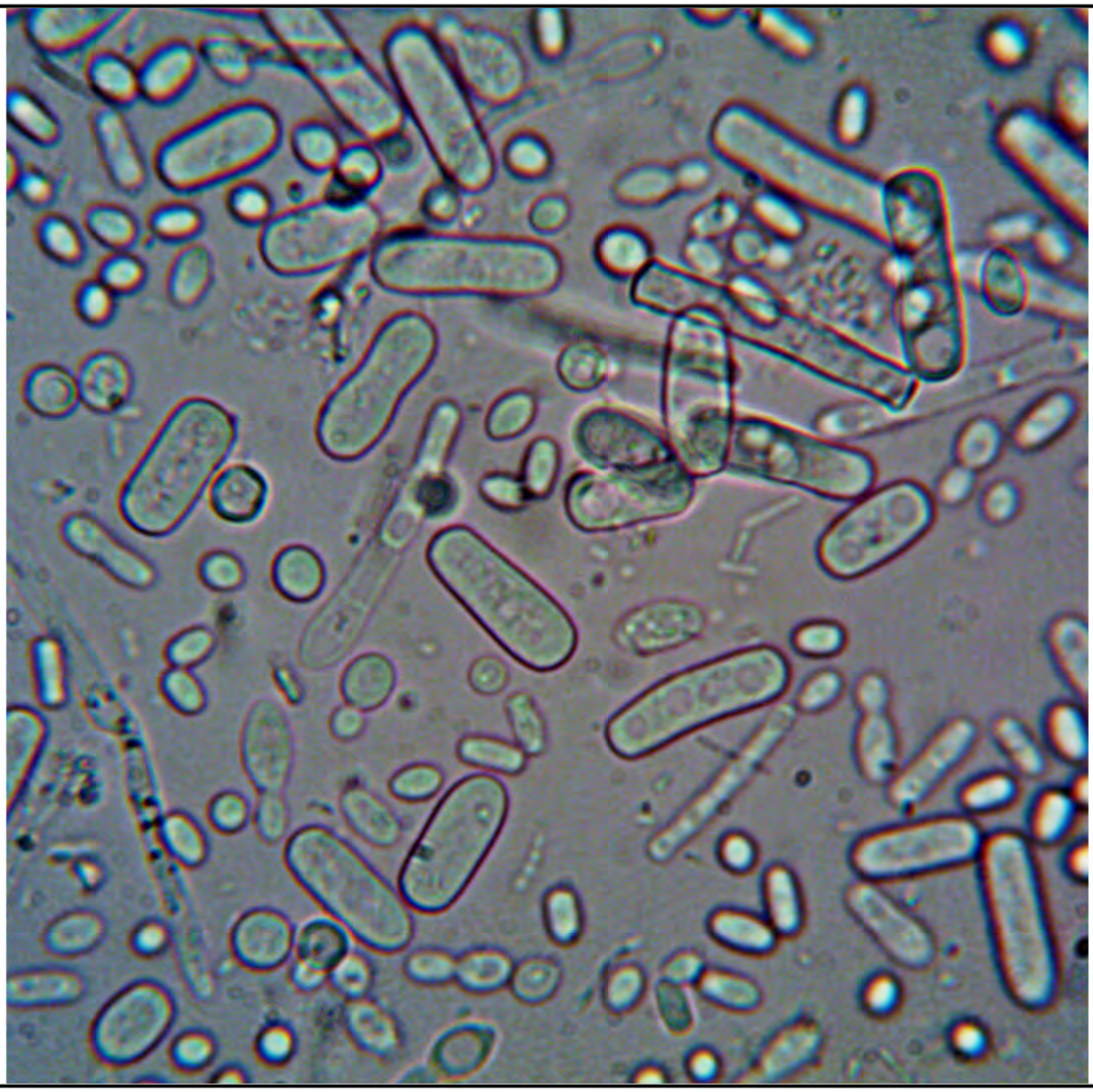
Abstract Book

International Symposium on Environmental Dimensions of Antimicrobial Resistance (AMR) & COVID-19 for One Health in Asia 2023, Dehradun, India

(END-AMR-Asia-2023)

