

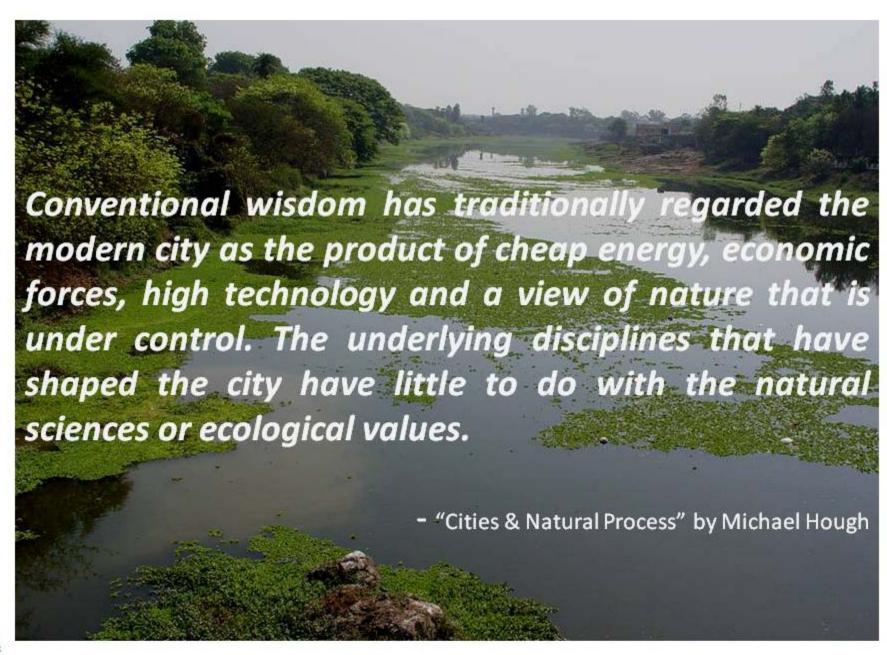
Green Bridges Ecotechnological Solutions for the Basin Governance

To Maintain the Water Quality of Hydrologic Cycle in Microwatersheds

Sandeep Joshi

Director Shrishti Eco-Research Institute, Pune, INDIA.







