ABSTRACT BOOK

INTERNATIONAL CONFERENCE

BRICS NUs: WATER RESOURCES AND POLLUTION TREATMENT [WRPT-21]

6th-8th July, 2021

NIT DURGAPUR
INDIA

IIT KANPUR
INDIA

CONTENTS

DETAILS OF THE INAUGURATION SESSION

Time	Speaker	Position and Affiliation
16:00-16:05	Dr. Hirok Chaudhuri Introduction to the theme of the conference	SPoC BRICS, National Institute of Technology Durgapur, India; Member of NCC (BRICS-India); Member of ITG (BRICS NUs); Associate Professor, Department of Physics and Center for Research on Environment and Water National Institute of Technology Durgapur, India
16:05-16:10	Prof. Y. M. Joshi	Dean of International Relations, Indian Institute of Technology Kanpur, India Professor, Department of Chemical Engineering, Indian Institute of Technology Kanpur, India
16:10-16:20	Prof. Anupam Basu	Director National Institute of Technology Durgapur, India
16:20-16:30	Prof. Abhay Karandikar	Director Indian Institute of Technology, Kanpur, India
16:30-16:40	Prof. Faizal Bux BRICS ITG: Water Resources and Pollution Treatment	BRICS NUs ITG Chair Professor Director Institute for Water and Wastewater Technology, Durban University of Technology, South Africa
16:40-17:00	Prof. Vinod Tare **Title of the Talk: "Arth Ganga" – River Conservation Synchronised Development: A Key Concept in Managing River Basins and Water Resources**	Former BRICS NUs ITG Chair Professor, Professor, Department of Civil Engineering, Indian Institute of Technology Kanpur, India
17:00-17:05	Dr. Supriya Pal Vote of thanks	Member of ITG (BRICS NUs); Associate Professor, Department of Civil Engineering, National Institute of Technology Durgapur, India

BREAK – 17:05-17:15 (10 minutes)

PROGRAMME : DETAILS OF THE ACADEMIC SESSION

Time	Abstract Id	Title of the Talk	Speaker	Country	Page No.
DAY-1 (July 6, 2021)					
16:40-17:00		Prof. Vinod Tare, Former BRICS NUs ITG Chair Professor, Professor, Department of Civil Engineering, Indian Institute of Technology Kanpur, India Title of the Talk: "Arth Ganga" – River Conservation Synchronised Development: A Key Concept in Managing River Basins and Water Resources			
Session –I Chairperson : Dr. Supriya Pal, Associate Professor, Department of Civil Engineering, National Institute of Technology Durgapur, India,					
17:15-17:35	IT 1	Application of wastewater based epidemiology for monitoring of covid19 infections : A South African context	Prof. Faizal Bux	South Africa	28-29
17:35-17:55	IT 2	Photocatalysis for wastewater treatment: engineering consideration and perspectives	Prof. Dawei Wang	China	30
17:55-18:15	IT 3	Adapting green and blue infrastructure to the built environment: benefits, perspectives and challenges	Prof. Nilo Nascimento	Brazil	31-32
Session –II Chairperson : Prof. Faizal Bux, Director, Institute for Water and Wastewater Technology, Durban University of Technology, South Africa,					
18:20-18:40	IT 4	Study on distribution and treatment of typical antibiotics in Poyang Lake Basin, China	Dr. Jiale Li	China	34-35
18:40-18:50	CT 1	Assessing spatial distribution of COVID-19 prevalence in Brazil using decentralised sewage monitoring	Dr. Cesar Rossas Mota Filho	Brazil	36-37
18:50-19:00	CT-2	Microbial interaction with microplastic in water and wastewater environments	Dr. Sheena Kumari	South Africa	38-39
19:00-19:10	CT-3	Highly porous silicotitaniumphosphate material and its application for toxic ion adsorption from wastewater	Dr. Nabanita Pal	India	40-41
Session –III Chairperson : Prof. Nilo Nascimento, Professor, Department of Hydraulic and Water Resources Engineering Universidade Federal de Minas Gerais, Brazil,					
19:15-19:35	IT 5	Environmental Geotechnics: Some Case Studies	Dr. Supriya Pal	India	43-44
19:35-19:45	CT-4	Geochemical patterns of migration of trace elements in soil waters of the Valday Upland	Mr. Dmitry Baranov	Russia	46-47
19:45-19:55	CT-5	Mapping of Groundwater Quality and Consumption Pattern of a Community Development Block of Jharkhand State in India	Dr. Abhik Chatterjee	India	48-49
19:55-20:05	CT-6	Identification of geosystem services to attenuate water pollution as a counter to water scarcity aftermaths	Mr. Aakash Mohan Rawat	India	50-51
20:05-20:15	CT-7	A case study on the Transboundary River Bank Management of Asia	Ms. Bipasha Mridha Ghosh	India	52
DAY-2 (July 7, 2021)					
Session –IV Chairperson : Prof. Kalyan Adhikari, HOD,					

Department of Earth and Environmental Studies, NIT, Durgapur,					
16:00-16:20	IT 6	The effects of velocity-dependent dispersion on groundwater contamination	Dr. Chunendra K Sahu	India	55
16:20-16:30	CT-8	Modelling of Jojari river in semi-arid western Rajasthan, India using the geospatial techniques and 1D flow model analysis	Mr. Himanchal Bhardwaj	India	56-57
16:30-16:40	CT-9	Spatiotemporal distribution and sources of inorganic nitrogen in shallow groundwater of Poyang Lake Basin, China	Dr. Yihui Dong	China	58-59
16:40-16:50	CT-10	Wastewater beneficiation using algal biomass	Dr. Ismail Rawat	South Africa	60-61
16:50-17:00	CT-11	Threatened water supply reservoirs: monitoring and modelling tools to support sustainable management".	Dr. Talita Silva	Brazil	62-63
17:00-17:10	CT-12	Radioactive survey on waterbodies of Durgapur industrial city, India	Ms. Suvashree Mukherjee	India	64-65
BREAK – 17:10-17:20 (10 minutes)					
Session –V Chairperson : Prof. Pathik Kumbhakar, Dean Academic Research, NIT, Durgapur, Professor, Department of Physics, National Institute of Technology Durgapur, India,					
17:20-17:40	IT 7	Impact of climate change on water resources in s semi-arid river basin: Management options and adaptation strategies	Prof. Yali Woyessa	South Africa	67-68
17:40-18:00	IT 8	Simulation of secondary mineral formation from water of Obskoye fen affected by municipal sewage	Dr. Evgeniya Soldatova	Russia	69-70
18:00-18:20	IT 9	Hydrological perspectives on rainfall-runoff models and remote sensing applications driven by environmentally integrated basin experiments in Brazil	Prof. Otto Corrêa Rotunno Filho	Brazil	71-72
Session –VI Chairperson : Prof. Kashyap Dubey Associate Professor, School of Biotechnology, Jawaharlal Nehru University, New Delhi, India,					
18:25-18:45	IT 10	Assessment of various coastal hazards and their management plan in the lower Gangetic delta, Sagar Island, West Bengal, India	Prof. Pankaj Kumar Roy	India	74-75
18:45-18:55	CT-13	Application of Biofilm reactor in the treatment of swine wastewater	Dr. Zebing Li	China	76-77
18:55-19:05	CT-14	Health risk assessment of toxic heavy metals in waterbodies of Durgapur Steel city, India	Ms. Kankana Seal	India	78-79
19:05-19:15	CT-15	Fate and removal of antibiotics and poly aromatic hydrocarbons in constructed wetland: a numerical modeling approach	Mr. Avishek Adhikary	India	80-81
19:15-19:25	CT-16	Derivation of flow duration curve for prediction of hydropower generation potential: A case study from Southern Africa	Dr. G Ndhlovu	South Africa	82-83
Session –VII Chairperson : Prof. R. N. Saha, Professor, HOD, Department of Chemistry, National Institute of Technology Durgapur, India,					
19:30-19:50	IT 11	Synthesis of triphase mesoporous TiO_2 photocatalyst for degradation of organic pollutants in wastewater	Dr. Hirok Chaudhuri	India	85-86
19:50-20:00	CT-17	Towards groundwater monitoring using satellite and ground-based observations in Brazil	Mr. Clyvihk Renna Camacho	Brazil	87-88
20:00-20:10	CT-18	A Runoff Simulation Model for Lower Gangetic Plain of India.	Mr. Kush Kumar Dey	India	89-90

DAY-3 (July 8, 2021)					
16:00-17:15	**BRICS ITG Meeting (only for the members of the ITG)** Chairperson: Prof. Faizal Bux, BRICS ITG Chair, Director, Institute for Water and Wastewater Technology, Durban University of Technology, South Africa				
BREAK – 17:15-17:30 (15 minutes)					
Session –VIII Chairperson : Dr. Evgeniya Soldatova, Senior Researcher, Vernadsky Institute of Geochemistry and Analytical Chemistry of RAS, Moscow,					
17:30-17:50	IT 12	Photo-catalytic membrane separator-reactor for cleaning persistent contaminants in wastewater	Dr. Mrinal Kanti Mandal	India	93-94
17:50-18:00	CT-19	Atmospheric profile evaluation using radiosondes and MODIS satellite products over the city of Rio de Janeiro - RJ - Brazil	Ms. Louise Caroline Carvalho dos Santos	Brazil	95-96
18:00-18:10	CT-20	COVID 19: Blessings or hazard to the water quality	Dr. Trina Dutta	India	97-98
Session –IX Chairperson : Prof. Ajit Kumar Meikap, Dean Research and Consultancy, NIT, Durgapur, Professor, Department of Physics, NIT Durgapur, India,					
18:15-18:35	IT-13	Strategies for treatment of hospital wastewater using integrated technology	Prof. Kashyap Dubey	India	100-101
18:35-18:45	CT-21	Removal of Chromium (VI) from Aqueous Solution Using Low Cost Bio-Adsorbents : A comparison on performances, Isotherms and Kinetics	Prof. Radha Das	India	102-103
18:45-18:55	CT-22	Comparative study of water analysis kits for evaluating fluoride removal using Potash Alum modified salty clay ceramic filters in Pali district, Rajasthan, India	Mr. Sunil Duhan	India	104-105
Session –X Chairperson : Dr. Mrinal Kanti Mandal, Associate Professor, Department of Chemical Engineering, National Institute of Technology Durgapur, India,					
19:00-19:10	CT-23	Climate Change and its impact in occurrences of droughts and floods, threat to water conservation and right to life – A study with special reference to India	Dr. Susmita Dhar,	India	107-108
19:10-19:20	CT-24	Defluoridation of Water using Ion-Exchange Resin	Mr. Debdas Chowdhury	India	109-110
19:20-19:30	CT-25	Water scarcity challenges & alternative	Ms. Sritama Chatterjee	India	111-112
19:30-19:40	CT-26	Managing the Blue Gold: A study of the Water-Energy-Food Nexus in Indus River	Ms. Nabeela Siddiqui	India	113-114
19:40-20:15	**Valedictory Session:** Chairperson : Dr. Hirok Chaudhuri, Associate Professor, Department of Physics, National Institute of Technology Durgapur, India				

ABOUT THE CONFERENCE

In recent time BRICS nations are facing a crisis on freshwater resources and also dealing with water pollution. Water must be treated and supplied according to usage with a focus on economic efficiency and environmental sustainability. Against this backdrop, an International Conference has been organized. The conference will see a convergence of renowned experts and research students from BRICS countries. Researchers will deliberate and discuss various water-related issues. The conference will provide an interactive platform for enormous brainstorming and sharing path breaking ideas for sustainable water resources management and pollution treatment. This is a continuation of the series of conferences related to BRICS ITG held at (i) Ural Federal University in Yekaterinburg, Russia in 2016 (ii) National Research University Higher School of Economics, Moscow, Russia in 2016, (iii) Hohai University, China in 2018, (iv) Stellenbosch University, South Africa in 2018.

MAJOR THEME

- **Water Scarcity Challenges Ahead**
- **Surface and Ground Water Management**
- **Extreme Climate Event-Drought and Flood**
- **River basin management**
- **IoT enabled water resource management system**
- **Water Supply and Treatment**
- **Clean Water**
- **Wastewater Treatment Technology**
- **New materials for wastewater treatment**
- **Mathematical modelling related to water resource management**
- **Waste Containment Structures for water resource management**
- **Wastewater based epidemiology and Covid-19**

ABOUT THE ORGANIZER

Patrons

- Prof. Anupam Basu, Director, NIT Durgapur
- Prof. Abhay Karandikar, Director, IIT Kanpur

Chairpersons

- Dr. Hirok Chaudhuri, Department of Physics, NIT, Durgapur and Centre for Research on Environment and Water, NIT, Durgapur
- Prof. Y. M. Joshi, Department of Chemical Engineering, IIT Kanpur and Dean, International Relations, IIT Kanpur

Organizing Committee

- Dr. Supriya Pal, Department of Civil Engineering, NIT, Durgapur
- Dr. Mrinal Kanti Mandal, Department of Chemical Engineering, NIT Durgapur
- Dr. Soumen Basu, Department of Physics, NIT Durgapur
- Prof. Rajnarayan Saha, HOD, Department of Chemistry, NIT Durgapur and Coordinator, Centre for Research on Environment and Water, NIT, Durgapur
- Prof. Nilotpal Banerjee, Dean, Alumni Affairs and Outreach, NIT, Durgapur
- Prof. Ajit Kumar Meikap, Dean Research and Consultancy, NIT, Durgapur
- Prof. Pathik Kumbhakar, Dean Academic Research, NIT, Durgapur
- Prof. Amiya Kumar Samanta, HOD, Department of Civil Engineering, NIT, Durgapur
- Prof. Kalyan Adhikari, HOD, Department of Earth and Environmental Studies, NIT, Durgapur
- Prof. Gopinath Halder, HOD, Department of Chemical Engineering, NIT Durgapur
- Dr. Sukadev Sahoo, HOD, Department of Physics, NIT Durgapur
- Prof. Sachchida Nand Tripathi, HOD, Department of Civil Engineering, IIT Kanpur
- Prof. Indra Sekhar Sen, Department of Earth Science, IIT Kanpur
- Prof. Chunendra K Sahu, Department of Civil Engineering, IIT Kanpur

International Advisory Committee

- Prof. Nilo Nascimento, Professor, Department of Hydraulic and Water Resources Engineering, Universidade Federal de Minas Gerais, Brazil
- Prof. Otto Corrêa Rotunno Filho, Professor, Civil Engineering Program, COPPE/UFRJ, Federal University of Rio de Janeiro
- Dr. Evgeniya Soldatova, Senior Researcher, Vernadsky Institute of Geochemistry and Analytical Chemistry of RAS, Moscow
- Dr. Natalia Guseva, Professor, Division for Geology, Tomsk Polytechnic University, Russia
- Prof. Y. M. Joshi, Dean of International Relations, Indian Institute of Technology Kanpur, India
- Prof. Vinod Tare, Professor, Department of Civil Engineering, Indian Institute of Technology Kanpur, India
- Dr. Supriya Pal, Associate Professor, Department of Civil Engineering, National Institute of Technology Durgapur, India
- Dr. Hirok Chaudhuri, Associate Professor, Department of Physics and Center for Research in Environment and Water, National Institute of Technology Durgapur, India
- Prof. Zhanxue Sun, East China University of Technology, China
- Prof. Shengji Li, Director of BRICS University Affairs Office, Ural Institute of NCWU, North China University of Water Resources and Electric Power, China
- Prof. Yiping Li, Director, Department of Environmental Science, College of Environment, Hohai University, China
- Prof. Faizal Bux, Director, Institute for Water and Wastewater Technology, Durban University of Technology, South Africa
- Prof. Yali Woyessa, Central University of Technology, South Africa

ABOUT THE ORGANIZING INSTITUTE

National Institute of Technology Durgapur:

NIT Durgapur is an academic institute of national importance under the Ministry of Education, Govt. of India. It was established in 1960 as Regional Engineering College at Durgapur, West Bengal state and converted to NIT in 2002 under an act of the Parliament of India. It hosts several engineering, science, management and humanities disciplines for UG, PG and Ph D students from India and abroad. NIT Durgapur is a partner institute of BRICS Network University under the thematic area "Water Resources and Pollution Treatment".

https://www.nitdgp.ac.in/

https://www.nitdgp.ac.in/p/brics-1

Indian Institute of Technology Kanpur:

Indian Institute of Technology, Kanpur, established in 1959, is one of the premier institutions established by the Government of India. The aim of the Institute is to provide meaningful education, conduct original research of the highest standard and to provide leadership in technological innovation. The globally acclaimed education at IIT Kanpur prepares the Indian students and international students for exciting careers all over the world. The education develops a critical thinking led approach and imparts knowledge in science, engineering, management and humanities fields to solve problems that challenge humanity. Researchers at IIT Kanpur do cutting edge research in their area. There is great synergy between the fundamental research and applied research done at IITK. Its alumni and faculty have won many international awards.

https://www.iitk.ac.in/

HISTORY AND OBJECTIVES OF THE BRICS NETWORK UNIVERSITY

For historical, economic, and political reasons, the universities of BRICS countries have not yet developed strong collaboration. Trying to cover this gap, the Ministries of Education of BRICS countries implemented in 2015 the BRICS Network University (BRICS NU).

Involving some of the top universities in the five BRICS countries, the objectives of this network are:

- in the short term, enhance the academic collaboration between universities of the five countries through joint-researches and mobility of students and scholars;
- in the middle-term, create joint Graduate programs issuing diplomas that will be valid for the five countries, and prepare high-qualified staff for the BRICS multilateral institutions;
- in the long-term, enhance scientific development according to the necessities of non-central countries; in this sense, it may contribute to "reshaping the world knowledge". BRICS NU is organized in six strategic axes (https://nu-brics.ru):

  - **BRICS studies**
  - **Computer science and informational security**
  - **Ecology and climate change**
  - **Economics**
  - **Energy**
  - **Water resources and pollution treatment**

- Promote educational cooperation among all BRICS universities and education institutions.
- Promoting the BRICS Network University research collaborations to foster productivity, innovation, economic growth and well-being.

ABOUT THE BRICS ITG :
WATER RESOURCES AND POLLUTION TREATMENT

BRICS Network Universities was developed in the BRICS 7th summit in Russia in July 2015, under a Russian proposal of the establishment of BRICS NU, which was written into Ufa Declaration. The International Thematic Group (ITG) purpose is to develop theoretical and practical knowledge about water resources and the methods of pollution treatment.

In particular, the ITG is aimed at:

- developing joint educational and professional training programs on protection of water resources and pollution treatment tailored to the BRICS countries;
- conducting research on the formation of water resources and the origin of groundwater and surface water composition in the BRICS countries;
- developing rational methods of natural and wastewater treatment and water conservation.

Member Universities of BRICS NUs

- Federal University of Minas Gerais (Brazil)
- Federal University of Rio de Janeiro (Brazil)
- Tomsk Polytechnic University (Russia)
- Saint Petersburg State University (Russia)
- National Institute of Technology Durgapur (India)
- Indian Institute of Technology Kanpur (India)
- Hohai University (China)
- North China University of Water Resources and Electric Power (China)
- Durban University of Technology (South Africa)
- Central University of Technology (South Africa)

BRICS ITG Chair Professor (Water Resources and Pollution Treatment)

since 2018 :

Prof. Faizal Bux

Director, Institute for Water and Wastewater Technology,

Durban University of Technology, South Africa

2016-2018

Prof. Vinod Tare

Professor, Department of Civil Engineering,

Indian Institute of Technology Kanpur, India

CONTACT INFORMATION OF THE FACULTY MEMBERS INVOLVED IN BRICS NUs ACTIVITIES AT NIT DURGAPUR, INDIA

Prof. (Dr.) Anupam Basu

Director

National Institute of Technology Durgapur (NIT Durgapur),India

ITG member, BRICS Programme

director@admin.nitdgp.ac.in

Dr. Supriya Pal

Associate Professor

Department of Civil Engineering and Coordinator, (NIT Durgapur),India ITG member, BRICS Programme

supriya070478@gmail.com

+919434788154

Dr. Hirok Chaudhuri

Associate Professor

Department of Physics, Single Point of Contact to Ministry for BRICS Programme at NIT Durgapur and ITG member, BRICS Programme NIT Durgapur, India,

hirok.chaudhuri@phy.nitdgp.ac.in

Dr. Mrinal Kanti Mandal

Associate Professor

Department of Chemical Engineering,NIT Durgapur, India

mrinalmandal@gmail.com

SOME OF THE ACTIVITIES OF NIT DURGAPUR UNDER BRICS STI FRAMEWORK

COLLABORATOR:

Tomsk Polytechnic University, Russia

East China University of Technology, China

Maithon Dam, India

Maithon Dam, India

DPL Canal

Nunia river, Raniganj

ECUT, China and TPU, Russia Team at India with NIT Durgapur

Ajoy river, Joydev

Durgapur barrage
(Damodar river)

Mukutmanipur dam
(Kangsabati river)

Mukutmanipur dam
(Kangsabati river)

NIT Durgapur Team at China with ECUT, China and TPU, Russia

NIT Durgapur Team at Russia with TPU, Russia

DAY – 1 (JULY 6, 2021)

Inauguration session

Dr. Hirok Chaudhuri

Dr. Hirok Chaudhuri is presently working as an Associate Professor at Physics Department, NIT Durgapur (NITD). He is also acting as an adjunct faculty and joint coordinator of Center for Research on Environment and Water at NITD. He is the founder coordinator of the Science Museum at NITD. He performed Post-Doctoral research activity at VECC (a unit of Department of Atomic Energy, Government of India) Kolkata, India. He completed his Ph D Thesis work from Saha Institute of Nuclear Physics, Kolkata, India. Dr. Chaudhuri received several awards as a young scientist. He was selected as a Fellow of Earth Science Society of India in 2015. He is also working as an invited member of the International Thematic Group of the BRICS Network University Programme on Water Resources and Pollution Treatment. Dr. Chaudhuri received Visiting Scientist Fellowship from Govt. of India, Department of Atomic Energy at VECC, Kolkata. He was also awarded by ONGC (Oil and Natural Gas Corporation), India in 2009 for his major contribution in R & D Activity on the country's first Pressure Swing Adsorption based Prototype Helium Purification Plant at ONGC's Kuthalam GCS, Tamilnadu. He received National Scholarship from the Government of West Bengal, Education Department, India in the year 1996.

Dr. Chaudhuri has a long-term working experience in the research areas:

Geochemical Precursors for Earthquakes, Geothermal Exploration, Helium Exploration, Environmental Radioactivity, Nonlinear Dynamics. Recently he started research activities in the field of **Wastewater Treatment using nano-technology**. Presently he is working as investigators of three research projects (both national and international status) and two academic and societal development projects. Dr. Chaudhuri successfully completed three research projects funded by Govt. of India MHRD, SERB, DST. He has several research publications (more than 40 publications) in Peer Reviewed International and National SCI, Scopus and Web of Science indexed Journals and monographs as book chapters. He is also working as a mentor for Research Student for Ph D Thesis work and M. Tech (Advanced Material Science and Technology) and M. Sc. (Physics) Project Thesis work. Dr. Chaudhuri delivers lectures in B. Tech., M. Tech (Advanced Material Science and Technology) and M. Sc. (Physics) levels and also for Ph D course work. He delivered more than 45 invited talk at different parts of the globe. He is also working as Reviewer in reputed international journals.

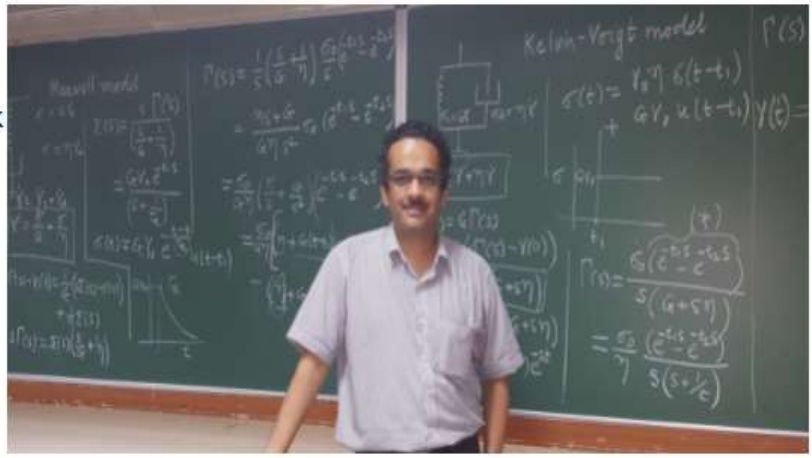
email: hirok.chaudhuri@phy.nitdgp.ac.in, imhirok@gmail.com, Cell Phone: +91 9434789019

Prof. Y. M. Joshi

Yogesh M Joshi

Dean of International Relations
and Pandit Girish & Sushma Rani Pathak
Chair Professor
Department of Chemical Engineering
Indian Institute of Technology Kanpur

Senior Editor, Langmuir



B.E. University of Pune, 1996
Ph.D. IIT-Bombay, Mumbai; National Chemical Laboratory, Pune 2001
Post Doctoral Fellowship, Benjamin Levich Institute for Physico-Chemical Hydrodynamics, New York, 2001-2004
Phone(office): 91-512-2597993
Fax: 91-512-2590104
Email: joshi [AT] iitk.ac.in

Breif Overview

Our group is interested in understanding physical behavior and dynamics of structured fluids. We combine expertise from Chemical Engineering, Physics, Chemistry and Materials Science to understand molecular phenomena that is responsible for the flow behavior. Major thrust area of our group is to understand ageing and effect of deformation on the variety of soft glassy materials such as concentrated suspensions, glassy polymers and polymer nanocomposites. Common theme in all these systems is their jammed state wherein primary entity (particle or molecular segment) is physically arrested due to overall crowding of constituents. In such state, system explores only a small part of the phase space thereby leading to a glassy behavior. Recently we showed that how rheological characterization can give profound insight into the ageing of colloidal glasses compared to that of colloidal gels. We also investigated effect of deformation on the ageing suspensions and how influence of the same on relaxation dynamics can be used to predict long time rheological behavior of these materials.We are also involved in understanding rheological behavior of discotic nematic suspensions, particularly their intriguing flow behaviors that are industrially very important.