March 27-28, 2023



Organizers:

University of Petroleum and Energy Studies (UPES), India
Kanazawa University, Japan,
Asia-Pacific Researcher Network on Environmental Dimension of Antimicrobial Resistance (END-AMR-Asia)

International Symposium on Environmental Dimensions of Antimicrobial Resistance (AMR) & COVID-19 for One Health in Asia 2023

Dehradun, India * March 27-28, 2023

Program & Abstracts

Organizers:

University of Petroleum and Energy Studies (UPES), India

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Sponsors:

Kurita Water and Environment Foundation, Japan

Japan Society for the Promotion of Science (JSPS), Japan

Science and Engineering Research Board (SERB), India

Program

March 28 (Tuesday)

09:30 **Lightening the lamp**

09:40 **Welcome address**
by Prof. Ram Sharm (VC, University of Petroleum and Energy Studies (UPES), India)

09:50 **Brief introduction of the conference**
by Dr. Manish Kumar (UPES, India)

09:55 **Brief introduction of the END-AMR-Asia**
by Dr. Ryo Honda (Kanazawa University, Japan)

10:00 **Plenary talks**
Fate of antimicrobial resistome in wastewater treatment plants and in an urban river in Japan
by Dr. Ryo Honda (Kanazawa University, Japan)

Conflicts and Contagion: Companions in Arms that Accelerate Antimicrobial Resistance
by Dr. Manish Kumar (UPES, India)

10:45 **Vote of thanks**

10:50 **Tea break**

11:10 **Plenary session by END-AMR-Asia**
From Sewage to Solutions: How Wastewater Monitoring is Revolutionizing Public Health for COVID-19 in Thailand
by Dr. Kwanrawee Sirikanchana (Chulabhorn Research Institute, Thailand)

Antibiotic resistance gene abundance and the correlations with fecal source tracking markers at tropical recreational beaches
by Dr. Prasert Makkaew (Walailak University, Thailand)

Continued on next page.

Vulnerability of urban waters in Sri Lanka to Pharmaceuticals Contaminants in the development of Antibacterial Resistance

by Dr. Tushara Chaminda (Ruhuna University, Sri Lanka)

Profiling Antibiotic-resistant Bacteria in high and low-density populations of a Tropical City (Preliminary results)

by Dr. Sulfikar (Universitas Negeri Makassar, Indonesia)

12:45 **Lunch break**

14:00 **Panel discussion by END-AMR-Asia:**
What is good monitoring framework of AMR in environment for Asian countries?
Panelists: Dr. Manish Kumar, Dr. Kwanrawee Sirikanchana, Dr. Prasert Makkaew, Dr. Tushara Chaminda, and Dr. Sulfikar
Facilitator: Dr. Ryo Honda

15:00 **Tea break and poster presentation**

15:30 **Parallel research sessions**
Venue 1: Hubble board room
Occurrence of Pharmaceuticals and Personal Care Products in Ganga and Adjoined WWTPs Across the Major Cities in Uttarakhand, India

by Dr. Surendra Singh Suthar (Doon University, India)

Antimicrobial Properties of Pyrolysis products of Chinese Fan Palm (Livistona chinensis) fruit

by Dr. Balendu Shekher Giri (UPES, India)

The fate of Antibiotic Resistance During Aerobic Composting of Cattle Manure with Sewage Sludge

by Dr. Payal Mazumder (UPES, India)

Venue 2: Block AB1 board room
Title (tbc) [Online]

by Dr. Bhumika Prajapati (GBRC)

Continued on next page.

Unlocking capacity of WBE surveillance for COVID-19 monitoring: Progress and Prospects [Online]

by Dr. Vaibhav Srivastava (Central University of Allahabad, India)

Prevalence of Multidrug resistant E-Coli in ambient water of Guwahati, India: Vulnerability Assessment in Urban Bionetwork [Online]

by Dr. Ritusmita Goswami (TISS, India)

16:30 **Round table discussion and valedictory session**

17:00 **Closing**

Fate of antimicrobial resistome in wastewater treatment plants and in an urban river in Japan

Ryo Honda[1], Hiroe Hara-Yamamura[1], Muhammad Adnan Sabar[1], Masaru Ihara [2], Toru Watanabe [3]

