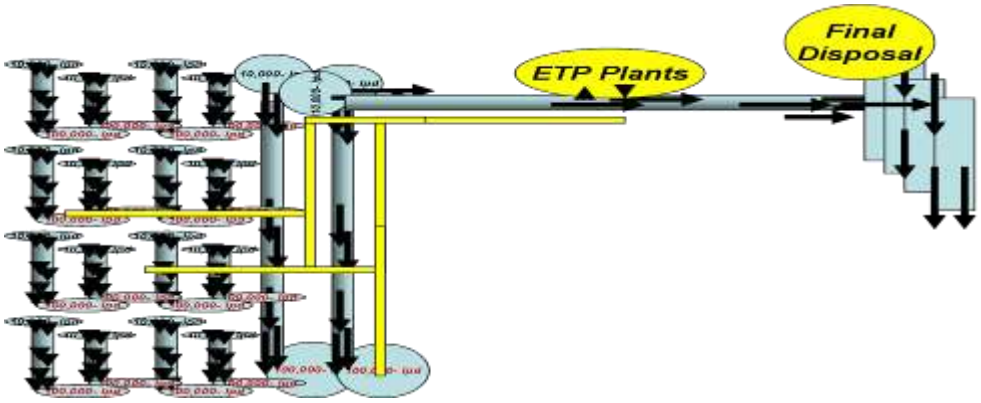


To carry Millions of Liters of Waste Water very high cost Drainage Cum Sewage Systems are Built…

2.2. Transportation has its own Problems…

Open Drains in the City causes many more problems…

2.3. Waste Water Management – The Urban Problems



ETP plants are situated on the outskirts of the city and hence very high cost/s are incurred on pipelines carrying waste water to the ETP plant/s and re-transportation of recycled water to re usage sites up to 30-50 kilometers…

Despite very large Capital Investments, most of the ETP plants do not run at full capacity due to many design constraints and hence a larger portion/volume of untreated waste water is disposed to the nearby water stream/s causing pollution…

2.4. Waste Water Management – Some more problems…

Involvement of large Manpower, Machinery, and Electrical Energy starting from Sewage Collection to ETP Operations creates many complexities in the operations affecting the efficiency and economics of waste water recycling.

Any in-efficiency in the treatment chain can bring down overall performance by many times. All plants are designed for an optimum load factor and performance drops if Waste Water volume/s increases or decreases sharply.

2.5. Shortcomings of Present Methods

- Highly Capital Intensive
- Dependent on the use of electrical energy
- Use many toxic and Polluting Chemicals
- Very High Operational Cost
- Complex Technology makes it difficult for day to day Operations
- Unsolved Problems for Disposal of waste products
- Many a times, the desired results are not obtained
- Foul smell bounces back most of the times
- Sludge disposal is a major problem

3. Morarka's Technology of Waste Water Recycling

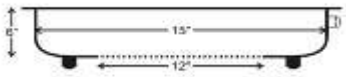
Morarka Foundation has invented biotechnology based eco-friendly solutions for effluent waste water treatment. Suitable physical and biological filters are designed that are made from natural materials and inoculated with microbes, which can absorb both organic and inorganic impurities of waste water.

3.1. Salient Features of This Technology

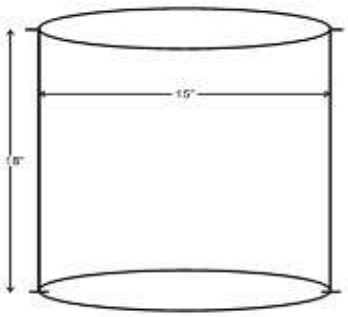
- No use of chemicals for correction of pH or turbidity.
- Very little use of electricity and thus reduction in operating costs
- All filter media used for recycling are of natural origin.
- Requires little maintenance
- Effectively reduces BOD, COD & TSS
- Helps in controlling Coliform bacteria
- No sludge generation
- Even a semi skilled person can operate the plant
- Suppression of foul odor, flies, mosquitoes
- Can be easily applied to existing treatment facility, synergistic with various technologies

4. Eco Friendly Waste Water Recycling System at HH Level

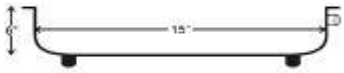
Intake tank with perforated bottom



Physical and biological filter/s



Collection tray with outlet



In a day out of total 400-700 Liters of Waste Water 50-70 % can be recycled at HH level

The easiest and simplest Waste Water Recycling System from Morarka can convert this Waste Water for use in Toilets Flushing, Floor-Car Washing and Kitchen Gardens

Waste water undergoes physical and biological treatment/s and gets recycled into water ready for re-use in gardens/ lawns.

