Circularity in Urban Domestic Used Water Management: Reuse, Market Potential, and Governance Reforms

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Impacting sustainable development at scale with data, integrated analysis, and strategic outreach

TRANSFORMATIONS

- Low-carbon Economy
- Energy Transitions
- Power Markets
- Industrial Sustainability
- Sustainable Livelihoods

QUALITY OF LIFE

- Clean Air
- Sustainable Water
- Sustainable Food Systems
- Sustainable Cooling
- Sustainable Mobility

ENABLERS

- Sustainable Finance
- Technology Futures
- Circular Economy
- Climate Resilience
- International Cooperation

250+
Multidisciplinary team

380+
Peer-reviewed publications

190+
Instances of increased data transparency

540+
Roundtables & conferences

20+
Indian states engaged

130+
Bilateral & multilateral initiatives promoted

SPECIAL INITIATIVES

- CEEW Centre for Energy Finance
- Powering Livelihoods
- Emerging Economies
- UP State Office

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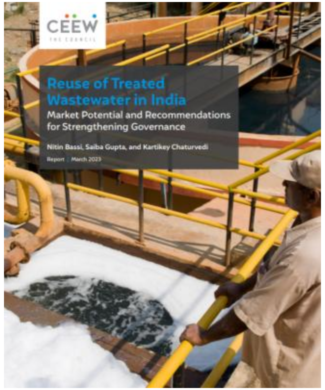
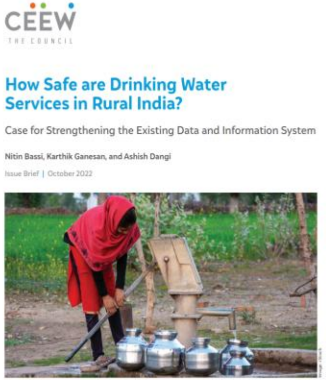
CEEW's sustainable water program

Aims to inform policy-making for sustainable development and management of water resources through research in the areas of circularity in wastewater management, policy coherence in water-energy-food sectors, capacity building for climate action, and water accounting for river basin management.

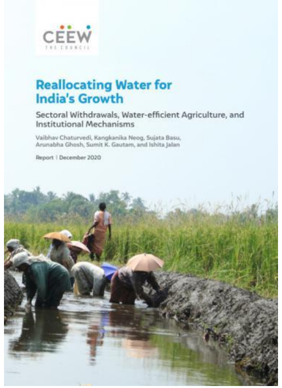


Makes a case for mainstreaming the reuse of TWW in India - market potential and recommendations for strengthening governance

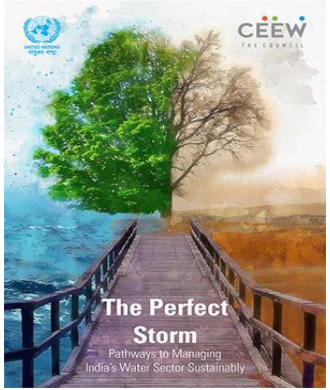
India's sustainable water resources management narrative 'India Water Story'



Recommends ways for strengthening reporting on safely managed drinking water services in India



Recommends pathways for India's water reallocation strategy



Recommends possible solution pathways for sustainably managing our water resources


EARTH DAY
INDIA HAS GOT IT RIGHT ON MANY ASPECTS OF WATER MANAGEMENT, FROM GOVERNANCE TO FUNDING TO INNOVATION. IT CAN, AND MUST, SET AN EXAMPLE FOR OTHER NATIONS
Leading on water security
NITIN BASSI & ARUNABHA GHOSH


मंथन
नदियों को मिले पुनर्जीवन
झाग और इसे खत्म करने के लिए डाले गए रसायनों के कारण यमुना नदी चर्चा में है। नदियों को स्वच्छ बनाने के लिए इन्हें प्रदूषित करने वाले विभिन्न स्रोतों को इनमें मिलने से रोकना होगा
साइबा गुप्ता
नितिन बस्सी


पृथ्वी को बचाना है तो उठाने होंगे चौतरफा कदम
व्यर्थ को अर्थ देने की दिशा में आगे बढ़ना ही होगा
साइबा गुप्ता
कार्तिकेय चतुर्वेदी
उपचारित अपशिष्ट जल के पुनः उपयोग की नीतियों व परियोजनाओं के सफल क्रियान्वयन में जनता के बीच इनकी स्वीकार्यता महत्वपूर्ण कारक है।


Dousing a crisis
India should leverage G20 presidency to step up water-related initiatives
NITIN BASSI AND EKANSHA KHANDUJA