Current Scenario of Water Pollution



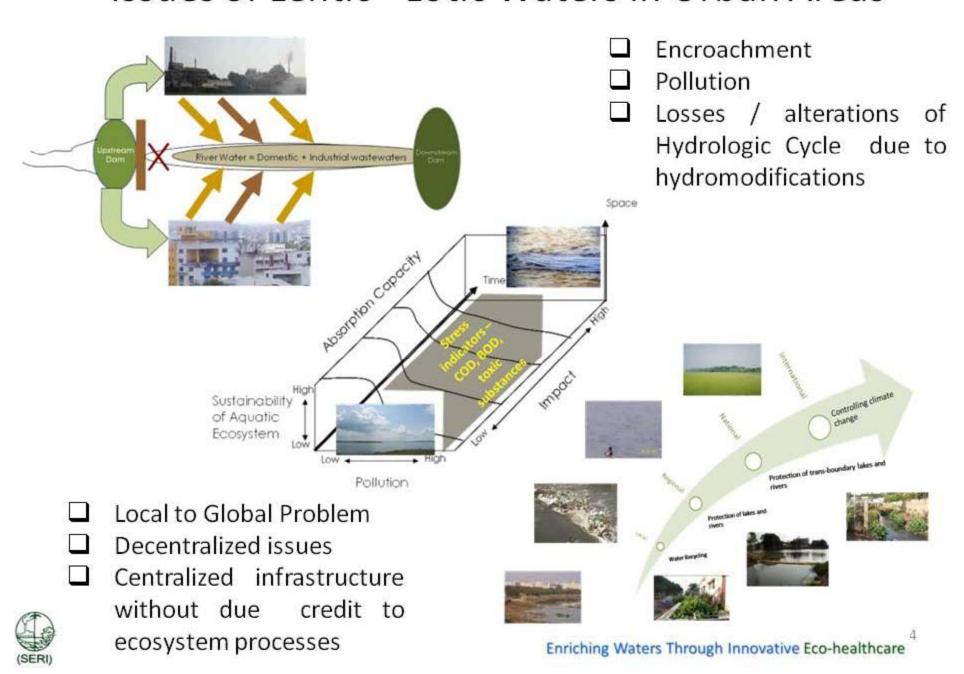






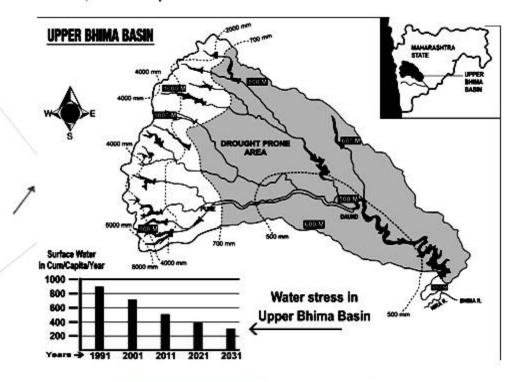


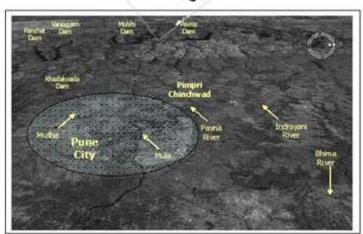
Issues of Lentic - Lotic Waters in Urban Areas



Ujjani Basin

Catchment – 14,700 sq. km

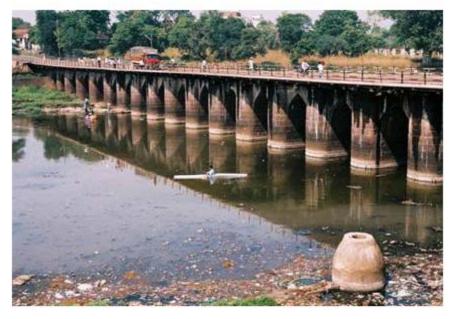














(SERI)



Yamuna: Receiver of Waste Streams









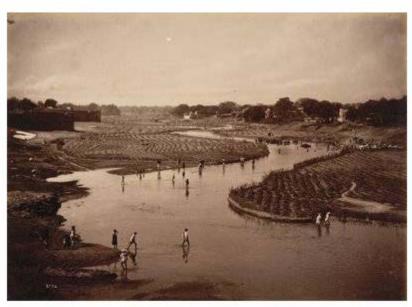


Musi River in Hyderabad: Lost it's Glorious Past!





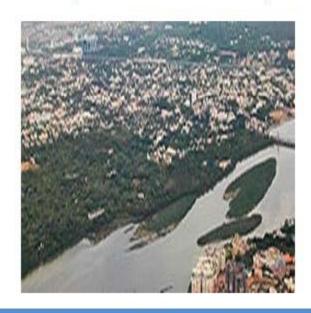




*With thanks to image up-loaders

What is needed for Pollution Control Mission?

- ✓ A team of "Green Surgeons"
- ✓ Sincere, honest, punctual, committed ground staff at every facility (Pollution Control Hospital)
- ✓ Assured sustainable finance for rejuvenation of existing infrastructures to ensure quality outcomes
- ✓ Insulation from politicization, administrative delays, hurdles, inactions and corrupt practices
- ✓ Ecosystem approach and ecotechnology for revival of self-purification capacity of lakes and rivers of India
- ✓ People's audit of such systems and / or tourist-learning destination for common man.



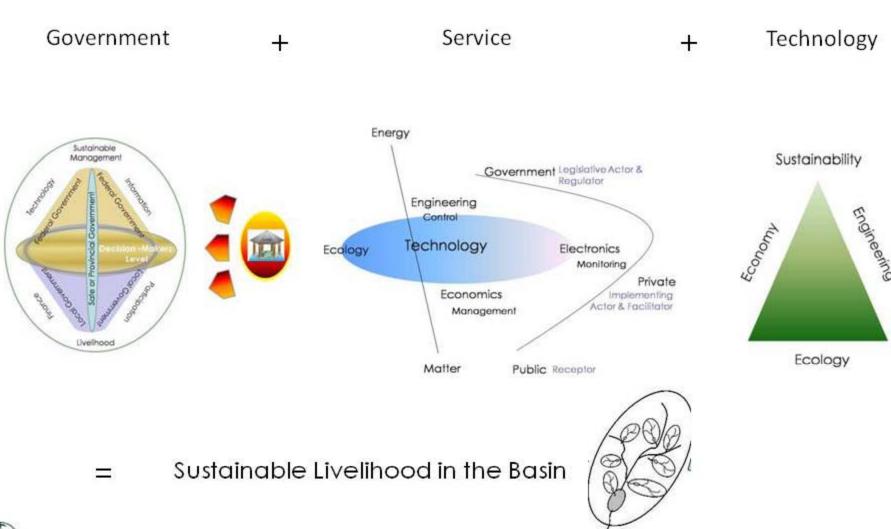




Adyar River: 98% Effluents; 42.5 km length (24 km Metro area); flow about 1000 MLD (?)