4.2. Technology for Treatment

Root bed treatment as biological filtration

Various natural materials for Pysical filtration

4.4. Demonstration/Models Systems

Household Systems

Institutional Systems

Add Photo of waste and recycled water

Result

This Technology can help reduce the fresh Water consumption and thus also generation of waste water at HH Level itself…

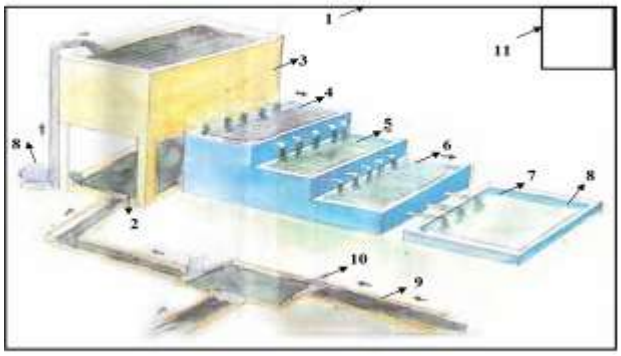
5. Eco Friendly Waste Water Recycling System at Area Level

Installation of a 50,000 L/Day
Waste Water Recycling Plant at Gulab Bag, Udaipur

25000 L/Day plant at Nawalgarh

50000 L/day plant at Nawalgarh
The project is sponsored by Dept. of Science and Technology, GOI

5.1. System Design



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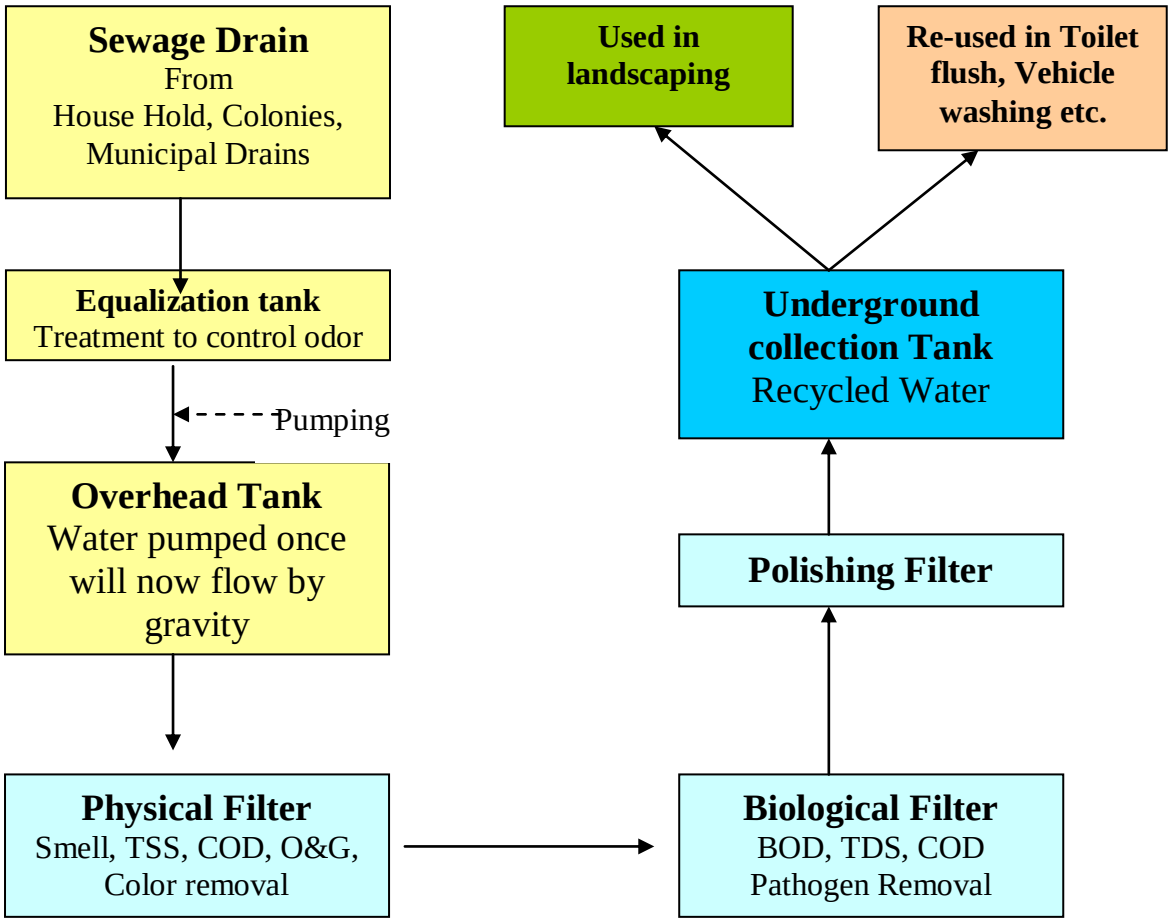
3. Overhead Tank
4. 1st Physical Filter
5. Biological Filter
6. 2nd Physical Filter
7. Recycled Water Collection Tank (Underground)
8. Pump
9. Collection Drain
10. Physical Filter Drain
11. Staff Room

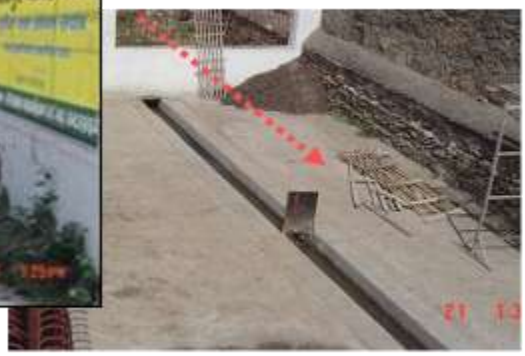
Various natural filters and Root Bed Bio technology processes are being used.