Main research area

- Structure and dynamics of Colloidal Glasses and Gels
- Soft Matter
- Rheology of Complex Fluids
- Polymer Science and Engineering, Polymer Nanocomposites

Prof. Anupam Basu

Prof. Anupam Basu, is the Director of National Institute of Technology, Durgapur and is Professor-on-lien, Dept. of Computer Science & Engineering, IIT Kharagpur. He is an active researcher in the areas of Cognitive and Intelligent Systems, Embedded Systems and Language Processing, He has led a number of projects for Technology Enabled Education, including School Education and education for those with Physical Disabilities. He has also taught at the University of California at Irvine and at the University of Guelph, Ontario, Canada.

He has acted as the Chairperson of the AICTE Curriculum revision committee for Computer Science & Engineering. He has served in several committees of the Govt. of India and those in the State of West Bengal.

Education:

- **Ph.D.** in Expert System for Control System Design, Department of Computer Science and Engineering, Indian Institute of Technology (IIT) Kharagpur, India 1988.
- **M.Eng.** in Computer Engineering with **1st class Honours** (**First Class 2nd**), Jadavpur University, India, 1982.
- **B.Eng.** in Electronics and Telecommunication Engineering**, 1st class Honours** Jadavpur University, India, 1980.
- **HSC** from St. Lawrence High School, Kolkata, India, 1975 (22nd in the combined merit list of West Bengal Board of Intermediate and Secondary Education, India).

Honours:

- **State Award for Best Innovator for Improving Life of Physically Challenged Community**, Ministry of Social Welfare, West Bengal Government, 2014
- **NCPEDP-Mphasis Universal Design Award 2011** for contributions in design for disabled, National Council for Promotion of Employment of disabled Persons, India and HP, USA
- **National Award for Technology Development for Empowering Persons with Disability 2007**, Ministry of Social Justice and Youth Empowerment, Government of India.
- **Da Vinci Award 2004** for Best Technology and Communication by Speech Impaired and People with Cerebral Palsy 2004, Engineering Society of Detroit & Multiple Sclerosis Society of Michigan, USA.
- **Fellow of Indian National Academy of Engineering**, 2000, Indian National Academy of Engineering
- **Humboldt Fellowship 1997,** Alexander von Humboldt Stiftung.
- **Jaycee Award** for Outstanding Persons for Research in Assistive System 1996, Calcutta Chamber of Commerce
- **Young Scientist Research Award** 1992, Department of Science & Technology, Government of India.

Prof. Abhay Karandikar

Prof. Abhay Karandikar is currently serving as the Director of IIT Kanpur. Earlier, he was the Dean (Faculty Affairs) and the Institute Chair Professor in the Department of Electrical Engineering at IIT Bombay. He has been instrumental in developing many pathbreaking technologies and has been at the forefront of several large initiatives both at the institute and the national level. He is the founding member and chairman of the Telecom Standards Development Society of India (TSDSI), India's standards body for telecom. He has also served as the coordinator of Tata Teleservices IIT Bombay Center of Excellence in Telecommunications (TICET) and the National Center of Excellence in Technology for Internal Security.

Prof. Abhay Karandikar received his M. Tech. and then a Ph.D. in electrical engineering from IIT Kanpur in 1988 and 1994, respectively. Prof. Karandikar's current research interests include frugal 5G and rural broadband, device to device communication, software defined networking, network function virtualization and 5G core network, and quality of service and resource allocation in wired/wireless networks. His large research group comprises research scientists, engineers, scholars and senior managers. They have together developed several pathbreaking technologies. These include Linux based MPLS router, Emergency Communication System for Force 1, Low Cost Cellular Backhaul for Rural Access (CeBRA), Mobile Social Networking Platform (MSNP) and several others. In 2002, he co-founded and incubated Eisodus Networks in IIT Bombay's business incubator. The aim was to develop metro Ethernet switch for broadband access network. Later, the company secured investors' funding and in 2007, became a part of Tejas Networks.

Achievements and Honors

- Mozilla Open Innovations Challenge for the Gram Marg solution for Rural Broadband, 2017.
- Impactful Research Award, IIT Bombay, 2017.
- IEEE Standards Medallion, 2016.
- VASVIK Industrial Research Award, 2013.
- NASI-Reliance Industries Platinum Jubilee Award, 2012.
- Hari Om Ashram Prerit Dr. Vikram Sarabhai Research Award, 2009.
- Prof K Sreenivasan Memorial Award, 2006.
- Prof. S.V.C. Aiya Memorial Award, 2006.
- Dr. P.K. Patwardhan Technology Development Award, 2004.

PROF FAIZAL BUX
South African
Director: Institute for Water and Wastewater Technology, DUT
NRF South African Chairs Initiative (SARChI), Chair-holder
Institute for Water and Wastewater Technology
Durban University of Technology (DUT), South Africa
faizalb@dut.ac.za

QUALIFICATIONS
PhD (2003): Biotechnology - DUT
MTech (1997): Biotechnology (Cum Laude) - Technikon Natal
BSc Hons (1987): Microbiology - University of Durban Westville;
BSc (1986): University of Durban Westville

RESEARCH FIELD: My research focused primarily within the field of environmental biotechnology, but more specifically the following research areas: water and wastewater treatment, wastewater beneficiation, environmental health, biotechnological applications of microalgae including biodiesel, bioremediation of industrial effluents and bioproducts. (NRF RATING: B3)

POSTGRADUATE SUPERVISION
Supervised 53 Masters and Doctoral graduates. Current supervision includes 17 Masters and 13 Doctoral students, and 34 Post -Doctoral Fellows served their tenure under my guidance.

PROFESSIONAL PROFILE/PARTICIPATION

- International Water Association (IWA)-SA Executive Committee member, 2013-current; treasurer, 2016-current; IWA Governing Assembly Member, 2020- current.
- Appointed as the South African representative on the BRICS Network Universities Panel for the ITG: Water Resource Management and Pollution treatment 2016- current; Chair of BRICS-Network Universities ITG: Water Resource Management and Pollution treatment, July 2018-current.
- Team leader of JICA SATREPS project, 2016-current; OKP project, 2018- current
- Senior Fellow of Water Institute of Southern Africa, 2021; Fellow of International Water Association, 2018; Fellow of Royal Society of Chemistry, 2016; Member of Academy of Science of South Africa (ASSAf), 2016
- Member of Global Water Microbial Consortium (GWMC)
- Awards: Winner of NSTF-Water Research Commission Award, 2020/21; NRF-Champion of Research Capacity Development and Transformation at South African Higher Education Institutions, 2018; WRC Knowledge Tree Award, 2017.

PUBLICATIONS AND CONFERENCE PRESENTATIONS
I have published 196 scientific papers in leading Science Citation Index (ISI) Journals and contribution to 23 book chapters, 15 technical Reports (Water Research Commission, South Africa), >170 conference presentations (national and international). Additional I have delivered 9 keynotes/guest speaker and chaired many sessions at international conferences and involved in several organizing committees. I have acted/current editor for several reputable journals and edited 8 books. Total number of citations is > 9300. H-index 48 (Google Scholar)

Dr. Supriya Pal

Dr. Supriya Pal is presently working as Associate Professor in the Dept. of Civil Engineering, National Institute of Technology Durgapur, West Bengal, India. He is having a total teaching, research and industrial experience of more than 19 years in the field of Geotechnical and Geo-environmental engineering. He has a Ph.D in Civil Engineering from Jadavpur University, Kolkata, India and obtained Master of Civil Engineering from the same institution in the specialization of Geotechnical Engineering. Dr. Pal has a long-term working experience in the research areas: Geotechnical Engineering, Geo-environmental Engineering, Solute transport through porous media, Industrial wastewater treatment, Electro-kinetic treatment of contaminated land. Recently he started research activities in the field of stability analysis of ash dykes, scientific study on open cast mine slope stability, metal extraction from fly ash. Dr. Pal has several national and international collaborations. He has research collaboration with Far Eastern Federal University, Russia (in metal extraction technology from fly ash); Tomsk Polytechnic University; Russia, Hohai University, East China University and Technology, China; Federal university of Rio De Janerio, Brazil; Institute for Water and Wastewater Technology, Durban University of Technology, South Africa (through BRICS NU Programme of Water Recourses and Pollution Treatment). Presently, Dr. Pal is working as investigators of three research projects on "land subsidence study of CBM gas producing block" funded by M/s Essar Oil, India, "Environmental geochemistry and treatment of organic pollutants in aquatic systems in the selected areas of China, India and Russia" under BRICS
BRICS STI Framework Programme, "Potential use of fine grained clay soil as landfill liner for containment of pollutants in waste disposal site" under RIG, MHRD. These projects are funded by Govt. of India MHRD, DST, and M/s Essar Oil, India. Dr.Pal has more than 25 publications in Peer Reviewed International and National SCI, Scopus and Web of Science indexed Journals. Moreover, he published 5 research articles as book chapters. Dr. Pal is the editor of the book "Advances in Water Resources Management for Sustainable Use" publish by Springer. Dr. Pal has numerous publications in the Proceedings of International / National Conferences, He delivered more than 25 invited talks in various conferences, seminars, workshop and technical meetings held in India and abroad.
Presently Dr. Pal is serving as the Coordinator and ITG (International Thematic Group) member of the BRICS Network University (NU) programme of NIT Durgapur in the thematic area of "Water Resources and Pollution Treatment". He is also acting as Member of National Coordination Committee (NCC) of BRICS Network University Programme under Dept. of Higher Education, MHRD, Govt. of India. He is also acting as coordinator of State Technical Agency (STA), Pradhan Mantri Gram Sadak Yojana (PMGSY), under the authority of the Ministry of Rural Development, Govt. of India.

email: supriya.pal@ce.nitdgp.ac.in, Cell Ph: +91 9434788154

DR. RAJNARAYAN SAHA

Professor & Head

Dept. of Chemistry

NIT Durgapur

E-mail: rajnarayan.saha@ch.nitdgp.ac.in

Research Interest:

Broad area: Environmental Chemistry

Dr. Rajnarayan Saha has more than 23 years of research experience in the field of Environmental Chemistry, Water and Wastewater Treatment. He earned his Ph.D degree from Indian Institute of Technology, Mumbai (IITB). He did his M.Tech in Science & Technology from IITB. and M.Sc. (Chemistry) from Burdwan University. He is currently working as professor in Department of Chemistry at National institute of Technology, Durgapur, India. Dr. Saha working in the areas on Physico-Chemical and biological treatment of wastewater, Food chain contamination of metals, Synthesis and environmental application of nano materials. Regularly handling research projects, sponsored by DST, UGC and other funding agencies. He has visited several countries like USA, Germany, Netharlands, Italy, Oman, Spain and France for his collaborative research and academic activities. 12 Ph.D students have already been awarded and 4 numbers of Doctoral students are working in various Environmental problems. In addition to the doctoral programme, many M.Tech students are pursuing of their Dissertation work under him. He has completed and running Sponsored Projects from Govt. of West Bengal and Govt. of India. He published more than 40 research papers in different renowned International and National journals like Analyst, journal of Hazardous Material, ACS Sustainable Chemistry & Engineering, Chemistry Select, Advanced Powder Technology, Desalination and Water Treatment, International journal of Environment and Engineering, Journal of Plant interaction, Water Sc.& Technology etc.

Zhanxue

Family Name: Sun

Sex: Male

Date of Birth: 1962-09-24

Prof. Dr. Zhanxue Sun

School of Water Resource and Environmental Engineering,

East China University of Technology

No.418 Guanglan Ave., Nanchang,

Jiangxi Province, P.R.China, 330013

Tel: +86-13707947436, Email: zhxsun@ecit.cn

Zhanxue Sun, Professor, his research interests are the use of environmental isotopes, geochemistry and hydrochemistry in geothermal studies, uranium prospecting, mining and environmental issues. Using stable isotopes together with geochemical and hydrochemical tools, he looks at the recharge origin of water, solutes and gases in geothermal systems, the hydrogeochemical processes that occurred in the subsurface, and uranium, radon and radium anomalies of groundwaters and their relations with uranium mineralization. He is interested in bacteria leaching of low-grade uranium and other metal ores and the biogeochemical reactions during the heap or in-situ leaching processes. He has served as principal scientific investigator in more than 30 research projects supported by China Geological Survey, NSFC (National Science Foundation of China), CNNC (China National Nuclear Corporation), MOST (Ministry of Science and Technology) and some other funding sources. He has taught hydrogeochemistry, uranium hydrogeochemistry and geothermics at undergraduate and postgraduate level at of the East China University of Technology for many years and has supervised more than 30 Ph.D. and master students in the field of hydrogeology and bio-hydrometallurgy. He has published 3 monographs and 3 textbooks and written over 80 articles in international/domestic journals and conferences.

Vinod Tare, Professor, Department of Civil Engineering, IIT Kanpur

Dr Vinod Tare is a Professor of Environmental Engineering and Management at the Indian Institute of Technology Kanpur and also held Sir M Visvesaraya Chair Professor established by the Ministry of Water Resources, GoI. He is a Civil Engineer, obtained his Master's and Doctoral degrees in Environmental Engineering from IIT Kanpur, and subsequently did post-doctoral research at the Illinois Institute of Technology, Chicago. Dr Tare began his professional career with a short tenure at the Engineers India Ltd and subsequently chose to serve the academic world and engage in research and development activities. He has guided numerous masters' and doctoral dissertations, and published many reports and papers in conference proceedings and journals of international repute. He was the Chairman of the International Conference on Water – Harvesting, Storage and Conservation (WHSC-2009) and First, Second, Third, Fourth and the Fifth India Water Impact Summit held in 2012, 2017, 2018, 2019 and 2020 respectively jointly organized by Ministry of Jal Shakti and IIT Kanpur led Centre for Ganga River Basin Management and Studies (cGanga). Dr Tare has served on numerous National and International Panels and Committees on various issues and is consultant/advisor to many government organisations, NGOs, Industries, and Institutions. He has developed nature-friendly toilet systems that has been successfully piloted for passenger trains in Indian Railways, for communities, house boats, large congregation such as Kumbh Mela, etc. and has a huge potential for deployment for public use. Dr Tare was the leader of the consortia of seven IITs for the preparation of Ganga River Basin Management Plan (GRBMP). He is the founding head of cGanga led by IIT Kanpur supported by the Ministry of Jal Shakti, Government of India.

Contact Address:

Dr Vinod Tare
Professor
Environmental Engineering and Management
Department of Civil Engineering
&
Founding Head, Centre for Ganga River Basin Management and Studies (cGanga)
IIT Kanpur, KANPUR – 208016
Uttar Pradesh

Email: vinod@iitk.ac.in
Tel: +91-512-259-7792 / 97
Mobile: +91 9651969695

"Arth Ganga" – River Conservation Synchronised Development: A Key Concept in Managing River Basins and Water Resources

Vinod Tare

Professor and Founding Head, Centre for Ganga River Basin Management and Studies (cGanga), Indian Institute of Technology, Kanpur.

vinod@iitk.ac.in

Abstract:

India's rapid development and integration with the world in recent decades had brought to fore some of her social and environmental weaknesses. Three key initiatives of the Indian government in the water sector – Namami Gange, Swachh Bharat, and Jal Jeevan programmes – have attempted to address these issues through a powerful concept of "Arth Ganga" – River Conservation Synchronised Development. The Namami Gange programme focuses on restoring and conserving the Ganga River (and other Indian rivers) through an inclusive, comprehensive, basin-wide approach involving the revival and conservation of large and small tributaries and waterbodies in the river basin and with people's participation. The Swachh Bharat programme focuses on universal sanitation, emphasizing open-defecation-free practice through the provision of universal household and community toilets. The Jal Jeevan Mission targets providing piped water supply to all households, rural and urban. Though the goals of each mission are technically different, taken together the three flagship programmes of the Jalshakti Ministry can complement each other in ensuring a holistic approach in national water management through balanced emphasis on ecological integrity, socio-cultural strengthening, environmental safety, human health, and water security. Such integration depends on the overarching consideration of long-term water and environmental security in deciding the nitty-gritty of each programme and developing them accordingly. Some key factors, bottlenecks and options are discussed in order to enable an integrated and holistic outcome from the three programmes.

References

[1] cGanga and NMCG (2015) Ganga River Basin Management Plan (GRBMP) – Extended Summary; Volume 1: Main Plan Document; Volume 2: Mission Reports, Authors: Tare, V. and Roy, G., Centre for Ganga River Basin Management and Studies, Indian Institute of Technology Kanpur.

[2] cGanga and NMCG (2019) River Restoration and Conservation Manual, Authors: Tare, V. *et al.*, Centre for Ganga River Basin Management and Studies, Indian Institute of Technology Kanpur.

Session – I

IT 1

Wastewater based epidemiology for monitoring COVID-19 infections in KwaZulu-Natal Province of South Africa

F.Bux *, L.Pillay, I.D.Amoah, O.O.Awolusi, K.Pillay, S. Kumari

Institute for Water and Wastewater Technology, Durban University of Technology, P.O. Box 1334, Durban 4000, South Africa.

*Corresponding author: faizalb@dut.ac.za

Abstract:

Wastewater-based epidemiology (WBE) has gained traction as a cost-effective approach, complimentary to the expensive, conventional clinical-based surveillance and screening. The WBE approach captures every category of infected individual, whereas with clinical testing and contact tracing many infected people may be overlooked, and their contacts not traced. WBE has been successfully used for COVID-19 surveillance in several countries, including U.S., Europe, Asia, and Australia, Brazil (Medema et al., 2020; Randazzo et al., 2020; Ahmed et al., 2020; Serchan et al., 2020). Four wastewater treatment plants in the cities of Durban and Pietermaritzburg were selected for the study. Untreated wastewater samples were taken weekly from June to December 2020. In 2021, only one plant in Durban was sampled. Using advanced droplet digital PCR platform, the SARS-CoV-2 viral load was determined and correlated with the clinical cases to ascertain the applicability of this approach. An increase in viral load from over 41 000 copies/mL on the 22nd of September to 240 000 copies/mL on the 29th of September was observed. This increase in SARS-CoV-2 viral load was observed to precede the corresponding increase in COVID-19 clinical cases by almost two weeks. It was also observed that easing of lockdown regulations resulted in increase in viral loads within the wastewater samples. In similar fashion, SARS-CoV-2 viral concentrations began to increase from 11th May 2021. These findings were three weeks before official acknowledgement of the third wave and were widely reported in the media from the 1st of June 2021. The findings from this study, which is still ongoing, indicates that WBE is a useful tool for monitoring COVID-19 infections. It (WBE) could significantly improve health authorities' preparedness by serving as an early warning, as observed in this study prior to the second and third infection waves in the province.

References

[1] Medema et al., *Sci. Technol. Lett.* **7** (2020) 511-516
[2] Randazzo et al., *Water Res.* (2020) 115942
[3] Ahmed et al., *Sci. Total Environ.* **728** (2020) 138764
[4] Serchan et al., *Sci. Total Environ.* **743** (2020) 140621

PROF FAIZAL BUX
South African
Director: Institute for Water and Wastewater Technology, DUT
NRF South African Chairs Initiative (SARChI), Chair-holder
Institute for Water and Wastewater Technology
Durban University of Technology (DUT), South Africa
faizalb@dut.ac.za

QUALIFICATIONS
PhD (2003): Biotechnology - DUT
MTech (1997): Biotechnology (Cum Laude) - Technikon Natal
BSc Hons (1987): Microbiology - University of Durban Westville;
BSc (1986): University of Durban Westville

RESEARCH FIELD: My research focused primarily within the field of environmental biotechnology, but more specifically the following research areas: water and wastewater treatment, wastewater beneficiation, environmental health, biotechnological applications of microalgae including biodiesel, bioremediation of industrial effluents and bioproducts. (NRF RATING: B3)

POSTGRADUATE SUPERVISION
Supervised 53 Masters and Doctoral graduates. Current supervision includes 17 Masters and 13 Doctoral students, and 34 Post -Doctoral Fellows served their tenure under my guidance.

PROFESSIONAL PROFILE/PARTICIPATION

- International Water Association (IWA)-SA Executive Committee member, 2013-current; treasurer, 2016-current; IWA Governing Assembly Member, 2020- current.
- Appointed as the South African representative on the BRICS Network Universities Panel for the ITG: Water Resource Management and Pollution treatment 2016- current; Chair of BRICS-Network Universities ITG: Water Resource Management and Pollution treatment, July 2018-current.
- Team leader of JICA SATREPS project, 2016-current; OKP project, 2018- current
- Senior Fellow of Water Institute of Southern Africa, 2021; Fellow of International Water Association, 2018; Fellow of Royal Society of Chemistry, 2016; Member of Academy of Science of South Africa (ASSAf), 2016
- Member of Global Water Microbial Consortium (GWMC)
- Awards: Winner of NSTF-Water Research Commission Award, 2020/21; NRF-Champion of Research Capacity Development and Transformation at South African Higher Education Institutions, 2018; WRC Knowledge Tree Award, 2017.

PUBLICATIONS AND CONFERENCE PRESENTATIONS
I have published 196 scientific papers in leading Science Citation Index (ISI) Journals and contribution to 23 book chapters, 15 technical Reports (Water Research Commission, South Africa), >170 conference presentations (national and international). Additional I have delivered 9 keynotes/guest speaker and chaired many sessions at international conferences and involved in several organizing committees. I have acted/current editor for several reputable journals and edited 8 books. Total number of citations is > 9300. H-index 48 (Google Scholar)

IT 2

Photocatalysis for wastewater treatment: engineering consideration and perspectives

Dawei Wang

College of Environment, Hohai University, China

dawei.wang@hhu.edu.cn

Abstract:

The debate on whether photocatalysis can reach full maturity at commercial level as an effective and economical process for treatment and purification of water and wastewater has recently intensified. Despite a bloom of scientific investigations in the last 30 years, particularly with regards to innovative photocatalytic materials, photocatalysis has so far seen a few industrial applications. Regardless of the points of view, it has been realized that research on reactor design and modeling are now equally urgent to match the extensive research carried out on innovative photocatalytic materials. In reality, the development of photocatalytic reactors has advanced steadily in terms of modeling and reactor design over the last two decades, though this topic has captured a smaller specialized audience. In this critical review, we introduce the latest developments on photocatalytic reactors for water treatment from an engineering perspective. The focus is on the modeling and design of photocatalytic reactors for water treatment at pilot- or at greater scale. Photocatalytic reactors utilizing both natural sunlight and UV irradiation sources are comprehensively discussed. The most promising photoreactor designs and models are examined giving key design guidelines. Other engineering considerations, such as operation, cost analysis, patents, and several industrial applications of photocatalytic reactors for water treatment are also presented. The dissemination of key photocatalytic reactor design principles among the scientific community and the water industry is currently one of the greatest obstacles in translating PWT research into widespread real-world application.

Prof. Dawei Wang
College of Environment, Hohai University, China

Dr. Wang is originally from Jiangsu Province, China. He received his B.E. and Ph.D. degrees in environmental engineering from Hohai University, China in 2011 and 2016, respectively. During 2014–2016. he also worked as a visiting student in the Department of Chemistry at University of California, Riverside, USA. After completed a postdoc fellowship at Virginia Commonwealth University, USA, and a postdoc fellowship at Clemson University, USA, he is currently a professor of environmental engineering at Hohai University, China.

IT 3

Adapting green and blue infrastructure to the built environment: benefits, perspectives and challenges

N. O. Nascimento[a*], T.Silva[a], D. B. Rosa[a]

a. *Department of Hydraulic Engineering and Water Resources, Universidade Federal de Minas Gerais, av. Antônio Carlos 6627, Pampulha, Belo Horizonte (MG),*

[*]Corresponding author: niloon@ehr.ufmg.br or niloon2012@gmail.com

Abstract:

Green and blue infrastructute (GBI) usually refers to the association of urban water management concepts such as water sensitive urban design (WSUD) and low impact development (LID) with concepts of green-blue corridors and urban forests providing connectivity between protected areas and promoting biodiversity, among other functions. GBI, frequently reported as an approach able to decisively contribute to the sustainability of urban water management (Maes et al., 2014, Rosa et al, 2020), aims to protect the environment, both the "green" (e.g. forests, parks, urban vegetation, grass, bushes, etc.…) and the "blue" (e.g. ponds, creeks, lakes, reservoirs, rivers, etc.), with several associated benefits such as: (i) reducing natural risks as flooding and land sliding; (ii) mitigating environmental impacts of urbanisation, agricultural, industrial and mining activities; (iii) mitigating impacts of urbanization on the local climate, as it is the case of heat islands, through a considerable increase on the presence of trees and green spaces in urban areas; (iv) promoting connectivity, integrating urban and protect areas within metropolitan regions; (v) restoring and protecting riparian areas, water sources and recharge areas and steep hilltops; (vi) promoting biodiversity by improving the ecological state of urban and metropolitan areas and recovering ecological continuity; (vii) making cities more resilient to climate change.

Nevertheless, one of the main challenges of adopting GBI approaches relates to the fact that the core of big cities is frequently composed by already built and densely occupied urban areas (e.g.: Romnée et al, 2015; Baek et al, 2015, Rosa et al, 2020). Particularly in the developing world, existing stormwater infrastructure has frequently been built according to conventional approaches. This leads to low adaptability in a changing world where pressures due to climate change and population growth require more flexible and adaptable approaches on urban development and sustainable resources management (Juntti et al, 2021). In the present paper, we describe results of on-going research projects on adapting GBI to built areas, using as case studies urban catchments in the Metropolitan Region of Belo Horizonte, Brazil.

References

Baek, S.-S., Choi, D.-H., Jung, J.-W., Lee, H.-J., Lee, H., Yoon, K.-S., Cho, K. H. (2015*). Optimizing low impact development (LID) fir stormwater runoff treatment in urban area, Korea: Experimental and modelling approach*. Water Research 86, 122-131.

Maes, J., Barbosa, A., Baranzelli, C., Zulian, G., Silva, F. B., Vandecasteele, I., Lavalle, C. (2014). *More green infrastructure is required to maintain ecosystem services under current trends in land-use change in Europe*. Landscape Ecology, *30*(3), 517–534. http://doi.org/10.1007/s10980-014-0083-2

Romnée, A., Evrard, A., Trachte, S. (2015). *Methodology for a stormwater sensitive urban watershed design*, Journal of Hydrology, 530, 87-102.

Juntti, M.; Costa, H.; Nascimento, N. (2021). Urban environmental quality and wellbeing in the context of incomplete urbanisation in Brazil: Integrating directly experienced ecosystem services into planning. Progress in Planning, v. 143, p. 100433.

