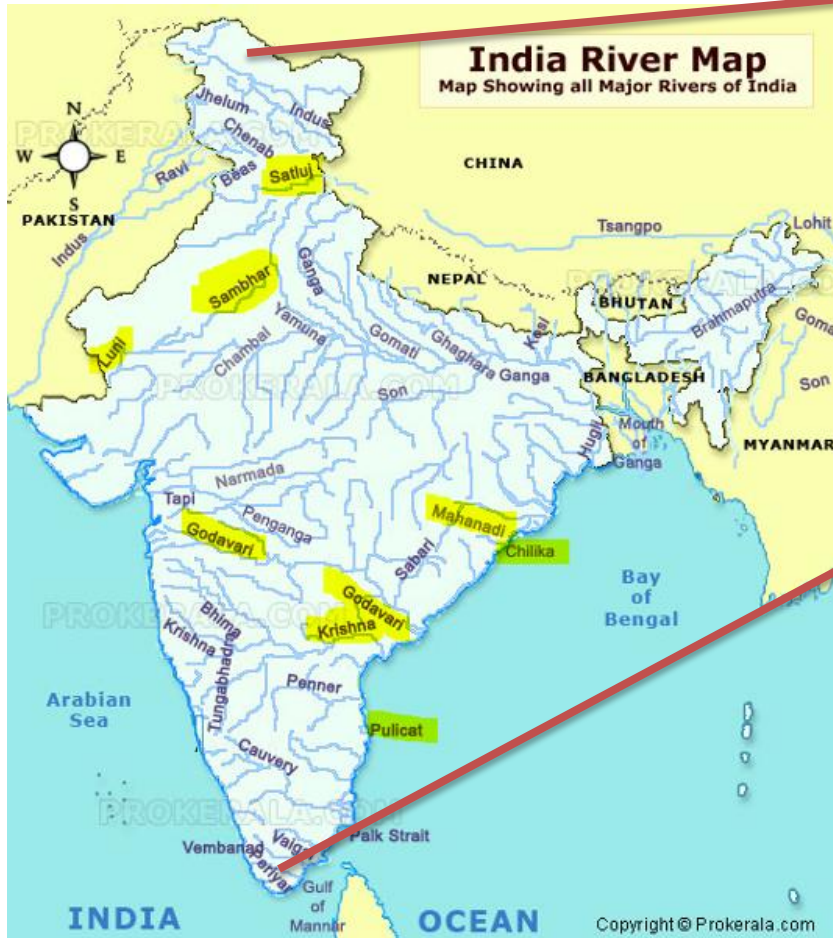


Ecotechnological Approach for Urban Water Management

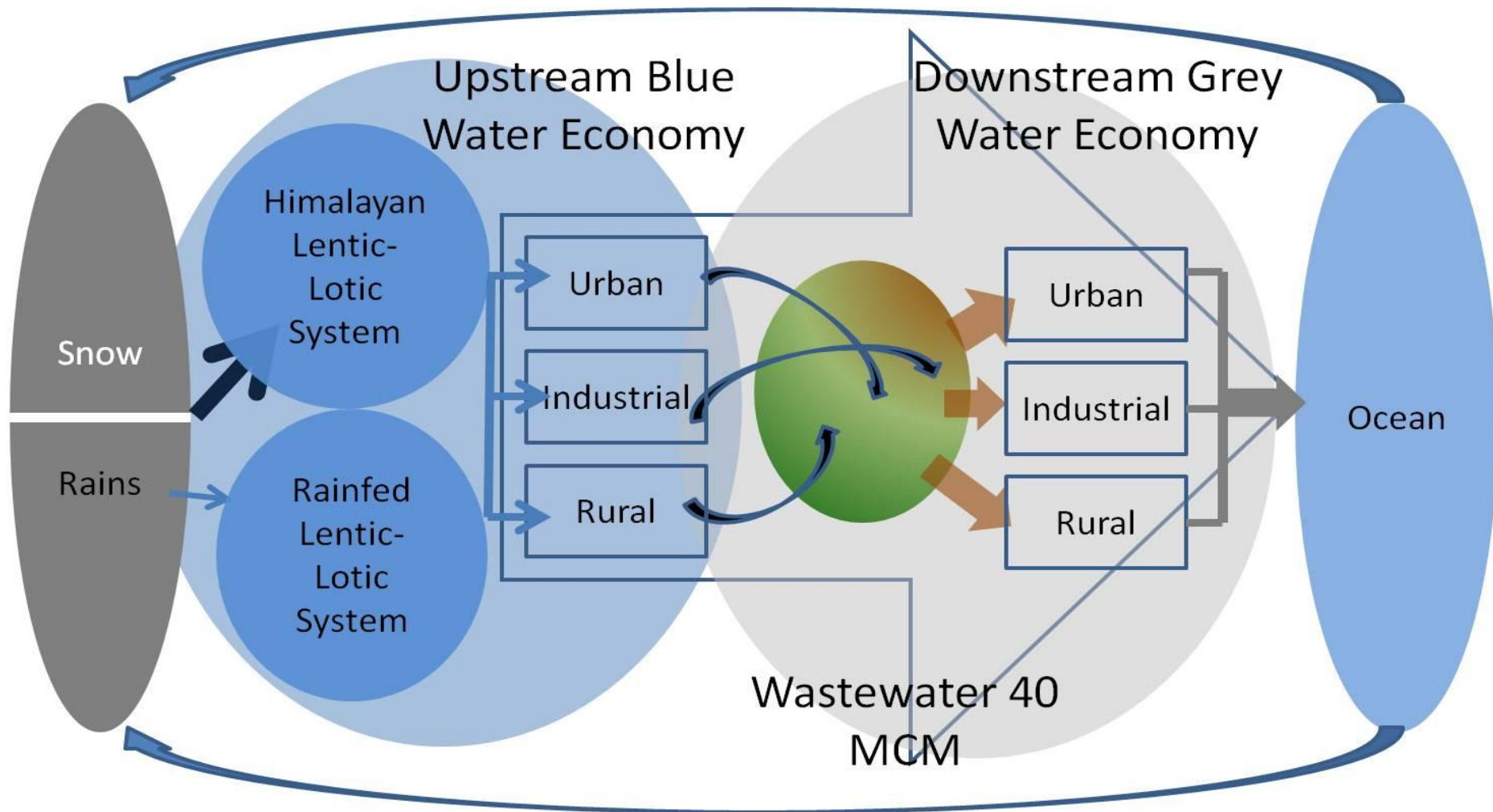


Sayali Joshi

CEO, SERI, Pune
sayali@seriecotech.com



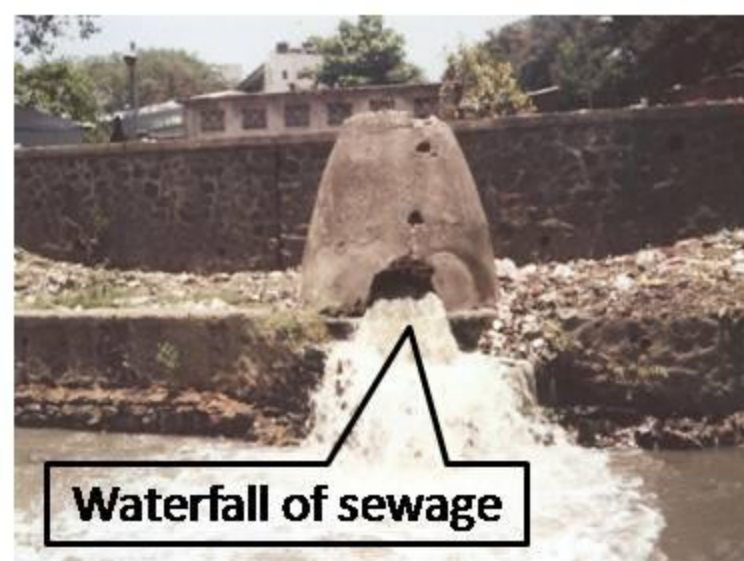
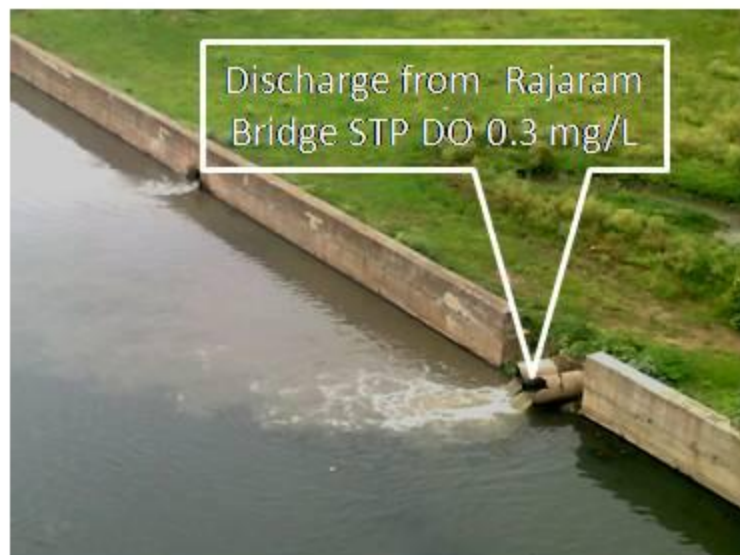
Indian Waters: Current Status



