

CENTRE FOR WATER RESEARCH

ANNUAL REPORT 2022-23

Indian Institute of Science Education and Research, Pune



Table of Contents

05

FOREWORD

06

PEOPLE

07

ADVISORY GROUP

08

RESEARCH AND TRAINING

09

PUBLICATIONS

10

ONGOING RESEARCH PROJECTS

11

OUTREACH

16

LIVING WATERS MUSEUM

Foreword

The Centre for Water Research (CWR) at IISER Pune is stepping into the third year of its activities.

The previous year saw CWR expanding its research, training, and outreach activities. Three MS dissertations were completed in areas as diverse as the application of water poverty index at a cross-country scale, sediment geochemistry of the Krishna river system, and applying environmental justice framework in riverfront development projects. Faculty members continued their research on various dimensions of water, speaking to science and policy. Eight peer-reviewed papers were published during the period, and CWR members were invited to speak at several academic, practice, and policy forums in India and abroad. Faculty research was featured in various media outlets.

CWR organized an internal seminar series beginning with a talk on groundwater, the theme of World Water Day on 22 March 2022. The seminar series provided a forum for faculty and researchers to understand their current research on water and build synergies.

Living Waters Museum (LWM) continued its outreach efforts with various activities. In March 2022 LWM organized a virtual exhibition Punyache Paani, tracing Pune's water heritage, which involved a week of cultural activities and panel discussions. LWM also completed the Water Classrooms project which involved the development of an open-source, multi-disciplinary, and interactive pedagogy on the water for middle school students.

CWR hopes to involve more students and young researchers in our activities as we move ahead and scale up our research and outreach efforts.

Bejoy Thomas,
Chair,
Centre for Water Research,
IISER, Pune
February 28, 2023



People

Bejoy K. Thomas (Chair, CWR)
Humanities and Social Sciences

Amrita Hazra
Chemistry

Aparna Deshpande
Physics (Science Activity Centre)

Argha Banerjee
Earth and Climate Science

Deepak Barua
Biology

Gyana Ranjan Tripathy
Earth and Climate Science

Joy Merwin Monteiro
Earth and Climate Science

Pushkar Sohoni
Humanities and Social Sciences

Sara Ahmed
Humanities and Social Sciences

Shalini Sharma
Humanities and Social Sciences

Sharachchandra Lele
Humanities and Social Sciences

Sujit Ghosh
Chemistry

Pinaki Talukdar
Chemistry

Radhika Mulay
Project Associate



Advisory Group

Dr. Himanshu Kulkarni, Executive Director, Advanced Centre for Water Resources Development and Management (ACWADAM), Pune, India.

Dr. Jagdish Krishnaswamy, Dean, School of Environment and Sustainability, Indian Institute for Human Settlements (IIHS), Bengaluru, India.

Prof. James Wescoat, Aga Khan Professor Emeritus of Landscape Architecture and Geography, Massachusetts Institute of Technology (MIT), USA.

Mr. K.J.Joy, Senior Fellow, Society for Promoting Participative Ecosystem Management (SOPPECOM), Pune, India.

Prof. Margreet Zwarteveen, Professor of Water Governance, UN-IHE Delft Institute for Water Education, The Netherlands.

Ms. Shailaja Deshpande, Founder-Director, Jeevitnadi, Living Rivers Foundation, Pune, India.



Research and Training

Details of MS Theses supervised during 2022-23 by CWR faculty

NO.	STUDENT	SUPERVISOR	PROJECT TITLE
1	Vaishnavi Kardile	Gyana Tripathy	Sediment geochemistry of the Krishna river system: Implications to Weathering pattern and elemental mobility
2	Chirag Gupta	Bejoy Thomas	Measuring water poverty: A cross-country study using the water poverty index
3	Viraj Dsouza	Shalini Sharma	Can Environmental Justice guide Sustainable Development? Case of Pune and Sabarmati Riverfront Development Projects, India