Governance Equilibrium in Lentic – Lotic Basin





GEARs of Lotic (Stream) / Lentic (Lake) Restoration Project Management

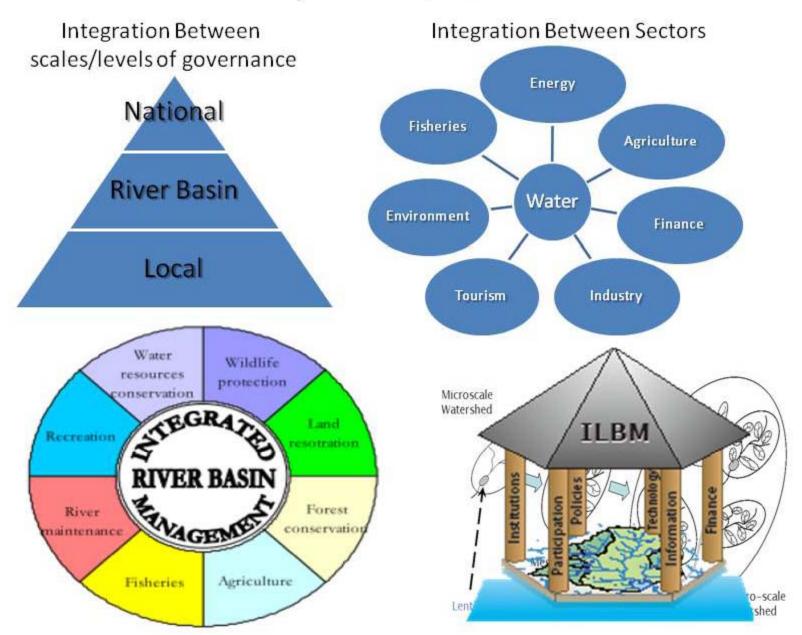


Examples: Roles of Each of the Green Wheel for Sustainable Lentic-Lotic System Management



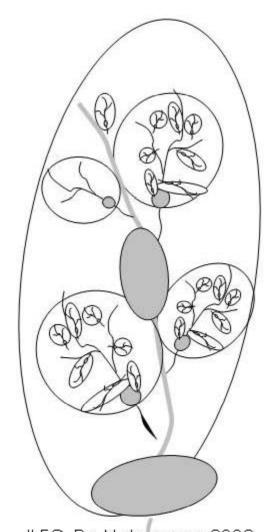
Activity	Nodal / Supporting Agencies	Green Surgeons, Analysts, Curators	People & organizations	
Policy framing for local action / plan	Lead role	Scientific support	Workable inputs	
Institutional mechanism	Commitment to cooperate with intra – & extra – governmental institutions	Commitment to designed & desirable outputs	Participation & cooperation for better actions & outputs	
Technology	Institutional memory for long term action plan	Consistency / constancy of actions & performance	Social adaptation & harmony	
Finances	Uninterrupted, as & when required	Lead role to economize the eradication & monitoring	Contribution by social & industrial organizations	
Audit	Financial by government auditor	Process / technical by planner /designer of treatment system or any other trained by designer	Social audit & feedback	

IWRM, IRBM and ILLBM





Green Bridge System



ILEC, Dr. Nakamura, 2009



- Culmination of 25+ years of research
- 100% Natural Process
- Reinvigorates the natural Ecosystem
- Truly sustainable
- · Carbon positive
- Nitrogen positive
- Fecal pathogen control

What is Ecotechnology?