Clean water
4000 BCM

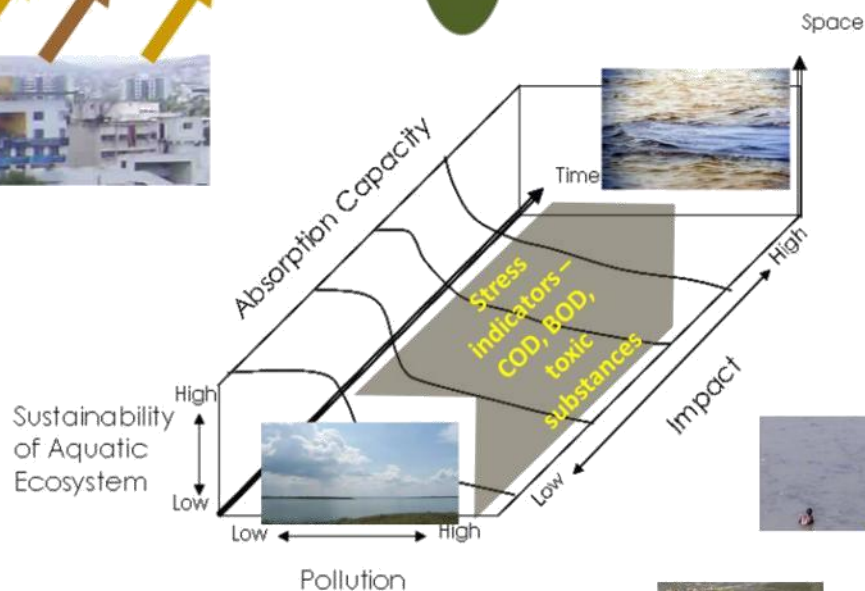
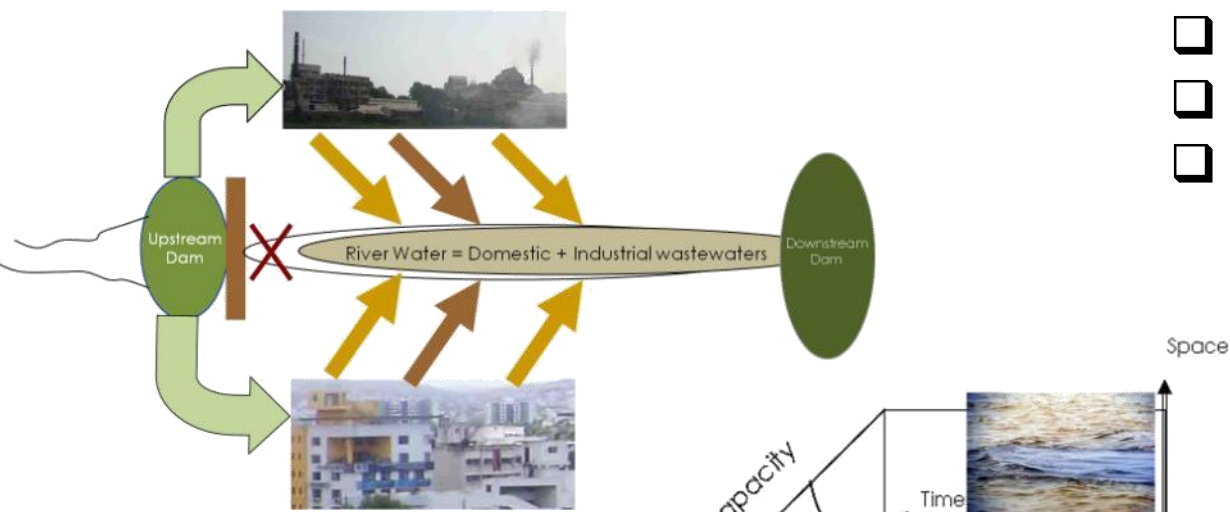
***Pollution: Major Cause of Economic Losses,
Stunted development in many regions***

Transformation of River into Gutter: Impact of City Development on Mutha River Is it Urban Culture?

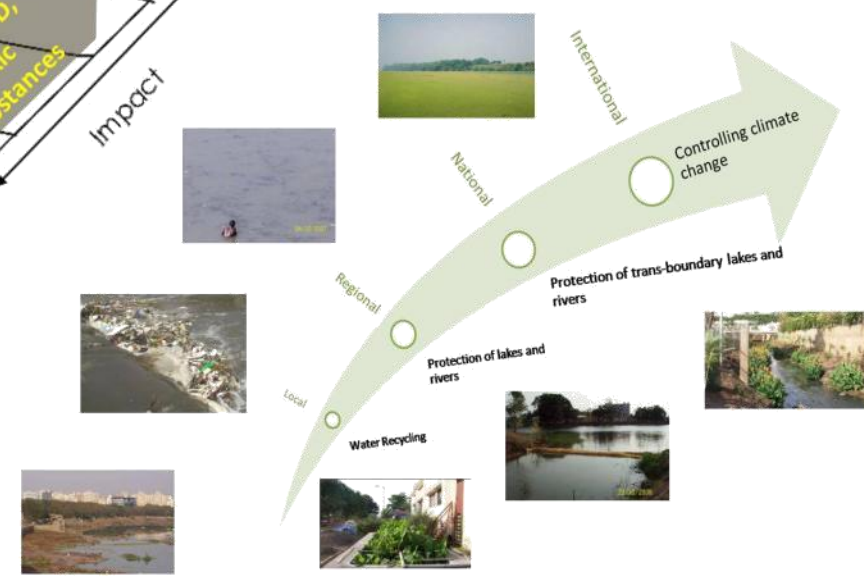


Issues of Waters – Rivers and Lakes

- Encroachment
- Pollution
- Losses / alterations of Hydrologic Cycle due to hydromodifications



- Local to Global Problem
- Decentralized issues
- Centralized infrastructure without due credit to ecosystem processes



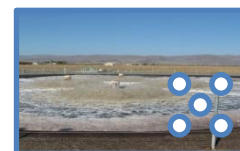
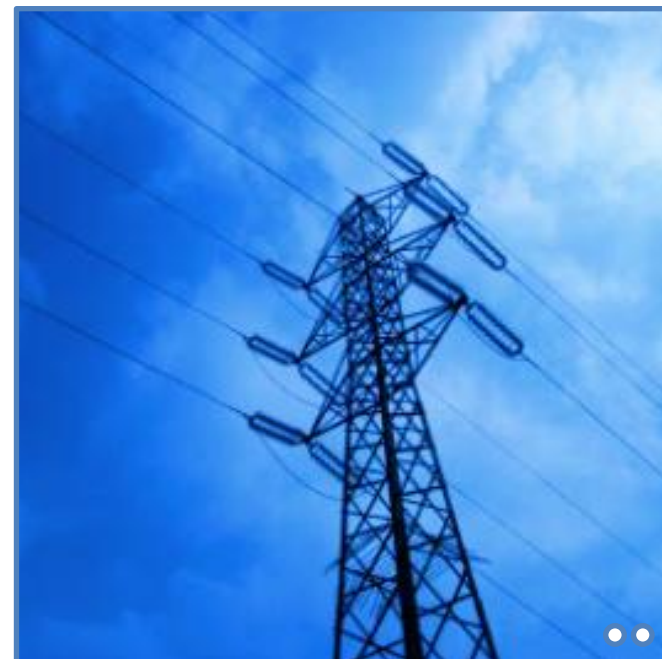
Aftermaths of the GAP Phase-I Schemes for Varanasi



1. BOD in the religious bathing area is high even after completion of the GAP I. The BOD is as high as 25 mg/l at the confluence of Ganga and Varuna.
2. Fecal coliform varied from 70000 mpn/100ml to 1.5 million/100ml.
3. In unpolluted upstream area of Assi river - 2mg/l of BOD and undetectable fecal coliform.
4. Treated sewage coming out from STPs has BOD >50mg/l; suspended solids >100mg/l; fecal coliform levels remain very high.
5. About 90 per cent of pollution into the holy river is caused by sewage generation while only about 5 to 6 per cent industrial effluents can be blamed for river pollution.

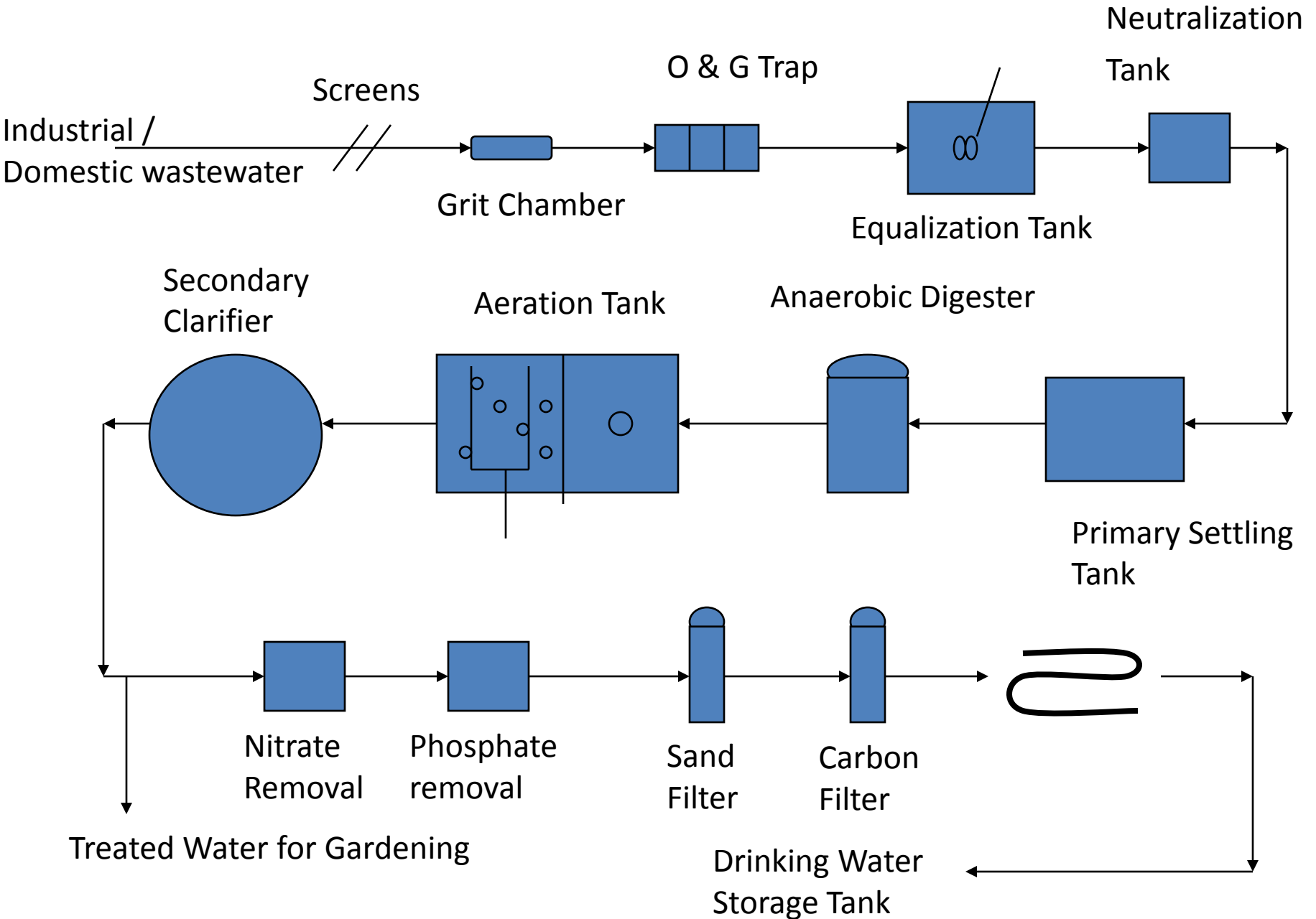
(Ref.: <http://www.eoearth.org/view/article/153800/> accessed on 28/05/2014)