5.2. Flow Chart:



5.3. Collection of Waste Water using Collection Drains

Grey water flowing through the drain



Collected through drain having sluice gate and physical filter

5.4. Pre Treatment in Underground Storage Tank

- To keep the concentration of the pollutants at a constant level
- Buffer the varying waste water flow, Aeration provided to increase DO
- Aerobic microbial formulation of the foundation i.e. NS - DL added
- This helps reduce an-aerobic decomposition and check foul smell of the sewage.

5.5. Overhead Collection Tank

The water is pumped from underground tank to the OHT
From here water flows at a constant pace to the filters by the force of gravity

5.6. 1st Filter - Primary Cleaning & Treatment

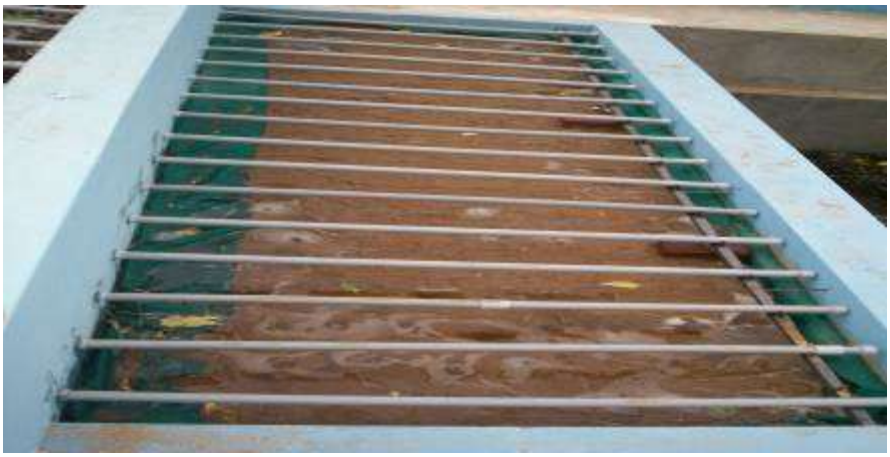
Removes physical impurities like oil and grease, suspended solids, color etc.

- The system provides fairly long Solid Residence Time (SRT) without requiring large Liquid Residence Time (LRT)
- Higher SRT is related to better removal of N & P from the system as it provides better nitrification and phosphorous solubilization
- Use of Activated Charcoal and Wood Charcoal removes chemical impurities, color and odor of the waste water.

.8. Biological Filter: Secondary Treatment Root Bed Treatment Process

Removes biological and chemical impurities

5.9. Polishing Filter (Tertiary Treatment)



5.10. Collection of recycled water…

5.12. Result…

Recycled water meeting parameters of CPCB norms

5.11. Result of Applications of Recycled Water on Plants…

Recycled Water application

Ground Water Application

This Technology has helped reduce the fresh Water consumption for Gardening in Gulab Bagh and also cost of transportation of Waste water to ETP Plant…

6. Test Reports for various installed systems

Parameter	Unit	Toilet		Kitchen		Restaurant		Office	
		Input	Output	Input	Output	Input	Output	Input	Output
pH		8.4	7.1	8.3	7.1	8.51	7.2	9.02	7.23
EC	ms	3.4	0.8	3.4	1.5	2.77	0.82	2.09	0.82
TDS	ppm	1340	880	1010	756	1277	880	1560	868
Salinity	ppm	1570	940	1210	910	1412	940	1670	905
DO	ppm	2.8	4.6	2.1	4.3	1.7	4.1	0.9	4.8
Hardness	ppm	360	170	365	185	370	188	410	175
BOD	ppm	220	16	256	20	276	78	256	82

Test Methods:
pH – pH Meter / EC, TDS, Salinity & DO – Systonix Water Analyzer / Hardness – Titration with ODTA / BOD – 5 day at 20^{o} C

7. Customers:

Technology approved by Dept. of Science and Technology, GOI and Rajasthan State Pollution Control board

7. News Paper Publications

दैनिक भास्कर
उदयपुर, शनिवार 10 जनवरी, 2009 | 3

सीवरेज के पानी से खिले गुलाब

देशी जुगाड़

THE FINANCIAL EXPRESS | New Delhi, Thursday, March 26, 2009

Industry, govt enterprises join hands for waste water mgmt

नवभारत टाइम्स

दिल्ली

इको फ्रेंडली प्रोसेस

यमुना भी हो सकती है साफ

Morarka is offering to join hands with enlightened Citizens and Authorities to make this a MASS MOVEMENT