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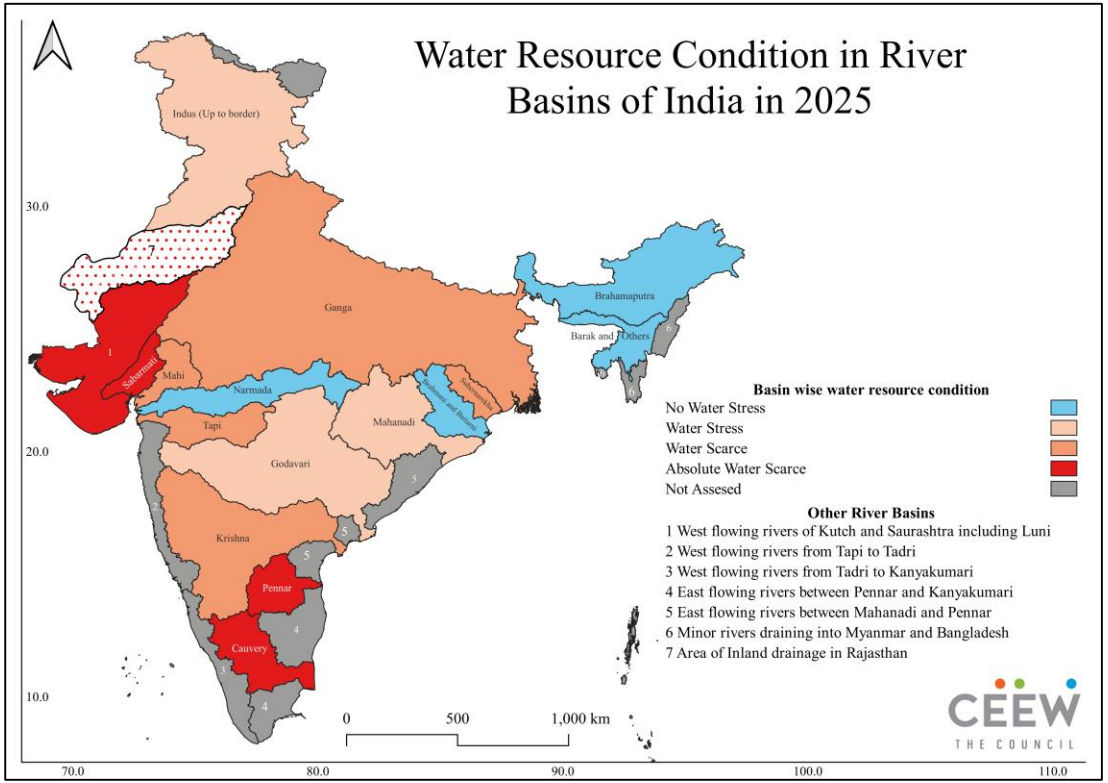
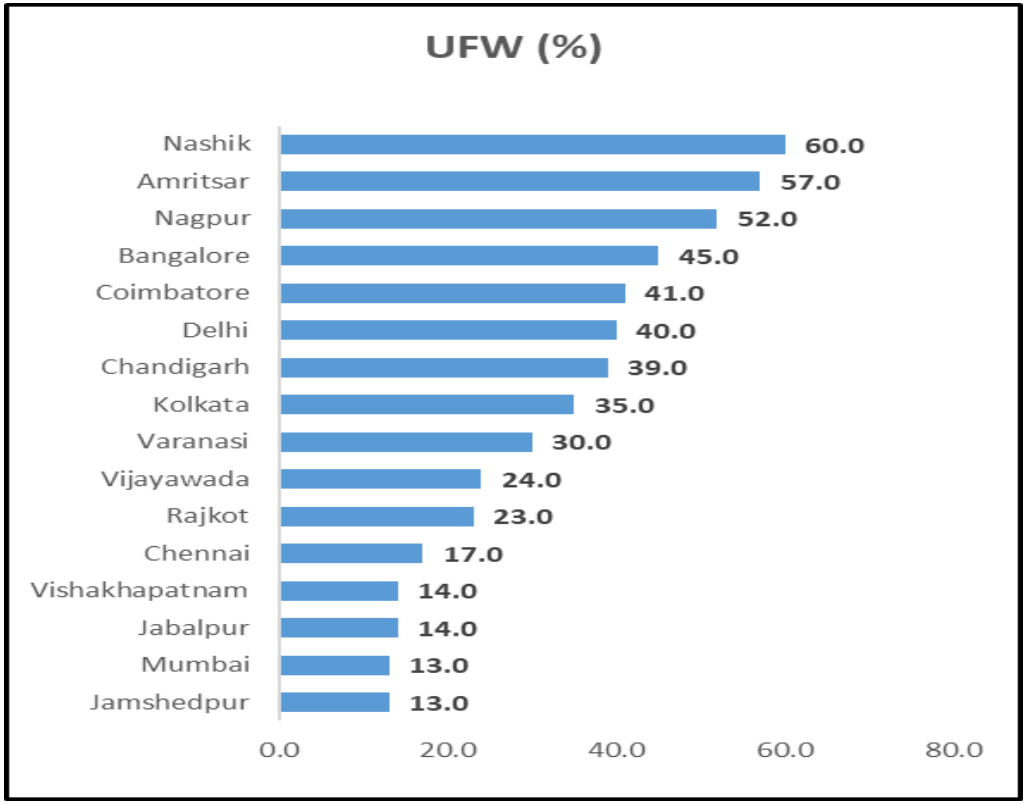
Most of the river basins in India are experiencing water stress