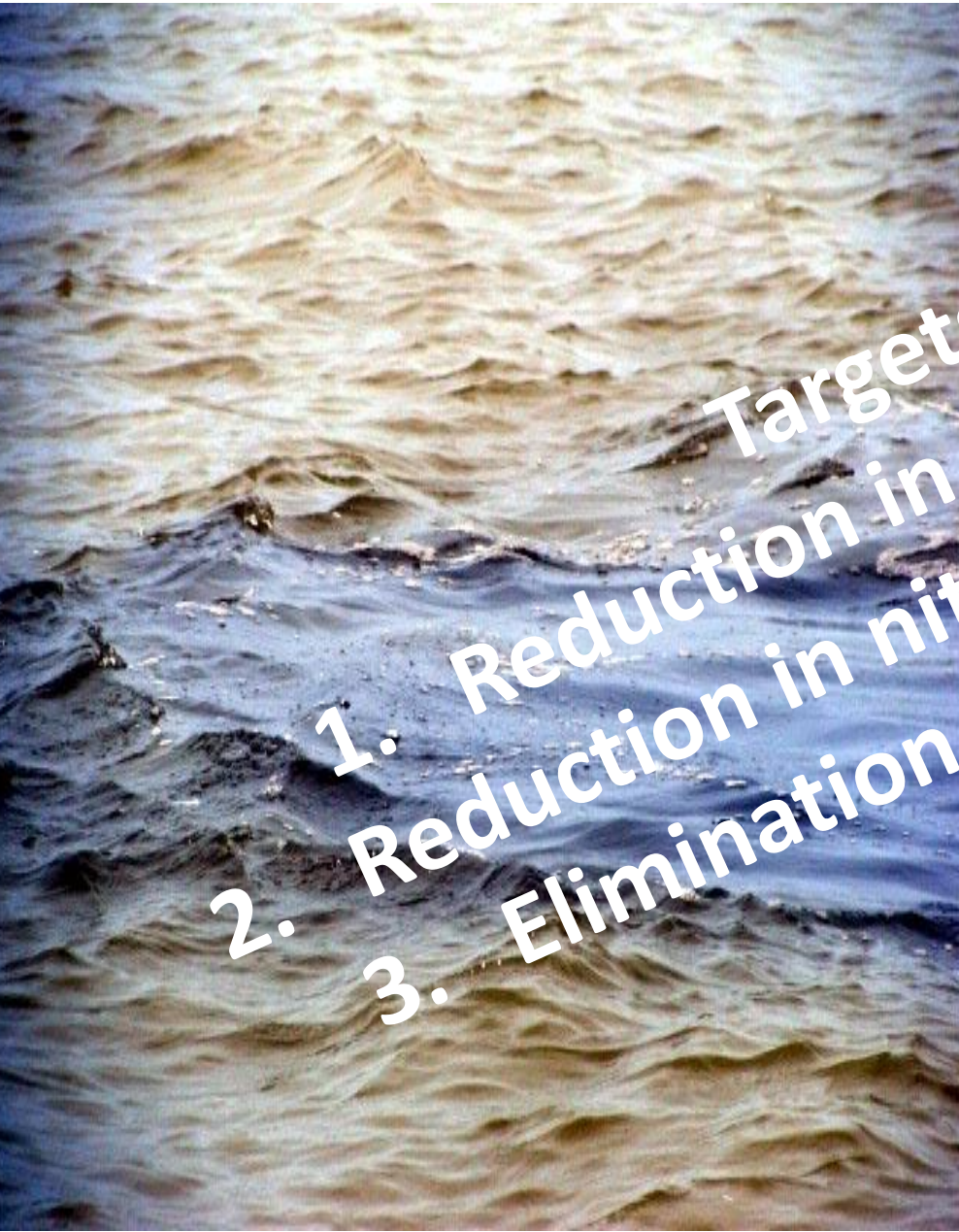
Conventional Solutions



○ Land ○○ Electricity ○○○ Chemicals ○○○ Infrastructure ○○○ Odor

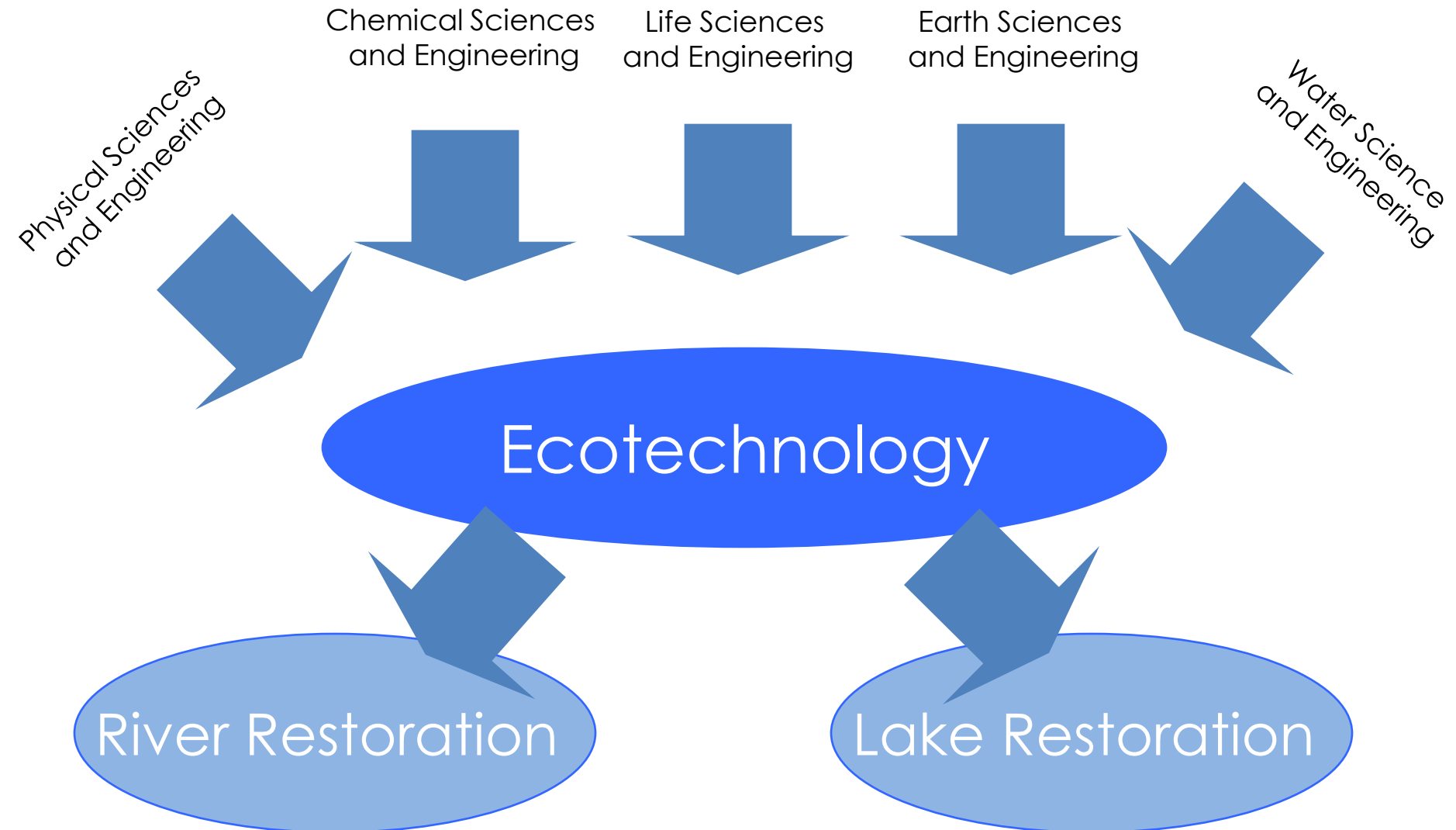
Typical Treatment Process Flow Chart





- Targets**
1. Reduction in Methane Gas
 2. Reduction in nitrate concentration
 3. Elimination of fecal coliforms

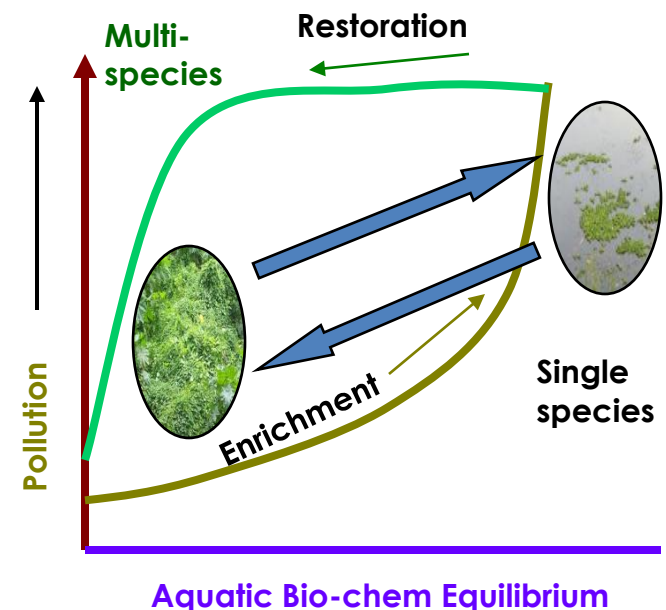
What is Ecotechnology?