1 Faculty of Geosciences and Civil Engineering, Kanazawa University, Japan

2 Faculty of Agriculture and Marine Science, Kochi University, Japan

3 Department of Food, Life and Environmental Sciences, Yamagata University, Japan

Abstract: Wastewater treatment plants (WWTPs) are important barriers for preventing the spread of antimicrobial resistance (AMR) from wastewater into the water environment, as well as the reservoir of AMR. In aquatic environment and WWTPs, AMR potentially proliferate by horizontal gene transfer (HGT) when antimicrobial resistance genes (ARGs) harbored by mobile gene elements (MGEs), such as plasmid, integron, transposon, etc. More importantly, combined sewer overflows (CSOs) have a greater impact on spread of AMR, as reported that the annual loading of ARB was estimated as 3.7-log larger than that of WWTP effluent (Honda et al. 2019).

We have investigated transition of antimicrobial resistome in 5 WWTPs in Japan over a variety of geographical locations, seasons, and biological treatment configurations. The results revealed that antimicrobial resistome transited at two locations during wastewater treatment process. The antimicrobial resistome in influent wastewater was characterized by ARGs to clinically important drug classes, whereas sludge abundantly retained multidrug ARGs associated with the efflux pump. Importantly, some ARGs of wastewater origin bypassed biological treatment and was retained in the treated effluent in conventional wastewater treatment processes.In an urban river receiving CSO and WWTP effluents, ARG abundance significantly increased during the CSO event and dry weather. Importantly, more ARGs to clinically important drug classes remarkably increased at the CSO event. The abundance of *tnpA*, and *intI1* was highly correlated with the total ARG abundance, suggesting its potential application as an indicator for estimating resistome contamination.

Biography:

Dr. Ryo Honda (Japan)

Professor, Kanazawa University

(Faculty of Geosciences and Civil Engineering)

Field: Water microbiology; Membrane-applied biological process

Research interest:

- Antimicrobial resistome in wastewater & water environment
- Wastewater-based epidemiology on COVID and AMR

Conflicts and Contagion: Companions in Arms that Accelerate Antimicrobial Resistance

Manish Kumar[1,2*], *Rahul Silori*[1], *Payal Mazumder*[1,3], *Jürgen Mahlknecht*[2]

[1]Sustainability Cluster, School of Engineering, UPES, Dehradun, India

[2]Escuela de Ingeniería y Ciencias, Tecnologico de Monterrey, Nuevo Leon, Mexico

[3]Centre for the Environment, IIT Guwahati, India

Abstract: Antimicrobial resistance (AMR) generally develops through drug overuse, and inappropriate prescription and disposal. However, wars and pandemics play a synergistic role in accelerating AMR and recent conflicts and COVID-19 have jeopardized antimicrobial stewardship. Wars and pandemics can affect large fractions of a human population simultaneously without regard for geographic boundaries. It has been reported that in World War I (WWI) alone, approximately 21 million people sustained injuries. War-related injuries, diseases, migration, poor sanitation, and pollution might lead to the spread of AMR. During WWII, many teenagers, and underage boys and girls enlisted in the military, and with an increase in admission to soldiers, teenagers, and women had to fill up the worker's posts at factories, farms, and agricultural fields increasing their exposure to infections/diseases. Antibiotics were also given to soldiers as enhancers during wars. Penicillin and Methicillin resistance was soon observed during WWII. The 2022 Russian strike on Ukraine resulted in the destruction of healthcare facilities, leading to prolonged injuries without treatment thus, causing infections. Similarly, regional and global pandemics result in the need for the simultaneous treatment of significant sections of a population. The increase in antibiotic consumption and AMR development following major global events are alarming. AMR-related illnesses in the U.S. have not only persisted but have become worse in 2020. Similarly, in China, India, and Portugal, an increase in antibiotic consumption and treatment of patients with antibiotics was observed. It's important to consider all potential sources of AMR and comprehend the processes and pathways to stop it from spreading. To stop the spread of resistance and extend the useful life of antibiotics as a valuable resource, best management practices are desperately required.