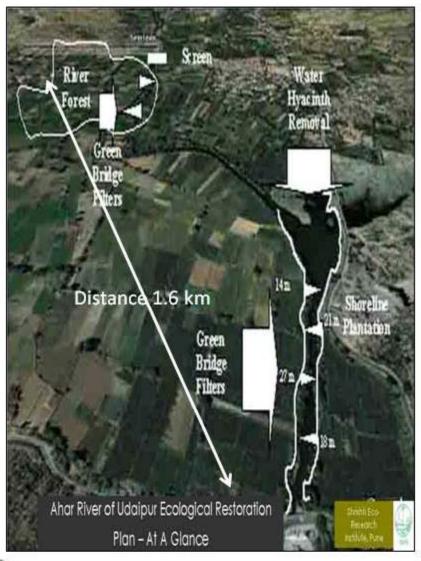
Chemical Sciences Life Sciences and Engineering and Engineerin

River Restoration

Lake Restoration



Eco-restoration of Ahar River, Udaipur 2010

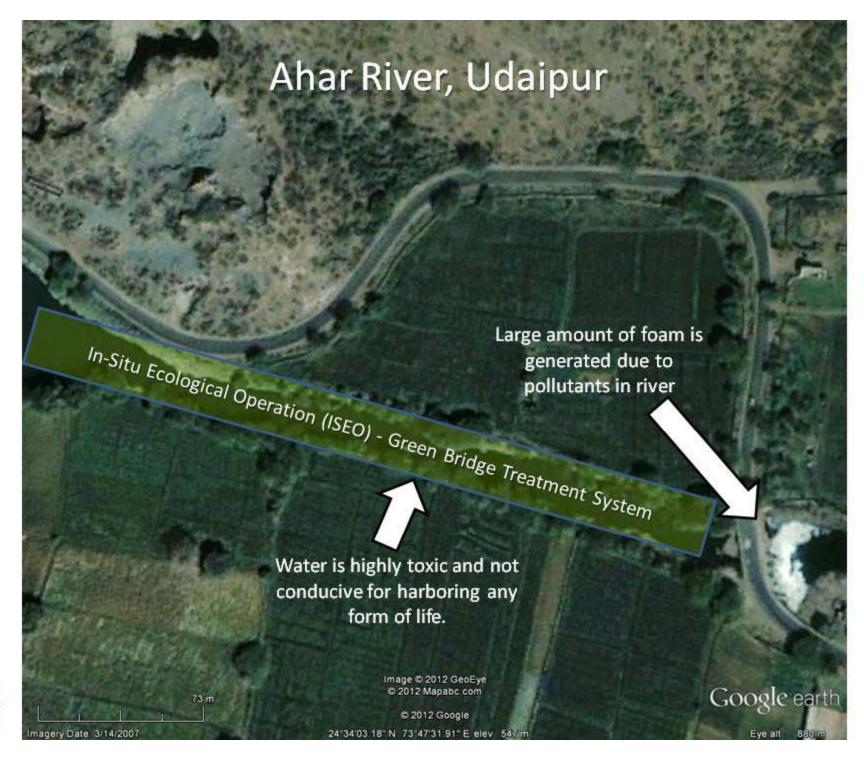


Flow	of	Dry We	ather	Flov	v – 9	4.35 N	۱LD	
Ahar Ri	ver	Normal Monsoon Flow – 435.46 MLD High Flood Flow - 2909.08 MLD High flood condition may last for 5 – 7						
		High Flood Flow - 2909.08 MLD						
		High fl	ood c	ond	lition	n may	last	for $5 - 7$
		days.	But	it	is	not	a	regular
		pheno	meno	n.				