Living systems in action for pollution treatment

- ✓ Expression of multi-species intelligence
- ✓ Supple and magnanimous as possible, thus keeping away drastic and irreversible consequences when something wrong, unexpected happens
- ✓ When changes occur in the natural systems due to external inputs, biogeochemical cycles and food chains are reorganized and balanced
- ✓ Emergence of a new dynamic order suitable to the environmental changes superimposed on it

Bio-dynamics of aqua-environ-equilibrium



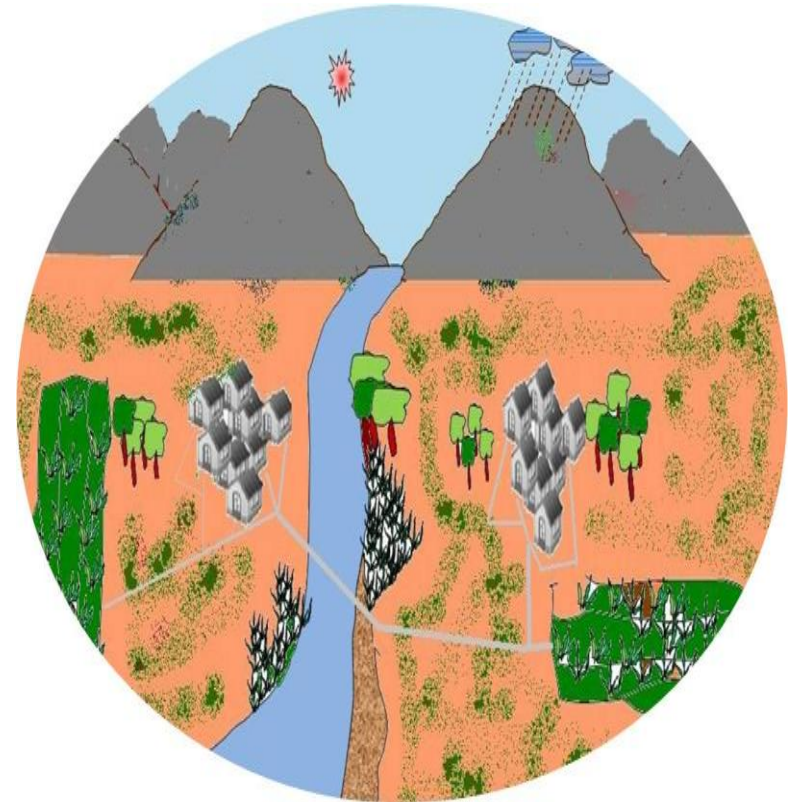
Living systems in action for pollution treatment



- ✓ One organism's waste is other's food
- ✓ Secondly, the green plants absorb carbon dioxide from the atmosphere
- ✓ Pollutants transferred to natural cycles i. e. biogeochemical cycles
- ✓ Carbon gets stored in vegetation and subsequently in the soil.

Ecological Restoration

Not infrastructure but eco-health improvement



It's Not ASSET but
PROCESS

Why Ecotechnology?



- ✓ No chemicals
- ✓ No machinery
- ✓ No electricity
- ✓ No hazardous waste generated
- ✓ 100% odour free treatment
- ✓ 100% control of mosquitoes and flies
- ✓ Helps reduce climate change (Green house effect)
- ✓ Enormously space saving
- ✓ Low investment
- ✓ Negligible maintenance: 1 Gardner for one hour per week
- ✓ No operating cost
- ✓ Short lead time
- ✓ Fast return on investment
- ✓ Single stage process, tailor made solutions



Cost Effective without compromising the results

SERI's Eco-technological Solutions

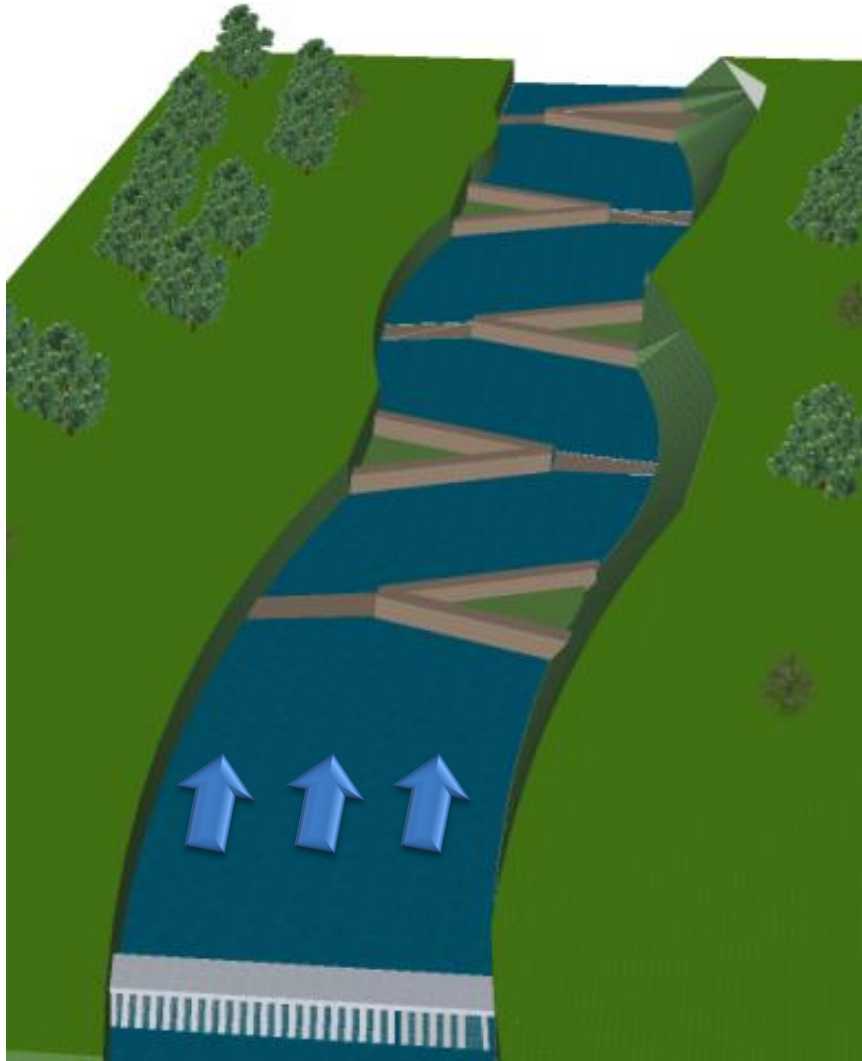


“Ecotechnology is an applied science that seeks to fulfill human needs while causing minimal ecological disruption, by harnessing and subtly manipulating natural forces to leverage their beneficial effects. “