Biography:

Dr. Manish Kumar (India)

Professor and Cluster head, UPES, Dehradun, India (Sustainability Cluster)

Field: Environmental Engineering

Research interest:

- Fate, transport, and remediation of geogenic, micro, microbial, and emerging contaminants in freshwater systems
- Hydro-geochemistry

From Sewage to Solutions: How Wastewater Monitoring is Revolutionizing Public Health for COVID-19 in Thailand

Kwanrawee Sirikanchana
Laboratory of Biotechnology, Chulabhorn Research Institute, Thailand

Abstract: This study investigated the utility of wastewater monitoring for detecting COVID-19 outbreaks and variants in Thailand. Wastewater samples were collected from 19 centralized wastewater treatment plants, comprising four large, four medium, and 11 small WWTPs, during seven sampling events from January to April 2021. The results revealed a strong correlation between wastewater surveillance (positive rates and viral loads) and daily new COVID-19 cases, suggesting its potential as an early warning system for COVID-19 resurgence. Additionally, the study found that routine monitoring of four large WWTPs could provide sufficient information for city-scale dynamics. Furthermore, the study identified the potential of using wastewater monitoring in international gateway cities, Bangkok and Phuket, as sentinel sites for monitoring COVID-19 variants. Wastewater samples were collected from eight representative municipal WWTPs in Bangkok and Phuket during 19 sampling events from October 2021 to March 2022. The results showed that the viral loads of different COVID-19 variants detected in wastewater samples agreed with daily new cases, indicating the potential of wastewater-based epidemiology to detect the arrival of new variants and support tourism-dependent economies. Overall, the study concluded that wastewater surveillance could play a critical role in detecting COVID-19 outbreaks and variants in populations and tourist hotspots, providing early warning and supporting public health efforts in Thailand.

Biography:

Dr. Kwanrawee Joy Sirikanchana (Thailand)
Senior Research Scientist 2, Laboratory of Biotechnology, Chulabhorn Research Institute
Field: Environmental Biotechnology
Research interest: Health-related water microbiology, wastewater-based epidemiology, microbial source tracking, water treatment and disinfection, quantitative microbial risk assessment, antimicrobial resistance in environment

Antibiotic resistance gene abundance and the correlations with fecal source tracking markers at tropical recreational beaches

Makkaew, P[1]*., Kongprajug, A., Chyerochana, N., Sresung, M., Precha, N., Mongkolsuk, S., and Sirikanchana, K.*

[1]Department of Environmental Health and Technology, School of Public Health, Walailak University, Thailand

Abstract: This study examined spatiotemporal variations of six Antibiotic resistance genes (ARGs) (*bla*$_{NDM}$, *bla*$_{TEM}$, *bla*$_{VIM}$, *mcr-1, sul1*, and *tetQ*) against the widely used antibiotic groups and a class 1 integron-integrase gene (*intI1*) at two Thai tropical recreational beaches (n = 41). Correlations between ARGs and sewage-specific MST markers (i.e., crAssphage and human polyomaviruses [HPyVs]) and fecal indicator bacteria (i.e., total coliforms, fecal coliforms, and enterococci) were also investigated. *Bla*$_{TEM}$, *intI1*, *sul1*, and *tetQ* were ubiquitous at both beaches (85.4-100% detection rate); *intI1* was the most abundant (3-6 orders in log10 copies/100 mL), followed by *bla*$_{TEM}$ (2-4 orders), *sul1* (2-3 orders), and *tetQ* (2-4 orders). *Bla*$_{NDM}$ was found in 7.3% (up to 4 orders), and no *mcr-1* was detected. Interestingly, *bla*$_{VIM}$ was prevalent at one beach (2-5 orders; n = 17), but found in only one sample at the other (4 orders). Temporal, but not spatial, differences were noticed; *bla*$_{TEM}$ was at higher levels in the wet season. *IntI1* correlated with *sul1* and *tetQ* (Spearman's rho = 0.47-0.97), suggesting potential horizontal gene transfer. CrAssphage, but not HPyVs, correlated with *intI1*, *sul1*, and *tetQ* (Spearman's rho = 0.50-0.74). Higher numbers of ARGs tended to co-occur in samples with higher crAssphage concentrations, implying sewage contribution to the marine water, with a persisting ARG background. This study provides insight into the ARG pollution status of tropical coastal waters and suggests crAssphage as a proxy for ARG pollution, which could facilitate effective management policies to minimize ARG dissemination in marine environments.