Rosa DWB, Nascimento NO, Moura PM, et al. (2020) Assessment of the hydrological response of an urban watershed to rainfall-runoff events in different land use scenarios – Belo Horizonte, MG, Brazil. Water Science and Technology 81(4): 679–693. DOI: 10.2166/wst.2020.148

Prof. Nilo Nascimento

Nilo Nascimento is Civil Engineer graduated from the Federal University of Minas Gerais (UFMG), in Brazil, in 1982. He holds a Master's degree in applied hydrology from the École Polytechnique Fédérale de Lausanne (EPFL), Switzerland (1985) and a doctorate in environmental sciences from the École Nationale des Ponts et Chaussées (ENPC), France (1995). He is full professor at the Department of Hydraulic and Water Resources Engineering of UFMG. He has 26 years of research experience on urban drainage, with focus on flood studies, sustainable urban drainage systems (SUDS) and more recently on blue and green infrastructure. He has lead researches on those topics funded domestically, by the European Union and by bilateral cooperation frameworks (France, the UK, Argentina). He served as Deputy Director of International Relations of UFMG between 2012 and 2014 and as Head of the UFMG Graduate Programme on Sanitation, Environment and Water Resources from 2015 to 2018. He has been member of the IWA/IAHR Joint Committee on Urban Drainage (2006-2012). He is a member of the editorial board of the Urban Water Journal and scientific committees of numerous national and international conferences.

Session – II

IT 4

Study on distribution and treatment of typical antibiotics in Poyang Lake Basin, China

Jiale Li*, Yihui Dong, Zhanxue Sun**, Fawang Hu, Ling Xiang, Chengfang Wei, Meng Wang, Yao Wang and Ye Yang

School of Water Resource and Environmental Engineering, East China University of Technology, Nanchang 330013, China

*First author: lijiale39@126.com

**Corresponding author: sunzhanxue@aliyun.com

Abstract:

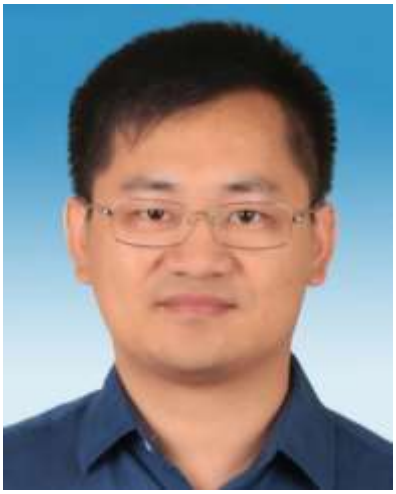
Antibiotic plays an important role not only in animal husbandry and aquaculture but also in the treatment and prevention of human diseases. Due to the mass production and use of antibiotics, there is much antibiotic wastewater in Poyang Lake Basin which is located in the Southeast of China. This research shows that, Sulfonamides and quinolones were frequently detected in the water around Poyang Lake, and the concentration of sulfonamides could reach μg/L level, while the concentration of quinolones and tetracyclines macrolides was low or not detected. The highest concentration in wastewater could reach 47460.68 ng/L, and the highest concentration of river water was 1861.53 ng/L. In the groundwater samples, the highest concentration was 2589.07 ng/L[1].

Fe_3O_4@PAC composites with activated carbor as carrier and Fe_3O_4 as catalyst were prepared by hydrothermal synthesis. The decomposition efficiency of Sulfamethoxazole (SMX) is stronger in an alkaline environment of Fe_3O_4@PAC/persulfate system (Fe_3O_4@PAC/PS). Periodic experiments show that Fe_3O_4@PAC has excellent catalytic stability and can be reused. NO_3^-, HCO_3^-, Cl^-, and humic acid (HA) have been shown to interfere with the removal of SMX by the Fe_3O_4@PAC/PS. The inhibitory intensity did not clearly increase with increasing NO_3^- concentration, HCO_3^- can significantly reduce SMX degradation, Cl^- has no apparent inhibitory effect on SMX removal in the Fe_3O_4@PAC/PS. With the addition of HA, the efficiency of SMX removal by the Fe_3O_4@PAC/PS system has also dropped. Fe_3O_4@PAC/PS may accelerate the removal of SMX in the presence of heavy metal pollutants (Zn, Cu, Ni) in the water. It was found that the removal rate of SMX increased with increasing metal concentration by adding different concentrations of heavy metals[2].

[1] Fawang Hu, master theisi, East China University of Technology, 2020.
[2] Ling Xiang, master theisi, East China University of Technology, 2021.

Jiale Li

Name: Jiale Li
M/F: M
Date of Birth: 11.26.1981
Nationality: People's Republic of China
Company/Department: East China University of Technology
Address: NO.418, Guanglan Street, Economic and technological development zone, Nanchang, Jiangxi Province, PRC
Phone: +86-17770030917
E-mail: lijiale@ecut.edu.cn; lijiale39@126.com



Jiale Li, male, who was born at 1986, PhD, Lecturer. He was graduated of the major of Groundwater science and engineering at China University of Geosciences (Wuhan) at, now working at School of Water Resources and Environmental Engineering, East China University of Technology. He is interested at the field of environmental organic pollution chemistry, groundwater pollution and prevention, radiation hydrogeology, and hydrogeochemistry. He has published for more than 20 articles, including 10 articles which were indexed by SCI and EI. He is now hosting 8 projects, taking part in IAEA projects, NSFC projects, and BRICS projects.

CT 1

Assessing spatial distribution of COVID-19 prevalence in Brazil using decentralised sewage monitoring

Authors: **Cesar R. Mota[1];** Thiago Bressani-Ribeiro[1]; Juliana C. Araújo[1]; Cíntia D. Leal[1]; Deborah Leroy-Freitas[1]; Elayne C. Machado[1]; Maria Fernanda Espinosa[1]; Luyara Fernandes[1]; Thiago L. Leão[1,6]; Lucas Chamhum-Silva[1]; Lariza Azevedo[1]; Thiago Morandi[1]; Gabriel Tadeu O. Freitas[1]; Michelle S. Costa[2]; Beatriz O. Carvalho[2]; Marcus Tulius P. Reis[3]; Marília C. Melo[4]; Sergio R. Ayrimoraes[5]; Carlos A.L. Chernicharo[1]

Affiliations

[1]Universidade Federal de Minas Gerais (UFMG). Departamento de Engenharia Sanitária e Ambiental, Escola de Engenharia

[2]Minas Gerais State Health Authority (SES).

[3]Sanitation Company for Minas Gerais (COPASA).

[4]Minas Gerais Institute for Water Management (IGAM).

[5]National Agency for Water and Sanitation (ANA)

[6]Centro Federal para Educação Tecnológica de Minas Gerais (CEFET-MG)

Abstract

Brazil has become one of the epicentres of the COVID-19 pandemic, with cases heavily concentrated in large cities. Testing data is extremely limited and unreliable, which restricts health authorities' ability to deal with the pandemic. Given the stark demographic, social and economic heterogeneities within Brazilian cities, it is important to identify hotspots so that the limited resources available can have the greatest impact. This study shows that decentralised monitoring of SARS-CoV-2 RNA in sewage can be used to assess the distribution of COVID-19 prevalence in the city. The methodology developed in this study allowed the identification of hotspots by comprehensively monitoring sewers distributed through Belo Horizonte, Brazil's third largest city. Our results show that the most vulnerable neighbourhoods in the city were the hardest hit by the pandemic, indicating that, for many Brazilians, the situation is much worse than reported by official figures.

Keywords: wastewater-based epidemiology; Covid-19; prevalence; hotspots; decentralised sewage monitoring; health vulnerability

Dr. Cesar Mota

Dr. Cesar Mota is Associate Professor in the Department of Sanitary and Environmental Engineering at the Federal University of Minas Gerais (UFMG), Brazil. He has a PhD in Civil and Environmental Engineering from North Carolina State University (USA, 2006), an MSc degree in Civil and Environmental Engineering from the University of Nevada (USA, 2001) and a Bachelor's in Civil Engineering from the Federal University of Ceará (Brazil, 1998). He coordinates projects funded by the Royal Society (UK) and Brazilian research councils and is Deputy Head of the National Institute of Science and Technology on Sustainable Sewage Treatment Plants (INCT-Sustainable STPs). His research interests are in the area of water quality engineering, with emphasis on biotechnology for water and wastewater treatment, sustainable, low-cost water/wastewater treatment processes, valorisation of wastes, and the use of sewage monitoring as an epidemiological tool (he is in the coordination team of the Sewage-Covid Project, financed by the National Water and Sanitation Agency, monitoring the sewage of Belo Horizonte, Rio de Janeiro, Brasília, Curitiba, Fortaleza and Recife). Before joining UFMG's faculty, Dr. Mota was a Lecturer at Newcastle University (United Kingdom), School of Civil Engineering and Geosciences (2007 to 2012), where he coordinated research projects funded by the Royal Society and the European Commission.

CT 2

Association of microorganisms with microplastics in wastewater

S Kumari[a], ID Amoah[a], F Kassa[a], S Rajcoomar[a] and F Bux[a]

Institute for Water and Wastewater Microbiology, Durban University of Technology, Durban 4000, South Africa

*Corresponding author: sheenak1@dut.ac.za

Microplastics (MPs) are contaminants of emerging concern, due to the widely reported threat of these contaminants to aquatic biota. Several sources could account for the presence of these contaminants in the environment. One significant source of MPs is municipal wastewater sludge and effluents with a direct potential to impact recipient water bodies and land through reuse of treated wastewater, a practice increasingly suggested worldwide and gaining prominence in South Africa. When MNPs are released into the aquatic environment, a coating of both organic and inorganic substances is formed. Subsequently there is the formation of biofilms on its surface within minutes to hours. These biofilms can be made up of phylogenetically and functionally diverse communities of bacteria, algae, protozoans, and fungi. These biofilms provide numerous advantages for competition and survival strategies, including possibilities for forming stable consortia, horizontal gene exchange, accumulation of nutrients, and protection against toxic substances and desiccation. This study therefore focused on the following areas: the identification and characterisation of MPs in wastewater in Durban, South Africa. To evaluate the removal of these MPs during wastewater treatment. To determine the conditions that may facilitate the formation of biofilms on these MPs and to profile the microbial community attached to MPs both in a laboratory scale experiments and in full-scale wastewater treatment plants.

Two wastewater treatment plants in Durban were selected for this project. Selection was based on the type of wastewater treated (treating domestic wastewater and the other industrial wastewater) and treatment configuration. A modified methodology was used to identify and quantify the MPs in the wastewater samples. To determine the ideal conditions for bacterial/biofilm attachment, different types of MPs were exposed to wastewater under varying conditions of temperature, time, oxygen content and surface structure. Untreated wastewater within the city of Durban was found to contain over 43 000 particles of MPs per liter of wastewater. These MPs were determined through Pyro-GC/MS analysis to polyvinyl chloride (5.6 µg/mg), *polyethylene (1.3 µg/mg)*, *polypropylene (1.3 µg/mg)*, polystyrene (0.12 µg/mg) and polyamide (4.3 µg/mg), with the predominant shapes of fragments, fibers, beads and films. The treatment plants were determined to achieve a removal of approximately 74% resulting in the release of more than 11000 particles of MPs per liter of treated wastewater. The results also indicate that biofilms formation on the MPs isolated from wastewater was not significant due to the insufficient retention time treatment process, which was backed by the data obtained in the laboratory experiments. The laboratory experiments showed that biofilm formation starts after a week of exposure with maximum biofilms formed after 3 weeks of exposure. No significant difference in biofilm formation was observed for the type of MP, the aerobic or anaerobic conditions and light or dark conditions. The result from this study indicates that wastewater treatment plants could be a major contributor to surface water pollution with MPs and associated biofilm forming pathogens.

PROF SHEENA KUMARI K PILLAI
Indian
Associate Professor
Durban University of Technology (DUT), South Africa
Sheenak1@dut.ac.za

QUALIFICATIONS
Doctor of Philosophy (2008)
Master of Science (2001)
Bachelor of Science (1999)
NQF (Level 5) Basics of Project Management (2015)

RESEARCH FIELD: Biological wastewater treatment, Emerging pathogens/contaminants in wastewater

POSTGRADUATE SUPERVISION
Total supervision to date includes 16 Doctoral and 18 Masters students. I have provided guidance and mentoring to 3 NRF interns, 3 international students, 1 Young Expert Programme candidate 7 Post-Doctoral fellows who served their tenure under my mentorship.

PROFESSIONAL PROFILE/PARTICIPATION
I have been serving as Principal researcher and Co-project leader for more than 10 National (WRC and NRF) projects and 5 International projects within the water and wastewater field since 2010. Currently, serving as South African co-ordinator for a multi institutional level project funded through the orange knowledge programme by Nuffic, Netherlands. I have been a member of the steering committee for 11 Water Research Committee projects, Panel member for National Research Foundation (2013-2023), Reviewer for more than 20 ISI journals articles as well as reviewer for a number of national and international funding agencies.

Awards/Recognitions

2020	DUT Faculty Research Excellence Award
2019	DSI South African Woman in Science Award (SAWiSA) 1st Runner up; Selected for Natural and Life Sciences standing panel (2019 – 2023)
2016 – 2021	C3 Rating obtained from NRF (South Africa) as established researcher
2013-2015	DUT Top Published Research Fellow

PUBLICATIONS AND CONFERENCE PRESENTATIONS
I have published over 65 ISI articles (Google scholar H index 22, citations 2217) and contributed to 8 book chapters, 5 technical reports and more than 60 conference presentations.

CT 3

Highly porous silicotitaniumphosphate material and its application for toxic ion adsorption from wastewater

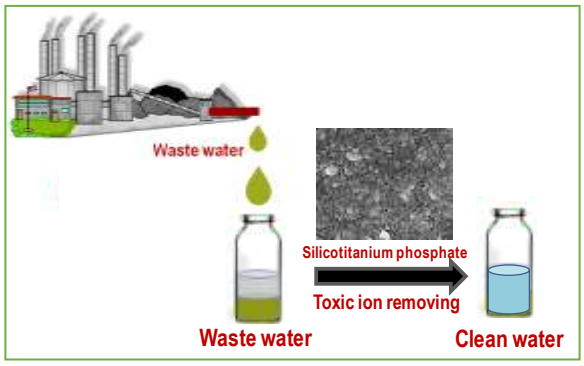
N. Pal,[a,b] M. Paul, [b] M. Ali,[c] A. Bhaumik [b]

[a]*Department of Physics and Chemistry, Mahatma Gandhi Institute of Technology, Gandipet, Hyderabad 500075, Telangana State, India*

[b]*Department of Materials Science, Indian Association for the Cultivation of Science, 2A & B Raja S. C. Mullick Road, Jadavpur, Kolkata , West Bengal 700 032, India*

[c]*Department of Chemistry, Jadavpur University, Jadavpur, Kolkata, West Bengal 700 032, India*

In the last few decades, with increasing urbanisation and industrial development, water pollution and scarcity of pure drinking water has become a major problem for many developing countries like India. Various industries, like textile, paper, pharmaceutical, smelting even domestic and agricultural discharge are contaminating water by releasing toxic heavy metal ions, organic chemicals etc. As a result, people from tender to old age are suffering from poor health conditions. Scientists all over the world have devoted themselves in search of a new material which will act as powerful adsorbent for removing toxic ions from wastewater. My presentation will discuss about a carefully designed mesoporous silicotitaniumphosphate material which was synthesized by evaporation induced self-assembly method (EISA) in a non-aqueous sol-gel route. The material has been thoroughly characterized by different analytical techniques. Potential application of this solid has been investigated for removal of toxic metal ions like As(III/V), Cd(II) and Hg(II) from the contaminated water. The future possibility of this porous material is also mentioned briefly. Hope, the work presented here can be helpful for any researchers working in other emerging fields of research also.



Reference

1. M. Paul, N. Pal, M. Ali, A. Bhaumik, ***J. Mol. Catal. A: Chem.*** 330 (2010) 49–55**.**

Short resume

Name: Dr. NABANITA PAL
Nationality: **Indian**
Designation: **Assistant Professor**
Affiliation: **Department of Physics & Chemistry, Mahatma Gandhi Institute of Technology (MGIT)**
Address: **Mahatma Gandhi Institute of Technology (MGIT) Gandipet, Hyderabad – 500075 Telangana, India.**
Email: nabanitapal_chem@mgit.ac.in
ORCID ID: http://orcid.org/0000-0001-7541-2964

Professional Experience

2018 Aug-till date: Assistant Professor in Chemistry, MGIT, Hyderabad, India.
2016 July-2018 April: Assistant Professor in Chemistry, ITS, IFHE, Hyderabad, India.
2014 June-2016 June: PDF, Saha Institute of Nuclear Physics, Kolkata, India.
2013 May-2014 May: PDF in Dept of Chem. Eng., Sungkyunkwan University, Suwon, South Korea.
2012 July-2013 May: Dr. D. S. Kothari PDF, Jadavpur University, Kolkata, India.
2006 November-May 2007: Part-time lecturer in Government College, Barasat, Kolkata, India.

Educational Background

2007-2012: Ph D (Sc.), Indian Association for the Cultivation of Science (IACS), Jadavpur University,
2004-2006: M.Sc. in Chemistry (Inorganic Chemistry), University of Calcutta, India
2001-2004:B.Sc. (Honours) in Chemistry, University of Calcutta, India

Field of Research Interest: Materials (Inorganic) Chemistry. Specific Fields Include:

- Synthesis of porous materials, nanoparticles via templated and non-templated routes.
- Liquid phase heterogeneous and homogeneous industrially important catalytic transformations.
- Adsorption of gases, toxic metal ions, biomolecules, photoconductivity, photocatalysis, drug delivery, biosensing and other energy application.

Achievements

Sponsored R&D projects = **TEQIP-III, JNTUH**
Total publication in international journal = **36**, Total citation = **972**, h-index = **17** (Google scholar)
Oral & Poster Presentation in National and international conference = **13**, best oral presentation award =**1**

Selected publications

N. Pal,* S. Sim, E.-B. Cho. *Micropor. Mesopor. Mater., Vol. 293 Yr 2020, page 109816.*
N. Pal, A. Bhaumik. *Adv. Colloid Interf. Sci. Vol. 189-190, Yr 2013, page 21-41.*
N. Pal, S. Yim, H. Kim, J. Park, E.-B. Cho. *J. Ind. Eng. Chem.Vol 81 Yr. 2020 page 99–107.*
N. Pal,* B. Saha, S. K. Kundu, A. Bhaumik, S. Banerjee. *New J. Chem. Vol 39, Yr 2015, 8035-8043.*
N. Pal,* I. Mukherjee, S. Chatterjee, E.-B. Cho, *Dalton Trans. , Vol 46, Yr 2017, page 9577-9590.*
N. Pal, E.-B. Cho, D. Kim, M. Jaroniec. *J. Phys. Chem. C Vol. 118 Yr. 2014 page 15892-15901.*
N. Pal, M. Paul, A. Bhaumik. *Appl. Catal. A: Gen. Vol. 393, yr 2011, page 153-160.*

Professional Membership

Life member (**L37719**): The Indian Science Congress Association, India.
Life member (**LM2808**): Chemical Research Society of India, India.
Life Member (**LMB2906**): Materials Research Society of India.

Session - III

IT 5

Environmental Geotechnics: Some Case Studies

Avishek Adhikary[1], Ramiz Raja[1], Sahinur Rahaman Mondal[2], ***Supriya Pal[3*],***

Hirok Choudhuri[4], Mrinal Kanti Mandal[5]

[1]Research Scholar, Department of Civil Engineering, National Institute of Technology Durgapur, West Bengal - 713209, India.

[2]Assistant Professor, Civil Engineering Department, Sanaka Educational Trust's Group of Institution-Durgapur, West Bengal, Pin-713212, India.

[3*]Associate Professor, Civil Engineering Department, National Institute of Technology Durgapur, West Bengal, Pin-713209, India. e-mail: supriya.pal@ce.nitdgp.ac.in, Tel. No. +91 94347 88154

[4]Associate Professor, Dept. of Physics, National Institute of Technology Durgapur, West Bengal, Pin-713209, India.

[5]Associate Professor, Chemical Engineering Department, National Institute of Technology Durgapur, West Bengal, Pin-713209, India.

Abstract: This paper deals with four research case studies in the thematic areas of environmental geotechnics such as (i) Assessment of heavy metal contamination in soils around Durgapur Industrial Area, West Bengal, India; (ii) Solidification/stabilization of heavy metals in a contaminated site by using pozzolanic-based materials; (iii) Electro-restoration of 2,4-Dichlorophenoxyacetic Acid, (2,4-D) Contaminated Soil-An Experimental Approach; and (iv) Efficacy assessment of clayey soil as liner material in phenolic laden waste containment structures. The elevated levels of heavy metal contamination in surface soil of the industrial city Durgapur, West Bengal, India, are an environmental concern due to their possible migration to the groundwater through leaching. In the first research study, the contamination assessment and source identification were carried out based on soil pollution indices and statistical analyses. The aim of the second case study was to assess the efficacy of solidification/stabilization technique to immobilize the various heavy metal contaminants viz. Arsenic (As), Chromium (Cr), Cadmium (Cd), Lead (Pb), Zinc (Zn), Mercury (Hg), Copper (Cu), Nickel (Ni) present in a multimetal-contaminated landfill site using Fly Ash (FA), quick lime (QL) and Blast furnace slag (BFS). In this study, the emphasis was given on containment of the contaminants and simultaneously improvement of geotechnical properties of the multimetal-contaminated soil. The efficacy of electro-kinetic (EK)

technology was examined in the third research investigation to assess in-situ decontamination of soil polluted with 2,4-dichlorophenoxyacetic acid (2,4-D) herbicides. The removal of 2,4D was observed around 80% from the contaminated soil. The efficacy of clayey soil as liner material in phenolic laden waste containment structures was examined through laboratory scale batch adsorption studies and migratory behavior of the same through the soil was assessed through physical and numerical modelling using HYDRUS 1D solute transport software to design the thickness of barrier material to protect precious groundwater from contamination. The outcome of the aforesaid research studies will help the geo-environmental engineers and consultants to decide proper remediation measures to protect the lithosphere from contamination.

Keywords: Soil and water contamination; Assessment; Remediation; Solidification/ stabilization; Electro-remediation; Waste containment structures.

Dr. Supriya Pal

Dr. Supriya Pal is presently working as Associate Professor in the Dept. of Civil Engineering, National Institute of Technology Durgapur, West Bengal, India. He is having a total teaching, research and industrial experience of more than 19 years in the field of Geotechnical and Geo-environmental engineering. He has a Ph.D in Civil Engineering from Jadavpur University, Kolkata, India and obtained Master of Civil Engineering from the same institution in the specialization of Geotechnical Engineering. Dr. Pal has a long-term working experience in the research areas: Geotechnical Engineering, Geo-environmental Engineering, Solute transport through porous media, Industrial wastewater treatment, Electro-kinetic treatment of contaminated land. Recently he started research activities in the field of stability analysis of ash dykes, scientific study on open cast mine slope stability, metal extraction from fly ash. Dr. Pal has several national and international collaborations. He has research collaboration with Far Eastern Federal University, Russia (in metal extraction technology from fly ash); Tomsk Polytechnic University; Russia, Hohai University, East China University and Technology, China; Federal university of Rio De Janerio, Brazil; Institute for Water and Wastewater Technology, Durban University of Technology, South Africa (through BRICS NU Programme of Water Recourses and Pollution Treatment). Presently, Dr. Pal is working as investigators of three research projects on "land subsidence study of CBM gas producing block" funded by M/s Essar Oil, India, "Environmental geochemistry and treatment of organic pollutants in aquatic systems in the selected areas of China, India and Russia" under BRICS BRICS STI Framework Programme, "Potential use of fine grained clay soil as landfill liner for containment of pollutants in waste disposal site" under RIG, MHRD. These projects are funded by Govt. of India MHRD, DST, and M/s Essar Oil, India. Dr.Pal has more than 25 publications in Peer Reviewed International and National SCI, Scopus and Web of Science indexed Journals. Moreover, he published 5 research articles as book chapters. Dr. Pal is the editor of the book "Advances in Water Resources Management for Sustainable Use" publish by Springer. Dr. Pal has numerous publications in the Proceedings of International / National Conferences, He delivered more than 25 invited talks in various conferences, seminars, workshop and technical meetings held in India and abroad.

Presently Dr. Pal is serving as the Coordinator and ITG (International Thematic Group) member of the BRICS Network University (NU) programme of NIT Durgapur in the thematic area of "Water Resources and Pollution Treatment". He is also acting as Member of National Coordination Committee (NCC) of BRICS Network University Programme under Dept. of Higher Education, MHRD, Govt. of India. He is also acting as coordinator of State Technical Agency (STA), Pradhan Mantri Gram Sadak Yojana (PMGSY), under the authority of the Ministry of Rural Development, Govt. of India.

email: supriya.pal@ce.nitdgp.ac.in, Cell Ph: +91 9434788154

CT 4

Geochemical patterns of migration of trace elements in soil waters of the Valday Upland

D. U. Baranov

Lab of Evolutionary Biogeochemistry and Geoecology, Vernadsky Institute of Geochemistry and Analytical Chemistry RAS, 19 Kosygina street, Moscow Russia

*Corresponding author: mitya.baranov.90@bk.ru

Abstract:

The aim of the study was to study the migration of trace elements in soil waters and to assess the influence of geochemical, biological and anthropogenic factors on the formation of the chemical composition of the waters of the aeration zone in a seasonal section (on the example of the Valday upland). The method of leaf lysimeters was used to study soil waters. Lysimeters were installed in the soil substrate. Based on the hierarchy of the world abstract base of soil resources IUS WRB (2015), it was determined that the study area consists of podzolic soils (PZ) [1]. The studies were carried out during the period of stable preservation of positive air temperatures and liquid precipitation, starting from mid-April and ending in mid-November, which is due to limitations in the operation of lysimetric installations.

According to investigation results the formation of the chemical composition of soil waters depends on the type of soil and the season of the year. Geochemical and biological processes influence the formation of aeration zone waters. The change in the main indicators of soil waters and the behavior of each element considered depends on the complex impact of biogenic and geochemical components. Fe Zn, Cu, Co, Mn are actively consumed by organisms and plants during the growing season. The statistical processing of the obtained data showed significant differences in the formation of the chemical composition of soil waters depending on the season for a number of indicators-pH, N, Ni, Rb. Regardless of the time of year and the depth of sampling.