- Wikipedia



Ecotechnological Solutions



Green Bridges

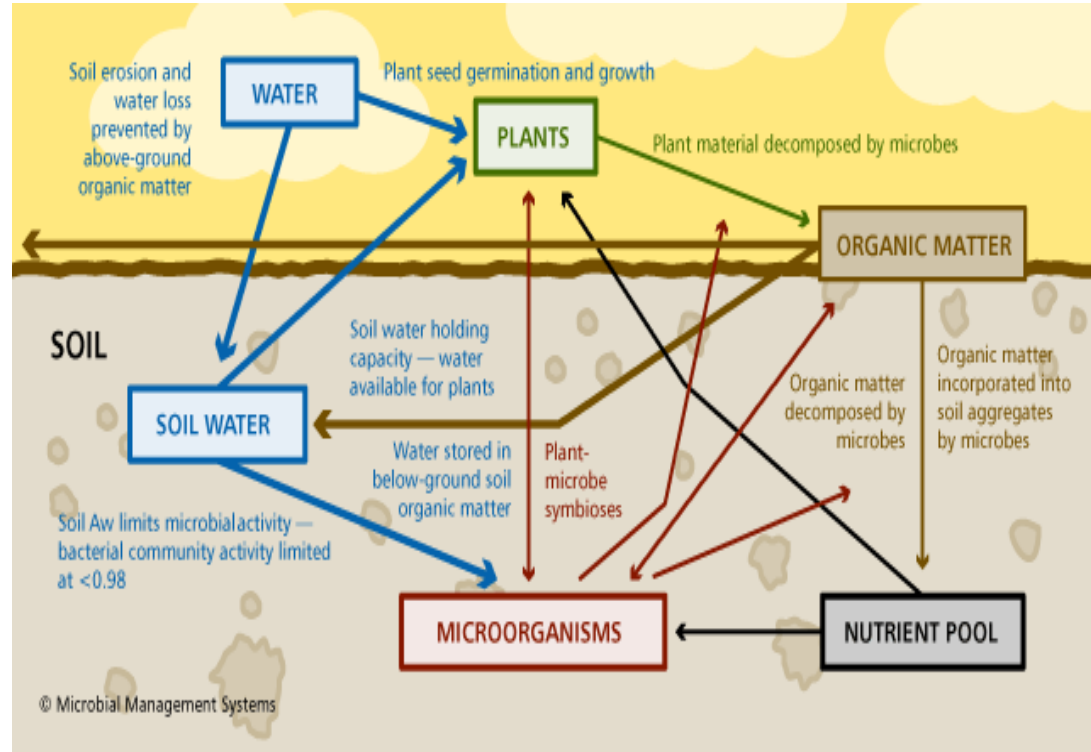
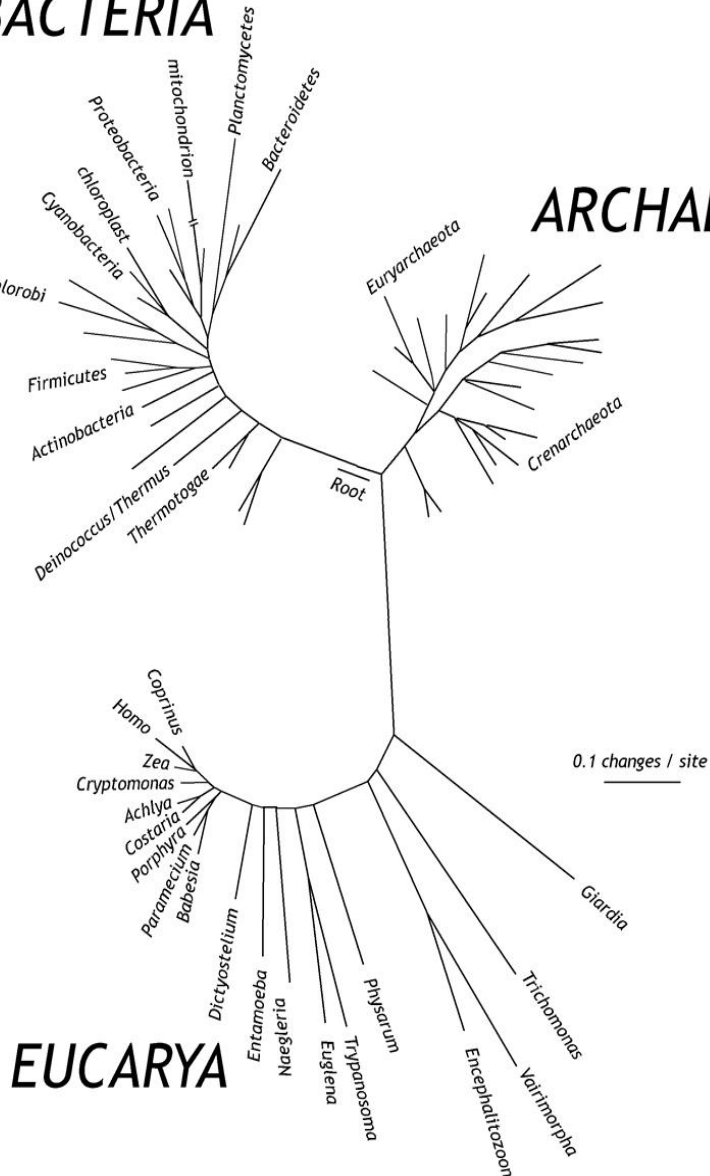
The horizontal eco-filtration system
A grafting of ecological system to
treat the pollution flowing through the
streams and rivers



Processes of Microbiology, Biochemistry & Ecology

BACTERIA

ARCHAEA



Ref. Internet





Green Bridge System: Ecological & Economical Solution



Green Bridge System: Science & Technology



Revitalization of self-purification capacity of water body



Grafting of micro-ecosystem enclosed in stone, sand bridge across the river with green banks with cascades add lot of oxygen to the water & reduces toxicity

Performance assessment of ecological restoration project

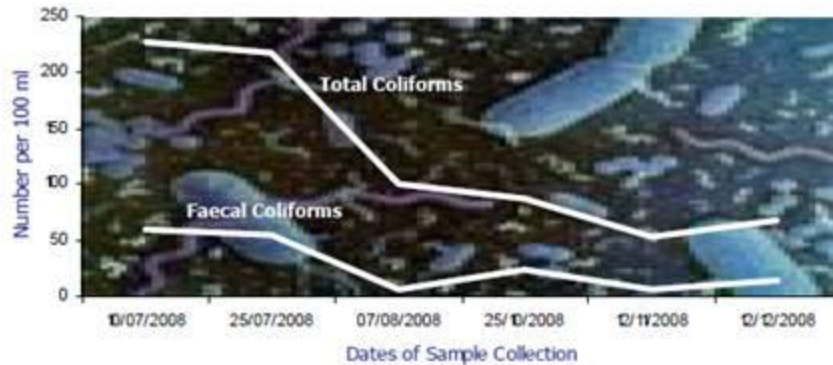


Ecological quality index (EQI) - measure of healthiness of rivers and lakes with sufficient dissolved oxygen for life

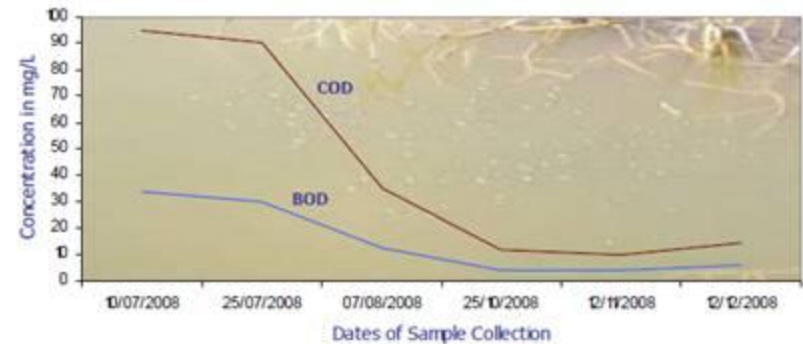
Effectiveness of Ecological Restoration of Medi Kuntha (Lake), Hyderabad



Ecotechnological Effect On Number of Total and Faecal Coliforms in Medi Kuntha Lake, Hyderabad



Ecotechnological Treatment of Organic Pollution in Medi Kuntha Lake, Hyderabad

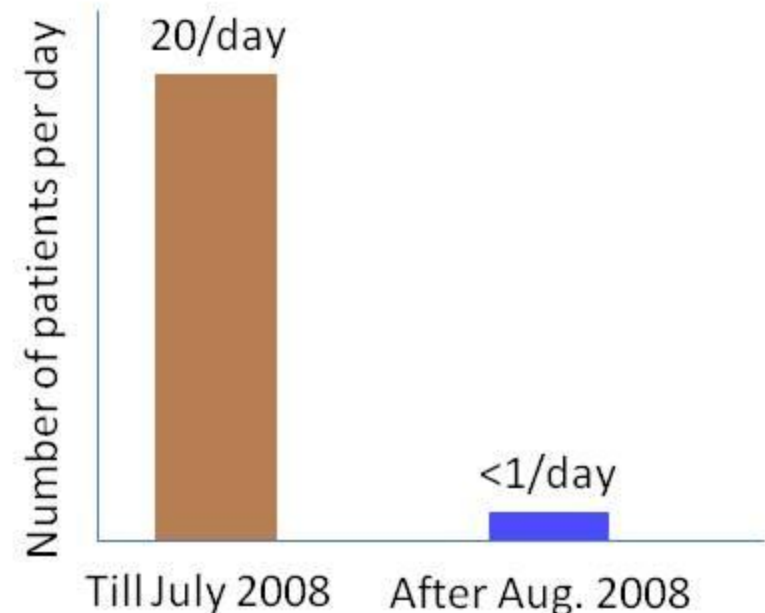


Project Governance

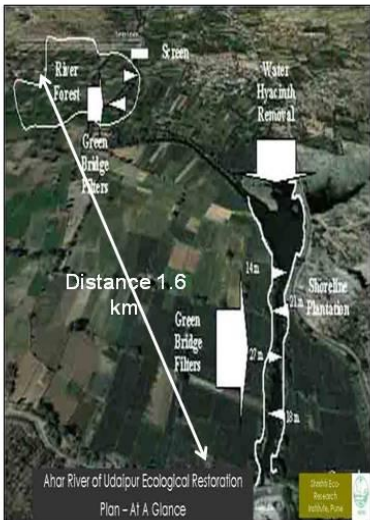
- ✓ Lake adopted by WIPRO from HMDA, Science, technology by SERI, Awareness by IAAB means government & professionals for the people
- ✓ Health improvement of 5000 poor population of Nanakramguda within 40 days



Index of Upgradation



Eco-restoration of Ahar River, Udaipur 2010



Flow of Ahar River	Dry Weather Flow – 94.35 MLD
	Normal Monsoon Flow – 435.46 MLD
	High Flood Flow - 2909.08 MLD
	High flood condition may last for 5 – 7 days. But it is not a regular phenomenon.