Biography:

Dr. Prsaert Makkaew (Thailand)
Lecturer, Walailak University
(Department of Environmental Health and Technology, School of Public Health)
Field: Environmental Health
Research interest:

- Health-related water microbiology
- Microbial food safety in food service establishments

Vulnerability of urban waters in Sri Lanka to Pharmaceuticals Contaminants in the development of Antibacterial Resistance

GG Tushara Chaminda[1], R. Honda, M. Kumar, M. Otaki and Y. Otaki

[1]Faculty of Engineering, University of Ruhuna, Sri Lanka

Abstract: Emerging contaminants such as multi-drug resistant microbes and Pharmaceuticals and Personal Care Products (PPCPs) in urban waters have become vital in urban sustainability issues. We tried to use pharmaceutical contaminants as markers to detect fecal pollution in groundwater and surface water and also assess the prevalence of antibiotic-resistant bacteria (ARB) in urban waters in Sri Lanka. Our studies detected around 20 PPCPs in urban waters in Sri Lanka. Acetaminophen was dominant in hospital discharge (up to 124 µg/L), while caffeine was the most significant contributor to municipal wastewater (up to 69 µg/L). We suggest using Caffeine, Carbamazepine, and Acetaminophen for detecting domestic pollution in groundwater and surface water. We also noticed that 50 to 100 % of antibiotic resistance in urban waters of Sri Lanka is comparatively higher than in other countries, alarming that multidrug-resistant has become a significant concern for community health. Compared to municipal wastewater, hospital wastewater effluent had a higher proportion of multidrug resistance due to the higher concentration of pharmaceutical products. We observed that no significant contribution of fecal contamination was found to increase the antibiotic resistance ratio. Further, we noted that the resistance percentage for older antibiotics like Sulfamethoxazole (ST) > Tetracycline (TC) was higher than the newer antibiotics in urban rivers in Sri Lanka. We strongly recommend continuously monitoring the urban water sources for PPCPs and ARB, as ongoing assessments are required for sustainable water management.

Biography:

Dr. GG Tushara Chaminda (Sri Lanka)
Professor in Civil and Environmental Engineering,
Faculty of Engineering, University of Ruhuna
Field: Environmental Engineering
Research interest:

- Emerging pollutants in urban waters
- Viral indicators for tracking contamination from onsite sanitation systems
- Sustainable water management

Profiling Antibiotic-resistant Bacteria in high and low-density populations of a Tropical City (Preliminary results)

Sulfikar[1], Rismawati Herman, Muhammad Afdal, Akmal Saputra, Zuhrah Adminira, Maryono

[1]Department of Chemistry, Universitas Negeri Makassar, Indonesia

Abstract: Makassar is the fourth largest city in Indonesia in the south of Sulawesi Island in the central part of the Indonesian archipelago. Uneven distribution of wealth has created enclaves of low-population density housing wealthy residents next to high-density slum areas. Treatment of domestic wastewater is done in each house using a septic tank. We isolated E. coli from wastewater from drains (n = 60) in areas of different housing densities, from high to low density. We also sampled E. coli isolated from surfaces (i.e. toilet seat, water tap, and carpet, n = 40) in a mosque located within each area to see the antibiotic resistance profile within the population of these areas. The susceptibility of the isolates was tested against amoxicillin-clavulanate, amikacin, chloramphenicol, norfloxacin, and trimethoprim using the Kirby-Bauer disc diffusion test. We found the number of resistant isolates was highest (70%) and more multiresistant (30%) from the high-density areas compared to the low-density enclave (30% and 5%, respectively). Resistance to all antibiotics tested was observed, except in isolates from low-density enclaves. In the latter, E. coli was resistant to amx-c and trimethoprim. Different results were observed in the mosque samples. We found two and four-resistant isolates in high- and low-density enclaves. Isolates from the low-density enclaves were resistant to amx-c, amikacin and trimethoprim. In comparison, those from the high-density enclave were resistant to amikacin. Our findings show that high-density housing with poor wastewater infrastructure might influence the occurrence of antibiotic resistance bacteria. The resistance profile in wastewater was not similar to the resistance profiles in the mosque. The results indicate using a different sampling regime if the purpose is to monitor the occurrence of ARB in the human population,S similar to Makassar's context.

