Brain Storming Communication Symposium

on

Development of New Water Supply Strategies and Vulnerability Assessment for Guwahati in relation to the Brahmaputra Watershed Management under the Climate Change Regime

Poster Competition

Symposium invite poster from Graduate Students and Fresh Ph.D scholars awarded within last 2 years. If your abstract is accepted, your poster will be on display at the symposium, where international scientists, scholars and academia will see and discuss your work with you. Prizes will be awarded. To recognize research theme focused on "Water Conservation, Water Supply, Urbanization and Climate Change," we are calling for posters in the following categories:

- Protecting freshwater and agricultural ecosystems and public health (Northeast Indian Scenario)
- Water Resilience: Vulnerability and Response
- Data science and engineering for water system
- Innovation in operational water management
- River watershed management under the preview of urbanization, population growth and climate change
- Engaging stakeholders and future leaders through science literacy and citizen science
- Transforming water policy and groundwater governance to develop sustainable and equitable water management practices

Abstract Deadline: March 25, 2017

How to Participate: an on-site, juried competition. Three posters will be selected for first, second and third best poster award. Participants must send an abstract (up to 350 words) to kumarken2016@gmail.com with their name, Affiliation, contact and willing to display their poster at the symposium and participate in the on-site competition.

There is no registration fee.

Submitting an Abstract

The Symposium Poster Committee will review the abstracts and notify presenters of their acceptance by email by March 27. If accepted, an electronic (.pdf) copy of the poster is due by March 30, 2017. Participants should bring their printed poster on the day of symposium and put on display by 11am.

Venue: Department of Environmental Science, Tezpur University, Assam

Awards

First Place: Certificate and Free registration to our next APN project conference in June/July 2017 with Travelling and accommodation allowance.

Second Place: Certificate and Free registration to our next APN project conference in June/July 2017 with accommodation allowance.

Third Place: Certificate and Free registration to our next APN project conference in June/July 2017

Questions about the poster competition? Contact Dr. Manish Kumar at kumarken2016@gmail.com or +918011339296

Brainstorming Communication Symposium

on

Development of New Water Supply Strategies and Vulnerability Assessment for Guwahati in relation to the Brahmaputra Watershed Management under the Climate Change Regime

March, 30th (Thursday), 2017
Seminar Hall, Dept. of Environmental Science, Tezpur University
Organizer: Project No. CRRP2016-06MY-Kumar by Asia-Pacific Network for Global Change Research
Co-organizer: Indo-Japan Cooperative Science Program (IJCSP) Funded Project

Cover Message

Dear Colleagues

It is our pleasure and honor to present the proceedings of Brain Storming Communication Workshop on *"Development of New Water Supply Strategies and Vulnerability Assessment for Guwahati in relation to the Brahmaputra Watershed Management under the Climate Change Regime"*. The workshop is financially supported by Asia-Pacific Network (APN)-Global Change Research (GCR) and DST-JSPS jointly funded the project under India-Japan Science Cooperation Program (IJSCP). We would like to thank all funding agencies for believing the India-Japan-Sri Lanka collaboration and funding the project. We offer our gratitude to all the speakers who have accepted our invitation to be present here. We would also like to thank other Co-PIs and collaborator Dr. Tushara Chaminda, G. G, University of Ruhuna, Galle, Sri Lanka, Dr. R. R. Hoque (TU) and Dr. Ryo Honda, Kanazawa University, Japan, without whom the whole event would not have been possible.

This brainstorming workshop is the second tier of the activities after the previous editions occurred last year when Indian and Sri Lankan collaborators visited University of Tokyo and Kanazawa University, Japan. The main objectives of this communication are to understand the expert's view, stakeholder's perspectives, and site-specific problems/solutions. Under this program, we will have several other activities in the coming months (June/July) of 2017 and 2018. According to the roadmap approved by the funding agencies, there are going to be two major events (conference and workshops) this year conference.

Finally, we would like to thank Tezpur University (India) administration, faculty, staff, research scholars and other members connected directly or indirectly to this project. Looking forward to your support throughout the project

Thanking you

Dr. Manish Kumar (PI- APN & IJSCP)
Dr. R. R. Hoque (Co-PI IJSCP)
Dept of Environmental Science
Tezpur University, Assam, India

Prof. Hiroaki Furumai
Dept of Urban Engineering
The University of Tokyo, Japan

Dr. Ryo Honda (Co-PI, APN-GCR)
Kanazawa University, Japan

Dr. Tushara Chaminda (Co-PI, APN-GCR)
University of Ruhuna, Sri Lanka

Program

-Introduction-

10:00〜10:10 Welcome remarks, by **Dr. Ashok Kumar** (Dean, School of Sciences, Tezpur Central Univ.)