Project governance

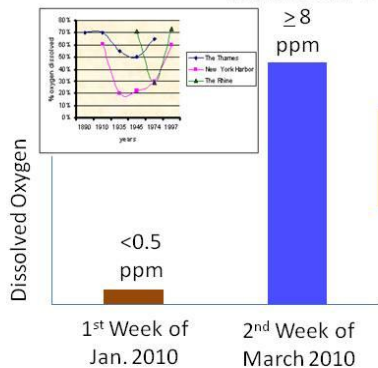
Initiator	NGO – Jheel Samrakshan Samiti
Designer	SERI – private research organisation
Implementer	GRIN - private
Financer	UCCI - industries



Though NLCP funds sanctioned for Udaipur's lakes; could not be given for this innovative project was told by then city commissioner



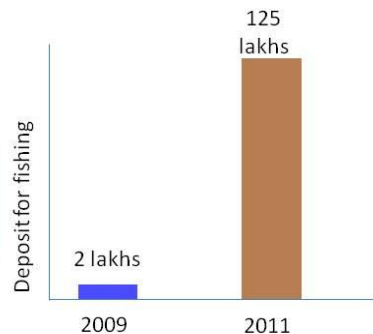
Indices of Transformation



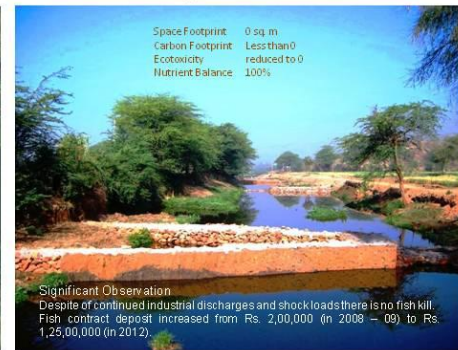
Currently 11,500 kg oxygen is being transferred in the river by bio-oxygenation process = Rs. 3 crores saved!!

162000 CO_{2eq}. Saved!! Ideal case for "Climate Protection"!!!

- Financial capitals converted into -
1. Social capital – 10,000 population came together on water issue
 2. Ecological capital – increased by 62.5 times in 2 years
 3. Benefit to poorest of poor – a victim of pollution in the region



Uniqueness of Ahar Project



Uniqueness of Ahar Project

- ✓ Dissolved oxygen from 0 to 5 ppm took 60 years in Thames River restoration programme & IN AHAR IT TOOK 60 DAYS ONLY!!
- ✓ Project Governance - Project by people for people – cultural expression of ecology
- ✓ Actions for long term benefits of poorest poor

Presented in SAARC IILBM Hertware Meeting 2013, Bhubneshwar,, India.



Ecotechnological Solutions

Effectiveness of Green Bridge System



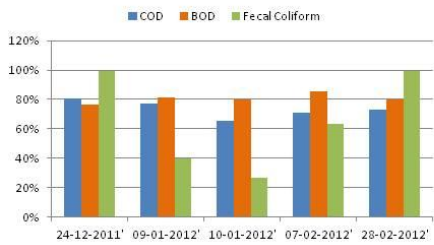
Reduction in Foam

Rasoolabad Stream Restoration Project: 2011 - 2012



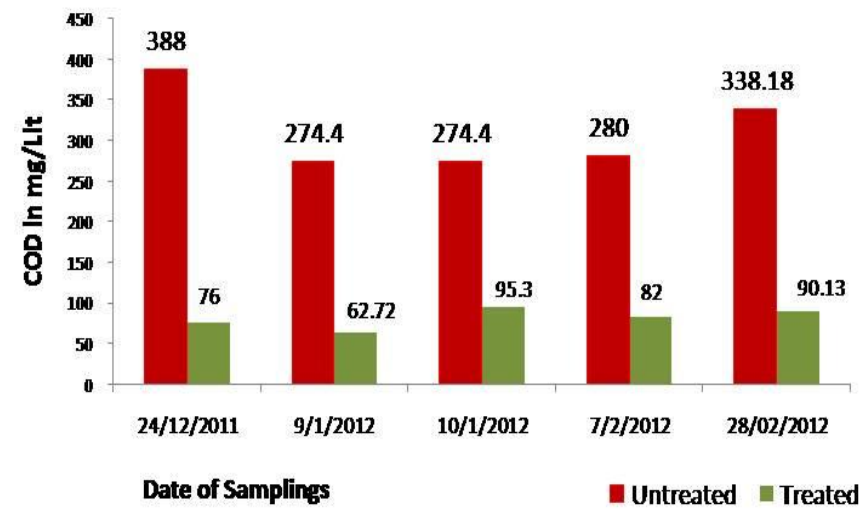
- ✓ Initiative by religious NGO – Ganga Sewa Abhiyan, designer SERI, implementer GRIN
- ✓ Cultural – people’s initiative for river restoration
- ✓ Improvement of water quality in 7 days; was demonstrated in Kumbha also

Index of Water Quality Upgradation



• Presented in SAARCILBM Hartware Meeting 2013, Bhubneshwar,, India.

COD Reduction in Rasoolabad Drain No. 1, Allahabad, UP



CITY



GIPE CAMPUS INCHARGE PULLED UP IN TREE HACKING INCIDENT
Page 4



TRAVEL AGENTS BARRED FROM TICKETING FOR KINGFISHER
Page 6

PuneMirror 2
THURSDAY, MARCH 8, 2012
www.punemirror.in/city
editfeedback@indiatimes.com

City NGO builds successful Green Bridges to save the Ganga

Devidas.Deshpande
@timesgroup.com

Although Central government agencies engaged in cleaning up the pollution-choked Ganges have met with little success even after spending huge amounts of funds, a small project spearheaded by city-based NGO Shrishti Eco Research Project (SERI) at Allahabad has reportedly achieved some success.

SERI has built five bridges that filter and clean the water at Ganga’s confluences so that relatively clean

water flows into the river. Owing to its filtering ability and no-energy cost, the system is called Green Bridge. Five such ‘green bridges’ were built at the Rasoolabad Ghat of Allahabad, just before the confluence of the Ganga and Yamuna rivers.

Dr Sandeep Joshi, head of SERI, told *Pune Mirror*, “Our aim was to show concerned authorities that the successful application of zero-electricity, low-cost technology is possible in a short time. The target was to complete the installation before the Magh Mela on January 9.”

Work on the project started in November 2011 after floods receded in Rasoolabad, involving cleaning the channels filled with solid waste and cattle waste.

A system was installed in the channels to filter solid waste. The organisation claims that the systems are effectively removing up to 90 per cent of suspended solids and up to 100 per cent of black colour and anaerobic odour. SERI designed and provided expertise, while Pune-based Green Infrastructure provided logistics support.

Dr Joshi and his team were invit-

ed by the Swami vimukteshwaranand Saraswati to conceptualise and design the Green Bridges. They were guided by Dr G D Agarwal, former member secretary of Central Pollution Control Board, known as Swami Gyan Swarup ‘Sanand’.

Interestingly, 82-year-old Swami Gyan Swarup is currently agitating to make the Ganges pollution-free, opposing the new hydro-power plants there. From January 15 to February 7, he abandoned food. Since February 8, he has abandoned eating fruits as well.



The choked nullah on the Ganga was successfully cleaned after the project

Buddha Nallah Ecological and Economical Restoration (NEER) Project



Nodal Agency
Punjab State Government

Design of Green Bridge Technology for Buddha
NEER Project

Shrishti Eco-Research Institute, Pune

Implementation Agency
Green Infrastructure, Pune



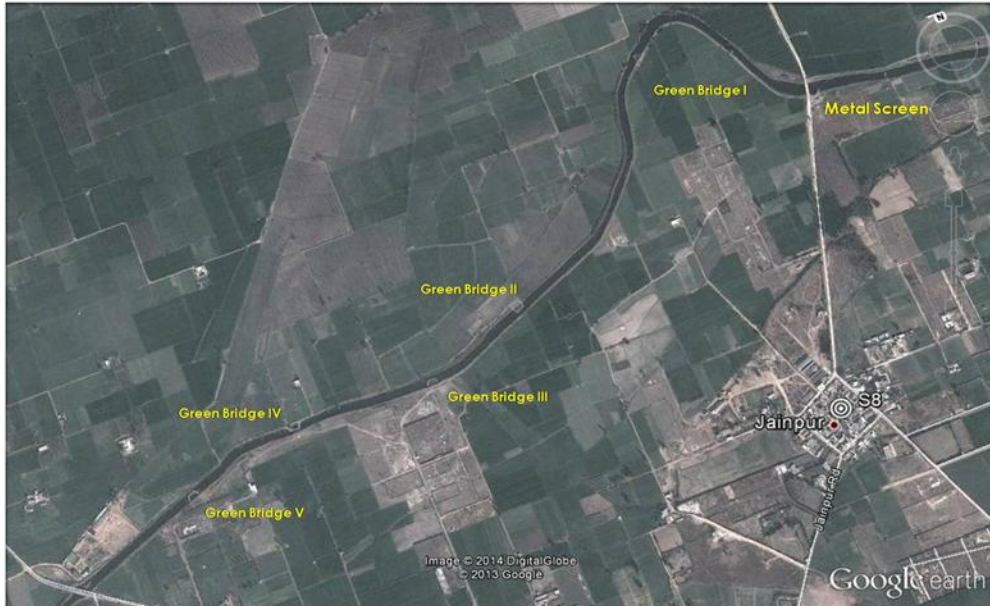
Local Co-ordinators
**Punjab Pollution Control Board, Ludhiana
& Patiala, NCRD, CPCB.**

Funded by
MoEF

Non-Monsoon flow of Buddha Nallah 600 MLD

Green Structures for revival

of river's self-purification capacity Buddha NEER Project with support from MoEF, NRCD, CPCB



Buddha Nallah to get new lease of life with project

CM NOD TO PROJECT FOR ECOLOGICAL RESTORATION

HT Correspondent
chinnewsdesk@hindustantimes.com

CHANDIGARH: Chief Minister Parkash Singh Badal on Monday gave a nod to the Buddha Nallah Ecological Restoration (NEER) Project to be executed by eco-technologist Dr Sandeep Joshi of Pune-based Shrishti Eco-Research Institute (SERI).