Biography:

Dr. Eng. Sulfikar (Indonesia)
Senior Lecturer, Universitas Negeri Makassar
(Department of Chemistry)
Field: Environmental and Analytical Chemistry
Research interest:

- Antibiotic-resistant Bacteria
- Biogeochemistry

Occurrence of Pharmaceuticals and Personal Care Products in Ganga and Adjoined WWTPs Across the Major Cities in Uttarakhand, India

Surindra Suthar
Doon University, India

Abstract: This study summarized the occurrence and seasonal variations of 15 different pharmaceuticals and personal care products (PPCPs) belonging to eight different classes in an urban stretch of River Ganges and wastewater treatment plants (WWTPs) as well at two holy cities *Rishikesh* and *Haridwar* (India). The overall concentration of PPCPs ranged between Below Detectable Limit (BDL) and 1104.84 ng/L in the water of the River Ganges. Acetaminophen, triclosan, N, N diethyl-meta-toluamide (DEET), tetracycline, and caffeine showed the highest detection frequency (> 90 – 100 %) in the river. PPCPs concentration, especially for NSAIDs (Ibuprofen, ketoprofen and acetaminophen), antibiotics (ciprofloxacin, tetracycline and ofloxacin) and metabolite (salicylic acid) was found to be higher in winter compared to summer in the Ganges. The seasonal variations in PPCPs at the studied stretch of Ganga could be attributed to the biodegradation efficiency related to temperatures and sunlight during different seasons. Results of risk quiescent (*RQ*) revealed a higher ecological risk for algae while a moderate risk for river fish biota. While in four studied WWTPs, an average total concentration of PPCPs was found to be 147.20 ng L^{-1} in influent, 105.06 ng L^{-1} in the effluent, and 87.75 ng Kg^{-1} in sludge. Results suggested a spatial and seasonal variation in PPCPs loads in influent, effluent and sludge in STPs studied. The overall PPCPs removal efficiencies of STPs were recorded in the ranges of -154 – 63% while the total mass load of PPCPs studied ranged between 0.02 and 448.64 mg/d/1000 population. The disposal of wastewater from untapped wastewater sources, WWTPs, anthropogenic activities (mass bathing, beach camping, water sports, etc.) and heavy pilgrim tourism in local areas were identified as active sources of PPCPs in the River Ganges. Long-term monitoring is required to examine the possible threat of PPCPs to the health of the river ecosystem and human population across the River Ganga basin.

Biography:

Dr. Surindra Suthar (India)
Associate Professor, Doon University
Field: Environmental Contamination & Management
Research interest:

- Emerging pollutants and phytoremediation
- Constructed wetlands and wastewater Treatment
- Waste-to-Energy, Sustainable Waste Management Practices
- Developing Biochar-based-Slow-Release Fertilizers

Antimicrobial Properties of Pyrolysis products of Chinese Fan Palm (*Livistona chinensis*) fruit

Balendu Shekher Giri[1] , *Mandavi Goswami*[2], *Ram Sharan Singh*[3], *Manish Kumar*[1]