References

[1] WRB (2015) World reference base for soil resources. Rome: FOOD AND AGRICULTURE ORGANIZATION OF THE UNITED NATION, 192 p.

Dmitry Baranov

Russian Federation
Junior Researcher

Lab of evolutionary biogeochemistry and geoecology,

Vernadsky Institute of Geochemistry and Analytical Chemistry of the Russian Academy of Sciences

19 Kosygina st., Moscow Russia

Specialist in the field of geochemistry of natural waters. The main scientific interests are biogeochemical factors of migration of elements in soil waters, identification of transboundary transfer of aerotechnogenic pollution.

The current works are devoted to the study of the main patterns of migration of elements in the surface waters of the Valday Upland. Special attention is paid to the migration forms of biophilic elements in soil waters.

CT 5

Mapping of Groundwater Quality and Consumption Pattern of a Community Development Block of Jharkhand State in India

Arun Kumar Pramanik[1], Deepanjan Majumdar[2], **Abhik Chatterjee**[1, *]

[1] Department of Chemistry, Raiganj University, Raiganj, 733134, India
[2] Kolkata Zonal Centre, CSIR-National Environmental Engineering Research Institute, i-8, Sector C, EKDP, EM Bypass, Kolkata-700107
[1] Department of Chemistry, Raiganj University, Raiganj, 733134, India

E-mail: abhikchemistry@gmail.com

Abstract:

Water resources are being reduced qualitatively and quantitatively day by day at a much faster rate due to anthropogenic interferences. Groundwater quality in the Chandwara block in Jharkhand is crucial to the livelihood. There is no comprehensive information on groundwater quality of this region, leading to lack of understanding on groundwater sustainability and socio-economic development of this region. Water samples were collected from 143 water sampling points during the post monsoon season (October 2018 to March 2019) and analysed for a few cardinal potable water quality parameters apart from iron, copper, arsenic, and fluoride. Mean water usage per family and per capita ranged from about 200 to 517 litres per day and 19.7 to 47 litres per day, respectively, which included potable and domestic uses. Per capita potable water consumption was 1.2-4.37 litres per day. In a total of 143 groundwater samples, most had iron beyond permissible limits of BIS and WHO (0.3 ppm or 300 ppb, respectively) (68% of samples), TDS (36% of samples), total hardness (39% of samples) and Ca (58% of samples), turbidity (15.4%). A few other samples exceeded safe limits for EC, alkalinity, magnesium, chloride etc. Fluoride never breached the safe limit for drinking. Factor analysis indicated that water quality was controlled by 2 principal factors to the extent of 43.3 and 13.5%, respectively. Factor 1 strongly indicated geochemically incorporated salts while Factor 2 was dominated by strongly correlating geochemical Fe and turbidity.

Dr. Abhik Chatterjee

Nationality: Indian
Designation: Associate Professor
Department of Chemistry, Raiganj University, Raiganj,
Uttardinajpur,
733134, West Bengal, India
Email: abhikchemistry@gmail.com

Academic Qualifications:
B.Sc (1st Class), 2000, Suri Vidyasagar College (The University of Burdwan),
M.Sc (1st Class), 2002, The University of Burdwan.
National Eligibility Test (NET), 2002. PhD, 2011, Visvabharati University.

Award:
1. Arun Sen Memorial award (Given by Suri Vidyasagar College)
2. National merit scholarship (On the basis of B.Sc marks)
3. Junior Research Fellow (DRDO project) at Jadavpur University

Previous & Present Employment:
Assistant Professor, Raiganj College (University College) 8th Nov2005 to 2nd February2015.
Assistant Professor, Raiganj University, 3rd February2015 to 9th May 2019.
Associate Professor, Raiganj University, 10th May 2019 to till date

Membership:
1. Indian Science Congress Association. 2. International science community association

Editorial Board Member: Research Journal of Chemical sciences

Research Interest:

1. Surface and Ground Water quality mapping and their treatment:
Selected publications:
i. *Evaluationof Hydrochemical Facies and Suitability of Water in Tilaiya Dam Reservoir of the Jharkhand State in India*, **Analytical Chemistry Letters**, 10:5, 684-702(2020).https://doi.org/10.1080/22297928.2020.1853604.
ii. *Factors Affecting Lean, Wet-Season Water Quality of Tilaiya Reservoir in the Koderma District of India during 2013–2017*.**Water Science**, 34:1, 85-97(2020). https//doi.org/10.1080/11104929.2020.1765451.
iii. *A Study on Groundwater Quality Based on Major Ion Chemistry of Jharkhand State in India: A Review*. Accepted in **Oriental Journal of Chemistry (2021).**

2. **Synthesis of organic molecules and Insilico study (Docking,dynamics,DFT etc).**

3. Catalyst development for Fuel cell & Lithium ion Battery applications.
Publications in *Journal of Power sources*, *Electrochemica acta*, *Internation journal of current research and review*, *Research and reviews in electrochemistry*, *International journal of Integrative Biology*, *Commun.Comput. Chem*, *Gene Reports* etc.

Administrative Experience:
1. Act as HOD/Coordinator (2010-2012, 2018-2020)
2. Member of Board of studies, PhD committee, Board of Research studies, Research Advisory Committee, Library Committee etc (Till date).

CT 6

Identification of geosystem services to attenuate water pollution as a counter to water scarcity aftermaths

Rawat, A.M[1]* Bagri, D.S[1], Kumar, S[2]

[1]Department of Geology, S.R.T Campus, HNB Garhwal University, Uttarakhand, India

[2]National Institute of Hydrology, Roorkee, Uttarakhand, India

[*]Corresponding author:aakashrawat4444@gmail.com

Urbanization and increasing volume of untreated wastewater from households and municipal townships culminates to water quality deterioration, particularly in the developing and geographically vast countries like India. This puts colossal pressure in the water resources in terms of quality and quantity of the water leading to unexpected water scarcity problems in coming decades. Also the randomly fragmented small townships in the vicinity of rivers poses much harm to these water bodies as their individual inputs as a point and nonpoint are often domino leaving them unmanaged. In the present study we identified geosystem services as a possible solution to the aforementioned problem in the Alaknanda valley (a pristine water component of the Ganga), Garhwal Himalaya. These geosystem services in the form of riparian strip as a solution needs to be replicated within the pollution source itself. Among the selected townships within the Alaknanda valley we identified a riparian strip present between Joshimath and Alaknanda River as an old land slide zone. The strip is absent in other townships namely Karanprayag, Rudraprayag and Srinagar. It was found that the towns along Alaknanda River with riparian strip has low E-Coli count of (~4) compared to the ones which are in the immediate vicinity of the river with higher E-Coli counts (~55.5). The riparian strip acts as a buffer to the E-Coli and traps them within it. We thus conclude that the geosystem services provided by riparian strip can help to restrict the pollutants at their source and prevent the water sources from integrated deterioration by urbanisation and its aftermaths (water scarcity). Integrating the use of these geosystem services in developing countries like India will also assist sewage treatments plants, as installing these sophisticated technologies everywhere is economically not plausible. It is advised that the integration of government policies with the knowledge and working of such geosystem services can protect the quality and quantity of water bodies.

Keywords: *Water quality, Attenuation, Geosystem Services, Sustainability, Riparian buffer, Water resources.*

Aakash Mohan Rawat

e- Mail – aakashrawat4444@gmail.com **Mob:** 8755294524, 9458950682

Proactive and creative researcher seeking entry level assignment in hydrology, water quality assessment, water resource allocations in rural and urban areas. I would like to be a part of an organization where I could use and enhance my knowledge and talent for the development of both the organization and myself.

A brief overview

- A budding professional with conceptual knowledge in hydrology, hydrological modeling, landuse in relation to water quality and anthropogenic influences effecting water resources.
- Effective communicator with excellent relationship building and interpersonal skills. Possesses a flexible and detailed oriented attitude with strong analytical, problem solving and organizational building abilities.
- Resourceful in understanding of fundamental concepts pertaining to water management issues.
- Interested to work in water quality assessment with special emphasis on anthropogenic drivers influencing water bodies and its effective management.

Academics

- **High School** with first division from St. Theresa's Convent School Srinagar Garhwal in 2007, Uttarakhand with 74 %.
- **Intermediate** with first division from St. Theresa's Convent School Srinagar Garhwal in 2007, Uttarakhand with 74.5 %.
- **Bachelor in Science** (Physics, Mathematics and Geology) with first class with from Hemvati Nandan Bahuguna Garhwal University, Srinagar Garhwal, Uttarakhand in 2012 with 61.38%.
- **Master in Science** (Geology) with first from Hemvati Nandan Bahuguna Garhwal University, Srinagar Garhwal, Uttarakhand in 2014 with 74.79. %.
- **Pre. Ph.D** course from Hemvati Nandan Bahuguna University in 2015
- **Doctor in Philosophy (Ph.D)** (2015- ongoing) in Hydrology from Hemvati Nandan Bahuguna University, S.R.T Campus, BadshahiThaul Tehri Garhwal under the supervision of Dr. D.S Bagri (Associate Professor in Dept. of Geology) in collaboration with National Institute of Hydrology Roorkee under the supervision of Dr. Sudhir Kumar (Scientist G).

Research and Teaching experience

- 3.5 years and ongoing research experience as Ph.D scholar at Hemvati Nandan Bahuguna University, S.R.T Campus, and BadshahiThaul Tehri Garhwal in collaboration with National Institute of Hydrology in water quality assessment of Alaknanda in Western Himalayas.
- Teaching experience in S.R.T Campus Tehri as a coursework of Ph.D from 2015 – ongoing.

CT 7

A case study on the Transboundary River Bank Management of Asia

Bipasha Mridha Ghosh

Asst. Professor, NSHM KNOWLEDGE CAMPUS Durgapur, India

Abstract:

The **Ganges** is a transboundary river of Asia, which flows through India and Bangladesh. It is the third largest river on earth surface discharge. It travels 2,525 km from western Himalayas, Uttarakhand, India and flows south and east through the Gangetic Plain of North India into Bangladesh. Every year , huge population turned to ecological refugee due to meandering of river, river bank erosion, shifting of river and flood. It causes economic loss, social distress. This study is an attempt to understand the pattern of riverbank management and to quantify its societal impact specifically of the river Ganga at upstream and downstream from 1940 to 2020. The study has been carried out by using various historical maps, satellite imagery and statistical analysis. The merit of the study remains to locate faults and to search possible measures to protect the Ganga riverbank to sketch a better riverbank management plan for betterment of two Asian countries.

Key Word: River bank management, India, Bangladesh, Asia.

Bipasha Mridha Ghosh

Name: Bipasha Mridha Ghosh
Nationality: Indian
Designation: Asst. Professor
Affiliation: NSHM KNOWLEDGE CAMPUS DURGAPUR
Address: Arrha, Shibtala, Durgapur; 713212
Email: bipasha.mridha@nshm.com

Bipasha Mridha Ghosh did her PhD in Earth and Environmental Studies from NIT-DGP and Masters in Environmental Science from Kalyani University of West Bengal , India.
Begin her career as environmental consultant and environmental epidemiology researcher then started as Lecturer of Environmental Science. She worked for last 14 year as Asst. Professor of Environmental Science. Her area of Research Interest involves Environment and Pollution management, wild life conservation, environmental history and many associated areas.

DAY 2 (JULY 7, 2021)

Session – IV

IT 6

The effects of velocity-dependent dispersion on groundwater contamination

Chunendra K Sahu
Department of Civil Engineering, Indian Institute of Technology Kanpur, India
cksahu@iitk.ac.in

Abstract:

Groundwater remains the primary source of potable, household water supply. With the large number of industries globally and their resultant waste production, contamination of groundwater due to the leakages from the waste piles is a major concern. The mixing of contaminants with the groundwater primarily occurs in the form of mechanical dispersion, which is a velocity-dependent phenomenon. Majority of the previous theoretical and computational studies, however, are based on constant-velocity-dispersion models, which is in contrast with the heterogeneities in the aquifers. We are investigating the effects of velocity-dependant dispersion on groundwater contamination with and without the background flow, theoretically and experimentally.

Dr. Chunendra K Sahu

Dr. Chunendra K Sahu is currently an Assistant Professor at IIT Kanpur (India) in the Department of Civil Engineering. Prior to joining IIT Kanpur, he was a Postdoctoral Researcher at the University of Cambridge (UK). He pursued his PhD from the University of Alberta (Canada) and MTech from IISc Bangalore (India). His research problems include mixing in the density-driven flows in porous media, with applications into the fields of groundwater contamination and carbon sequestration etc.

CT 8

Modelling of Jojari river in semi-arid western Rajasthan, India using the geospatial techniques and 1D flow model analysis

Himanchal[1], Aman Meena[2], Sunil Duhan[3], Meraj Ahmad[3], Pankaj Jakhar[3], Aswathy Puthukkulam[4], Vinayak Shedekar[5], Asmita Murumkar[5], Anand Plappally[6]

[1] *Scholar, Inter-Disciplinary Research Platform of Space Science and Technology, Indian Institute of Technology, Jodhpur, Rajasthan, India*

[2] *Graduate Student, Dept. of Civil Engineering, Indian Institute of Technology, Jodhpur, Rajasthan, India*

[3] *Scholar, Dept. of Mechanical Engineering, Indian Institute of Technology, Jodhpur, Rajasthan, India*

[4] *Director, Unnada Pvt. Ltd, Jodhpur, Rajasthan, India*

[5] *The Ohio State University, Columbus, OH, USA*

[6] *Associate Professor, Centre for Emerging Technologies and Sustainable Development, Indian Institute of Technology, Jodhpur, Rajasthan, India*

Corresponding author: himanchal.1@iitj.ac.in

A geospatial on-site survey of the length of the Jojari River in western Rajasthan, India is performed. Temporal variation of the presence of water in the river is elaborated. During March 2021, onsite data was gathered from 40 locations along the river. The data obtained is utilised to perform a 1-D modelling model of the fluvial process within the river. MIKE- SHE is used to enumerate water balance in the river during this process. This modelling is supported by satellite-based digital elevation models using ArcGIS 10.8 platform. A river channel with shallow depressions pooling water lined with light brown soils was observed during the survey. The bed is dotted with bars indicative of previous flows over a mixture of Mudh soils and fine Thar sands. With precipitation just below 150mm during the rainy season, Jojari water was found to be diverted for irrigation at different locations. The implication of the study is the identification of similar fluvial processes in arid streams across western Rajasthan, India.

Name: Himanchal

Nationality: Indian

Designation/Position: Research Scholar

Affiliation: Inter-Disciplinary Research Platform of Space Science and Technology, Indian Institute of Technology, Jodhpur, Rajasthan, India

Address: I-2 Hostel, IIT Jodhpur, NH 65 Surpura Bypass Road, Karwar, Jodhpur, Rajasthan, India

Email: himanchal.1@iitj.ac.in

CT 9

Spatiotemporal distribution and sources of inorganic nitrogen in shallow groundwater of Poyang Lake Basin, China

Yihui Dong, Chunhuang Liu, Jinjing Zan, Yajie Liu, Jiale Li, Chengfang Wei, Zhanxue Sun*

1. State Key Laboratory of Nuclear Resources and Environment, East China University of Technology, Nanchang 330013, China

2. School of Water Resource and Environmental Engineering, East China University of Technology, Nanchang 330013, China

**Corresponding author: sunzhanxue@aliyun.com

Abstract:

Nitrogen contamination in groundwater, mainly nitrate, is a safe-drinking water problem globally in over 110 countries and regions. The largest fresh water natural reservoir in China, the Poyang Lake in the basin of the same name located in Jiangxi province, is exposed to nitrate pollution caused by intense and large-scale irrigation practices [1]. Agricultural activities in this area also lead to nitrate enrichment of the surface water and groundwater. Nitrate concentration in shallow groundwater reaches up to 206 mg/L [2], exceeding the WHO recommended value of 11.29 mg/L for drinking water. This study took the Poyang Lake Basin, China, as the research area and the shallow groundwater was selected as the research object. The distribution characteristics and temporal and spatial variation of nitrate in shallow groundwater in the Poyang Lake Region were studied and source of nitrate in groundwater was analysed. Nitrate concentration in shallow groundwater was between 0.5-21.6 mg/L with an average of 7.0 mg/L. In the wet and dry seasons, nitrate concentration was 0.7-21.6 mg/L and 0.5-15.7 mg/L, respectively. Groundwater with high concentration of nitrate was mainly found in the typical agricultural irrigation area. The hydrogen and oxygen isotopic characteristics of water samples showed that surface water was mainly from meteoric precipitation, and influenced by other recharge sources and evaporation. Shallow groundwater was mainly recharged by local meteoric precipitation and was mixed with surface water, less affected by evaporation. The results of nitrogen and oxygen isotopic composition of nitrate showed rainfall, irrigation activities, land use type and fertilizer application were major factors affecting the concentration and distribution of nitrate in shallow groundwater in the study area. The calculation results using Bayesian model showed that soil nitrogen had the maximum contribution rate to nitrate in groundwater, with an average contribution rate of 44.6%. Atmospheric precipitation had a secondary contribution rate to nitrate in groundwater with an average contribution rate of 28.2%. The contribution rates of nitrogen fertilizer, sewage and faeces were 19.4% and 7.8%, respectively.

References

[1] Evgeniya Soldatova, Yihui Dong, Jiale Li, et al. Nitrogen transformation and pathways in the shallow groundwater–soil system within agricultural landscapes [J]. Environ Geochem Health,2021,43:441–459.

[2] Evgeniya Soldatova, Yihui Dong, Jiale Li, et al. Geochemical conditions of natural wetland and paddy fields in the Poyang Lake area, China[J]. SN Applied Sciences, 2021, 3(1):1-11.

Dr. Yihui Dong, lecturer at East China University of Technology and fellowship of Geological Society of China, is a promising young scholar in the field of groundwater geochemistry and remediation. She presided two coordinated research projects funded by International Atomic Energy Agency. She has published as author and co-author of over 30 papers in peer-reviewed journals. Her research interests include groundwater contamination and remediation, and groundwater safety in the vicinity of nuclear power plant.

CT 10

Wastewater Beneficiation using Algal Biomass

I Rawat and F Bux*

Institute for Water and Wastewater Technology, Durban University of Technology, Durban, South Africa

*Corresponding author: faizalb@dut.ac.za

Abstract:

Microalgae provide a sustainable, renewable solution to produce a number of commodity products however the cost of production is a major hurdle to commercial-scale development. Major factors influencing the production of algae are the cost of nutrients, availability of water and contamination of cultivation systems. Wastewater is a freely available resource which could alleviate some of the nutrient and water requirements for cultivation of algal biomass at large scale. This study focused on the cultivation of algal biomass from pilot (10 m2) to large scale (1146 m2) raceway ponds located at a full scale WWTP. It demonstrates biomass productivity under different climatic conditions and that supplemented post-chlorinated wastewater was a viable medium for cultivation. Growth performance was reduced with increase in pond size from pilot scale raceways pond under controlled conditions to circular ponds under uncontrolled conditions and finally the large-scale raceway pond. Biomass productivities for the raceway pond ranged from 2.7 to 7.34 g/m2/d, mainly due to the long periods of cultivation but in keeping with similar research studies. Adaptive Neuro-Fuzzy Inference System (ANFIS) modelling of the system showed that maximum biomass productivity was achieved at depths between 20 and 22 cm at light intensities between 200 and 400 µmol/m2/s and pH in the range of 9 to 9.5. As the system was carbon limited, addition of CO2, preferably a waste stream, and shorter cultivation periods could significantly enhance the overall biomass productivity.

DR ISMAIL RAWAT
South African
Researcher/Research Technician
Durban University of Technology (DUT), South Africa
rawati@dut.ac.za

QUALIFICATIONS

Doctor of Philosophy (2021): Biotechnology - Durban University of Technology
Master of Technology (2011): Biotechnology - Durban University of Technology
Bachelor of Science Honours (2007): Microbiology - University of KwaZulu-Natal

RESEARCH FIELD: My research interests are focused primarily within the field of algal biotechnology, sustainable and renewable bioenergy, resource recovery and bioremediation. I serve as a member of the DUT Community Engagement Committee amongst others and within various local and international projects.

POSTGRADUATE SUPERVISION

Total supervision to date includes 1 Doctoral, 3 Masters, and 12 Honours/BTech students, providing technical guidance to 2 PhD students and mentoring 6 interns who served their tenure under my guidance.

PROFESSIONAL PROFILE/PARTICIPATION

2020	DUT Silver Research Impact Group Award
2015	The 2015 Applied Energy Award - highly cited research and review papers for "Rawat I, Ranjith Kumar R, Mutanda T, and Bux F 2013. Biodiesel from Microalgae: A Critical Evaluation from Laboratory to Large Scale Production. Applied Energy. 103: 444–467"
2013	DUT Top Published Doctoral Student of the Year per Faculty
2012-2013	Applied Energy Highly Cited Review Paper 2012 to 2013 Awarded to: Rawat, I., Ranjith Kumar, R., Mutanda, T., Bux, F. For the paper entitled: Biodiesel from microalgae: **A critical evaluation from laboratory to large scale production.** This paper was published in: Applied Energy, Vol 103, 2013, pages 444-467
2012	DUT Top Published Doctoral Student of the Year (3rd Place)
2011	National Research Foundation Innovation Scholarship
2011-2012	Journal of Applied Energy Certificate of Excellence to our Most Downloaded Authors For the article: **Dual role of microalgae: Phycoremediation of domestic wastewater and biomass production for sustainable biofuels production** (Applied Energy 88 (2011) 3411–3424) in recognition of an outstanding contribution to the quality of the journal

PUBLICATIONS AND CONFERENCE PRESENTATIONS

I have published and contributed to 40 Journal articles, 7 book chapters, 21 Peer reviewed conference proceedings and 15 workshops/non peer reviewed conferences (2007-2019) nationally and internationally. I have reviewed 22 journals (2009-2021). Total number of citations is 4449. H-Index: 30 and i10 Index: 38.

CT 11

Threatened water supply reservoirs: monitoring and modelling tools to support sustainable management

T. Silva[a]* and N. O. Nascimento[a]

a. *Department of Hydraulic Engineering and Water Resources, Universidade Federal de Minas Gerais, av. Antônio Carlos 6627, Pampulha, Belo Horizonte (MG),*

*Corresponding author: talita.silva@ehr.ufmg.br

Abstract:

Anthropic pressures and extreme climate events have been impacting reservoirs worldwide, threatening water supply and other ecosystem services they provide. In Belo Horizonte (Brazil), Pampulha reservoir (9.9 hm^3, 16 m maximum depth) constructed on 1938 provided water to the city until 1980 when frequent cyanobacteria blooms led to the suspension of water withdrawn. In the Metropolitan Region of Belo Horizonte (MRBH), Serra Azul reservoir (81.6 hm^3, 47 m maximum depth) reached the dead storage capacity on November 2014 due to extreme drought conditions which impacted water supply in the MRBH. This study presents the assessment of monitoring and modelling tools, applied to these study sites, that may contribute to the sustainable management of the water bodies and their catchments. In Pampulha reservoir, *in vivo* and *in situ* fluorometry was assessed in order to identify and quantify phytoplankton biomass [1]. In Serra Azul reservoir, surface water temperature monitoring through remote sensing was assessed using Landsat images [2]. In both reservoirs, hydrodynamic and ecological modelling is under development to help understand the major drivers of water quality and to simulate prospective scenarios considering different management strategies [3,4]. So far, results are promising but also show the challenges involved in the monitoring and modelling of such complexe ecosystems.

References

[1] Silva, T. et al., *Ecological Engineering 97* (2016).
[2] Vieira, L. da C. et al., *In Proceedings of the E-proceedings of the 38th IAHR World Congress*; IAHR: Panama City (Panama), 2019.
[3] Soares, L.M.V. et al., *Inland Waters* **9** (2019).
[4] Silva, T.F.G. et al., *Water* **11** (2019) 946.

Dr. Talita Silva

Dr. Talita Silva is adjunct professor in the Department of Hydraulic Engineering and Water Resources at the Universidade Federal de Minas Gerais (UFMG), Brazil. She has a co-direction PhD in Sciences and Environmental Technology from Université Paris-Est (France) and from UFMG (Brazil). She is civil engineer from UFMG and holds a master's degree in Water Management from Ecole des Ponts ParisTech (France). Currently, she teaches hydrology and water resources management in the Environmental Engineering undergraduate program and in the Sanitation, Environment and Water Resources graduate program, both at the UFMG. Her recent research has focused on coupling hydrological and lake ecological modelling to assess the impacts of urbanization and extreme climate events on water resources.

CT 12

Radioactive survey on waterbodies of Durgapur industrial city, India

Suvashree Mukherjee[a], Hirok Chaudhuri[b,a], Mrinal Kanti Mandal[c,a], Supriya Pal[d,a]

*sm.19cr1101@phd.nitdgp.ac.in, suvamukh11111@gmail.com

[a] Center for Research on Environment and Water (CREW), National Institute of Technology Durgapur, India

[b] Department of Physics, National Institute of Technology Durgapur, India

[c] Department of Chemical Engineering, National Institute of Technology Durgapur, India

[e] Department of Civil Engineering, National Institute of Technology Durgapur, India

Abstract:

Nowadays, Water pollution has become a significant concern to the global scientific community. Water quality monitoring is an important field of research to protect the ecosystem. Radioactivity in water in any densely populated area is an essential survey to evaluate possible health hazards to the dwellers. Durgapur in West Bengal province, situated on the bank of the Damodar river, is the major industrialized city in eastern India which includes more than 30 industries (both large and small scales) with a population of around 0.7 million people. The radioactive status has yet not been reported for this Durgapur industrial city. The present study has investigated the radiological impact on the health of the dwellers of Durgapur city due to radioactive element radon-222 for the first time. It is observed that the radioactive substance radon-222 concentration varies from 0.05±0.07 Bq/L to 9.37±0.96 Bq/L for various water samples in that city, depending on the location and depth of the water sources.

Keywords*:* Water pollution, Radiation in water, Radon-222, Radioactive hazard, Durgapur industrial zone.