A latest biological technology — 'Green Bridge' — would be used for the cleaning of Buddha Nallah in Ludhiana.

According to a government spokesperson, a decision to this effect was taken in a meeting of the Chief Minister held with the SERI team led by Dr Joshi.

Dr Joshi made a brief presentation before the Chief Minister to apprise him about



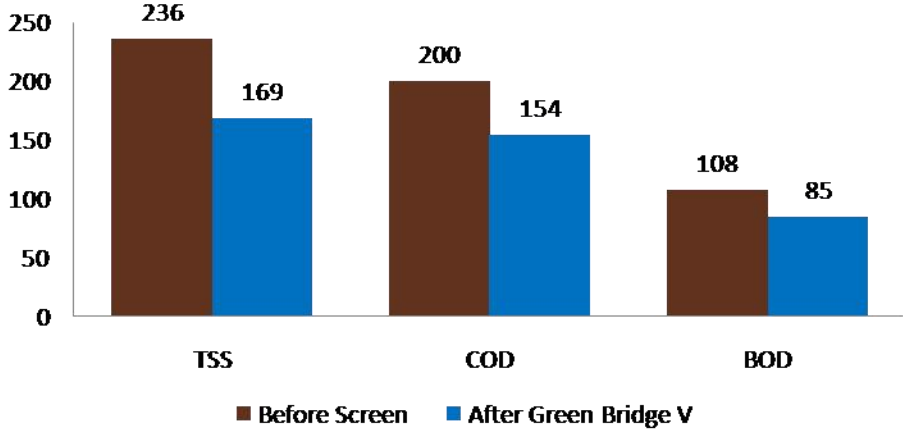
Punjab Chief Minister Parkash Singh Badal reviewing the Buddha Nallah Ecological Restoration (NEER) project in Chandigarh on Monday.

the technology to be adopted for cleaning of Buddha Nallah on the basis of preliminary report during his two-day visit for on-the-spot assessment of the entire 47.25-km stretch of Buddha Nallah along with the officials of Punjab Pollution

Control Board. Central Pollution Control Board (CPCB) chairman Dr S.P. Gautam had deputed Dr Joshi to undertake the study of the Buddha Nallah to recommend an appropriate technology for its ecological

restoration. Badal asked Dr Joshi to implement the project at the earliest after the preparation of a detailed project report, likely to be submitted within 10 days to the state government and CPCB.

Ecological Restoration of Buddha Nallah Project, Ludhiana (P)



*This is initial analysis results, project is under commissioning stage



On Going Projects – Narmada at Dharampuri



**Krishna River At Wai-
Conceptual Plan**

Eco-Restoration of Kham River, Aurangabad

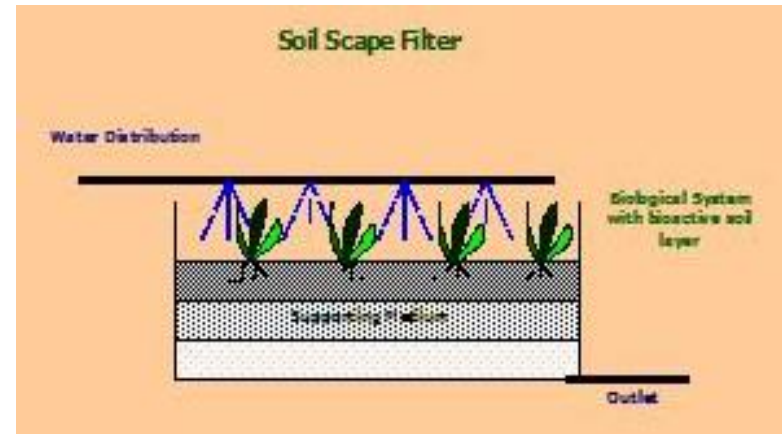


Soil Scape Filter

Applicable for Food & fruit industries, pharmaceutical & chemical units, electroplating, dairies, edible oil refineries, petroleum waste, coolant waste, sewage etc.

It's a simple slow sand filter topped with layers of bio-active (i.e. biologically activated) soil - Organotreat - ecofriendly material.

- * Gravity filtration with attached growth; no sludge system; Area as good as Aerobic Treatment System
- * Aerobic process but no demand of electricity for aeration



"Sewer to Pure Stream using Breathing Soils"



- * Green plants maintain system aerobic & engineer growth of microorganisms suitable for degradation of pollutants
- * Self – maintaining and self – sustaining system
- * Minimum maintenance suitable to treat COD up to 2,00,000 mg / L

Some previous Installation of Filtration system

At Nichrome Packaging Solutions, Shirwal

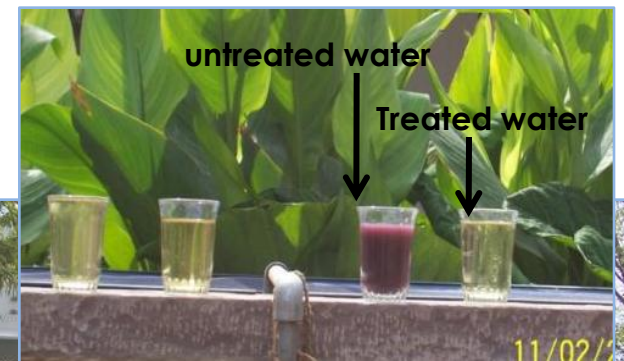


At Pimpri Chinchwad New Town Development Authority, Administration Building, Pune



The Soil Scape Filters at Jaipur, being used at a textile unit employing natural dyes for colouring

The treated water at this unit is equivalent to the untreated water diluted 4000 times! Notice the difference





SSF installed just behind the stage at prestigious resort



SSF installed around the play ground at residential complex

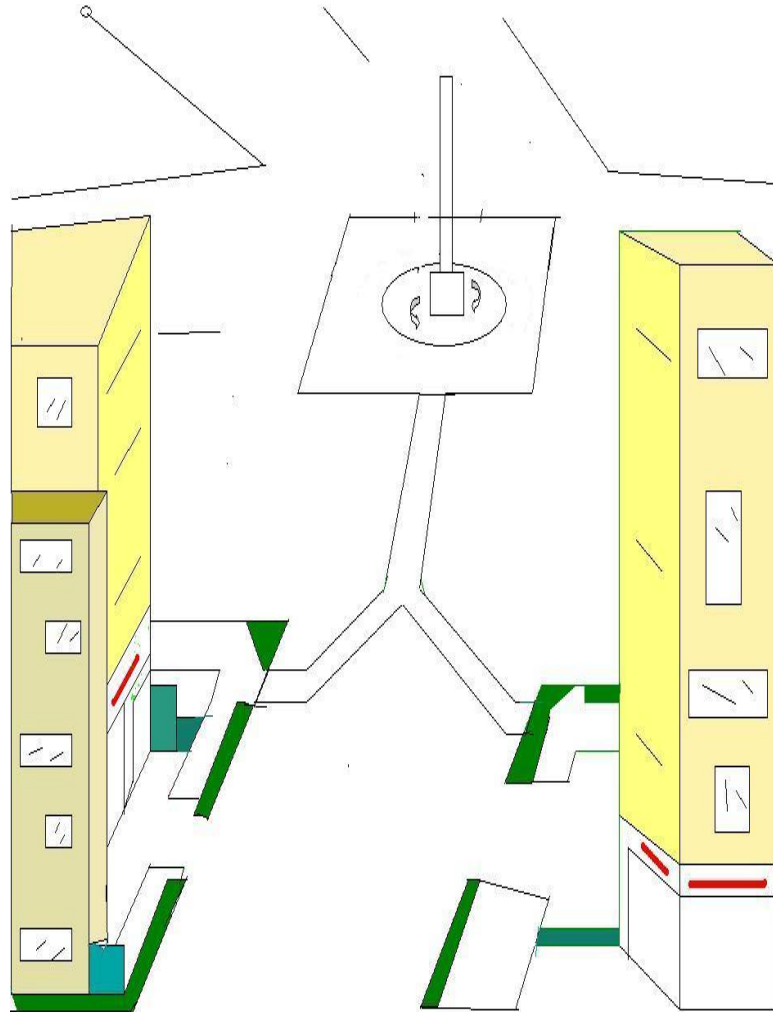
Compliance with Pollution Control Board Norms

Sr. No	Parameter	Recommended standards for discharge of waste water	Untreated waste water quality	Expected outlet quality from Soil Scape Filter	Improvement
1.	pH	5.5 - 9	7.5 – 8.2	6.5 – 8.0	NA
2.	TSS mg / L	100	180	60 - 80	55%
3.	COD mg / L	250	400	100 – 150	62.5%
4.	BOD mg / L	30	200	10 – 16	92%
5.	Oil & grease mg / L	10	15	2 - 3	80%

SSF installed at prestigious complex in Goa



Treatment of sewage from individual houses, colonies, apartments and slums along the roads



Innovative idea is to use sewage ecotreatment units parallel to roads in the city – in Pune city, total length of the roads is 1800 km out of which 25 % are having width 24 m.

If the width of about 2 – 4 m of Green channel for the sewage treatment is added to 24 m, then it will ease the problem of sewage conveyance to outskirts of city and issues like rehabilitation raised due to laying of sewage pipeline.