[1]University of Petroleum and Energy Studies (UPES), India

[2]Indian Institute of Technology, India

[3]India Institute of Technology Banaras Hindu University, India

Abstract: The discharge of industrial effluents from various industries is a multidimensional problem which affects ecosystem in several ways even though many new technologies are being developed, it remains to be seen which of those can be practiced in a real scenario. The current investigation attempts to adsorb an effluent from textile dye using Chinese Fan Palm Seed Biochar (CFPSB). Accordingly, this biochar is prepared using fruits of Chinese Fan Palm (*Livistona chinensis*) tree. The fruit also yielded a significant amount of biochar and bio-oil. 1.346 kg of fresh and cleaned fruit was fast pyrolyzed at 500-700 ^{0}C in a laboratory scale pyrolizer resulting in 0.487 kg of biochar and 0.803 L of bio-oil. CFPSB yield came out to be 36.2% and bio-oil yield came out to be 59.7%, accounting for nearly 96% of the input. The extracted CFP seed bio-oil exhibited significant antibacterial activity on the four different bacterial species including *E. coli, Serratia sp., B. subtilis and P. fluorescens*. The numerical value of these all strains were in the form colony forming unit (CFU) which were around 10^9 while their optical density (OD) was 1 at 600 nm wavelength. The bacterial colonies on the agar plate experienced cytotoxic effect by the action of various organic and inorganic molecules from the bio-oil, which was evident by the zones of inhibition. It has been observed that the maximum zone of inhibition of 3.3 cm was found for *P. fluorescens* while for *B. subtilis*, it was 3.22 cm. *Serratia* sp. showed the least inhibition at 2.15 cm and E. coli portrayed 2.9 cm.

Keywords: Biosorption; Textile Dye; Biochar; Bio-oil, Zone of Inhibition, Antibacterial activity

Biography:

Dr. Balendu Shekher Giri (India)

Assistant Professor, Sustainability Cluster, SoE, UPES, Dehradun

Field: Environmental Biotechnology and Sustainable Engineering

Research interest:

Topic 1: Hybrid treatment system for environmental pollutants

Topic 2: Application of pyrolyzed products including biochar and bio-oil

Topic 3: Microbial application for the biotreatment systems

The fate of Antibiotic Resistance During Aerobic Composting of Cattle Manure with Sewage Sludge

Payal Mazumder[1,2], *Manish Kumar*[2,3], *Ajay Kalamdhad*[4]

[1]Centre for the Environment, Indian Institute of Technology Guwahati, India

[2]Sustainability Cluster, Department of Civil and HSE, UPES, India

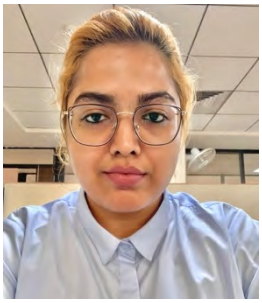
[3]Escuela de Ingeniería y Ciencias, Tecnologico de Monterrey, Mexico

[4]Department of Civil Engineering, IIT Guwahati, India

Abstract: One of the biggest threats to world health in the post-COVID-19 era is antibiotic tolerance. While manure and sewer sludge (SS) has been utilized as nutrient-rich fertilizers for millennia, recent studies have drawn attention to the spread of antimicrobial resistance (AMR) through the soil application of these materials. This research examined the microbial population and the prevalence of antibiotic resistance bacteria and genes (ARB/Gs) in SS, cattle manure (CD), and their compost products. 16S rRNA gene-based metagenomic analysis showed that the sewage sludge compost (SSC) had major classes of bacteria viz., Bacteroidia, Alphaproteobacteria, Gammaproteobacteria, Flavobacteriia, Methanobacteria, Planctomycetia, and Actinobacteria. While CD comprised Methanomicrobia, Bacteroidia, Planctomycetia, Spirochaetes, Alphaproteobacteria, Acidimicrobiia, and Clostridia. *E. coli* was isolated from SS, CD, and SSC samples, and antibiotic resistivity test against kanamycin monosulphate (KM), ciprofloxacin (CIP), norfloxacin (NFX), levofloxacin (LVX)], sulfamethoxazole (ST), and tetracycline (TC) was conducted. In SS, NFX, CIP, KM, and ST-resistant *E. coli* were dominant. Whereas, in CD and SSC, resistivity for KM and ST was seen. ARGs tet(40, 41), catQ, cmx; EreB, OXA-58, TEM-131; OXA-237, tet(42), TEM-89, smeD, floR were found in the samples. The results indicated the abundance of ARB/Gs increased in the final product.