Details of PhD Theses supervised during 2022-23 by CWR faculty

NO.	STUDENT	SUPERVISOR	PROJECT TITLE
1	Anupam Samanta	Gyana Tripathy	Weathering and climate linkage at seasonal to kilo-year timescales: Evidence from water and sediment chemistry
2	Kalyani Thatte	Bejoy Thomas	Inequity in groundwater access: A study of farm households in Marathwada region, India
3	Sourav Laha	Argha Banerjee	Studies of glacier mass-balance processes and the climate response of glacier-fed rivers in the Himalaya

Publications

The names of authors with CWR affiliation are in all-caps.

PEER-REVIEWED

1. Laha, S; **BANERJEE, ARGHA**; Singh, A; Sharma, P; Thamban, M. 2023. Climate sensitivity of the summer runoff of two glacierised Himalayan catchments with contrasting climate. *Hydrology and Earth System Sciences*, 27(2), 627-645. 10.5194/hess-27-627-2023.
2. Nair, J; **THOMAS, BEJOY**. 2023. 'Why is Adoption of Micro-irrigation Slow in India? A Review', *Development in Practice*, 33(1): 76-86. 10.1080/09614524.2022.2059065.
3. Anupam Samanta; **TRIPATHY, GYANA**; Nath, B; Bhushan, Ravi; Panchang, Rajani; Bharti, Nisha; Shrivastava, Ankush. 2022. Holocene variability in chemical weathering and ocean redox state: A reconstruction using sediment geochemistry of the Arabian Sea. *Journal of Asian Earth Sciences*, 224, 105029. 10.1016/j.jseaes.2021.105029.
4. Ahmad, Nafees; Singh, Satinder; Lone, Aasif; Qasim, Abul; Bhushan, Ravi; **TRIPATHY, GYANA**; Shah, Chinmay. 2022. Historical variations in autochthonous and allochthonous sediment supplies to the largest freshwater lake in Central India. *International Journal of Sediment Research*. 10.1016/j.ijsrc.2022.02.008.
5. Lone, Aasif; Singh, Satinder; Shah, Rayees; Achyuthan, Hema; Ahmad, Nafees; Qasim, Abul; **TRIPATHY, GYANA**; Samanta, Anupam; Pankaj, Kumar. 2022. The late Holocene hydroclimate variability in the Northwest Himalaya: Sedimentary clues from the Wular Lake, Kashmir Valley. *Journal of Asian Earth Sciences*, 229, 105184, 10.1016/j.jseaes.2022.105184.
6. S, Balasubramanya; Brozovia, N; Fishman, R; **LELE, SHARACHCHANDRA**; Wang, J. 2022. Managing irrigation under increasing water scarcity. *Agricultural Economics*. 10.1111/agec.12748.
7. Mollick, S; Saurabh, S; More, Y; Fajal, S; Shirolkar, M; Mandal, W; **GHOSH, SUJIT**. 2022. Benchmark uranium extraction from seawater by an ionic macroporous metal-organic framework. *Energy Environ. Sci.*, 15, 3462-3469.
8. Fajal, S; Hassan, A; Mandal, W; Shirolkar, M; Let, S; Das, N; **GHOSH, SUJIT**. 2022. Ordered Macro/Microporous Ionic Organic Framework for Efficient Separation of Toxic Pollutants from Water. *Angew. Chem. Int. Ed.* XX, e02214095.

OTHER

1. **AHMED, SARA**. 2022. Using art and song to help bring the world's largest mangrove swamp back from the brink. *The Conversation*.
2. Prothi, Nupur; Chauhan, Malavika; Lokgariwar, Chicu; **AHMED, SARA**. 2023. A gender perspective in exploring river culture in India. In *River culture: life as a dance to the rhythm of the waters* (33-42). UNESCO Publishing, Paris. 10.54677/QFNS9381

Ongoing Research Projects

Argha Banerjee

Observation and modelling of the water cycle in Chandra and Upper Alaknanda Basins, funded by HiCOM, NCAOR (Completed in March 2022).