Need to explore alternatives, improving efficiency of water supply and reusing treated wastewater are some options

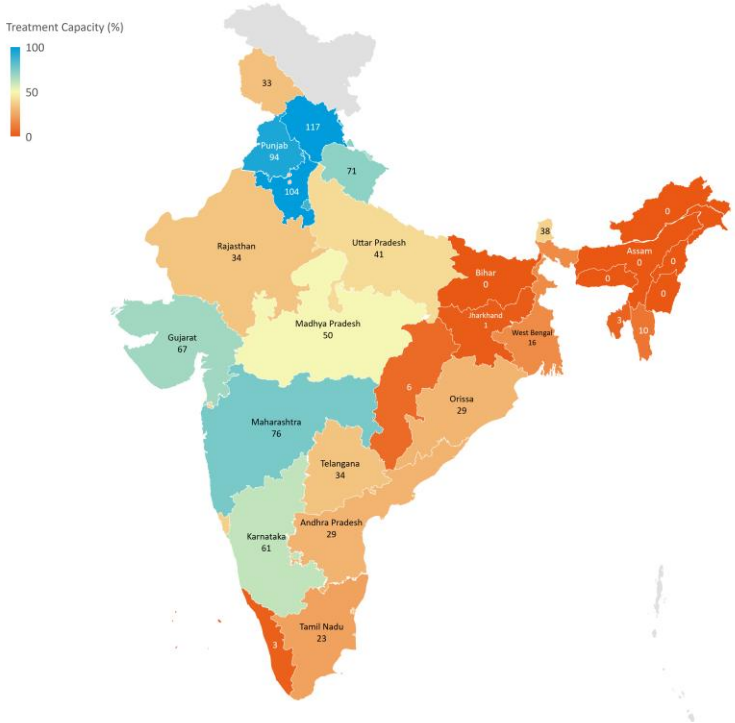
Maps Source: CEEW analysis using CWC data

In urban landscape, unaccounted for water (UFW) varies from 13-60%

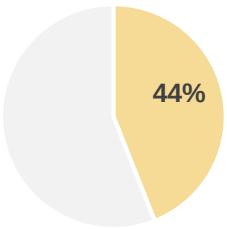


Source: CEEW analysis based on data accessed from various ULBs

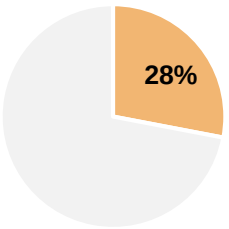
Less than 1/3rd of wastewater is treated in India



Wastewater generation (urban):
72,368 million litres per day (MLD)