Keywords: Antibiotic resistance; metagenome; compost; sewage sludge; manure

Biography:



Payal Mazumder (India)

Assistant Professor, UPES, Dehradun, India

(Sustainability Cluster)

Field: Environmental Microbiology

Research interest:

- Antimicrobial resistance and its spread
- Micro- and nano-plastics in soil and aquatic environment

Unlocking capacity of WBE surveillance for COVID-19 monitoring: Progress and Prospects

Vaibhav Srivastava[1], *Shashank Shekhar, Manish Kumar**

[1]Department of Botany, University of Allahabad, Prayagraj, India

Abstract: The current ongoing global Coronavirus disease (COVID-19), caused by the infection of SARS-CoV-2, has spread in 216 countries and territories, with >761 million confirmed cases and more than 6.8 million deaths worldwide, as of March 20, 2023 (WHO, 2022). Further, in the current COVID-19 outbreak, a large part of infections is undiagnosed because about half of COVID-19 infections are asymptomatic. The advantage of WBE is to enable surveillance including those undiagnosed people. WBE for COVID-19 is reportedly effective for early warning of outbreak and to find and quarantine undiagnosed infections in a community. Recently, the emergence and spread of new variants with higher infectivity increases threats of COVID-19. Several studies reported the detection of SARS-CoV-2 variants by sequencing viral genetic materials in wastewater samples. However, optimization and standardization of the methodology are required for a reliable application to inter-regional comparison. On the other hand, there has been unparalleled consumption of antimicrobials (antivirals/antibiotics) during this COVID-19 pandemic is feared to bring a dangerous spike in the increase of antidrug resistance (ADR) in different matrices of the environment, posing a possibility of another pandemic of ADR. Therefore, it is requisite to trace the COVID-19 imprints on the prevalence of ADR through wastewater-based genomic epidemiology (WBGE). Early detection and containment of new variants are becoming an important strategy for control of the current COVID-19 outbreak. Genotyping of SARS-CoV-2 variants in wastewater, i.e. WBGE is a promising approach to enable early detection and the spatiotemporal tracking of the emerging variants.

Biography:

Dr. Vaibhav Srivastava (India)

Assistant Professor, University of Allahabad, Prayagraj

(Department of Botany)

Field: Ecology and Environment; Cytogenetics

Research interest:

- Waste Management,
- Ecotoxicology,
- Emerging Contaminants

Prevalence of Multidrug resistant E-Coli in ambient water of Guwahati, India: Vulnerability Assessment in Urban Bionetwork

Ritusmita Goswami[1], Trishna Kalita, Niraj Singh, Birson Ingti

[1]Centre for Ecology, Environment and Sustainable Development, Tata Institute of Social Sciences

Abstract: Emerging pollutants in the water ecosystem and rise of bacterial contamination has become a major issue worldwide concerning human health. The study aimed to identify the presence of total coliform and E. coli that predicts faecal contamination, assess the antibiotic susceptibility of E.coli from different water sources, and examine the groundwater quality of urban as well as rural areas of the Kamrup district, Assam. Water samples (n=90) were collected from Brahmaputra, Bharalu and Bahini river, open wells and tube wells and analysed for coliform presence (by membrane filtration), isolation of E. coli by standard protocols and Antibiotic susceptibility test (Kirby- Bauer disc diffusion method). Comparative analysis between different water sources and the quality of urban v/s rural groundwater was done. Coliforms and e.coli was found in all the water sources, highest in river water (coliform,E.coli-100%), well water (coliform-80%,E.coli-75%) and showing more E.coli presence(30%) in urban than rural groundwater. Antibiotics kanamycin (43.34%) and tetracycline (38.5%) showed highest resistance to river water and well water whereas amikacin (90%) and norfloxacin (87.92%) showed maximum susceptibility. Faecal contamination and antibiotic resistance in water sources with inefficient wastewater treatment to monitor these issues may increase risk of water borne diseases in Guwahati. E.coli positivity in groundwater makes it highly vulnerable embarking awareness for communities depending on groundwater. The study serves as a call to combat misuse of antibiotics, and limiting dispersal of bacterial contamination and selection of resistance in the water ecosystem.

Biography:

Dr. Ritusmita Goswami (India)

Assistant Professor, Tata Institute of Social Sciences

(Centre for Ecology, Environment and Sustainable Development)

Field: Environmental Science

Research interest:

- Groundwater contamination and remediation
- Prevalence of Emerging contaminants and Antibiotic Resistance Bacteria in urban ecosystem