10:10〜10.20 Briefing of the Departmental Profile **by Prof. Kali Prasad Sarma** (Tezpur Central Univ., India)

10:20〜10:30 Introduction of the project, by **Dr. Manish Kumar** (Tezpur Central Univ., India)

10:30〜10:35 Background of Indo-Japan collaboration, by **Prof. Hiroaki Furumai** (Univ of Tokyo., Japan)

10:35〜10:45 Inaugural Talk, by **Prof. Mihir Kanti Chaudhury** (Vice-Chancellor, Tepzur Central Univ.)

-High Tea (10:45〜11:00)-

Session 1: Project background researches –

11:00〜12:10 Japanese Experience of Urban Water and River Management: Lessons and relevance to Indiaby **Prof. Hiroaki Furumai** (The Univ. of Tokyo, Japan)

12:10〜12:40 Development of new water supply strategies in two major cities of India and Sri Lanka in thecontext of climate change, rapid urbanization and population growth: a vulnerability assessmentapproach, by **Dr. Manish Kumar** (Tezpur Central Univ., India)

12:40〜13:00 Innovative ways to spread awareness among stakeholders and increase participationby Prof. **R. R. Hoque** (Tezpur Central Univ., India)

13:00〜13:30 Water Wealth of the Brahmaputra: The Sustainable Pathby **Prof. Chandan Mahanta** (IIT Guwahati, India)

-Lunch Break (13:30〜14:30)-

-Session 2: Poster Session (14:30〜15:30)-

-Session 3: Invited lectures on project related researches –

15:30〜16:00 Status of solid waste management in Guwahati/Assam and its impact on Water managementby **Dr. Ajay Kalamdhad** (IIT Guwahati, India)

16:00〜16:20 Role of wetlands in the Brahmaputra Watershed Management under climate change regimeby**Prof. K. P. Sarma** (Tezpur Central University, India)

16:20〜16:35 Water Supply, Sanitation and Health: Special reference to Assam and Guwahati,by **Dr. Ritusmita Goswami** (SERB-DST Young Scientist, Tezpur Central University, India)

16:35〜16:55 Wrap-up discussion,coordinated, by **Prof. Hiroaki Furumai & Dr. Manish Kumar**

16:55〜17:10 Felicitation, Best Poster Award & Vote of Thanks,by **Dr. Manish Kumar** (Tezpur Central Univ., India)

Development of sustainable urban water use system adapted to climate change

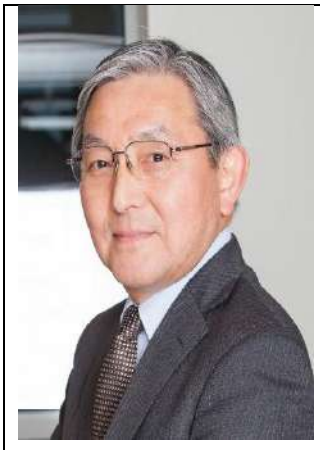
Hiroaki Furumai[1]

1) Research Center for Water Environment Technology, The University of Tokyo, Japan

ABSTRACT:

Climate change and increased water demand through rapid urbanization have caused water scarcity in growing mega cities. Concern about the sustainability of urban water use is the strong motivation to understand the potential use of rainwater and reclaimed water. We conducted the research project entitled by "Development of well-balanced urban water use system adapted to climate change", which was supported by Japan Science and Technology Agency. This project aims to reexamine the current urban water use system and propose a new one adaptive to the future climate change. To reduce pressure on withdrawal of surface water and groundwater, reclaimed water and harvested rainwater should be utilized to supplement the water demand in the urban area. In this presentation, the past and current practices on water resource management in Japan are summarized. Then, researches on water quality evaluation of rainwater and reclaimed water are introduced. We conducted water quality monitoring work at a road-runoff infiltration facility and evaluated biodegradable organic matter in different water reclamation systems and reclaimed water distribution system in Japan. Rainwater and reclaimed water should be properly allocated to urban water use by considering the balance between water supply and demand in cities. This requires information on available amount and detailed quality of various water resources in a watershed. We are pursuing possible strategies for sustainable urban water use adapted to climate change.