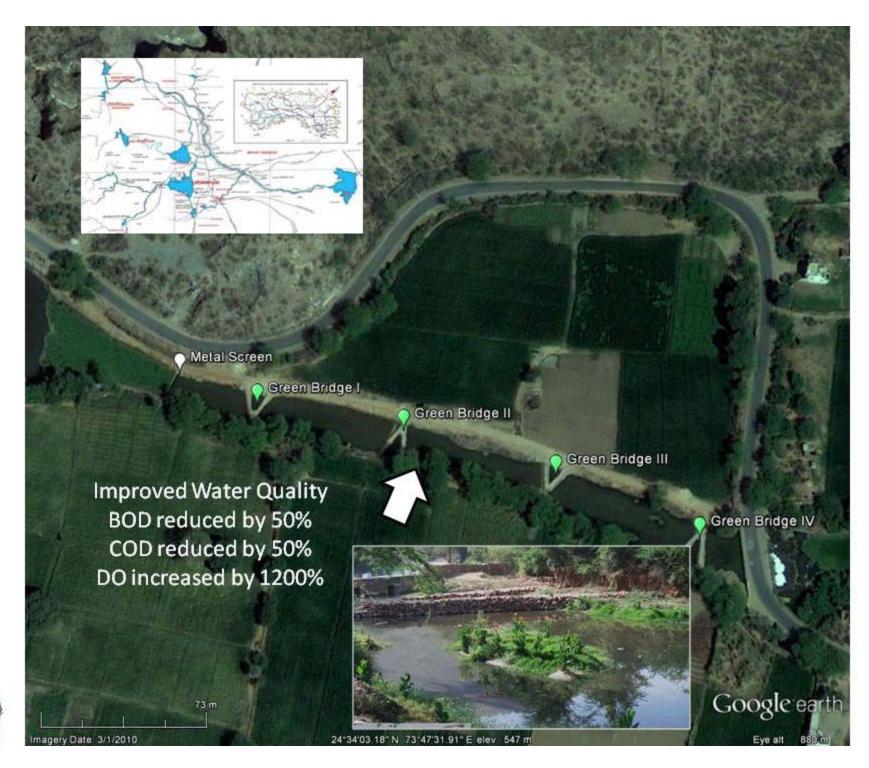
Treatment	Based	on	horizontal	ecofiltration		
Process	process – Green Bridge Filter with metal					
	screen upstream					

- Innovative approaches to engage all relevant interest groups - spiritual, social, technological, administrative and cultural in program to trigger the concept of revival of selfpurification capacity of Ahar River using ecotechnological remediations
- Financial support from local industrial group
- A classic successful example of public-privateprofessionals' participation

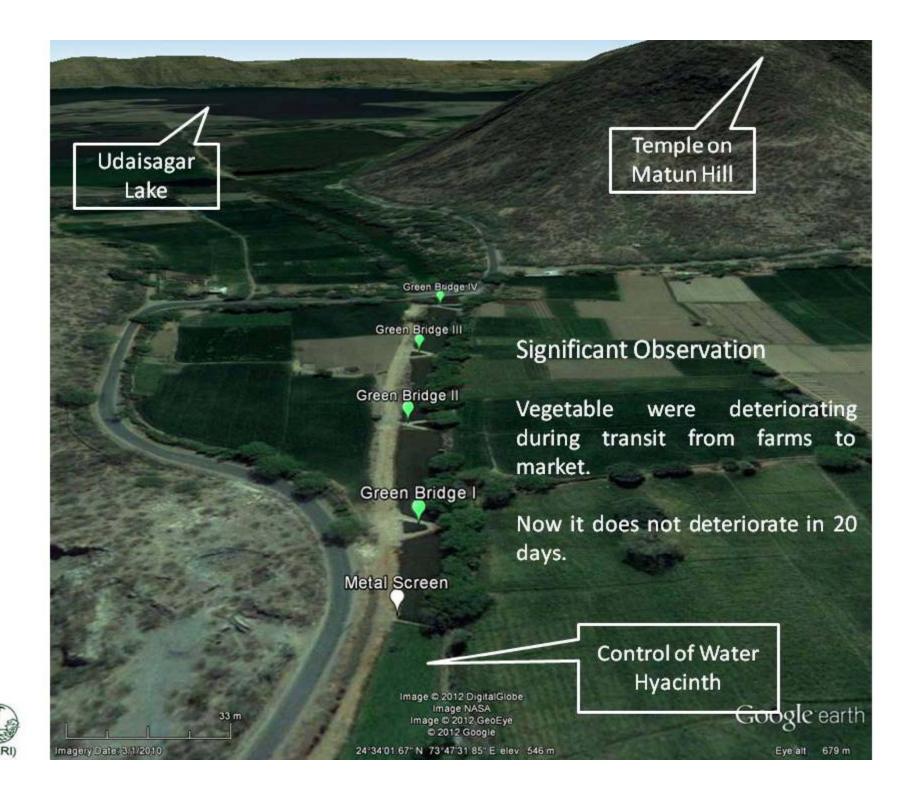














Significant Observation

DO concentration increased from 0 mg/L (untreated stretch) to 11.4 mg/L (treated).

