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Outline

- Overview of managed aquifer recharge/riverbank filtration in India
- RBF investigations in Ganga and Damodar basins and NE India (2020–2024)
- Summary and conclusions
- Upcoming capacity enhancement events on MAR/RBF in Dresden & Roorkee

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Location (river)	Characterized by	and and a start of the
<u>Haridwar (</u> Ganga), RBF site	Urban setting; high microbial load and high turbidity (monsoon), low organic and low OMPs loads	a sperade of
Agra (Yamuna), RBF site	Urban setting; high organic & microbial load, high turbidity (monsoon), impact of domestic/industrial wastewater	Vers -
Damalia (Raniganj, Damodar river), RBF site	Rural/peri-urban setting; high turbidity, organic and microbial load	Damalia
Guwahati (Dakhin Pakur Kona, Kalajal river), RBF site	Rural/peri-urban setting; high turbidity, organic and microbial load	D1: Haridwar
and other sites (Srinagar & Karnaprayag in Uttarakhand, Dera Ba	D2: Agra D3: Varanasi
& Gagdhagara (Pu	njab), RWSS in Assam, Chennai)	D4: Guwahati D5: Goa
		Base-map: WHYMAP (2008)





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RBF site developed since 2010	DW production by RBF in 2015 [m³/d]	DW production by RBF in 2018 [m³/d]	Increase in DW production (2015-2018) [m³/d]	Number of persons additionally supplied	Hered Unantities See the 2020(8) Viver (Prote
Srinagar	937	3,667	2,730	17,600	
Karna- pravag	706	5,760	5,054	42,666	
Gauchar	~400	4,320	3,920	32,000	A
Kapkot	New wells	2,020	2,020	14,962	Instant Product of Tank
Bageshwar	New wells	2,020	2,020	14,962	
Uttarkashi	New wells	5,700	5,700	36,770	
	Total	23,487	19,624	158,960	All and the second s
			Source: N	NIKWINDU (2019)	Nepal









RBF in mining-impacted areas -	- Damal	ia, Damodar r	HTWO Sold iver pasin
 RBF scheme by Damodar River for urban to Raniganj town. Production: 22,700 m³/d 1 RCW, 1 CW with 4 infiltration galleries vertical wells High removal of bacteriological indicator 	supply ay & & 12	Providence of the second	CMERI Dargapur (2021)
TC > 6.4 Log ₁₀ , <i>E. coli</i> > 3.7 Log ₁₀		Total coliform count [MPN/ 100 mL]	E. Coli count [MPN/100 mL]
Low organic pollution and heavy metals	Damodar R.	> 2.4 x 10 ⁶	2,800
	RBF well	5,016	< 1
within drinking water limits		Source: Bane	rjee P, Chandra S (2024)
Good potential for RBF in river-channel HTWJ) 15.05.2025 MH Commission on Managed Agafter Restrange. Online MMR semisar #4-	Alluvium	deposits of Dam	odar basin ar riverbasins & NE India 15





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Summary, conclusions and upcoming events

Summary: RBF in India - situation in 2024

7 new sites investigated

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- Generally high attenuation of pollutants observed at all investigated sites
- Construction of exploratory wells
- indispensable for determining geohydraulic conditions
- Post-treatment required at some sites
 RBF can be considered as a sustainable source → key aspect of



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Conclusions on geohydraulic aspects

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- · Hydraulic connection between the river and aquifer is the most essential criteria for RBF
- Necessity to establish hydraulic connection for potential new sites to plausibly determine portion
 of bank filtrate and consequent removal rates of contaminants → beneficial, if RBF is proposed
 as a strategy to address overexploitation of GW resources (e.g. in China & Vietnam, Hoang et
 al., 2022)
- · Excellent conditions for RBF in submontane locations (e.g. Haridwar)
- Challenging at some other sites due complex subsurface lithology

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· Geohydraulic investigations should be supplemented with stable isotope and OMP investigations

Conclusions on regulatory compliance & sustainability

- Compliance with country-/state-specific regulatory framework is necessary.
- Aspects that can be highlighted as sustainability indicators for RBF are
- greater water security by attenuation of pollutants within multiple-barrier concept and sustained water availability,
- impact on base-flow of especially smaller rivers \rightarrow combination of GW recharge techniques (check dams, spreading) with RBF
- $\mbox{--}$ and long-term water level and quality monitoring and determination of portion of bank filtrate \rightarrow empowering local/grass-roots communities and stake holders
- Permit granting processes must be considered
- Public and stakeholder participation must be further addressed, especially in rural areas \rightarrow positive examples for aquifer recharge from rural India

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	Federal Ministry of Education and Research

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