Advantages

- Minimum electricity requirement
- Treated wastewater can be use for fountains in the squares, recharging of groundwater, and rivers
- Plants help in reducing dust pollution

Evaluation of Ecological Restoration Using New Performance Criteria



Sr. No.	Parameter	Conventional Aerobic / Anaerobic Treatment	Ecological Restoration	
			Ahar River	Medi Kuntha
1.	SAB	1.2	8.7	6.4
2.	CFC	1	8	8
3.	NSR	0	48	36
4.	CF	2.5	0.16	0.09
5.	SF	1	0	0
6.	NB (C:N)	40	5	2.5
7.	EE	4.3	37.23	92.9
8.	COP	0	10	0

Where—

SAB - Saprobic to Aerobic Biodiversity

NSR - Native Species Recurrence

SF - Space Footprint

EE - Economic Efficiency

CFC - Complexity of Food Chain

CF - Carbon Footprint

NB - Nitrogen Balance

COP - Community Ownership of Project

• Presented in Ecosummit 2012, Columbus, US

Project Governance



Ecological Science & Technology

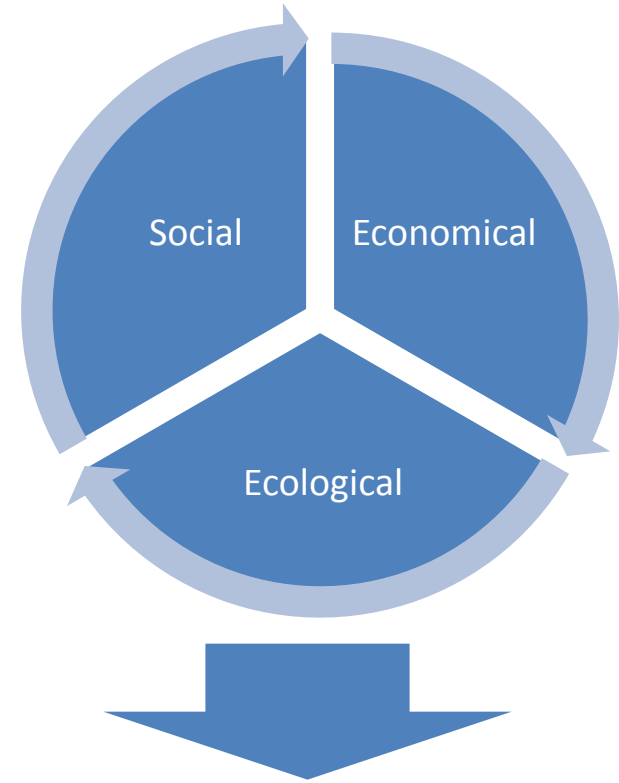
- Green surgeons &
- Green curators

Project Stewardship

- MOWR
- MoEF
- Urban, Irrigation & Agriculture
- CPCB, SPCBs

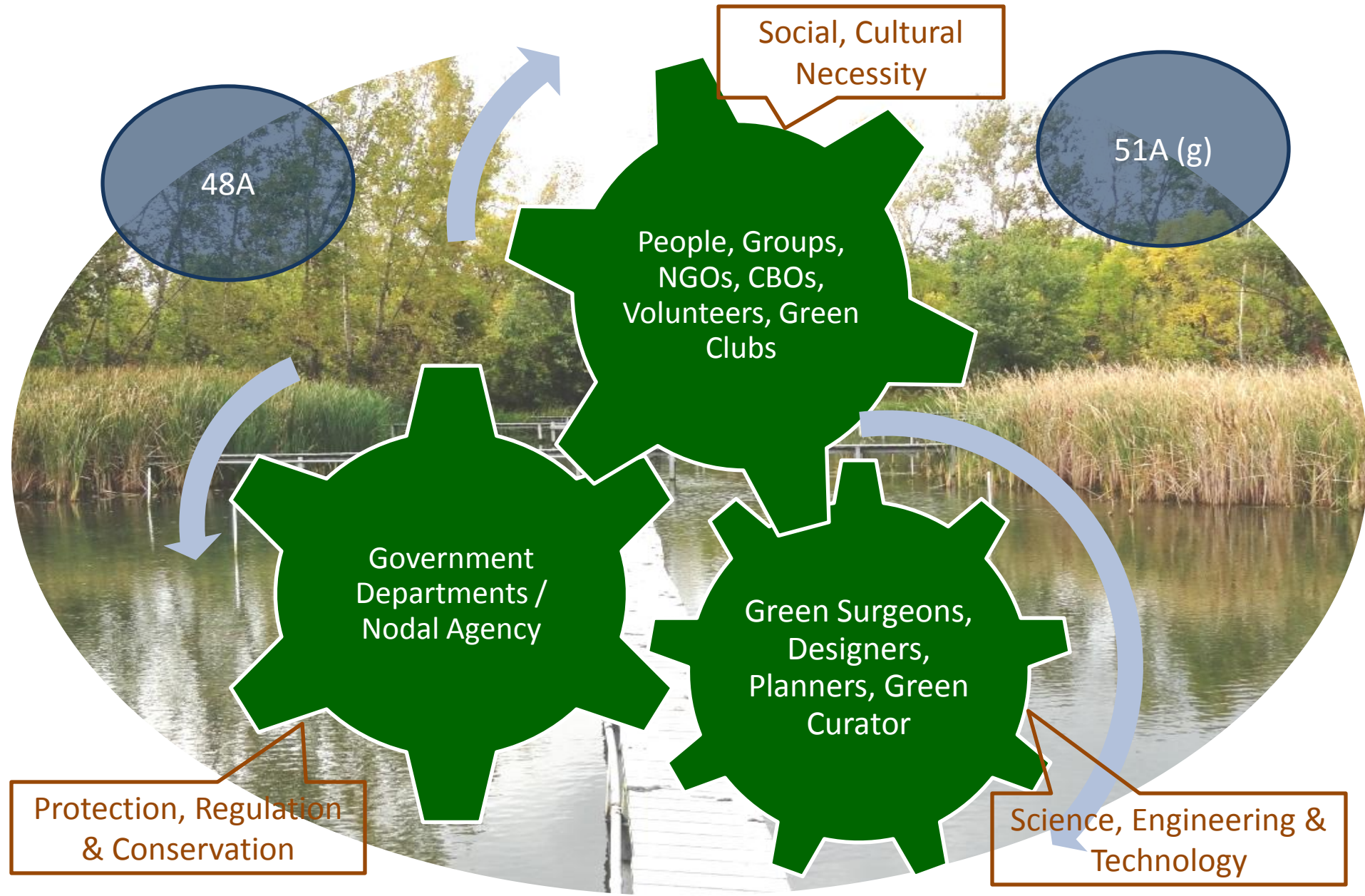
Monitoring & Assessment

- Public participation
- Students
- Labs



Sustainable Water
Resources Management

Governments' Environmental Accountability and Responsibility of Lotic (Stream) / Lentic (Lake) Restoration Project Management



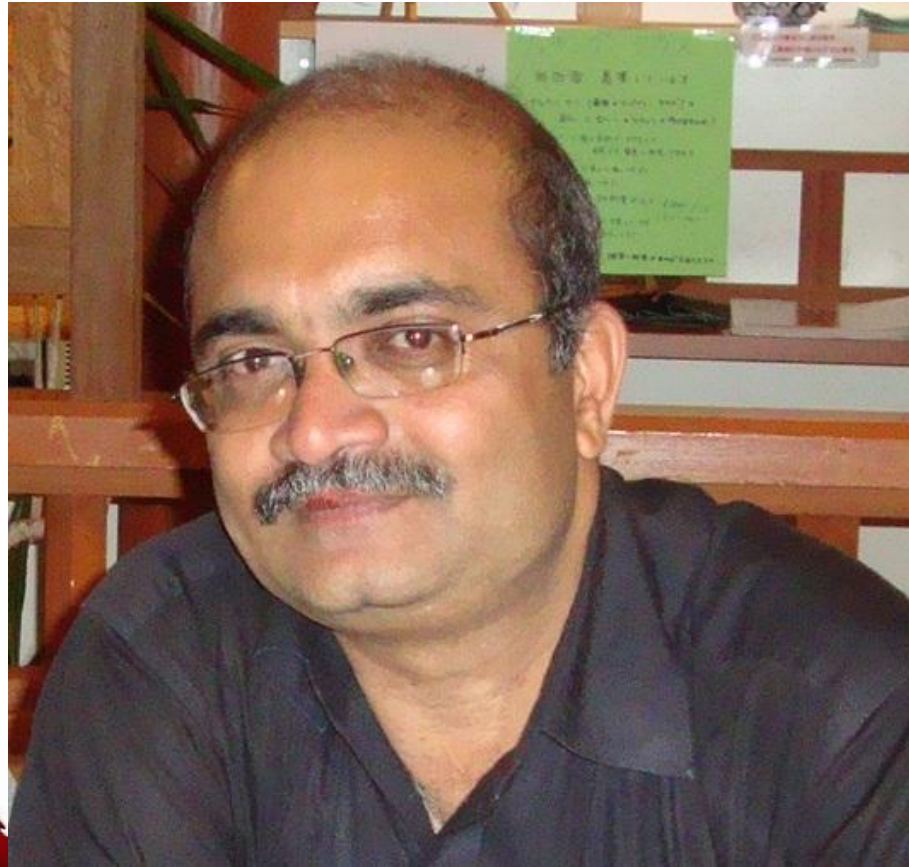


Rebirth of Streams & Lakes With Ecotechnology & Ecological Engineering

Shrishti Eco-Research Institute
B-106, Devgiri, Opp. P. L. Deshpande
Garden, Near Ganesh Mala, Sinhagad
Road, Pune - 411 030 Phone: +91-20-
- 24253773 TeleFax: +91-20-
66206539
Email: seriecotech@yahoo.co.in

In association with -
1. Green Water Revolution Pvt. Ltd.
Pune
2. TransNVtech, Pune

WE SALUTE THE WISDOM, VISION and THE PASSION



Shri. Sandeep Joshi

[7 Jan '67 – 23 Sep '14]

Founder Director, SERI.