NAME: Suvashree Mukherjee
NATIONALITY: Indian
DESIGNATION: Research Scholar
AFFILIATION: National Institute of Technology Durgapur, India
ADDRESS: Katwa, District- Purba Bardhaman, West Bengal, India
EMAIL: suvamukh1111@gmail.com ; sm.19cr1101@phd.nitdgp.ac.in

Suvashree Mukherjee is presently working as a Research Scholar at the Centre for Research on Environment and Water (CREW), NIT Durgapur. She is also working as a Junior Research Fellow of the BRICS Multilateral Project at NIT Durgapur. Her research interest is on water quality monitoring and cost-effective wastewater treatment technology. Her research activities include radioactive survey on water bodies and the determination of various water quality parameters. She is performing research activities in the field of Wastewater Treatment using Photocatalytic materials and membrane technology.

Suvashree Mukherjee passed Master degree in Physics from NIT Durgapur and Bachelor degree (Honours in Physics) from the University of Burdwan. She was awarded double Gold Medal for securing the highest CGPA in Master degree in Physics. She passed various National level exams like JAM, CSIR NET (JRF), GATE. She presented her research work at many conferences, including the International symposium on soil and Groundwater in China 2019.

Session – V

IT 7

IMPACT OF CLIMATE CHANGE ON WATER RESOURCES IN A SEMI-ARID RIVER BASIN: MANAGEMENT OPTIONS AND ADAPTATION STRATEGIES

Yali E. Woyessa

Department of Civil Engineering

Central University of Technology, Free State

Bloemfontein 9300, South Africa

Abstract

Recent climate projections suggest a drop of up to 10% in precipitation in most of Southern Africa by 2050. It is estimated that by the year 2025 almost one-half of the world population will be living in water stressed regions. Furthermore, rapid population increase, industrialization and pollution are putting a strain on the available and diminishing freshwater resources. The main aim of this paper is to model the impact of regional climate change scenarios on the availability of water resources in a semi-arid river basin in South Africa. In this paper, a dynamically downscaled data was derived from the GCM simulations of the Coupled Model Inter-comparison Project Phase-5 (CMIP5) and across two greenhouse gas emission scenarios known as Representative Concentration Pathways (RCP) 4.5 and 8.5. The spatial resolution of the dataset is 50 km × 50 km. Eight GCM (climate models) were used for this set of data. SWAT model was run using these data for a period of up to end of the century (2020 – 2100) and the results were then compared with long-term historical data. Comparison of measured data with simulated historical data showed strong correlation ($R^2 \geq 0.9$), which is indicative of the reliability of projected future climate. Varied results were obtained depending on the type of climate model used, but generally the trends were similar in most cases. However, the multimodel average showed a possible decrease in precipitation (up to -3%), a decrease in water yield (up to -13%) and an increase in potential evapotranspiration (up to +22%). The latter is indicative of possible drought spells between rainy events. It is expected that the results of this research will assist in formulation of adaptation strategies that will minimize the negative impact of climate change in the region.

Keywords: climate, modelling, water, river basin, adaptation

Prof Yali Woyessa

Assistant Dean for Research, Innovation and Engagement in the Faculty of Engineering, Built Environment and Information Technology,
Central University of Technology, Free State
Private Bag X20539, Bloemfontein 9300, South Africa

Fulbright Scholar
Department of Bioproducts and Biosystems Engineering
University of Minnesota
St. Paul MN 55108, USA

Prof Woyessa joined the Central University of Technology (CUT) in 2003 as a post-doctoral fellow and later became a full-time faculty member where he currently serves as Assistant Dean in the Faculty of Engineering, Built Environment and Information Technology and Director of the Centre for Sustainable Smart Cities. Prof Woyessa also obtained two additional masters degrees during the last few years: **MA** Degree in Higher Education Studies which helped him establish himself as a faculty member by engaging in current debates in the area of teaching, learning and assessment in higher education and in addressing the challenges related to diversity in higher education institutions; and **MBA** in General Management which provided him with an in-depth knowledge for efficient and effective innovation in leadership and management of human and financial resources in the higher education sector.

Prof Woyessa is registered with the Engineering Council of South Africa as a Professional Engineering Technologist. Prof Woyessa's research interest include socio-hydrological dynamics; climate change, water security; land-water linkages; modelling of land use/land cover change and its impact on water resources. He has published two books and more than 50 papers in peer reviewed journals and conference proceedings.

IT 8

Simulation of secondary mineral formation from water of Obskoye fen affected by municipal sewage

E. A. Soldatova[a]*, E. S. Sidkina[a], O. G. Savichev[b]

a. *Lab of Modeling Hydrogeochemical and Hydrothermal Processes, Vernadsky Institute of Geochemistry and Analytical Chemistry RAS, 19 Kosygina sreet, Moscow Russia*
b. *School of Earth Sciences and Engineering, Tomsk Polytechnic University, 30 Lenin Avenue, Tomsk Russia*

*Corresponding author: sea@geokhi.ru

Abstract:

The study aims to create a numerical model of mineral precipitation from fen water under the influence of municipal sewage discharge. For this purpose, the mixing model of fen water and sewage was created to assess the changes in the geochemical conditions of the Obskoye fen. The Obskoye fen near the Nashchekovo village was taken as a geochemical background to study the fen water chemical composition. It is located approximately 2 km from the sewage discharge of the communal services of Melnikovo settlement up the slope. The simulation was performed in the HCh software package [1]. The thermodynamic model considers the metal complexation with organic ligands since they significantly affect the speciation of chemical elements in the fen environment.

According to simulation results, calcite and goethite are potentially precipitated from the fen water of the background area. The proportion of kaolinite and apatite among the potential secondary minerals of the fen water does not exceed 0.5%. The mixing of sewage with fen water has a significant effect on the precipitation of secondary minerals, particularly apatite. The apatite content significantly increases when the wastewater is added to the natural fen water. The mass of apatite increases by almost 19 times compared to the fen water of the background area at the first simulation step. This step corresponds to the ratio of "fen water/sewage" equal to 10/1. The mass of other precipitated secondary minerals (calcite, goethite, kaolinite) also increases.

References

[1] Shvarov Y.V. HCh: New potentialities for the thermodynamic simulation of geochemical systems offered by Windows, *Geochemistry International* **46**(8) (2008) 834–839.

Evgeniya Soldatova

Russian Federation
Senior Researcher
Lab of Modeling Hydrogeochemical and Hydrothermal Processes,
Vernadsky Institute of Geochemistry and Analytical Chemistry of the Russian Academy of Sciences

19 Kosygina st., Moscow Russia

sea@geokhi.ru

Specialist in hydrochemistry of various climatic and landscape zones, including Poyang Lake wetland (Jiangxi Province, PRC), Tom'-Yaya interfluve (Western Siberia, Russia), Karelia (Russia).

The main research interests are geochemistry of the shallow groundwater-soil system, nitrogen cycle within agricultural landscapes, and health risk assessment of exposure to potentially toxic components via drinking water.

Current works are devoted to modeling the speciation and immobilization of chemical elements in the water of flooded mines and wetland waters affected by agricultural activity and sewage discharge. Special attention is paid to complexation with organic ligands and sorption on secondary minerals.

IT 9

HYROLOGICAL PERSPECTIVES ON RAINFALL-RUNOFF MODELS AND REMOTE SENSING APPLICATIONS DRIVEN BY ENVIRONMENTALLY INTEGRATED BASIN EXPERIMENTS IN BRAZIL

Otto Corrêa Rotunno Filho
Email:otto@coc.ufrj.br, ottorotunno@gmail.com

Laboratory of Water Resources and Environmental Studies (LABH2O), Civil Engineering Program, Alberto Luiz Coimbra Institute for Postgraduate Studies and Research in Engineering – COPPE, Federal University of Rio de Janeiro, CEP 21945-970, Rio de Janeiro – RJ, Brazil

Abstract. Hydrological simulation models have become an integral part of almost all aspects of hydrology. Models are used in planning studies to evaluate the benefits and impacts of alternative land use plans or flood control measures. In design studies, models are used to assist in developing specifications for engineering structures to solve specific flood control, navigation, or water supply problems. In hydrology, remote sensing is being recognized as a viable approach to handle spatial variability of watershed properties, because the basic data are spatial in nature. The state of the art in the research about the use of remote sensing data as input to lumped and distributed hydrological models can be summarized as follows: (i) visible and infrared part of the electromagnetic spectrum applied to determination of land use and land cover in a watershed; (ii) the use of the thermal part of the electromagnetic spectrum for determination of brightness temperature and land surface temperature; (iii) microwave energy applied to the identification of water, land use and land cover and digital elevation models, and (iv) the measurement of the total continental water storage including surface water, soil moisture and groundwater using gravimetric remotely sensed data. Under this framework, this talk provides an overview of some research works developed in Brazil aligned to the following scientific issues, namely: (i) global climate change and its regional effects, (ii) hydrology and meteorology at the mesoscale, (iii) surface-atmosphere interactions, micrometeorology and hydrology of the vadoze zone, (iv) the quality of water, air and soil and (v) management of water resources.

Keywords: Hydrological Modeling, Remote Sensing, Water security, Water quantity, Water quality, Climate change

Dr. Otto Corrêa Rotunno Filho (Associate Professor, Laboratory of Water Resources and Environmental Studies - LABH2O, Civil Engineering Program, Alberto Luiz Coimbra Institute for Postgraduate Studies and Research in Engineering – COPPE, Federal University of Rio de Janeiro, Brazil)

He was born in Porto Alegre in 1963, attended Civil Engineering at UFRGS (1984), Masters in Civil Engineering - Water Resources at COPPE / UFRJ (1989), Ph.D. in Civil Engineering - Water Resources at the University of Waterloo (1995) and postdoctoral degree at Paul Sabatier University -Toulouse III (2006). Since 2010, he is head of the Laboratory of Water Resources and Environment of the Civil Engineering Program of COPPE / UFRJ, which now includes the Hydrology Laboratory, the Computational Hydraulics Laboratory and the Tracers Laboratory. Between 2010 and 2014, he acted as vice-coordinator of the Civil Engineering Program. In June 2014, he was elected to coordinate the Civil Engineering Program, with a two-year term (2014-2016). In June 2016, he was re-elected as Coordinator of the Civil Engineering Program (2016-2018), with an exercise that ended in July/2018. He supervised several M.Sc. and Ph.D. thesis and published several technical papers in peer reviewed journals and in the Proceedings of National and International Conferences.

Session – VI

IT 10

Assessment of various coastal hazards and their management plan in the lower Gangetic delta, Sagar Island, West Bengal, India

Pankaj Kumar Roy[1]*, SK Mohinuddin[2], Saurabh Kumar Basak[3], Malabika Biswas Roy[4],

[1]Professor & Joint Director, School of Water Resources Engineering, Jadavpur University, Kolkata-32, India.

[2] Project Fellow, School of Water Resources Engineering, Jadavpur University, Kolkata- 32, India.

[3]Research Scholar, School of Water Resources Engineering, Jadavpur University, Kolkata- 32, India.

[4] Assistant Professor, Department of Geography, Women's College, Kolkata-700003, India.

*Corresponding author:pk1roy2014@gmail.com

Abstract

Delta is the most important depositional structure that forms at the confluence of fluvial and marine conditions. It is made up of a large amount of sediments that come from both rivers and the ocean and are deposited near the river's mouth due to the interplay of both fluvial and marine processes. Sagar Island, on India's east coast and one of the largest deltas in the Sundarban group, is threatened by coastal erosion, coastal vegetation deterioration, and a variety of natural disasters. Clay mining, wave activity, and the influence of the river and tidal currents of the Muri Ganga and Hooghly Rivers are the primary causes of erosion. Natural and human activities are causing morphological changes on Sagar Island at an alarming rate. Rapid erosion has been observed in the eastern part of the island due to the destabilization and growth of tidal flats and the gradual shifting of water current towards the island. Furthermore, Tropical cyclones, flood events, saline water intrusion, land degradation, tidal ingression, and dune encroachment are important natural environmental hazards (NEH) that harm the island. The majority of the people in the region have a low quality of living and are dissatisfied with government efforts to preserve land from the effects of climate change. This study focuses on the identification of various coastal hazards and their effects on Sagar Island, South 24 Parganas, West Bengal, India. In an attempt to alleviate these problems, suggestions are also made for the sustainable development of the coastal environment using an integrated coastal zone management (ICZM) plan.

Keywords: Coastal erosion, Coastal vegetation deterioration, tropical cyclones, flood events, seawater intrusion, land degradation, tidal ingression, and dune encroachment.

Prof. (Dr.) Pankaj Kumar

Prof. (Dr.) Pankaj Kumar Roy is currently the Dean of Interdisciplinary Studies, Law and Management of Jadavpur University and Professor and Joint Director of the Department of School of Water Resources Engineering, Jadavpur University (JU). He earned his doctorate in Water Resources Engineering and Management from Jadavpur University which was mainly concentrated on modeling hydrological regime under impact of climate change scenario. His thrust area includes hydraulics and water resources engineering, fluid mechanics, climate change and its impact on water resources engineering, surface water pollution and its mitigation, groundwater dynamics, watershed technology and management, water conservation technology, hydro-geological investigation, surface and ground water interaction, solid waste management, environmental modelling, waste water characteristics etc. He is the recipient of several fellowships and awards such as Young Scientist (Institute of Engineers, Govt. of India), 1st National Doctorate Fellow by AICTE at JU (Govt. of India), Internship Fellowship (University of Pisa, Italy) and IEI Young Engineers Award (Institution of Engineers (India), Government of India). He has acted as the invited speaker and the chair-person in as many as 20 reputed national and international seminars, conferences and workshops. He was the co-ordinator of international Conference on Sustainable Water Resources Management conducted by School of Water Resources Engineering, Jadavpur University under collaboration with Women's College Calcutta and National Institute of Technology, Durgapur. He has completed 20 national and international research projects funded by DST, PHED, etc. and has conducted 30 consultancy research items. Currently he is the principal investigator of 4 research projects funded by NRDMS, DST, RUSA 2.0, DST, Govt of West Bengal, etc. He has more than 20 years of teaching and research experience. He is the reviewer of two reputed journals, namely, Groundwater for Sustainable Development, Elsevier, and Environmental Science & Technology, ACS publications. He has published more than 140 articles in national and international journals and published 13 research articles as book chapters. He has acted as a sectional recorder of Engineering Science section of The Indian Science Congress Association, for the period of 2018-19 and 2019-20. He is now the member of as many as 10 number of learned societies.

CT 13

Application of Biofilm reactor in the treatment of swine wastewater.

Zebing. Li[a]*, Shennan. Zeng[a] and Zhanxue. Sun[a,b]

a. *School of Water Resources & Environmental Engineering, East China University of Technology, Nanchang 330013, China University of Technology, Nanchang 330013, China*
b. *State Key Laboratory of Nuclear Resources and Environment, East China*

*Corresponding author: lizebing@ecut.edu.cn

Abstract:
A combined process including anaerobic biofilm and multi-stage AO biofilm is applied to the treatment of swine wastewater. The research results show that the amount and quality of wastewater discharged by pig farm are closely related to the environmental temperature. The higher the temperature, the greater the wastewater volume, but the concentration of pollutants such as COD and nitrogen decreases; during the process operation period, the removal rate of COD from the swine wastewater exceeds 80%, the removal rate of ammonia nitrogen exceeds 85%, and the removal rate of total nitrogen exceeds 70%.

Fig.1. Photograph of reactor and wastewater samples

References

[1] Li ZB, Han F, Zeng SN, et al. A review on the factors affecting the removal of sulfonamides from breeding wastewater in constructed wetlands [J]. Asian Journal of Ecotoxicology, 2020, 15: (in Chinese)

Zebing Li, lecturer, master tutor. Mainly engaged in the teaching and scientific research of sewage biolog ical treatment, research and development of new biological denitrification technology, and solid waste res ource recovery. Presided over 1 National Natural Science Foundation project, 2 Municipal level scientific research projects; participated in 4 National Natural Science Foundation projects, 1 BRICS international cooperation project, and 3 Municipal level scientific research projects. Published more than 30 papers and authorized 4 invention patents.

CT 14

Health risk assessment of toxic heavy metals in waterbodies of Durgapur Steel city, India

Kankana Seal [*a,b], Hirok Chaudhuri[a,d], Sanhita Pal[c], Soumen Basu[a], Mrinal Kanti Mandal[b] Supriya Pal[d,e]

*seal.kankana@gmail.com, ks.16ph1101@phd.nitdgp.ac.in

[a] Department of Physics, National Institute of Technology Durgapur, India
[b] Department of Chemical Engineering, National Institute of Technology Durgapur, India
[c] Department of Mechanical Engineering, University of Alberta, Edmonton, Canada
[d]Center for Research on Environment and Water (CREW), National Institute of Technology Durgapur, India
[e]Department of Civil Engineering, National Institute of Technology Durgapur, India

Abstract:

Health risk assessment of human, plants, aquatic living creatures and other animals becomes an important and urgent task to understand the negative impact of polluted water in the environment. Health index assessment plays a vital role in the policy making and scientific management system of polluted water and its remediation. Long term exposure of contaminated water causes a significant health hazard on the human body. Present work attempts to find probable health risks due to the high pollution level of few identified heavy metals at Durgapur industrial city and its adjacent Raniganj-Asansol region, one of the eastern India's most enriched industrial hubs. Continuous discharges of industrial waste degrade the water quality of both surface water and groundwater resources of Durgapur city and nearby areas. It seems to be the first of its kind to evaluate the spatial distribution of concentration of toxic heavy metals and their detrimental influence on human bodies, which has not been reported earlier in Durgapur province. High concentrations of heavy metals like Fe, Mn, Ni, Pb, Cd, Cr, As, Hg and Co are contributing a potential health risk to the inhabitants of Durgapur city and its adjacent areas. In this study, almost 32 groundwater samples and 20 surface water samples were evaluated to estimate the non-carcinogenic health risk of adults and children. In addition, two parameters like hazard quotient (HQ) and hazard index (HI), were calculated for individual heavy metals to map the zonal distribution of high health risks over this region. The alarming health risks were found at extreme level near to thermal power plants, steel and chemical industries of mainly Durgapur city. Apart from the health risk evaluation, the spatial distribution analysis confirmed high groundwater contamination. In addition, water streams of canals and rivers passing through industrial zones are found to be more toxic than the rest of the surface water sources (ponds and lakes). The conclusion of this work also denotes a probable solution to deal with heavy metal contamination to protect the environment.

Kankana Seal

Kankana Seal
Indian
Senior Researcher (Ph. D student)
Department of Physics and Department of Chemical Engineering &
BRICS research group
National Institute of Technology Durgapur, India
seal.kankana@gmai.com, ks.16ph1101@phd.nitdgp.ac.in

She has expertise in the overall estimation of the pollution profile of selected industrial-based regions of India and its possible remediation. Her current study area is Damodar river basin, India. The aim of er research work belongs to water geochemistry of surface water /groundwater bodies of Damodar river adjacent area, assessing the health risk of humans due to the long-term influence of toxicants and their spatial-statistical analysis. She is also working on the synthesis of photocatalytic materials to remove organic based pollutants from wastewater in Damodar river area. She has developed metal oxide-based photocatalytic materials by varying reaction conditions like temperature, ion concentration, aging time, etc. Furthermore, she has analysed photocatalytic metal oxide samples from crystallographic aspects to find the effect of morphological evaluation on the degradation process of organic compounds in wastewater to improve the removal efficiency.

CT 15

Fate and Removal of Antibiotics and Poly Aromatic Hydrocarbons in Constructed Wetland: A numerical modeling approach

Avishek Adhikary[1*], Tapabrata Chakraborty[2], Pradyumna Konar[3], Supriya Pal[4]

[1,3,4] Department of Civil Engineering, National Institute of Technology Durgapur, West Bengal-713209, India.

[2] Department of Earth and Environmental Studies, National Institute of Technology Durgapur, West Bengal-713209, India.

In developing countries like India, Antibiotics, and Poly Aromatic Hydrocarbons (PAHs) use are rampant. Hence, industrial wastewater is laden with humongous amounts of them. Wastewater treatment plants are also neglected due to a lack of infrastructure, terrible design, poor maintenance, high operating costs, and a technical workforce shortage. Constructed Wetlands (CWs) are a low-cost, natural, eco-technological biological wastewater treatment technique that imitates processes seen in natural wetland ecosystems and are currently being considered as a potential alternative or additional wastewater treatment method.

Two of the most commonly used organic compounds, Erythromycin(ERY) and Naphthalene(NAPH), were taken into consideration with initial concentrations of 25mg/L and 12mg/L, respectively, and studied to assess their removal efficacy through a laboratory scale vertical one-dimensional column study, horizontal tank study and through vertical surface flow constructed wetland, with the usage of locally available silty-sandy soil as adsorbent.

The migratory behavior of ERY and NAPH through vertical soil column and horizontal tank test set up was simulated using a three-dimensional HYDRUS Standard Solute Transport module. The same through laboratory-scale CW was modeled using a two-dimensional HYDRUS CW2D module. The modules use the Galerkin-type linear finite element technique to solve Richard's equation for saturated-unsaturated water flow and the Fickian advection-dispersion equation for heat and solute transport.

The 90% saturation of the 40 mm thick, 60 mm wide soil column was achieved around 1.3 days for ERY, while for NAPH, it was around 1.5 days. Similarly, in the case of the numerical model of Tank having a length of 400 mm, width 200 mm, and height 300 mm, it was found that 90% saturation occurred around 100 days and 105 days, respectively. In the case of CW, four different observation nodes were considered, with the top one just below the soil surface and the subsequent nodes 10 cm apart from each other in the vertical direction. The model time for CW was kept for 24 hours, with the input being at every 4 hours. The maximum exit concentrations obtained from the bottom-most node were 1.9mg/L for ERY at the 8^{th} hour

and 0.85 mg/L for NAPH at the 12th hour of elapsed time. So, the maximum removal efficiency obtained was 92.4 % for ERY and 92.9% for NAPH.

Keywords: Erythromycin; Naphthalene; Constructed Wetland; HYDRUS;

RESUME

Name	Avishek Adhikary
Educational Qualification	• Masters in Environmental Science and Technology • Currently Pursuing PhD in Civil Engineering
Affiliation	**NIT Durgapur**
Research Field	• Geotechnical and Geo-environmental engineering. • Numerical modelling of water and solute transport through sub-surface soil media. • Water Resources and Pollution Treatment • Analysis and design of wastewater and solid waste containment structures.
Publications	• Journal/Book Chapter – 3 • Conference - 4

CT 16

Derivation of Flow Duration Curves for prediction of Hydropower Generation Potential: A case study from Southern Africa

G Z. Ndhlovu[a]* and YE. Woyessa[a]

[a]*Department of Civil Engineering, Central University of Technology,20 President Brand Street,Code 9300, Bloemfontein,South Africa*

*Corresponding author: gndhlovu@cut.ac.za

Abstract:
Derivation of flow duration curves in data scarce regions for design of hydro power generation presents a challenge that needs solutions. Further more flow duration curves for many river basins in Southern Africa are still based on historical flow records without taking into account the future climate change scenarios. Flow duration curves are a function of many factors which include;biophysical data such as topography, landuse land cover,soils,precipitation,temperature and discharge measurements. Change in climate corresponds to changes in flow duration curves which directly influence the existing hydropower generation capacity and identified potential in selected sites. The study was undertaken with five GCM projections based on baseline, RCP 4.5 and RCP 8.5 climate scenarios for derivation of flow duration curves in order to determine the future of the existing small scale hydropower generation capacity and the identified potential. The calibrated SWAT model was applied for simulation of streamflows from GCM projections which were then used for derivation of flow duration curves for the three climate scenarios. The results under RCP 4.5 compared with baseline show that there will be insignificant changes in flow duration curves. Whilst results under RCP 8.5 compared with baseline show considerable changes in flow duration curves which is likely to affect the future hydropower generation capacity and identified potential. The results predict increased hydropower genaration potential for existing stations and identified sites. Furthermore the results also demonstrate the application of the derived flow duration curves in data scarce regions and ungauged catchments for estimation of hydropower generation potential in Southern Africa.

Keys words: *climate change; flow duration curves; hydro power generation potential; simulations; streamflow*

NDHLOVU George Zayeqa, Doctor of Engineering (Civil), Ma (WREM), HD(Civil), Dip (Agric Eng.), AMSAICE, FEIZ

George Zayeqa Ndhlovu holds a Doctor of Engineering (Civil) degree from Central University of Technology, South Africa. His doctoral studies focused on evaluation of the impact of climate change on hydrology and water resources in the Upper Zambezi River Basin. His contribution to the body of knowledge has been the quantification of the impact on catchment hydrology and water resources and the development of adaptation and mitigation strategies. He is currently involved in investigations of impact of climate change on hydrology and water resources in the transboundary river basins in Southern Africa. Prior to his doctoral studies, He worked in the water and sanitation sector for 10 years. Dr Ndhlovu also holds a Masters degree in Geoinformation Science and Earth Observation, with a specialisation in integrated catchment and Water Resources Management from ITC, University of Twenty, The Netherlands.He also studied civil engineering at Copperbelt University, Kitwe, Zambia and Agricultural Engineering at Natural resources Development College, University of Zambia, Lusaka. Zambia. He is employed as a lecturer in Civil Engineering Department at Central University of Technology.

Session – VII

IT 11

Synthesis of triphase mesoporous TiO_2 photocatalyst for degradation of organic pollutants in wastewater

Kankana Seal [*a,b], **Hirok Chaudhuri[a,c]**, Soumen Basu[a],
Mrinal Kanti Mandal[b], Supriya Pal[d]

*hirok.chaudhuri@phy.nitdgp.ac.in

[a] Department of Physics, National Institute of Technology Durgapur, India

[b] Department of Chemical Engineering, National Institute of Technology Durgapur, India

[c] Center for Research on Environment and Water (CREW), National Institute of Technology Durgapur, India

[d]Department of Civil Engineering, National Institute of Technology Durgapur, India

ABSTRACT:

Mesoporous TiO_2 nanoparticles were synthesized by varying solvothermal temperature and synthesis pH. This work is focused on the morphology evolution of triphase mesoporous TiO_2 in terms of lattice defects of crystallographic planes. Structural anisotropy of the prepared titania was observed to be enhanced with an increment of synthesis pH. The prepared material was proven to be a better photocatalyst (efficiency > 99.5% in 80 minutes) than single-phase anatase titania. The prepared photocatalyst will be very useful for the degradation of organic pollutants in wastewater to protect the environment.