Bejoy Thomas

fairSTREAM (2022-24), a project on Bhima basin in partnership with IIASA, Austria, and SOPPECOM, Pune.

Sujit Ghosh

Development of Metal-organic Frameworks (MOFs) based Sensory Materials for Detection of Environmental Pollutants in Water (Ongoing SERB funded project).



Outreach

CWR Season 3: Internal Talks

Centre for Water Research organized Water Talks on various dimensions of water by the faculty and researchers based at CWR.

1. Making the invisible visible': field evidence and policy challenges. Speaker: **Bejoy Thomas**, CWR, HSS Dept, IISER-Pune. Date: 22 March 2022
2. Himalayan Glaciers and Glacier-fed Rivers. Speaker: **Argha Banerjee**, CWR, ECS Dept, IISER-Pune. Date: 17 May 2022
3. The Heads and Tails of Ganga, the Cryosphere and the Delta. Speaker: **Radhika Mulay**, CWR, IISER-Pune. Date: 14 June 2022
4. Remember Bhopal Museum: Insights from co-curation with those living with contaminated groundwater. Speaker: **Shalini Sharma**, HSS Dept, IISER-Pune. Date: 26 July 2022
5. Visualizing water heritage - the Living Waters Museum. Speaker: **Sara Ahmed**, Adjunct Faculty, HSS Dept, IISER-Pune. Date: 30 August 2022
6. Catch me if you can: Sequestration of Priority Environmental Pollutants for Safe Drinking Water. Speaker: **Sujit Ghosh**, Chemistry Dept, IISER-Pune. Date: 21 September 2022

CWR Guest Talks and Visits

1. Film Screening and Discussion by **Minket Lepcha**: 'Weaving Stories around Water in the Northeast' at IISER-Pune, 5 May 2022.
2. CWR Dialogue with **Virkamjit Rooprai** at CWR, IISER-PUNE, 4 November 2022.
3. Guest Visit by Advisory Member **Prof. Margreet Zwarteveen** at CWR, IISER-Pune, 13 February 2023.



Outreach

Invited Talks

Bejoy Thomas

- 'Linking water, trees and people', Maharashtra State Biodiversity Board, India, World Biodiversity Day 2022 event, Pune. 22 May, 2022
- 'Rethinking water management: a river basin perspective', Agharkar Research Institute, Pune, India, Azadi Ka Amrit Mahotsav and ARI Platinum Jubilee lecture. August 17, 2022
- 'Rethinking urban water management: an integrated, river basin perspective', Indian Institute of Forest Management, Bhopal (online). 12 September, 2022
- 'Environment-development trade-offs at different scales', Indian Institute of Technology Kanpur, India, Workshop on Developing an Actionable Approach to Carbon Neutrality. 11 October, 2022
- 'Rethinking water management: a river basin perspective', National Institute for Environmental Studies, Tokyo, 25 November, 2022
- 'The city and its water: how our cities manage their water and waste water?', Christ College, Pune. 2 December, 2002
- Moderator for the panel on 'Integration in Water Education', Wednesdays for Water Foundation's Water Festival, TISS Hyderabad. 12 January, 2023
- Invited participant at 'Workshop on Future of Water for Pune', CDSA campus Pune. 29 September, 2022

Gyana Ranjan Tripathy

- 'U-Th series and dating methods. National training workshop on Paleoclimate-archives, proxies and analysis/measurement techniques', IITM, Pune. 18, January, 2023
- 'Sulfide oxidation in the western Himalaya: Constraints based on dissolved sulfur isotopes', 2nd Frontiers in geosciences research conference, PRL, Ahmedabad. 2 February, 2023