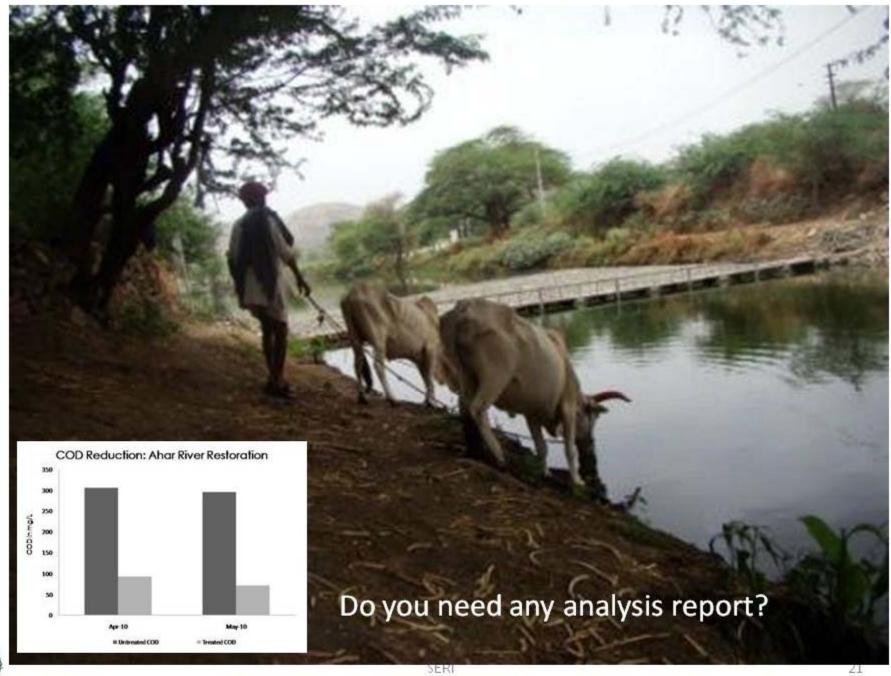
DO transfer in a day – 11500 kg in 1 km stretch of ecotechnological treatment (equivalent to Rs. 3 crores – the cost incurred for mechanical aeration)

















Rasoolabad Stream Restoration Project: 2011 - 2012









GIPE CAMPUS INCHARGE PULLED UP IN TREE HACKING INCIDENT





City NGO builds successful Green Bridges to save the Ganga

Devidas.Deshpande

Ithough 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 Fine 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 Punebased Green Infrastructure provided logistics support.

Dr Joshi and his team were invit-

ed by the Swami vimusteshwaranand 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

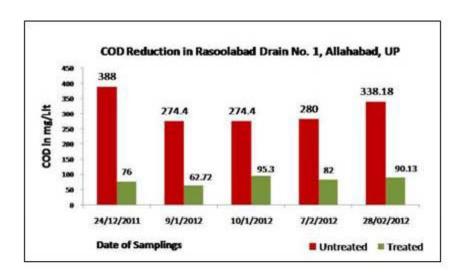


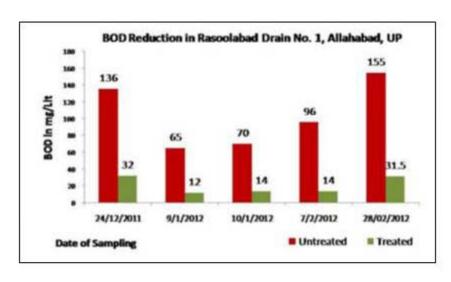
Rasoolabad Stream Restoration Project: 2011 - 2012

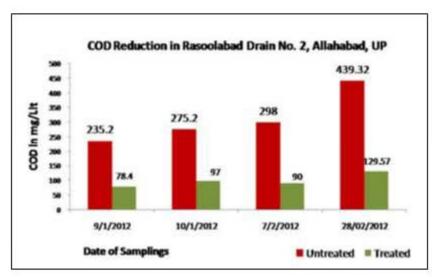


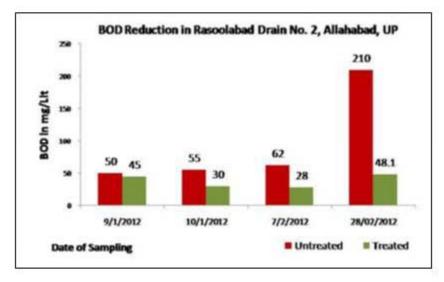


Results of Rasoolabad Stream Restoration Project



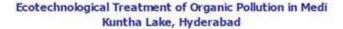


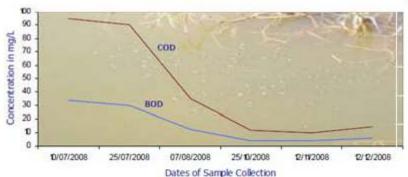




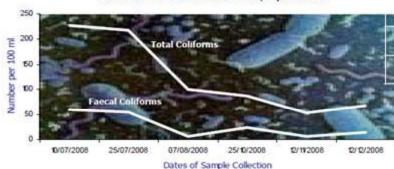


Evaluation of Ecological Restoration Using New Performance Criteria





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



Sr. Parameter No.	Parameter	Conventional Aerobic	Ecological Restoration	
	/Anaerobic Treatment	Ahar River	Med Kuntl	
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