KEYWORDS: Triphase TiO2, solvothermal reaction, synthesis pH, morphological evolution, photocatalysis, degradation of organic pollutant, wastewater

Dr. Hirok Chaudhuri

Dr. Hirok Chaudhuri is presently working as an Associate Professor at Physics Department, NIT Durgapur (NITD). He is also acting as an adjunct faculty and joint coordinator of Center for Research on Environment and Water at NITD. He is the founder coordinator of the Science Museum at NITD. He performed Post-Doctoral research activity at VECC (a unit of Department of Atomic Energy, Government of India) Kolkata, India. He completed his Ph D Thesis work from Saha Institute of Nuclear Physics, Kolkata, India. Dr. Chaudhuri received several awards as a young scientist. He was selected as a Fellow of Earth Science Society of India in 2015. He is also working as an invited member of the International Thematic Group of the BRICS Network University Programme on Water Resources and Pollution Treatment. Dr. Chaudhuri received Visiting Scientist Fellowship from Govt. of India, Department of Atomic Energy at VECC, Kolkata. He was also awarded by ONGC (Oil and Natural Gas Corporation), India in 2009 for his major contribution in R & D Activity on the country's first Pressure Swing Adsorption based Prototype Helium Purification Plant at ONGC's Kuthalam GCS, Tamilnadu. He received National Scholarship from the Government of West Bengal, Education Department, India in the year 1996.

Dr. Chaudhuri has a long-term working experience in the research areas: Geochemical Precursors for Earthquakes, Geothermal Exploration, Helium Exploration, Environmental Radioactivity, Nonlinear Dynamics. Recently he started research activities in the field of Wastewater Treatment using nano-technology. Presently he is working as investigators of three research projects (both national and international status) and two academic and societal development projects. Dr. Chaudhuri successfully completed three research projects funded by Govt. of India MHRD, SERB, DST. He has several research publications in Peer Reviewed International and National SCI, Scopus and Web of Science indexed Journals and monographs as book chapters. He has more than 40 publications in the Proceedings of International / National Conferences. He is also working as a mentor for Research Student for Ph D Thesis work and M. Tech (Advanced Material Science and Technology) and M. Sc. (Physics) Project Thesis work. Dr. Chaudhuri delivers lectures in B. Tech., M. Tech (Advanced Material Science and Technology) and M. Sc. (Physics) levels and also for Ph D course work. He delivered more than 45 invited talk at different parts of the globe. He is also working as Reviewer in reputed international journals.

CT 17

TOWARDS GROUNDWATER MONITORING USING SATELLITE AND GROUND-BASED OBSERVATIONS IN BRAZIL

Clyvihk Renna Camacho
Email:clyvihk.camacho@cprm.gov.br

Geological Survey of Brazil- CPRM, Belo Horizonte and Laboratory of Water Resources and Environmental Studies (LABH2O), Civil Engineering Program, Alberto Luiz Coimbra Institute for Postgraduate Studies and Research in Engineering – COPPE, Federal University of Rio de Janeiro, CEP 21945-970, Rio de Janeiro – RJ, Brazil

Abstract. Estimates indicate that between 97-98% of available fresh water is groundwater and about 43% of the total use of water for irrigation is of underground origin. Brazil is one of the largest agricultural producers in the world. In addition, the country has large aquifers with high storage and production capacity. Furthermore, about 56.8% of Brazilian municipalities have underground water supply, which includes industrial production. Accordingly to the national demands and given the importance to expand hydrogeological knowledge, as of 2009, the Geological Service of Brazil - CPRM, started the installation and operation of the Integrated Groundwater Monitoring Network (RIMAS), with continuous monitoring, so that in the medium and long term, it can identify impacts to groundwater as a result of exploitation, building estimates of groundwater resource availability, among other information. Currently, RIMAS has 409 dedicated monitoring wells, spread across the largest and most important aquifers in Brazil. The monitoring of such extensive country requires great efforts from the Geological Survey of Brazil. In this sense, the application of new aquifer monitoring technologies is a way to reduce research costs. Currently, different monitoring methods are being tested. One of the most promising approaches is the application of remotely sensed products, such as gravitational data provided by the GRACE mission (Gravity Recovery and Climate Experiment), which, jointly with *in situ* measurements, can be associated with artificial intelligence models. Such alternative will foster the development of new tools for a greater coverage of the Brazilian territory and corresponding study of regional aquifers.

Keywords: Groundwater, Aquifers Monitoring, Remote Sensing, Artificial Intelligence

Clyvihk Renna Camacho

MSc. Clyvihk Renna Camacho, Researcher in Geological Survey of Brazil and PhD candidate at the Civil Engineering Program, Alberto Luiz Coimbra Institute for Postgraduate Studies and Research in Engineering – COPPE, Federal University of Rio de Janeiro - UFRJ, Brazil.

Geologist Engineer from the School of Mines, Federal University of Ouro Preto - UFOP (2013), Masters in Geology – Federal University of Ceará - UFC (2016). Since 2014, he is researcher in Geological Survey of Brazil in hydrogeology area. He has worked on several groundwater research projects, being a permanent researcher at the Integrated Groundwater Monitoring Network - RIMAS (since 2014). He works in research and monitoring of the quality and quantity of groundwater, in the development of hydrogeological and of hydro-geochemical models, in structural geology, remote sensing and applied geophysics. He develops models based on Artificial Intelligence, Machine Learning and Deep Learning for hydrogeology.

CT 18

A Runoff Simulation Model for Lower Gangetic Plain of India.

[1]Kush Kumar Dey, [2] Dr.Vijay Kumar Dwivedi, [3]Dr. Satanand Mishra.

[1]Research Scholar, National Institute of Technology Durgapur, India.

[2]Professor, National Institute of Technology Durgapur, India.

[3]Sr. Scientist, CSIR, Advanced Materials Processes Research Institute, Bhopal, India.

[1]kushdey242@gmail.com, [2]vkdwivedi10725@yahoo.co.in, [3]snmishra07@gmail.com,

ABSTRACT:

River Ganges traversing a distance of about 2525 km from Gangotri in the Lower Himalayas to Hubli at the mouth of Bay of Bengal is life line of about **40**% (check) of populace living in Indian sub-continent. Discharge in the river Ganges varies along longitudinal distance along the course of the river due to change in climate and hydrological input in different reaches and changing topographical characteristics converting the hydrological input (forcing) to hydrological output for satiating the needs of the living beings dependent on this holy river. Due to varied output available all along the course of River Ganges, the quality of life along different reaches of the River Ganges varies to a great extent. There has been constant attempt to predict accurately the hydrological output from different sub-basins of River Ganges at spatial-temporal scale. Reaches along the River Ganges have broadly been categorised in Upper Gangetic Region, Middle Gangetic Region and Lower Gangetic Region. Extensive work has been done to model the climate variability on hydrological output of upper and middle reaches of River Ganges but not for lower reaches of River Ganges, particularly the plateau region draining into the river. Wide spread change in water availability in this plateau region have been observed and this change in water availability is getting more sporadic with climate change. The existing methods for simulation of runoff from the plateau region of Lower Ganges covering district of Purulia on Lower Gangetic Plain (Zone no-III, Eastern slope of Chhota Nagpur Plateau) lying in the State of West Bengal do not give satisfactory results as compared to the observed runoff Therefore, in the present study, a runoff simulation model for the plateau region of Lower Ganges covering district of Purulia has been developed by employing concepts of Artificial Neural Networks (ANNs) by which relative impact of different climatic variables such as rainfall, temperature, cloud cover, evaporation, potential evapotranspiration, and relative humidity for the district of Purulia on the surface runoff from the district area could be assessed. Real-time data series of 116 years (1901-2016) for the ten meteorological stations of district Purulia from India Meteorological Department, Pune have been used for developing the ANNs model for predicting surface runoff. The available data were separated as 70% for training, 15% for testing, and 15% for validation. Back propagation algorithm has been

developed to compute surface runoff. Nash-Sutcliffe Efficiency criteria has been employed to estimate efficiency of the developed model which has 97% efficiency in accurately predicting the surface runoff.

KEYWORDS: Runoff, Simulation, Artificial Neural Networks, Climate Change, District Purulia.

KUSH KUMAR DEY

Phone No: 09933420198 / 08942872286 **Skype ID – kushdey242@gmail.com**

E-mail - kushdey242@gmail.com

PERSONAL DETAILS :

Father's Name	:	Late Sudhir Chandra Dey
Date of Birth	:	**20th September, 1968**
Present Address	:	**Street No. – 3A, Rishi Arabinda Pally, Durgapur – 713201, W.B**
Nationality	:	Indian
Category	:	General
Religion	:	Hindu
Sex	:	Male
Marital Status	:	Married

EDUCATIONAL QUALIFICATION:

Name of the Examination	Board/Institute/College/University	Year of Passing/Period	% of Marks	Division/ Class
Madhyamk	W.B.B.S.E.	1985	62	1st
H.S (Science)	W.B.C.H.S.E.	1987	57	2nd
D.C.E.	K G E I, Bishnupur, State Council for Engineering & Technical Education (Govt. of W.B.)	1990	69	1st
B.Tech – Civil Engg.	Swami Vivekanand Subharti University, Meerut, U.P	2012	76	1st
M .Tech – Civil (Environmental Engg. & Mgmt)	Swami Vivekanand Subharti University, Meerut, U.P	2012-2014	73	1st
PhD(Pursuing)- Civil Engineering	**National Institute of Technology Durgapur, W.B,**	From July 2016	Expected to be completed by **2021**	Civil Engineering

DAY 3 (July 8, 2021)

Session – VIII

IT 12

Photo-catalytic membrane separator-reactor for cleaning persistent contaminants in waste water

Dr Mrinal Kanti Mandal
Associate Professor, Department of Chemical Engineering, National Institute of Technology Durgapur, West Bengal – 713 209
E-mail: mrinalkanti.mandal@che.nitdgp.ac.in; mrinalmandal@gmail.com
Mobile No.: +91 9434788188
https://nitdgp.ac.in/department/CH/people

Abstract

Water scarcity is a worldwide problem affecting many countries. Moreover water sources are increasingly contaminated by industrial and domestic discharges. The demand for safe and clean water is increasing due to an exponential rise in population in a country which actually leads to enhance pollution of the water. Industrial wastewater is a global environmental issue and a real technological challenge due to the diverse chemical composition of persistant compounds and its broad range of concentrations. Complex dedicated wastewater treatment facilities need to be devised to accommodate such amounts presenting an unprecedented challenge. This work focuses on waste water purification and treatment of emerging and existing pollutants as pesticides/antibiotics with the target to contribute to a fully recyclable and reusable water quality and zero pollution. The generation of a safe resource will reduce the pressure on natural resources and contribute to sustainable water governance.

Our approach offers a new and powerful solar photocatalytic membrane separator-reactor perspective of how advanced water treatment technologies can be implemented, combining filtration and photocatalytic processes under normal solar light conditions, a key factor for the reduction of energy requirements for low cost and efficient water treatment. The technology consists of visible light active (VLA) novel smart heterostructure photocatalytic system supported on ceramic membrane and that can be integrated with existing processes. This will allow to merge both units as separator-reactor for purification of multiple contaminants. This flexible wastewater management solution will contribute to better environmental and human health conditions as well as an increase in available water resources for agriculture, industrial and domestic use. This work could positively impact on science, industry, environment, economy, and society through the development of an integrated approach that will enable an effective treatment of pathogen/organic waste from contaminated waters.

Dr Mrinal Kanti Mandal
Associate Professor, Department of Chemical Engineering, National Institute of Technology Durgapur, West Bengal – 713 209
E-mail: mrinalkanti.mandal@che.nitdgp.ac.in; mrinalmandal@gmail.com
Mobile No.: +91 9434788188
https://nitdgp.ac.in/department/CH/people

Dr. M. K. Mandal, Associate Professor, Dept. of Chemical Eng., NIT Durgapur, India, has expertise in the area of membrane separation processes, catalytic membrane reactors, membranes in water and energy and wastewater treatment. He has gained experience in Reliance Industries Ltd, R&D Centre as Research Scientist and Assistant Professor in the Department of Petroleum Engineering, ISM Dhanbad. ***His research interest is on treatment of emerging pollutants (antineoplastic/antibiotics/pesticide/PAH) in waste water using advanced photo-catalyst and membrane.*** Dr. Mandal has received Inno-Indigo award for his contribution in the field of "***Clean water and health***". He has awarded BRICS STI in the field of wastewater treatment and pollution control. He has numbers of M. Tech and Ph.D students as supervisor/ co-supervisor and published several book chapters/articles in peer reviewed international journals in the field of membrane technology/ composite membrane reactor.

CT 19

ATMOSPHERIC PROFILE EVALUATION USING RADIOSONDES AND MODIS SATELLITE PRODUCTS OVER THE CITY OF RIO DE JANEIRO - RJ - BRAZIL

Louise Caroline Carvalho dos Santos
Email: louise.santos@coc.ufrj.br

Laboratory of Water Resources and Environmental Studies (LABH2O), Civil Engineering Program, Alberto Luiz Coimbra Institute for Postgraduate Studies and Research in Engineering – COPPE, Federal University of Rio de Janeiro, CEP 21945-970, Rio de Janeiro – RJ, Brazil

Abstract. Dynamic and thermodynamic patterns of the atmosphere are well known to be essential information to mesoscale and local hydrometeorological modeling. Further efforts are being developed to generate improvements on weather forecasting and nowcasting increasingly dependent on the association of ground and remotely sensed datasets. The extraction of datasets from the vertical profile of the local atmosphere and surrounding areas can indeed indicate proper conditions for the occurrence of rainfall. Atmospheric profile information can be obtained by launching radiosondes and by on-board sensors installed on a variety of satellite platforms. Given the posed framework, it is proposed to investigate the use of vertical atmospheric profile products from satellites in comparison to radiosondes at the daily scale. Such information reflects atmospheric behavior regarding potential scenarios of rainfall. In the present work, we studied atmospheric profiles over the city of Rio de Janeiro, which depicts a long history of severe rainfalls. MODIS products acquired by sensors on board the AQUA and TERRA satellites and radiosondes launched along the years 2016 - 2018 were used. More specifically, seven days were selected along the referred time span to establish the proposed comparison. It is noteworthy to say that a case of heavy rainfall took place in Rio de Janeiro in one of the days analyzed. The results indicate a strong positive correlation between the variables estimated by MODIS and the data from the soundings, highlighting the feasibility of using satellite product over the region.

Keywords: Atmospheric Profile, MODIS Products, Radiosondes, Rainfall

Louise Caroline Carvalho dos Santos

BSc. Louise Caroline Carvalho dos Santos, Researcher in Water Resources Engineering and M.Sc. candidate at the Civil Engineering Program, Alberto Luiz Coimbra Institute for Postgraduate Studies and Research in Engineering – COPPE, Federal University of Rio de Janeiro - UFRJ, Brazil.

Meteorologist, Federal University of Rio de Janeiro - UFRJ (2018), Meteorology Technician – CEFET/RJ (2011). For her final work to the B.Sc. degree in 2018, she presented a case study of heavy rainfall over the city of Rio de Janeiro analyzing the synoptic scale and mesoscale with reanalysis data along with an in-depth research about atmospheric patterns associated with heavy rainfall cases over the history of the city. In 2019, she started developing research works on hydrometeorology using remotely sensed data.

CT 20

COVID 19: Blessings or hazard to the water quality

Trina Dutta[1]*, Hirok Chaudhuri[2,3]

[1]Department of Chemistry, JIS College of Engineering, Kalyani, Nadia, West Bengal 741235, India, ORCID ID: https://orcid.org/0000-0003-3909-6153

trina.dutta@jiscollege.ac.in

[2]Department of Physics, National Institute of Technology Durgapur, West Bengal 713209, India, ORCID ID: 0000-0002-3925-4257

[3]Center for Research on Environment and Water, National Institute of Technology Durgapur, West Bengal 713209, India

hirok.chaudhuri@phy.nitdgp.ac.in

Abstract:

Since 2020, different countries worldwide are forced to opt lockdown as one of the measures to retard COVID 19 contamination. In the immediate effect of lockdown, the surface water quality of rivers and lakes improved as the industrial and human activities decreased. Also, the reduction of vehicle movement improved the ambient of water quality which is directly connected with the air quality.

But the presence of SARS-CoV-2 in the feces of infected patients has drawn attention to the potential risk of faecal-oral transmission of COVID-19 through intake of river water. Also, the use of wastewater may be an epidemiological tool.

This paper analyses the benefit and hazard potential of COVID 19 on water quality. It also suggests the urgent need for domestic sewage management which is directly discharged into the river.

Keywords: COVID-19, Reduced activities, Water quality parameters, Faecal-oral transmission, Risk potential

References:

1. Ali P. Yunus, Yoshifumi Masago, Yasuaki Hijioka; "COVID-19 and surface water quality: Improved Lake water quality during the lockdown", Science of the Total Environment 731 (2020) 139012
2. Mohammad Adil Aman, Mohd Sadiq Salman, Ali P. Yunus; "COVID-19 and its impact on environment: Improved pollution levels during the lockdown period – A case from Ahmedabad, India", Remote Sensing Applications: Society and Environment 20 (2020) 100382
3. Ramsha Khan, Abhishek Saxena, Saurabh Shukla, Selvam Sekar, Pooja Goel; "Effect of COVID-19 lockdown on the water quality index of River Gomti, India, with potential hazard of faecal-oral transmission", Environmental Science and Pollution Research (2021) 28:33021–33029, https://doi.org/10.1007/s11356-021-13096-1
4. Polo D. et. al. "Making waves: Wastewater-based epidemiology for COVID-19 –approaches and challenges for surveillance and prediction", Water Research 186 (2020) 116404.

Dr. Trina Dutta

Assistant Professor
JIS College of Engineering, Kalyani, Nadia
trina.dutta@jiscollege.ac.in, https://orcid.org/0000-0003-3909-6153

Areas of Research
Environmental Crisis and Sustainable development.
Data Analysis

More than 15 years' experience with passionate commitment to student development and the learning experience. Active team member who effectively collaborates will all levels of stuff members and establishes quality relationship with students.

Recent Publications

"Pollution in Damodar River Basin- A statistical analysis", *Advances in Water Resources Management for Sustainable Use*, Springer Nature, Volume 131, Pp-187-215, **2021** https://doi.org/10.1007/978-981-33-6412-7_15.

"Addressing global pandemic (COVID 19) – How much testing needed to control the disease effectively", *Journal of Physics*:**2021** https://doi.org/10.1088/1742-6596/1797/1/012001

"IoT for Healthcare Industries: A Tale of Revolution", *Healthcare Paradigms in the Internet of Things Ecosystem*, Elsevier, pages 21-45, **2021.** https://doi.org/10.1016/B978-0-12-819664-9.00002-8

Advanced Vehicle Systems and Technologies: Economic and Environmental Implications. *Encyclopedia of Renewable and Sustainable Materials*, vol. 3, pp. 232–244. Elsevier.**2020.** http://dx.doi.org/10.1016/B978-0-12-803581-8.11050-1

Green and Sustainable Manufacturing of Metallic,Ceramic and Composite Materials. *Encyclopedia of Renewable and Sustainable Materials*, vol. 3, pp. 474–486. Elsevier.**2020.** http://dx.doi.org/10.1016/B978-0-12-803581-8.11023-9

Sustainable Carbon Di-Oxide Sequestration Using Photosynthetic Reactions. *Encyclopedia of Renewable and Sustainable Materials*, vol. 3, pp. 759–770Elsevier.**2020.** http://dx.doi.org/10.1016/B978-0-12-803581-8.11025-2

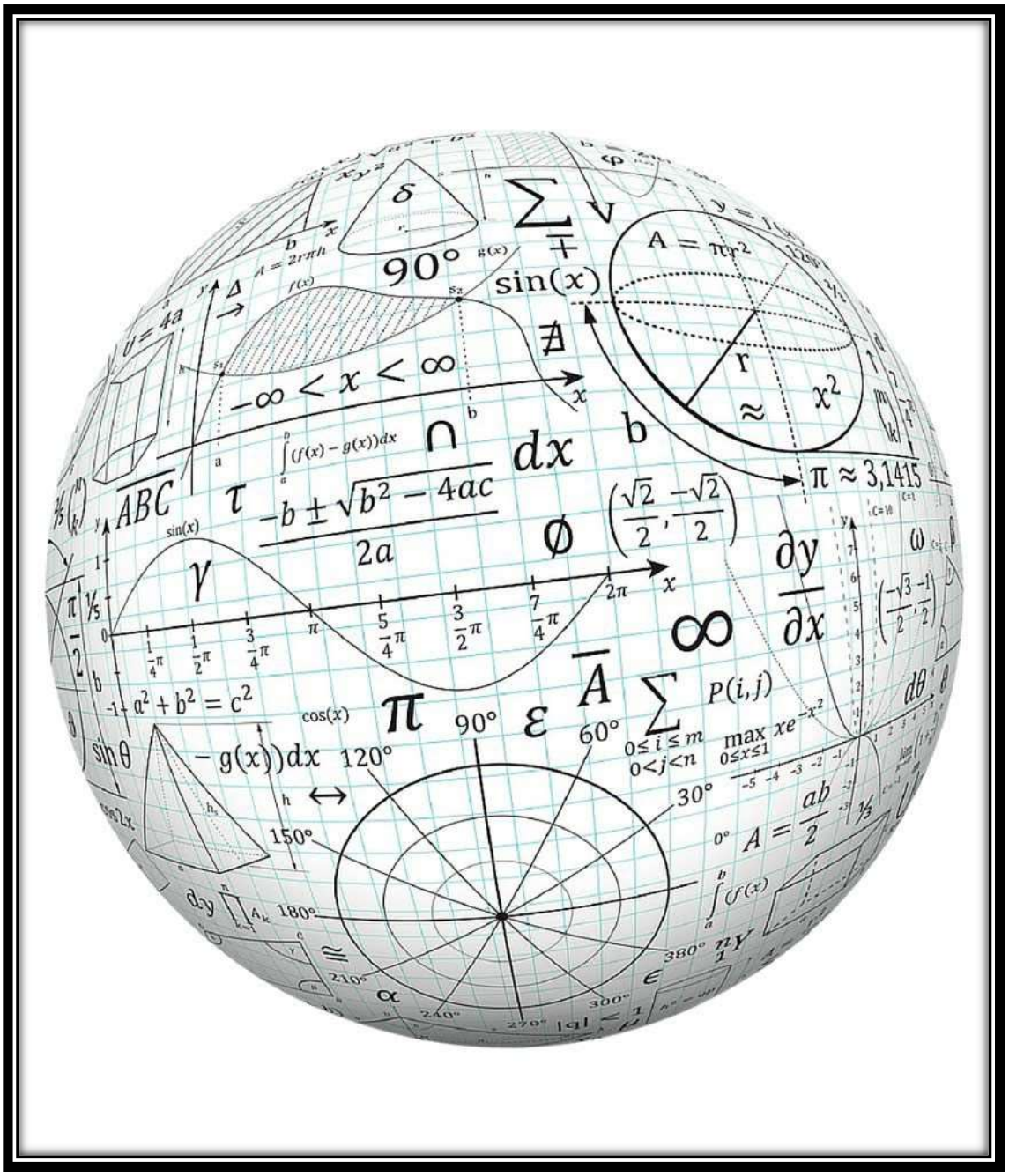
Education

2018
Ph.D.
Jadavpur University, Kolkata-700032

2003
M.E.
Jadavpur University, Kolkata-700032

Project & Certifications

- UGC minor project completed in 2017.
- AICTE_AQIS_STTP completed in 2019.
- Water, Society and Sustainability | NPTEL
- Exploratory Data Analysis with MATLA
- Machine Learning with Python-level 1IBM
- Node-RED: basics to bots IBM
- Outcome based pedagogic principles for effective teaching NPTEL (Elite and Topper of 5 %)


90°
sin(x)
$-\infty < x < \infty$
$\frac{-b \pm \sqrt{b^2-4ac}}{2a}$
$\pi \approx 3{,}1415$
$a^2 + b^2 = c^2$
cos(x)
120°
150°
60°
30°
180°
$A = \frac{ab}{2}$
$\frac{\partial y}{\partial x}$
$P(i,j)$

Session – IX

IT 13

Strategies for treatment of hospital wastewater using integrated technology

Kashyap Kumar Dubey

School of Biotechnology, JNU, New Delhi-India

India is lacking of hospital wastewater treatment process to remove antineoplastic agents from wastewater in hospitals (mainly in metro city). European Union countries like Portugal and Belgium are sharing the same situation in which antineoplastic agents are not removed specifically, reaching conventional wastewater treatment plants that are not able to destroy these persistent components, reaching the aquatic environment. In addition, the increasing rate of cancer patients all over the world has become a global fact during the last two decades. Keeping in the view, the necessity of specific treatment methods for removal of antineoplastic agents (Cyclophosphamide, 5-flurouracil, Etoposide) developed with the integration of biological and membrane technology.

Kashyap Kumar Dubey (Ph.D, M.Tech.) M.N.A.Sc.
Associate Professor
School of Biotechnology
Jawaharlal Nehru University, New Delhi
Mobile No. +91-9996122280
E-mail: kashyapdubey@gmail.com

Prof. Dubey is currently working as Associate Professor at School of Biotechnology, JNU New Delhi. Prof. Dubey received his PhD degree in 2008 in the area of Industrial Biotechnology. Dr. Dubey has research interest in biochemical engineering and wastewater treatment which includes process development of value added pharmaceutical products (3-demethylated colchicine, betulin, CoQ10, pullulan and lipstatin), through optimization of enzyme reactions and toxicological studies of micro-pollutants.

He is having grants from DST-BRICS, European Commission (IPP1) on Clean Water for Health, BIRAC-DBT and DBT on microbial process development. He has been completed Four major research projects and published 50 research articles in International reputed Journals. He is a Member of Various Scientific societies like BRSI, NASc, ISCA, SBC, DST-INSPIRE, MSI, ISCB, IFbioP, and AMI. He has been organised Four National Conferences, Conducted 03 GIAN courses, and 01 STTP. He has delivered several expert lectures in various scientific events. He significantly published in the area of biocommodity engineering and wastewater. His effort has been to develop low cost technology which would lead to lesser cost.