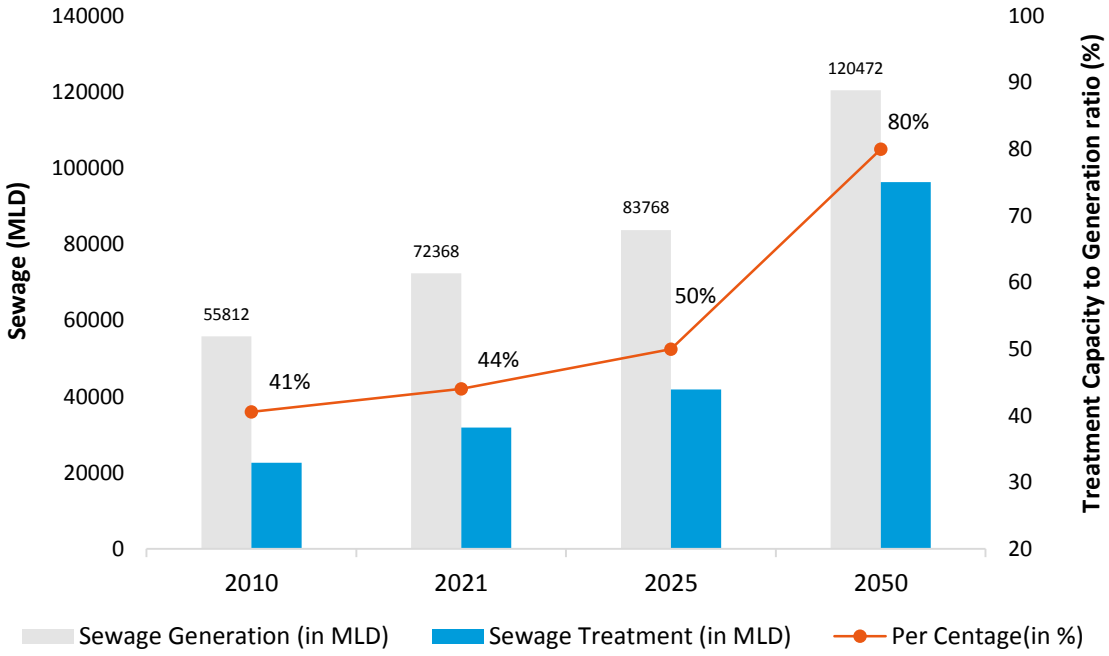
Installed treatment capacity
31,841 MLD



Actual treatment
20,236 MLD

Source: CEEW analysis using CPCB, 2021

Sewage treatment capacity is estimated to be 80% in 2050



Source: CEEW analysis using Niti Aayog Demographic Scenario 2025 and CPCB 2021

Projected Sewage Generation = Urban population X 185 X 0.8

MLD = Million Litres per Day

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Substantial economic & market potential of reusing treated used water in India

Total TWW

11,622 MCM
estimated amount of TWW available for reuse in **2021**

35,178 MCM
estimated amount of TWW available for reuse in **2050**

₹ 630 million
market value generated from sale of TWW in **2021**

₹ 1.9 billion
market value generated from sale of TWW in **2050**

TWW for irrigation

9
times the area of **New Delhi** could have been irrigated using the available TWW in **2021**

26
times the area of New Delhi in **2050**

₹ 966 billion
estimated revenue generated from irrigation using TWW

Additional benefits

₹ 50 million
savings from reduction In synthetic fertilizer use

CO_2 1.3 million tonnes
reduced GHG emissions from using TWW in irrigation

Source: CEEW 2023 (Bassi et al. 2023)

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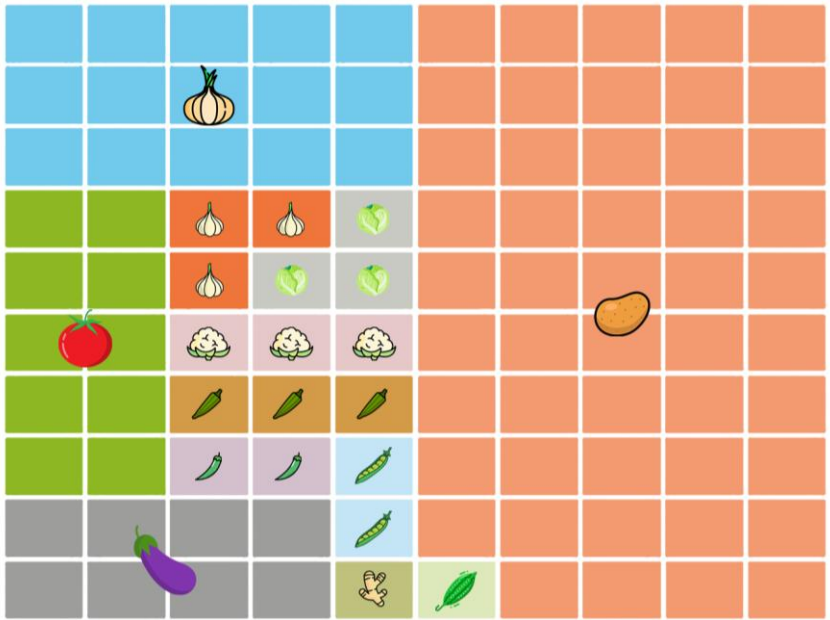
Selected horticulture crops that can be irrigated using treated used water