Medi

Kuntha

0.09

92.9

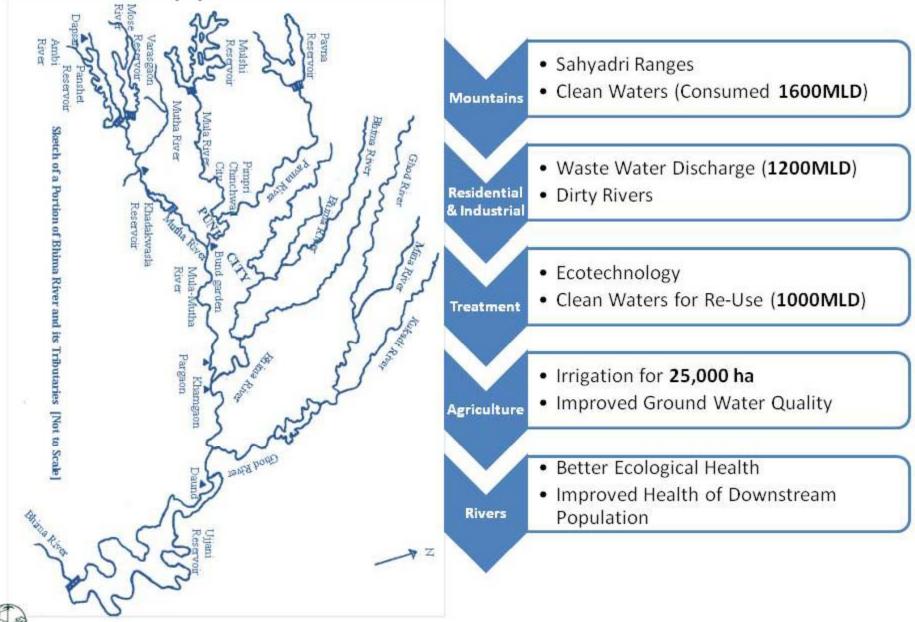
Where -			
SAB	 Saprobic to Aerobic Biodiversity 	CFC	 Complexity of Food Chain
NSR	- Native Species Recurrence	CF	- Carbon Footprint
SF	- Space Footprint	NB	- Nitrogen Balance
EE	- Economic Efficiency	COP	- Community Ownership of Project



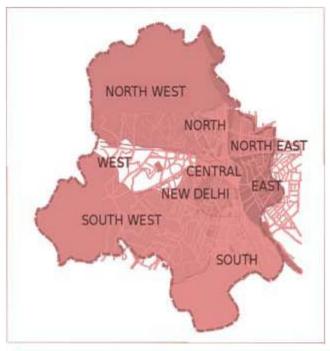
Action involves Governance, Finance, Science, Minds, Hands and Ecosystem



Basin Approach for Catchment Waste Treatment



Yamuna's Ecotechnological Factsheet



- Delhi's population 17 millions & area 1483 sq. km
- The 48-km stretch of Yamuna River receives untreated sewage and direct discharge of industrial chemical wastewater.
- 24 major drains polluting Yamuna
- Sewage generation from Delhi about 2800 MLD
- World Bank funded, "Delhi Water Supply & Sewerage Project" estimated waste water generation at 3760 MLD in 2021

	Conventional Treatment	Ecotechnological Treatment
Area Requirement (liquid + residue treatment & disposal)	Min. 1000 ha	Max. 280 ha (vertical + horizontal filtration systems)
Capital costs per MLD	\$300000-1200000	\$100000-300000
Operational costs per MLD	\$200-\$700	\$10-40
Social capital (Estimated)	-\$?	+\$?
Ecological capital (Estimated)	-\$?	+\$?



Future of Water Governance

Consider Ecology as Economy