CT 21

Removal of Chromium (VI) from Aqueous Solution Using Low Cost Bio-Adsorbents : A comparison on performances, Isotherms and Kinetics

Radha Das [*a] , Arghyadeep De [*a], Amit Mukherjee [*a], Ishita Sinha [a, b],

[a] Department of Chemical Engg, Haldia institute of technology. Haldia -721657, India

[b] Sr. Project Engineer, Project Engineering Division, Linde India Limited., Kolkata, India :

Email Corresponding & presenting Author : : radha.das6@gmail.com, **deyarghyadeep50@ gmail.com**

Abstract :

Effluents from various industries like leather tanning , electroplating, dye, cement, petrochemicals etc where chromium salts are widely used, contains toxic hexavalent chromium ,Cr(VI) with concentration of 10^{th} to 100^{th} ppm level. In order to get rid of health hazard due to long term exposure of Cr(VI), feasible cost effective technologies for its removal are in high demand which would eventually save aquatic & human lives.

In this work adsorption of chromium (VI) compound from aqueous solution were investigated using Indian Neem leaf powder (NLP), Rice Husk and Sugarcane bagasse using adsorption process at various pH and temperature . It was found that the removal of Cr(IV) increases with the increase of time of contact and adsorbent amount but decreases with increase of solute concentration . The concentration of free Cr(VI) ions in the effluent is determined Spectro-Photometrically at 540 nm. The results show that about 95-99 % reduction of Cr(VI) may be achieved successfully depending on nature of adsorbents. An attempt has been made to find out the rate constants of this sorption process using first order reversible, pseudo first order and pseudo second order kinetic model. Applicability of Freundlich Isotherm and rearranged Langmuir model has been investigated. The maximum adsorption of Cr(VI) was obtained as 102.04 mg/gm using NLP comparing to other adsorbents. A comparison of Cr(IV) adsorption performance of some adsorbents have been observed an presented here. .

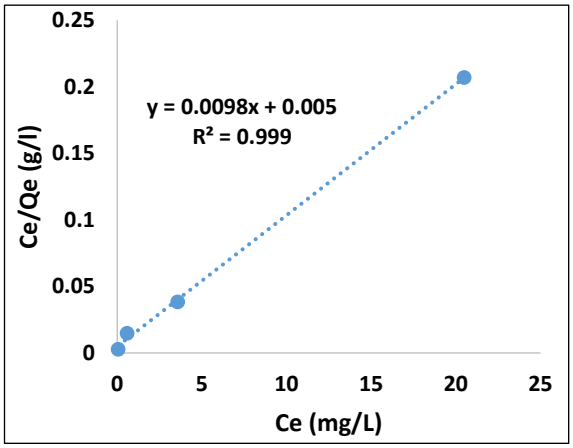


Fig.1 : Langmuir Isotherm, NLP : 0.5 g/l, pH: 1.29, at 302 K

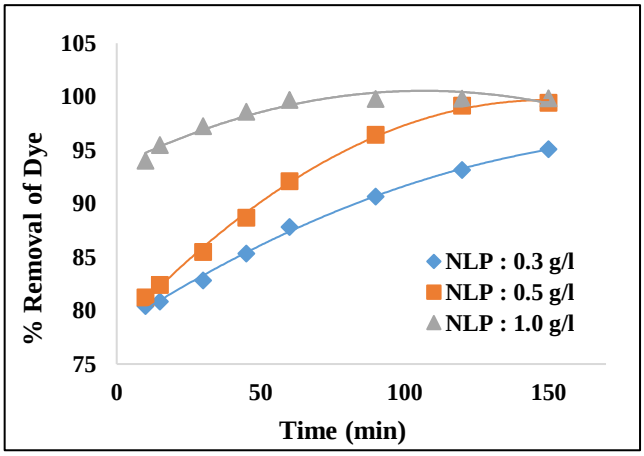


Fig. 2: Effect of adsorbent (NLP) amount on Cr (IV) removal (Solute : 10 mg/l, pH: 1.29, at 302 K)

Name : (Dr). Radha Das

Nationality : Indian

Designation : Professor & Dean (School of Chemical, Bio –Tech & Food Technoly)

Affiliation : Maulana Abul Kalam Azad University of Technology , W.B

Address : Department Of Chemical Engg, Haldia Institute of Technology

ICARE Complex , Haldia : 721657 , West Bengal, India.

Email : radha.das6@gmail.com

Prof (Dr). Radha Das (FICS, LMIIChE, LMISTE, LMIEI) :

Dr. Radha Das completed B.Tech, M.Tech, Ph. D in Chemical Engg. from University of Calcutta and Post Doc. from University of Torino, Italy and presently engaged as Dean (School of Chemical , Biotech and Food Technology) at Haldia Institute of Technology, West Bengal . She has published about 77 papers in various national and international journals and conferences. Received Gold Medal from Calcutta University in 2010 . Best paper award -2000 and Certificate of Merit award - 2008 from Institute of Engineers India (IEI) . She was awarded "Teacher of the year Award" from West Bengal University of Technology in 2017. She is engaged as reviewer and editor of many international reputed Journals. She served as national council member of Indian Institute of Chemical Engineers , IIChE during 2012 and 2015-2017, also as Honorary Registrar of IIChE during 2016. She is the founder secretary of Haldia Regional centre of IIChE.. She is actively engaged with various research work in the field of Ceramic Membranes, Environmental Science, Separation Process and Adsorption Process.

CT 22

Comparative study of water analysis kits for evaluating fluoride removal using Potash Alum modified salty clay ceramic filters in Pali district, Rajasthan, India

Sunil Duhan[1], Badal Kumar[1], Anuj[1], Nirmal Gehlot[2], Hanwant Rathore[2], Meraj Ahmad[1], Himanchal[1], Pankaj Jakhar[1], Ambesh Dixit[3], Pradip K Tewari[3] and Anand Plappally[3]

[1]Student, Department of Mechanical Engineering, Indian Institute of Technology, Jodhpur, India

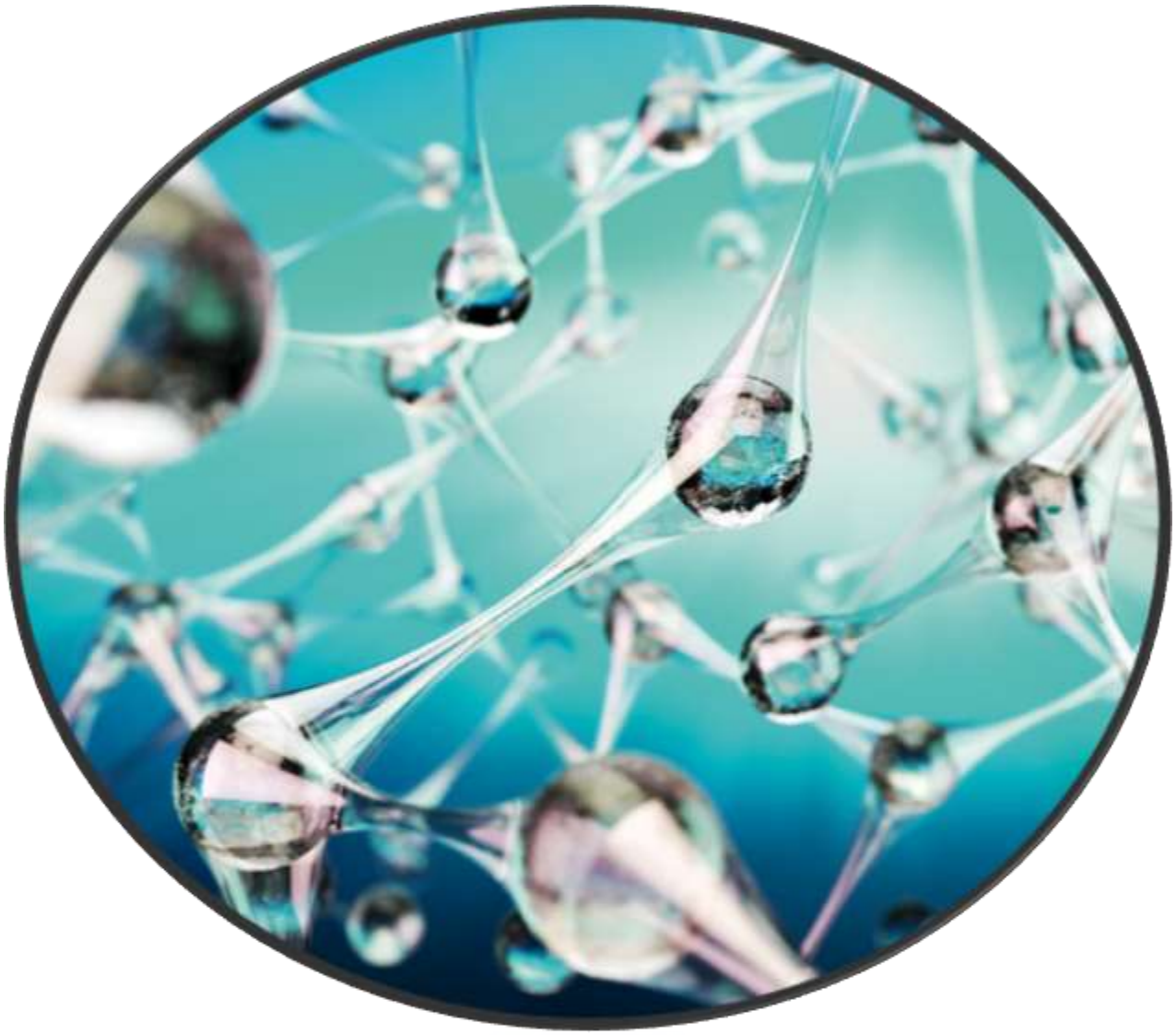
[2] Project Assistant, Unnat Bharat Abhiyan RCI, Indian Institute of Technology, Jodhpur, India

[3]Faculty, Center for Emerging Technologies for Sustainable Development, Indian Institute of Technology, Jodhpur, India

Corresponding Author Email: sunil.2@iitj.ac.in

Abstract: A field survey conducted in 2019-20 revealed that many villagers at Hingola Kalan Village, Pali district, Rajasthan, India, were suffering from fluorosis. The drinking water was found to have fluoride beyond WHO limits. Survey forms with questionnaires related to socio-economic parameters and water filter used in the area were distributed to 26 volunteering individuals. A pilot intervention based on salty clay ceramic water filters with raw material modification was performed to solve the fluoride contamination of drinking water. These filters were manufactured with an addition of 5% by volume of Potash Alum. Participants were encouraged to use these modified filters and water samples (both filtered and non-filtered) were collected for the duration of the experiment. Questions regarding the maintainability of these filters, medical assistance availability, education status of users, and their socio-economic status were recorded during the 3-month experiment. The samples were tested in labs using three testing kits, namely, LTEK Fluoride testing kit, Aqua-XL water analysis kit, and ProaKtive kit. Statistical analysis showed that there is a significant reduction in fluoride concentrations after using these filters. Out of 3 kits, LTEK and Aqua-XL kits were found to be more accessible, handy, and easy to use. The implication leads to the need of risk assessment of kits commercially available to rural populations of India to testify the presence of fluoride in drinking water.

Name	Sunil Duhan
Nationality	Indian
Designation	Research Scholar
Affiliation	IIT Jodhpur
Address	105 B5 IIT JODHPUR RAJASTHAN
Email	sunil.2@iitj.ac.in



Session – X

CT 23

Climate Change and its impact in occurrences of droughts and floods, threat to water conservation and right to life – A study with special reference to India

Authors Name : Dr. Susmita Dhar, Asst. Professor, Sister Nivedita Univeristy

Email ID : susmitadhar00@gmail.com

Abstract

Climate change is the most important global problem of this hour. Global warming is increasing day by day and the climate changes to extreme weather events. The anthropogenic activities are the direct cause of such extreme weather events and climate change. The catastrophic changes of the atmosphere results in unprecedented heat weaves, severe drought, sharp sea level rises, crop damage, flood, spreading of infectious disease and extinction of biodiversity etc. It is a climate emergency because we don't have planet B we need to transfer this beautiful habitat to the upcoming generations with sustainable development. The climate emergency is a modern curse of present global scenario which is harmful to human right to life and development.

Water is life and 71% of the earth surface is covered by water though only 1% can be consumed as drinking water. Access to safe drinking water is now human fundamental right. Water security preservation of water is the main threat due to exposure of floods and droughts, global warming. The Southeast Asia including India is at economic risk of flooding. India is the country of 130 crore people, is striving for water preservation and conservation as it is an agriculture based country. Flood and drought are rampant due to extreme climate event and cyclones and tsunamis. India is facing the problem of delayed monsoon due to climatic change and melting of Himalayan glaciers which causes flood situations worsen. In this paper the author try to throw some light on the impact of climatic change in occurrences of flood and drought which become a threat to water conservation and right to life in India with legal mechanism and judicial notion references.

Key Words : Climate Change, Extreme Weather Event, Water Conservation, Right to Life, Legal Mechanism and Judicial Notion regarding Water Protection in India.

Dr. Susmita Dhar

Name : Dr. Susmita Dhar, Ph.D, NET (Law)

Nationality : Indian

Experience : The paper presenter is currently attached to academics for 6 years and served as a guest lecturer in the department of law of the Burdwan University and Calcutta University both for years. Presently attached to Sister Nivedita University as Asst. Professor, Law. Before joining academics she served as an advocate in the Calcutta High Court from 2003 specially in writ and criminal side. The author has presented 25 papers in national and international seminars and having 16 publication of her credit. The research topic of the author in Ph.D was "IPR IN TRANSFER OF CLIMATE CONTROLLING TECHNOLOGY AND ITS IMPACT IN INDIA – A LEGAL STUDY". From the University of Burdwan, Law Department, the researcher completed her Ph.D in 2020 and from the Hazra Law College, Calcutta University completed LL.M in 2010.

Designation / Position / Affiliation : Asst. Professor, Grade – II, Sister Nivedita University, Newtown, Kolkata, Department of Law, DG Block(Newtown), Action Area I, Newtown, New Town, West Bengal 700156

Residential Address : Rai Apartment, Flat No. – G1, 53/M, J.N. Lahiri Road, Lahiri Park, P.O. – Serampore, Dist. – Hooghly, Pin – 712201, W.B.

Email ID : susmitadhar00@gmail.com

Phone Number : 9830303079

CT 24

Defluoridation of Water using Ion-Exchange Resin

Debdas Chowdhury[1], Pankaj Kumar Roy[2], and Arunabha Majumder[3]

[1]Junior Research Fellow, School of Water Resources Engineering, Jadavpur University
[2]Professor and Joint Director, School of Water Resources Engineering, Dean of FISLM, Jadavpur University
[3]Emeritus Professor, School of Water Resources Engineering, Jadavpur University
Email ID: dev.chowdhury93@gmail.com[1]

ABSTRACT:

The ionic form of fluoride is distributed unevenly throughout the environment. Fluorides can be found in minerals, rock, soil, clay, and anthropogenic activities as sedimentary deposits. Due to fluoride's significant toxicity to humans, it is essential to treat fluoride-contaminated drinking water to make it safe to consume. According to WHO recommendations, the maximum amount of fluoride allowed in drinking water is 1.5 mg/l. Fluorosis affects both teeth and bone at levels higher than this, resulting in dental, skeletal, and non-skeletal fluorosis. This study shows that fluoride can be removed from drinking water using an Ion Exchange method including cationic and anionic resin. The sorptive removal capability of fluoride from water is studied using cationic and anionic resin. The fluoride removal capacity is high when cation-anion exchange resin bed is combined with sand and gravel beds as the filter media, but the pH of the treated water decreases rapidly. When only anionic resin bed is utilized with sand and gravel beds as a filter media, however, the fluoride removal capacity remains high, and the pH, TDS (Total Dissolved Solids), EC (Electrical Conductivity), Total Alkalinity and Total Hardness of the treated water meet drinking water standards. The Maximal sorption of cationic-anionic resins and anionic resins is found to be around 521.25mg/kg and 509.5mg/kg respectively. Freundlich model is found to show better means to describe fluoride adsorption at equilibrium.

Name: Debdas Chowdhury

Nationality: Indian

Designation/Position: Junior Research Fellow

Affiliation: Jadavpur University

Address: Jadavpur University, Kolkata 700032

Email ID: dev.chowdhury93@gmail.com

CT 25

WATER SCARCITY CHALLENGES & ALTERNATIVE

Sritama Chatterjee[1], Pankaj Kumar Roy[2], Arunabha Majumder[3] and Malabika Biswas Roy[4]

[1]Ph.D. student, School of Water Resources Engineering, Jadavpur University, 188/2 R.S.C. Mullick Road, Jadavpur, Kolkata - 700032

[2]Professor and Dean Faculty of Interdisciplinary Law and Management, Jadavpur University, 188/2 R.S.C. Mullick Road, Jadavpur, Kolkata – 700032

[3]Emeritus Professor, School of Water Resources Engineering, Jadavpur University, 188/2 R.S.C. Mullick Road, Jadavpur, Kolkata – 700032

[4]Assitant Professor, Dept. of Geography, Women's College Calcutta, Kolkata – 700003

{Corresponding author's email: sritama21@icloud.com}

Abstract

Global water scenario is evident that freshwater resources are discreetly spread and limited from view point of direct utility. Their utility is high in different sectors such as agriculture, domestic, industrial and environment. In view of global population growth rate and increasing water demand it can be envisioned fresh water scarcity is global phenomenon 21st century is confronting. This raises several challenges before future generation regarding sustainability of existing fresh water resources, an alternative option and no compromise in water quality of resources to be used. India with second largest population in the world is no exception in water scarcity scenario. 54% of Indian water resources are reported to be scarce. The Central Ground Water Board (CGWB) as per Falkenman water scarcity index classifies India into critical, semi-critical and safe regions in addition to their findings of over-exploited, saline regions and unassessed hilly regions. This has accounted for physical water scarcity but economic water scarcity has not been accounted for. This study considers United Nation Commission on Sustainable Development on water scarcity index based on Annual Water Resource of India. This study put forward the water scarcity index blind to diversion of used water for various water utility sectors. However, consumptive use of water should be taken into account. Present study envisages to depend on alternative solution to water utility in present context of water scarcity in India as well as in global scenario to meet the future demand. The major problem in alternative source is quality issue which can be encountered through application of various available technologies and arrive at a solution.

Keywords: Fresh water scarcity, Water quality, Consumptive use, Alternative source

NAME	:	SRITAMA CHATTERJEE
NATIONALITY	:	INDIAN
DESIGNATION	:	Ph.D. SCHOLAR
AFFILIATION	:	SCHOOL OF WATER RESOURCES ENGINEERING, JADAVPUR UNIVERSITY
ADDRESS	:	188 R.S.C. MULLICK ROAD JADAVPUR, KOLKATA – 700032
E-MAIL	:	sritama21@icloud.com/sritama21@gmail.com

CT 26

Managing the Blue Gold: A study of the Water-Energy-Food Nexus in Indus River

Author(s): **Mohd Kamil Vakil*** and Nabeela Siddiqui**

* Department of Civil Engineering, Indian Institute of Technology (IIT) Kanpur, 208016 Kanpur, India;
Email: kamilvakil@gmail.com; Mobile: 8279938099 (Presenter)
** CHRIST (Deemed to be) University, Delhi-NCR, India, nabeelsiddiqui09@gmail.com

Abstract:

The conflict over water between India and Pakistan has been and is again making headlines. The Indus Waters Treaty (IWT) has survived diplomatic disputes for nearly sixty years, but current upstream water infrastructure projects have reignited difficulties. Climate change's deteriorating effects on Himalayan glaciers may increase the incidence of disasters and jeopardize populations' long-term water security. Under present usage and storage patterns, many communities in the Indus Basin confront water shortages. This paper evaluates the water, energy, and food nexus (WEFN) in the Indus River of India and Pakistan.

Fears of future water shortages as a result of dam construction have strained relations between India and Pakistan. Furthermore, the IWT does not examine the impact of the water-energy-agriculture nexus on the overall water crisis and management. The potential of different alternative water allocation mechanisms and water infrastructure developments to address growing water, energy, and food security concerns in the country will be assessed. While more flexible surface water allocation policies can mitigate negative climate change impacts on agricultural water and energy use allowing for larger crop and hydro-power production, such policies might also increase the inter-annual variability of resource use. Moreover, a more flexible surface water allocation policy would increase surface water use in the basin, while groundwater and energy use would be lower.

Mohd Kamil Vakil

Indian,

Research Scholar, IIT Kanpur

kamilvakil@gmail.com

He is working in the areas of environmental engineering and management with a primary focus on agricultural sustainability. His research areas include agricultural inputs, outputs, and biodegradable losses associated with crop and livestock production. Kamil holds a B.Tech. in Civil Engineering and M.Tech in environmental engineering from Aligarh Muslim University, India. He is an active member of United Nations' Food and Agriculture Organization - Agriculture, Forestry and Other Land Use (FAO-AFOLU), International Sustainable Development Research Society (ISDRS), American Society of Civil Engineers (ASCE), etc.

Nabeela Siddiqui

Indian, Research Scholar,

CHRIST (Deemed to be University), Delhi-NCR

nabeela.siddiqui@res.christuniversity.in, nabeelasiddiqui09@gmail.com

Her research revolves around Water Conflicts. She has completed her B.A.LL.B (Hons) from Aligarh Muslim University, Aligarh, India. She was awarded the prestigious President of India, Dr. Shankar Dayal Sharma Gold medal, The Innes Prize, The Carmicheal Prize, and The V. Suresham Memorial Award for her Masters (LL.M.) from University of Madras, Chennai, India. She has previously worked as a Research cum Teaching Assistant at National Law University, Jabalpur, and as a Research Assistant at the National Green Tribunal, Principal Bench, New Delhi. She is an active member of The Global Network for Human Rights and the Environment (GNHRE) and The International Society for Therapeutic Jurisprudence (ISTJ).












BRICS NUs Workshop at Stellenbosch University, South Africa, 2018

BRICS NUs Workshop at Hohai University, China, 2018

BRICS NUs Workshop at Higher School of Economics, Moscow, Russia, 2016

BRICS NUs Workshop at NIT Durgapur, India, 2019

LIST OF THE REGISTERED PARTICIPANTS

Name	Position and Affiliation	email
Dr. Hirok Chaudhuri	Associate Professor, Department of Physics and Center for Research on Environment and Water National Institute of Technology Durgapur, India	hirok.chaudhuri@phy.nitdgp.ac.in imhirok@gmail.com
Prof. Y. M. Joshi	Dean of International Relations, Indian Institute of Technology Kanpur, India Professor, Department of Chemical Engineering, Indian Institute of Technology Kanpur, India	doir@iitk.ac.in
Prof. Anupam Basu	Director, National Institute of Technology Durgapur, India	director@admin.nitdgp.ac.in
Prof. Abhay Karandikar	Director, Indian Institute of Technology, Kanpur, India	director@iitk.ac.in
Prof. Faizal Bux	Director, Institute for Water and Wastewater Technology, Durban University of Technology, South Africa	faizalb@dut.ac.za
Prof. Vinod Tare	Professor, Department of Civil Engineering, Indian Institute of Technology Kanpur, India	vinod@iitk.ac.in tare.iitk@gmail.com
Dr. Supriya Pal	Member of ITG (BRICS NUs); Associate Professor, Department of Civil Engineering, National Institute of Technology Durgapur, India	supriya.pal@ce.nitdgp.ac.in
Prof. Kalyan Adhikari	HOD, Department of Earth and Environmental Studies, NIT, Durgapur,	kalyan.adhikari@ees.nitdgp.ac.in
Prof. Pathik Kumbhakar	Dean Academic Research, NIT, Durgapur, Professor, Department of Physics, National Institute of Technology Durgapur, India,	pathik.kumbhakar@phy.nitdgp.ac.in
Prof. Ajit Kumar Meikap,	Dean Research and Consultancy, NIT, Durgapur, Professor, Department of Physics, NIT Durgapur, India,	ajit.meikap@phy.nitdgp.ac.in
Dr. Mrinal Kanti Mandal,	Associate Professor, Department of Chemical Engineering, National Institute of Technology Durgapur, India,	mrinalkanti.mandal@che.nitdgp.ac.in
Prof. R. N. Saha,	Professor, HOD, Department of Chemistry, National Institute of Technology Durgapur, India,	rajnarayan.saha@ch.nitdgp.ac.in
Prof. Dawei Wang	Professor, College of Environment, Hohai University, China	dawei.wang@hhu.edu.cn
Prof. Nilo Nascimento	Professor, Department of Hydraulic and Water Resources Engineering Universidade Federal de Minas Gerais, Brazil	niloon2012@gmail.com
Dr. Jiale Li	Lecturer, School of Water Resource and Environmental Engineering, East China University of Technology, China	lijiale39@126.com
Dr. Cesar Rossas Mota Filho	Associate Professor, Department of Sanitary and Environmental Engineering at the Federal University of Minas Gerais (UFMG), Brazil.	cesar@desa.ufmg.br
Dr. Sheena Kumari	Associate Professor, Durban University of Technology (DUT), South Africa	sheenak1@dut.ac.za
Ms. Kankana Seal	Ph D Student, Department of Physics, NIT Durgapur, India	seal.kankana@gmail.com