Radhika Mulay

- 'Finding the Flow Within', Friday Waters, Wednesdays for Water Foundation (online) 23 December, 2022
- 'Water Research and Dance in the context of Climate Change' Dialogues on Climate Action and Interfaith Peace-building, Fireflies Intercultural Centre, Bengaluru. 20 February, 2023
- 'River Avulsions and Flows', Seminar on India's Water Crisis and Water Conservation at Pondicherry University, February 24, 2023
- Invited participant at 'DHARA 2023 (Driving Holistic Action for Urban Rivers)', organized by River Cities Alliance, Namami Gange, National Institute of Urban Affairs, Pune, 14 February, 2023

Outreach

Invited Talks

Sara Ahmed

- Panelist in special thematic session on 'Endogenous Knowledge and Local Solutions for Water Education, Policies and Use', 9th World Water Forum, Senegal, 23 March, 2022
- Panelist in special thematic session on 'Global Water Heritage: A practical bridge to peace and development', 9th World Water Forum, Senegal, 24 March, 2022
- 'Water Museums: Understanding our fluid heritage and building our water future' presentation at the Vadnagar International Conference for Promoting Archaeological Heritage, Vadnagar, Gujarat, 18-20 May, 2022
- 'Water Stories: History, Cooperation, Conflict and Challenges', public talk at the Catskill Water Discovery Centre, Arkville, New York, 10 August, 2022.
- 'Our Water Stories: History, Conflict, Challenges, Innovation', public talk at the Centre for Imagination, Woodstock School, Mussoorie, 5 September, 2022.
- 'Tangible gains from a virtual effort: the Living Waters Museum', talk at the Water Festival hosted by Dakshina Chitra Museum, 10 September, 2022.
- Co-Chair, Session 1 on the 'Heritage of Water in Morocco and the Maghreb – Ancestral Hydro-technologies for farsighted use of groundwater', Marrakech, Morocco, 26-28 October, 2022
- Panelist at the hybrid session on 'Valuing Ancient Water Cultures' at the UN-Water Summit on Groundwater, Paris, 6 December, 2022.
- Member, Advisory Board for 4th International Conference of the Global Network of Water Museums on Water Museums and Groundwater: Making the Invisible Visible, Marrakech, Morocco, 26-28 October, 2022

Shalini Sharma

- 'Remembering Bhopal with a focus on co-curation with communities affected by groundwater contamination', IIT Gandhinagar. 14 October, 2022.
- 'Remember Bhopal Museum: The Struggle Over The Future. With a focus on memorialization and water justice', Oslo Metropolitan University's Environmental Humanities Lecture Series titled - Crisis of Imagination: Registers of Loss, Pain, Hope, and Climate Change in India (online). 24 October, 2022.

Sharachchandra Lele

- 'Integrating Multiple Stressors Multiple Concerns and Governance into Water Management in India', Keynote Address, International Conference on Water Management Climate Change ICWMCC 2023, WALMI, Dharwad, 24 January, 2023.

Sujit Ghosh

- Centre for Clean Environment (CCE), Vellore Institute of Technology, Vellore, India. 26 August, 2022.

Outreach

Community Engagement

Bejoy Thomas

Organized a workshop on 'Identifying Water, Food and Biodiversity Nexus Challenges in the Upper Bhima Basin', IISER Pune, January 17, 2023, as part of the fairSTREAM project. Aim was to develop and demonstrate methodologies for knowledge of co-production under food-water-biodiversity nexus.



Images of System Mapping Tools for participatory mapping exercise and casual loops to establish connections with resources, socio-economic activities, and pressures/drivers in the Upper Bhima basin.

Shalini Sharma

Immersive learning and outreach: Uttan coastal town, Thane, for BS-MS course on Political Ecology (10-12 Feb 2023) in collaboration with NCAS India.