TWW: 8603 MCM

Land Area: 1.38 Mha

- Potato
- Onion
- Tomato
- Brinjal
- Garlic
- Cabbage
- Cauliflower
- Lady's finger
- Green chillies
- Peas
- Ginger
- Bitter gourd

CEEW analysis using data from Horticulture Statistics at a Glance 2018 (Dept. of Agriculture Cooperation and Farmers, GoI); National Horticulture Board 2022

We need policies to realise the reuse potential

State/UT	Agency	Adopted in
Andhra Pradesh	Municipal Administration & Urban Development Department	2017
Chhattisgarh	Urban Administration & Development Department	Final
Gujarat	Water Supply Department	2018
Haryana	Government of Haryana	2019
J&K	Government of J&K	2017
Jharkhand	Urban Development & Housing Department	2017
Karnataka	Urban Development Department	2017
Madhya Pradesh	Urban Development & Housing Department	2017
Maharashtra	Urban Development Department	Draft is ready
Punjab	Government of Punjab	2017
Rajasthan	Department of Local Self Government	2016

Reuse specified for non-potable purposes

Mandatory reuse of treated wastewater for thermal power plants within 50km distance of STP

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Existing policies need to be made more comprehensive for scaling up reuse

Parameter	States								
	PB	RJ	GJ	HR	JH	CG	KA	MP	AP
Need for policy									
Address water scarcity and distributional inequity	✓	✓	✓	✓	✓	✓	✓	✓	✓
Improve water quality and public health	✓	✓	✓	✓	✓	✓	✓	✓	✓
Develop a tangible action plan	×	×	×	✓	×	×	×	×	×
TWW reuse options									
User categories defined	✓	✓	✓	✓	✓	×	✓	✓	✓
Priorities among users defined	✓	✓	✓	✓	✓	×	×	✓	✓
Mentions specific industries and industrial purposes for reuse	✓	✓	✓	✓	✓	×	×	✓	✓
Lists mandatory and non-mandatory provisions	×	×	✓	✓	×	×	×	✓	×
Technology recommendations									
Mentions process for wastewater treatment	×	×	×	×	✓	×	×	✓	✓
Suggests technologies for treatment	Partial	✓	×	×	×	×	Partial	✓	×
Has provisions to explore and identify innovative technologies	✓	✓	✓	✓	✓	×	×	✓	✓
Focuses on nature-based solutions	×	✓	×	Partial	✓	×	✓	✓	×
TWW allocation mechanism									
Mentions principles guiding the allocation of treated wastewater	×	×	×	×	×	×	✓	×	×
Mentions criteria to decide allocation priorities	×	×	✓	✓	×	×	✓	×	✓
Has a layout enforcement mechanism	×	×	✓	✓	×	×	×	✓	×
TWW pricing									
Defines pricing mechanism	✓	✓	✓	✓	✓	×	✓	✓	✓
Mentions pricing criteria	✓	✓	✓	✓	✓	×	✓	✓	×
Identifies authority for managing revenues	✓	✓	✓	Partial	✓	×	✓	✓	✓
Quality standards and performance benchmarking									
Mentions standardising TWW quality	✓	✓	✓	✓	×	✓	✓	✓	✓
Lists key objectives behind standards and regulations	✓	✓	×	×	✓	×	✓	✓	✓
Has provision for performance monitoring	✓	✓	✓	✓	✓	✓	✓	✓	✓
Provides quality standards for TWW reuse	×	×	×	×	×	×	×	×	×
Supporting legal framework									
Enshrines constitutional principles	×	×	✓	✓	×	✓	×	✓	×
Mentions national policies and acts	✓	✓	✓	✓	✓	✓	✓	✓	✓
Mentions state policies and acts	✓	✓	✓	×	×	✓	✓	✓	×
Makes reference to CPHEEO manual, 2013	✓	✓	✓	✓	×	✓	✓	✓	✓
Business models									
Sets priorities for project sanctioning	Partial	✓	×	×	✓	×	✓	✓	×
Discusses scope for PPP	✓	✓	✓	✓	✓	✓	✓	✓	✓
Makes linkages with sustainable infrastructure	×	✓	×	×	✓	×	×	✓	×

Recommendations based on international best practices

- Recognise wastewater as an integral part of water resources by including it in all water management policies, plans, and regulations.
- Define specific reuse purpose water quality standards.
- Empower urban local bodies to formulate and adopt long-term reuse plans. Engage end-users in the reuse projects.
- Improve financial viability.
- Leverage technological developments.
- Invest in public outreach.

Thank you

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For any query, please contact

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