Mr. Dmitry Baranov	PhD student, Junior Researcher Dmitry Baranov; Vernadsky Institute of Geochemistry and Analytical Chemistry of RAS, Moscow	mitya.baranov.90@bk.ru
Dr. Abhik Chatterjee	Associate Professor, Department of Chemistry, Raiganj University, Raiganj, 733134, India	abhikchemistry@gmail.com
Mr. Aakash Mohan Rawat	Ph D Student, Department of Geology, S.R.T Campus, HNB Garhwal University, Uttarakhand, India	aakashrawat4444@gmail.com
Ms. Bipasha Mridha Ghosh	Assistant Professor, Department of Science (Env. Science) NSHM Knowledge Campus Durgapur, India	bipasha.mridha@nshm.com
Dr. Chunendra K Sahu	Assistant Professor, Department of Civil Engineering, Indian Institute of Technology Kanpur, India	cksahu@iitk.ac.in
Mr. Himanchal Bhardwaj	Ph D Student, Inter-Disciplinary Research Platform of Space Science and Technology, Indian Institute of Technology, Jodhpur, Rajasthan, India	himanchal.1@iitj.ac.in
Dr. Yihui Dong	Lecturer, School of Water Resource and Environmental Engineering, East China University of Technology, China	yhdong@ecut.edu.cn
Dr. Ismail Rawat	Research Technician Durban University of Technology (DUT), South Africa	rawati@dut.ac.za
Dr. Talita Silva	Adjunct professor Department of Hydraulic Engineering and Water Resources at the Universidade Federal de Minas Gerais (UFMG), Brazil	talita.silva@ehr.ufmg.br
Ms. Suvashree Mukherjee	Ph D Student, Center for Research on Environment and Water, NIT Durgapur, India	sm.19cr1101@phd.nitdgp.ac.in
Prof. Yali Woyessa	Central University of Technology, South Africa	ywoyessa@cut.ac.za
Dr. Evgeniya Soldatova	Senior Researcher, Vernadsky Institute of Geochemistry and Analytical Chemistry of RAS, Moscow	2a61@mail.ru
Prof. Otto Corrêa Rotunno Filho	Professor, Civil Engineering Program, COPPE/UFRJ, Federal University of Rio de Janeiro	otto@coc.ufrj.br, ottorotunno@gmail.com
Prof. Pankaj Kumar Roy	Dean, Faculty of Interdisciplinary Studies, Law & Management, Jadavpur university, Professor & Joint Director School of Water Resources Engineering, Jadavpur University, India	pk1roy2014@gmail.com
Dr. Zebing Li	Lecturer, School of Water Resource and Environmental Engineering, East China University of Technology, China	lizebing@ecut.edu.cn
Dr. Nabanita Pal	Assistant Professor Department of Physics and Chemistry Mahatma Gandhi Institute of Technology (MGIT) Hyderabad - 500075, India	naba.p27@gmail.com, nabanitapal_chem@mgit.ac.in
Mr. Avishek Adhikary	Ph D Student Department of Civil Engineering, NIT Durgapur, India	avishek.adhikary31@gmail.com
Dr. G Ndhlovu	Lecturer, Department of Civil Engineering, Central University of Technology, South Africa	gndhlovu@cut.ac.za
Dr. Hirok Chaudhuri	Associate Professor, Department of Physics, National Institute of Technology Durgapur, India Center for Research on Environment and Water, NIT Durgapur, India	hirok.chaudhuri@phy.nitdgp.ac.in imhirok@gmail.com
Mr. Clyvihk Renna Camacho	Ph. D. Student Civil Engineering Program at COPPE/UFRJ Researcher, Geological Survey of Brazil	clyvihk.camacho@cprm.gov.br
Mr. Kush Kumar Dey	Ph D Student, National Institute of Technology Durgapur, India	kushdey242@gmail.com
Dr. Mrinal Kanti Mandal	Associate Professor, Department of Chemical Engineering, National Institute of Technology Durgapur, India	mrinalkanti.mandal@che.nitdgp.ac.in
Ms. Louise Caroline Carvalho dos Santos	Meteorologist, Federal University of Rio de Janeiro – UFRJ M.Sc. Student, Civil Engineering Program, Alberto Luiz Coimbra Institute for Postgraduate Studies and Research in Engineering – COPPE, Federal University of Rio de Janeiro - UFRJ, Brazil.	louise.santos@coc.ufrj.br
Dr. Trina Dutta	Assistant Professor, Department of Chemistry, JIS College of Engineering, Kalyani, Nadia, West Bengal 741235, India	trina.dutta@jiscollege.ac.in
Prof. Kashyap Dubey	Associate Professor, School of Biotechnology Jawaharlal Nehru University, New Delhi, India	kashyapdubey@mail.jnu.ac.in

Prof. Radha Das	Professor & Dean (School of Chemical, Bio –Tech & Food Technoly), Haldia Institute of Technology, India	radha.das6@gmail.com
Mr. Sunil Duhan	Ph D Student, Department of Mechanical Engineering, Indian Institute of Technology, Jodhpur, India	sunil.2@iitj.ac.in
Dr. Susmita Dhar,	Assistant Professor, Department of Law, Sister Nivedita Univeristy, DG Block, New Town, West Bengal 700156, India	susmitadhar00@gmail.com
Mr. Debdas Chowdhury	Ph D Student, School of Water Resources Engineering, Jadavpur University, Kolkata, India	dev.chowdhury93@gmail.com
Ms. Sritama Chatterjee	Ph.D. Student, School of Water Resources Engineering, Jadavpur University, 188/2 R.S.C. Mullick Road, Jadavpur, Kolkata – 700032, India	sritama21@icloud.com
Ms. Nabeela Siddiqui	Ph D Student, CHRIST (Deemed to be University), Delhi-NCR, India Teaching Assistant, National Law University, Jabalpur Judicial Clerk, National Green Tribunal, Principal Bench, New Delhi	kamilvakil@gmail.com nabeelsiddiqui09@gmail.com
Mohd Kamil Vakil	Ph D Student, IIT Kanpur, India	kamilvakil@gmail.com

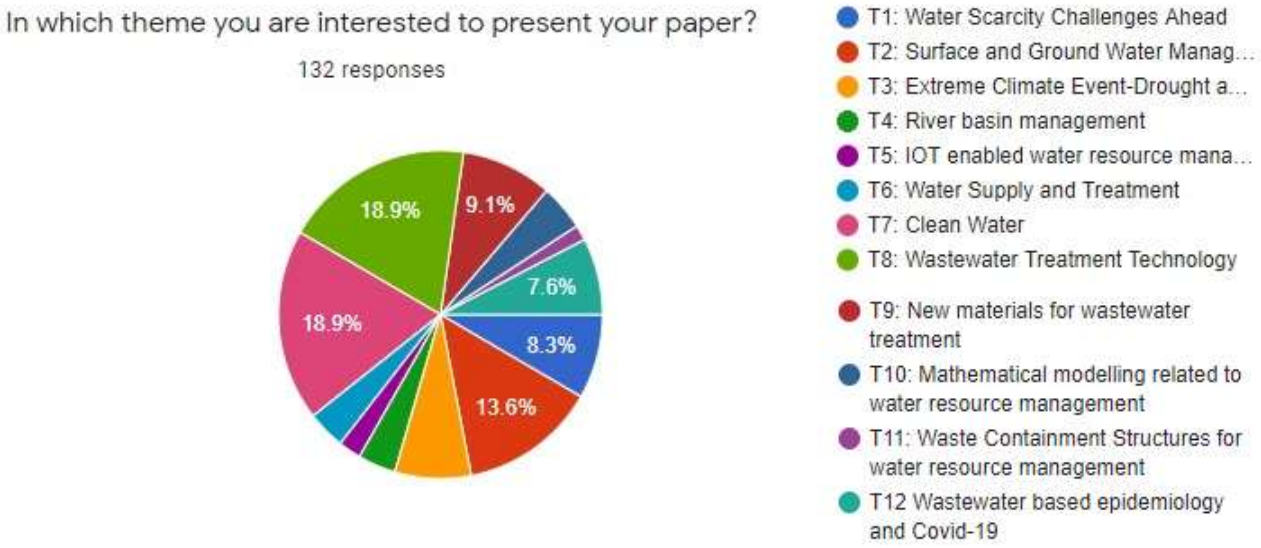
Mr. S. Kamalakar	Assistant Professor	Rayalaseema University	Kamalakar76@gmail.com
Dr. Prerna Choubey	Assistant Professor	SAGE University, Indore	
Dr.GUDI SUDHAKAR	Lecturer	Rayalaseema University	gudisudhakar@gmail.com
Dr. KULATHURAAN. K	Assistant Professor	Arulmigu Palaniandavar College of Arts and Culture, Palani, Tamil Nadu	pkkmaterials@gmail.com
Dr Gopal sharma	Research scholar	Chaudhary charan Singh university meerut	gopalshrm194@gmail.com
Mr. Susanta Kumar Parida	Lecturer	Lokanath Mohavidyalaya, Patkura	susantakumarparida50@gmail.com
Dr. Rajeev Kumar Bhadkariya	Assistant Professor	Govt. P. G. College Morena (M. P.)	rkbhadkariyachem@gmail.com
Dr. Priti Saini Agrawal	Dean	Shri Rawatpura Sarkar University, Raipur, Chhattisgarh	preeti.saini0302@gmail.com
Dr Jayashri Yuvaraj Jadhav	Assistant Professor	University of Mumbai, Sundarrao More Arts Commerce and Science College Poladpur-Raigad	saijayu20@gmail.com
Mr. Ritik sachan	Student	Babu banarasi das university Lucknow	Ritiksachan504@bbdu.ac.in
Mr. YAWAR ALAMGEER	Research Scholar	Lalit Narayan Mithila University Darbhanga	yawaralamgeer@gmail.com
Dr Subhadra Rajpoot	Assistant professor	Amity university greater noida	Srajpoot@gn.amity.edu
Dr Kamala Haripal	Lecturer	Sonepur College Sonepur	kamalaharipal@gmail.com
Ms. Himani Chandel	PhD Student	Shoolini University	himanichandel9@gmail.com
Mr. Sunil Kumar Sharma	M.Sc tudent	School of Biotechnology, Shoolini University	ssharma35234@gmail.com
Mr.Navneet Kumar	PhD student	Shoolini University	navneet171098@gmail.com
Mr. P SAI KIRAN	Research Scholar	IIT KGP	psaikiran0891@gmail.com
Dr. Dipanjan Ray	Assistant professor	Bajkul Milani Mahavidyalay	dipanjan2010@gmail.com
Dr. Syed Rafi Ahmad	Assistant Professor	Government Degree College Pulwama	rafiindrabi@gmail.com
Dr. Ainal Hoque Gazi	Assistant professor	ICFAI university Tripura	samratgazi284@gmail.com
Mr. Ahamed Ali	Student	Aliah University	ahamedali256@gmail.com
Ms Manu Yadav	Research Student	Shoolini University	manukoslia98@gmail.com
Deep shikha	Student	Shoolini university	65dshikha@gmail.com
avantikA	Student	shoolini university	avantikanegii3775@gmail.com
Dr. Gulshan Akhtar	Assistant Professor	Hamidia Girl's Degree College, University of Allahabad	akhtar.gulshan@gmail.com
Mr. Suman Kumar Chakraborty	Lecturer	Asansol Institute of Engineering and Management-Polytechnic	skcasn@yahoo.com
Mr. Sameer Ahmad	Research Scholar	Jamia Millia Islamia	ahmad.sameer68@yahoo.com
Dr.	Professor	Institute of Engineering & Management	ruchira.mukherjee@iemcal.com
Mr. Sudhakar Kadam	Associate Professor	PREC	wani.sudhakar1@gmail.com

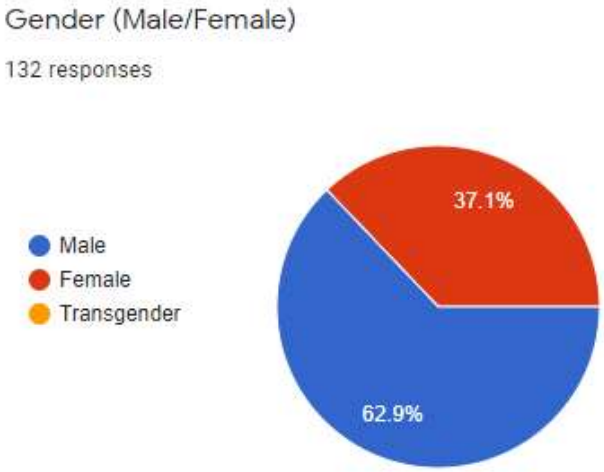
Dr.Bipasha Mridha Ghosh	Asst. Professor	NSHM Knowledge Campus Durgapur	bipasha.mghosh@gmail.com
Dr. Koyel Misra	Assistant Professor	NSHM Knowledge Campus Durgapur GOI	koyel.misra@nshm.com
Dr ULLHAS	Director	Mastersconsultancy	Mastersconsultancy641@gmail.com
MD SHAHREYAR	PG SCHOLAR	ALIAH UNIVERSITY	jakirhossain20@gmail.com
Dr. Mukesh Singh	Associate Professor	Department of Biotechnology, Haldia Institute of Technology	msingh006@gmail.com
Mr.	UG Student	Tripura University (A Central University)	choudhurys2012@gmail.com
Dr. Naseer Ahmad Dar	Assistant Professor	University of Kashmir	naseerpulwama@gmail.com
Ms	Student	Nit durgapur	pujainfo1@gmail.com
Dr Anamica Bhattacharya	Educator/consultant	Independent Researcher	anamicab@gmail.com
Mr. Shyam Surisetty	Student	National institute of technology Durgapur	shyamsurisetty@gmail.com
Mr IMRAN A SHEIKH	ASSISTANT PROFESSOR	AIKTC SCHOOL OF PHARMACY NEW PANVEL , AFFLIATED TI UNIVERSITY OF MUMBAI	iaspharma@gmail.com
Dr. Evgeniya Soldatova	Senior Researcher	Vernadsky Institute of Geochemistry and Analytical Chemistry RAS	2a61@mail.ru
Mr. TARUN SINGH SENGAR	xxxxxxxxxx	xxxxxxxxxx	sengartarun09@gmail.com
Mr. Shiladitya Purakayastha	Ph.D. Research Scholar	Namkhana High School [H.S.]	shilapgeo@gmail.com
Mr.	Student	NIT Durgapur	ab.20p20276@msc.nitdgp.ac.in
Geetansh	Reseqrch Scholar	Shoolini University	geetanshsharma.gs@gmail.com
Mrs. Suravi Ghosh	Visiting Faculty	University of Burdwan	legalreliefsg@gmail.com
MS.DIVYA M	STUDENT	THEIVANAI AMMAL COLLEGE FOR WOMEN,VILLUPURAM	mkdivya2001@gmail.com
Ms. Rukhsar Parveen	Research scholar	SGRR University	rukssiddiqui93@gmail.com
Dr. Maneesha Singh	Dean/Professor	Shri Guru Ram Rai University	singhmaneesha2@gmail.com
Sk Alimuddin	Student	ALIAH UNIVERSITY	skalimuddin512@gmail.com
Anamika Rana	PHD Scholar	Department of Microbiology	anamikarana160@gmail.com
Bhawana Gahtori	Research scholar	Bhawana Gahtori	bhawana.gahtori@tulas.edu.in
Chhaya Singh	Assistant professor	Sri dev Suman University	chhaya.singh.08051979@gmail.com
Dr.	Assistant Professor	Institute of Engineering & Management	tina.de81@gmail.com
Ms.	Admin Assistant	Durban University of Technology	londiwed1@dut.ac.za
Himanchal	Research Scholar	IIT JODHPUR	himanchal.1@iitj.ac.in
Prof.	Director:	Durban University of Technology	faizalb@dut.ac.za
Ms. Garima Singh	Research scholar	University of Rajasthan	uniraj.ac.in
Mr. Meraj Ahmad	Ph.D. Scholar	Indian Institute of Technology, Jodhpur	meraj.1@iitj.ac.in
Dr. Suvanka Dutta	Research Associate	Central Pollution Control Board	dutta.suvanka@gmail.com
Mr. Arijit Chakraborty	Student	National Institute of Technology Durgapur	arijit2210@gmail.com
Athul Raj R S	Student	NIT Durgapur	athulism@gmail.com
Ms.	Research Scholar	Central University of Haryana	manisharma11112@cuh.ac.in
Ms. Saheli Chowdhury	Research scholar	Jadavpur University	saheli.chowdhury.rs@jadavpuruniversity.in
Dr. Trina Dutta	Assistant Professor	JIS College of Engineering	trina.dutta@jiscollege.ac.in
Dr. Vishal Chauhan	Assistant Professor	Graphic Era Hill University, Dehradun	vishalchauhan@gehu.ac.in
NIDHI SINGH	Research Scholar	Dr. Bhim Rao Ambedkar University,Agra	Singhnidhi338@gmail.com
RAJARSHI RAY	STUDENT	HALDIA INSTITUTE OF TECHNOLOGY	rajarshiray42292@gmail.com
Subhamita Hazra	Student	Haldia Institute Of Technology	subhamita04.hazra@gmail.com
Kashyap Kumar Dubey	Associate Professor	Jawaharlal Nehru University New Delhi	kashyapdubey@gmail.com
Mr	Assistant Professor	Mallabhum Institute Of Technology	info@mitbishnupur.ac.in

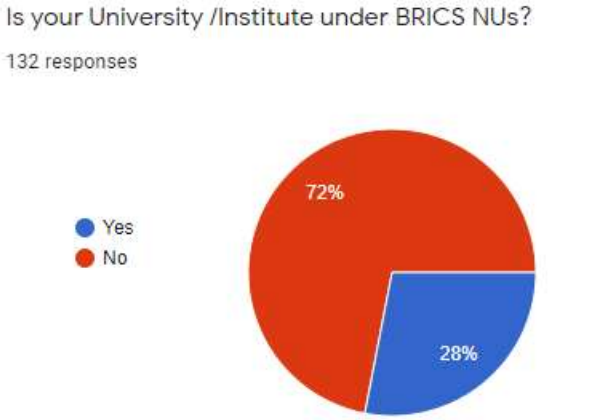
Dr	Asst. Prof	St. John's college	drpriyankamasih@stjohnscollegeagra.in
Mr. Prosenjit Mondal	Student	Haldia institute of technology	prosenjitmondal2580@gmail.com
Mr.pabitra Kumar jana	Student	Haldia institute of technology	pabitrakumarjana96@gmail.com
Mr. Archisman Dutta	Senior Chemist	Geological Survey of India	duttaarchisman1@gmail.com
Mrs. Ankita Dawn	College Teacher	DURGAPUR WOMEN'S COLLEGE	ankitadawn31@gmail.com
Mr. Yashpal Yadav	Student	Visva Bharati university	yashyadav9609@gmail.com
Mr.gourab saha	Graduate	Kalyani university	gouravsaha550@gmail.com
Suman Banerjee	Quality control officer	Organic Orchards Pvt Ltd	suman90envs@gmail.com
Mr. ARITRA KUMAR GHOSH	LECTURER	NARULA INSTITUTE OF TECHNOLOGY	aritraipsita9495@gmail.com
Dr. Piyal Bhattacharya	College Teacher	University of Kalyani	amipiyal@gmail.com
Mr	Pursuing MSc	Visva Bharati	csubhendu171@gmail.com
Dr. SUBHAJIT BHAR	Senior Officer	Skipper limited	subhojitbhor@gmail.com
Mr. Arka Mandal	Student	Sidho Kanho Birsha University	Arkamandalprl@gmail.com
Mr. Pradeep Kumar Singh	Assistant Professor	Rai University	pradeepsingh.171@rediffmail.com
Neha kumari	Research Scholar	Shri Guru Ram Rai University Dehradun Uttarakhand	neharohilla818@gmail.com
Mr. Hemanta Mukherjee	Research scholar	University of Kalyani	envsphdpaper@gmail.com
Aakash Mohan Rawat	Research Scholar	HNB Garhwal University, Srinagar Garhwal,Uttarakhand	aakashrawat4444@gmail.com
Dr. Talita Silva	Adjunt professor	Universidade Federal de Minas Gerais	talita.silva@ehr.ufmg.br
Dr.Rakhi Roy	Academician	BNHS Kolkata	spider.rakhi.in@gmail.com
Mr. Chandramouli Saha	Student	National institute of technology, durgapur	cs.19u10475@btech.nitdgp.ac.in
Mr. Sayantan Mitra	Research Scholar	Sidho-Kanho-Birsha University	jeetmitra55.sm@gmail.com
Dr. Gurcharan Singh Kainth	Professor (Retired)	IIT KANPUR (1960 95)	dr.gskainth.india@gmail.com
Dr Isaac Dennis Amoah	Research Associate	Durban University of Technology	Isaaca@dut.ac.za
Prof. Sheena Kumari K Pillai	Associate Professor	Durban University of Technology	sheenak1@dut.ac.za
Mr. Joydeep Mukherjee	Research Scholar	Sidho Kanho Birsha University	joyphs151@gmail.com
Mr. Sushanta Sutradhar	Research Scholar	Sidho-Kanho-Birsha University	registrarskbu@gmail.com
Dr. Amandeep Kaur	Teacher	St Agnes'Loreto day school	salds.amandeepkaur@gmail.com
Reema Sharma	M tech student	Indian Institute of engineering science & technology, Shibpur	325519004.reema@students.iiests.ac.in
Mr.	Phd Scholar	Central University of Haryana	ankushrao540@gmail.com
Ms. Nabeela Siddiqui	Doctoral Candidate	CHRIST (Deemed to be University), Delhi-NCR	nabeelasiddiqui09@gmail.com
Mr. Kush Kumar Dey.	Research Scholar	National Institute of Technology Durgapur	kushdey242@gmail.com
Mohd Kamil Vakil	PhD student	IIT Kanpur	kamilvakil@gmail.com
Dr. Radharani Das	PROFESSOR & DEAN	MAULANA ABUL KALAM AZAD UNIVERSITY OF TECHNOLOGY	admin@hithaldia.in
Ms.	Research scholar	West Bengal State University	dipika.patra1988@gmail.com
Mr. Sunil Duhan	Research Scholar	IIT Jodhpur	sunil.2@iitj.ac.in
Mr. Dmitry Baranov	Junior Researcher	Vernadsky Institute of Geochemistry and Analytical Chemistry of RAS, Moscow	mitya.baranov.90@bk.ru
Dr. Nabanita Pal	Assistant Professor	Mahatma Gandhi Institute of Technology Hyderabad	nabanitapal_chem@mgit.ac.in
Mr.Atin Chatterjee	M.sc. Student	VISVA BHARATI Central University	atin94759@gmail.com
Raima Datta	Student	Visva Bharati University	dattaraima1@gmail.com
Manoj Mondal	Student	Heritage Institute of Technology, Kolkata	manoj.mondal.che21@heritageit.edu.in
Dr	Researcher	Durban University of Technology	rawati@dut.ac.za
Mr. Binoy Kumar Show	Research scholar	Visva-bharati	binoyshow@gmail.com
Dr.	Associate Professor	National Institute of Technology Durgapur	supriya.pal@ce.nitdgp.ac.in

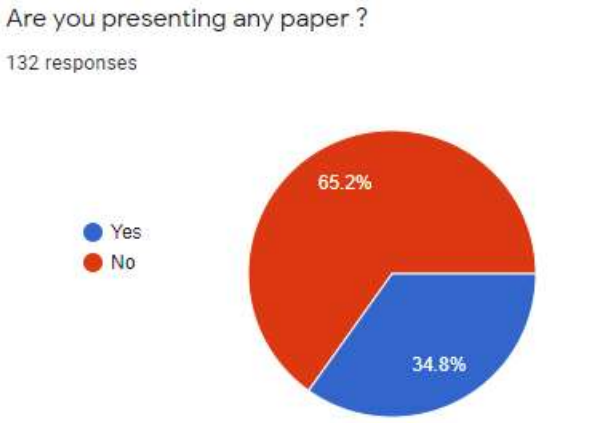
Anirban kr Maity	Student	Heritage institute of technology	anirban.kumarmaity.che21@heritageit.edu.in
Dr. Susmita Dhar	Asst. Professor	Sister Nivedita University	susmitadhar00@gmail.com
Mr. Aniket Nag	Student	National Institute of Technology, Durgapur	en08anik@gmail.com
Dr. Abhik Chatterjee	Associate Professor	Raiganj University	abhikchemistry@gmail.com
Mr. Saikat Mondal	Student	NATIONAL INSTITUTE OF TECHNOLOGY, DURGAPUR	saikattt1998@gmail.com
Dr.Sritama Chatterjee	RESEARCHER	JADAVPUR UNIVERSITY	sritama21@icloud.com
Ms. Suvashree Mukherjee	Research Scholar	National Institute of Technology Durgapur	suvamukh11111@gmail.com
Mr.Berochan Marik	Student	Heritage Institute of Technology	berochan.marik.che24@heritageit.edu.in
santosh sowdagar	Student	Independent researcher	santoshsowdagar.me@gmail.com
Mr Priyanshu Sanyal	Student	Heritage Institute of Technology	priyanshu.sanyal.che24@heritageit.edu.in
Riya Mandal	Student	Heritage institute of technology Kolkata	mandalriya980@gmail.com
Mr. ARKA PATRA	STUDENT	HERITAGE INSTITUTE OF TECHNOLOGY	arka.patra.che24@heritageit.edu.in
Ms	Student	Maulana Abul Kalam Azad University of Technology Kolkata	sarkardipanwita551@gmail.com
Mr.Anubhav Mondal	Student	Heritage Institute of Technology	anubhav.mondal.che24@heritageit.edu.in
Dr. Chunendra K Sahu	Assistant Professor	IIT Kanpur	cksahu@iitk.ac.in
Mr. Raj Ranjan Srivastava	Research Scholar	Dedan Kimathi University of Technology (DeKUT)	rajranjan23@gmail.com
Mr. Debdas Chowdhury	Junior Research Fellow	Jadavpur University	dev.chowdhury93@gmail.com
Arghyadeep De	Graduate	Haldia Institute of Technology	deyarghyadeep50@gmail.com
Mr. Ritam Das	Student	Heritage Institute of Technology	ritam.das.che24@heritageit.edu.in
Ms. K. Seal	Ph.D student	National Institute of Technology Durgapur	ks.16PH1101@phd.nitdgp.ac.in
Prof. Otto CorrÃªa Rotunno Filho	Professor	Federal University of Rio de Janeiro	otto@coc.ufrj.br
Dr. Jiale Li	Lecturer	School of Water Resource and Environmental Engineering, East China University of Technology	lijiale39@126.com
Dr. Dong	Lecturer	East China University of Technology	yhdong@ecut.edu.cn
Mr Sonjoy Mondal	Assistant Professor	Sidho-Kanho-Birsha University	sonjoymondal2009@gmail.com
Mr. Clyvihk Renna Camacho	Researcher/PhD Candidate	Federal University of Rio de Janeiro/Geological Survey of Brazil-CPRM	clyvihk.camacho@cprm.gov.br
Prof. Rajnarayan Saha	HOD in Chemistry and Coordinator CREW	NIT Durgapur	rajnarayan.saha@ch.nitdgp.ac.in
Himanshu Shekhar	Masters Student	National Institute of Technology Durgapur	hs.20p10437@mtech.nitdgp.ac.in
Ms. ISHITA SINHA	Sr. Engineer Project	Linde India Limited	sinha.ishita94@gmail.com

SOME STATISTICS ABOUT THE REGISTERED PARTICIPANTS










ВЫСШАЯ ШКОЛА ЭКОНОМИКИ
BRICS Workshop: Water Environmental Protection
and Water Resource Management

BRICS

INDIA