Outreach

Community Engagement

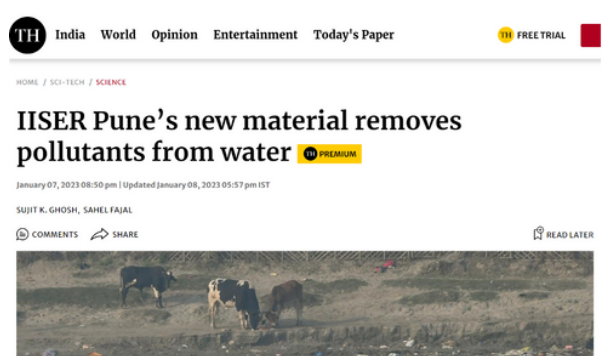
Radhika Mulay

Field visit to the origin of the Mutha river at Vegare in the Western Ghats as part of the Maharashtra government and citizen initiative 'Chala Januya Nadila' - Know the River, 7 December 2022.



Sujit Ghosh

The published work related to 'Development of Metal-organic Frameworks (MOFs) based Sensory Materials for Detection of Environmental Pollutants in Water' received media coverage appreciating the merit of the work as well as its potential toward the well-being of our society in combating groundwater pollution.



Living Waters Museum

Established in 2017, the Living Waters Museum is a virtual museum which engages young people and children in visualizing water heritage and re-imagining sustainable, inclusive and equitable water futures. Through the power of storytelling and technology we seek to celebrate our water wisdom, inspire youth to look at water from an interdisciplinary perspective and co-build a digital repository as a source of learning for the future. The following section gives brief updates about the projects undertaken by researchers at LWM during 2022-23.



Punyache Paani – Stories of Pune’s Waters

The first exhibition on Pune’s urban waterscapes – Punyache Paani - Stories of Pune’s Waters – was co-curated by Dr. Chhavi Mathur and Dr. Sara Ahmed and launched online on March 27, 2022. The exhibition brought together several individuals – academics, artists, architects, designers, as well as grassroots organizations who co-created visually engaging stories that trace Pune’s water history, heritage, and ecology. The exhibition website was designed by Studio Vitamin-D and is available in English and Marathi. Click here to access the website: <https://punyachepaani.livingwatersmuseum.org/>. The launch of the exhibition was accompanied by a week of academic, social, and cultural events around the theme of water - People, Places, and Practices.



Several partners and water professionals from Pune and faculty and students from IISER Pune participated in these events and contributed to critical dialogues concerning the multiple water challenges faced by the city and the need to build holistic and ethical water stewardship. The events were covered by several newspapers such as the Mint, Hindustan Times as well as the yearly student magazine at IISER Pune – Kalpa <https://kalpa.iiserpune.ac.in/kalpa2022/>.

Living Waters Museum

Water Classrooms

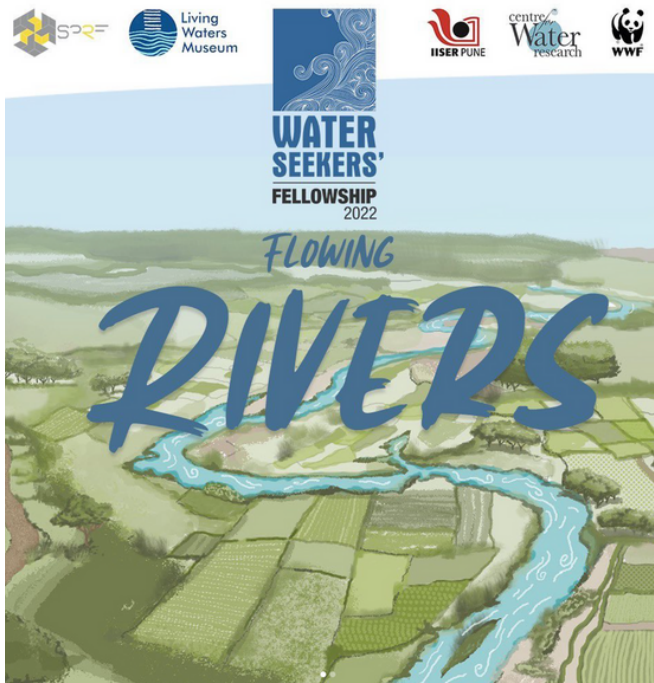
Building on the knowledge and partnerships developed during the Punyache Paani exhibition, Dr. Chhavi Mathur led the development of an open-source, multi-disciplinary, visually engaging and interactive pedagogy on water for middle school students. This project, called the **Water Classrooms** (<https://waterclassrooms.in/>) was undertaken with LWM and in collaboration with Science Activity Centre, Department of Humanities and Social Sciences and Department of Earth and Climate Science at IISER Pune and Centre for Environment Education (Pune). It was co-funded under a UK-led global initiative called Transforming Education for Sustainable Futures (India) (<https://tesfindia.iihs.co.in/>) at the Indian Institute of Human Settlements (Bangalore). Workshops to test the four water modules developed, were conducted on Sunday mornings from July to August 2022 with nearly 30 students and seven educators from six schools in and around Pune. Student outputs during these workshops showed a measurable increase in their understanding of water, not only from a physical/scientific perspective as is taught through conventional textbooks, but also from the lens of natural heritage, accessibility and equity, culture and systems thinking.

Student learnings were also captured through art in an end-term exhibition, called **Ripples – Reimagining Learning on Water**. The exhibition (curated by Dr. Chhavi Mathur, Ritvee Talele and Dr. Sara Ahmed) was held on February 19, 2023 at the Madan Mohan Malviya Hall, IISER Pune and was attended by school students, teachers and parents. The exhibition included science demonstrations on water by the Science Activity Centre and the Department of Biology at IISER Pune, as well as a musical presentation on Water and the Arts by Sukrit Sen (Arts and Outreach Coordinator, LWM).



Living Waters Museum

2022 Water Seekers' Fellowship



The Living Waters Museum, SPRF India, and World Wide Fund for Nature-India invited young researchers interested in exploring riverine ecosystems in India to apply for short-term visual research-cum-policy-analysis fellowships. The theme of the fellowship '**Flowing Rivers**' focused on understanding the dynamics of river systems. The fellowship adopts an interdisciplinary lens to understand the policy implications of water distribution and management on national and global water, food security, energy, and livelihoods. Some of the visual narratives can be accessed here:

<https://www.livingwatersmuseum.org/rivers-of-india>.

The Living Waters of Kolkata

The Kolkata Chapter of the Living Waters Museum has been involved in a diverse range of activities over the past few months. As we gear up for our upcoming urban chapter titled **জল-জ্যান্ত কলকাতা- The Living Waters of Kolkata**- we have been working with a group of experts, college and school children to develop and curate exclusive content on waters of Kolkata expected to launch in June 2023. Other than this, the **Climate Wall Project** is on its last leg with the students of Kolkata developing creative content through performing arts for the virtual climate wall and the students of Sundarbans having finished planting 5000 saplings of mangroves after a thorough research of the landscape and plantation process for the physical climate wall. Our Kolkata Chapter Coordinator, Sukrit Sen along with our partners East India Dastangos has also been performing storytelling musicals around the city in various festivals to raise awareness on creative advocacy for water action.

Collaboration at the 2023 Mumbai Urban Arts Festival and Pondicherry Water Festival

Radhika Mulay and Sukrit Sen from LWM were part of a series of presentations, workshops, and performances at the Mumbai Urban Arts Festival organized by Start India and Avid Learning and Pondicherry Water Festival 2023 organized by Sri Aurobindo Society, PONDYCan, and other organizations on behalf of 'All for Water for All' program and Alliance for Good Governance.

Contact Us...

Email Address

info_cwr@iiserpune.ac.in

LWM welcomes expressions of interest, please contact:

Dr. Sara Ahmed at

sara.ahmed@iiserpune.ac.in

livingwatersmuseum@gmail.com

Address

Indian Institute of Science Education and Research Pune,

Dr. Homi Bhabha Road,

Pune 411008, India