Speaker's profile:



Prof. Hiroaki Furumai
Professor, Research Center for Water Environment Technology, Graduate School of Engineering, The University of Tokyo, Japan
International Water Association, Board of Director (2012-), IWA Fellow(2010-), Japan Society on Water Environment, President (2015-), Water Research, Editor (2008-)

Field of Interest:

Sustainable urban water management focusing on water pollution control and water environment conservation. Urban nonpoint source pollution, modeling water quality dynamics, urban drainage management and rainwater & reclaimed water use.

Development of new water supply strategies in two major cities of India and Sri Lanka in the context of climate change, rapid urbanization and population growth: a vulnerability assessment approach

Manish Kumar[1]

1) Department of Environmental Sciences, Tezpur University, India

ABSTRACT:

This project aims to re-examine the current urban water use system and propose a new one to cope up with the future climate change, rapid urbanization and population growth in two South-Asian Cities. In the new system, each water resource will be properly allocated to each water use by considering the balance between water supply and demand. This requires information on theavailable amount, and chemical and biological quality of various water resources, recharge zone identification for sustainable planning as well as people perception and willingness to pay. Two of main cities in South Asia; Guwahati (India) and Colombo (Sri Lanka), are selected as research fields. Both locations fall under Asian monsoon region but are in different phases in economic and demographic growths. Henceforth, suggested water supply strategies are going to be an integral part of infrastructure development of urban area especially in developing countries. Climate change and related uneven rainfall distribution cause awater shortage. In such areas, safe water supply might become unsustainable, because water pollution becomes severer by adecrease of water recharge and unintentional shift of water resources. We intend to evaluate urban water use strategies suitable for each city from various angles and develop Water Quality Information Platform (WQIP) and new strategies of sustainable water supply under climate change scenario. The research will have an impact not only on the critical scientific understanding of emerging chemical and biological pollutants issues posing threat on water potable use but also on the development of a sustainable water management in urban and agriculture sectors.

Speaker's profile:

Dr. Manish Kumar

Assistant Professor, Dept. of Environmental Sciences, Tezpur University, Assam, India

Visiting Faculty, University of Nebraska-Lincoln, USA

Field of Interest:

Pathways of contamination in Freshwater System, Sources of the urban pollution and sustainability of urban water cycle under changing climate regime, Development of pollution assessment tools, remediation technique and management

Innovative ways to spread awareness among stakeholders and increase participation

Prof. R. R. Hoque[1]

1) Department of Environmental Science, Tezpur Central Univ., India

ABSTRACT:

All water management strategies emphasise on two vital points - one, the control and movement of water to minimise damage soil and other property, and life and two, to maximise benefit through efficient distribution and use. The third aspect of the management of water could be on maximising water availability by adding up more sources to the existing ones. Rain harvesting and recycling are other such reservoirs that could add to the existing natural sources. In fact an efficient rain harvesting in cities of the Brahmaputra Valley could mitigate urban flood besides meeting the water demand. As the popular motto of water management goes – "Decentralise water and catch it where it falls" – rain harvesting initiatives demand decentralization, which again demands public participation. Therefore, reaching out to the public and involving them in the process needs very astute planning. This is often overlooked by agencies. So, public consultation and reach-out may be an important component of water management strategies, especially in the aspects of rain harvesting. With the development of technology reaching out through mass media has become easy compared to the period a decade back. Social media could be an important tool in this process. Besides, this region is known for very powerful folk cultural media like *Ojapali* and puppetry, which may be explored in taking the message to the people. For the administrative needs interest groups (Rain Help Groups!) may be considered as a unit instead of taking already existing administrative divisions. This could ensure better acceptability of ideas and, therefore, better output.

Speaker's profile:

Prof. R. R. Hoque

Department of Environmental Science, Tezpur Central Univ., India

Field of Interest:

Environmental Monitoring and Assessment, Air pollution, VOC, NOx & Ozone chemistry, Environmental Law, Environmental issues, Atmospheric Chemistry, Environmental PAHs and Atmospheric Deposition.

Water Wealth of the Brahmaputra River: The Sustainable Path

Chandan Mahanta[1]

1) Department of Civil Engineering , IIT Guwahati

ABSTRACT:

The inconsistency of unusually rich water resources and yet a water under-nourished Brahmaputra floodplain is quite a paradox. One can argue that vast water resources alone, without the required institutional arrangements and a forward looking vision, have failed to leverage the nature given wealth to the benefit of one of the highest concentration of impoverished population. All water allied sectors reflect, among other factors, (a) Often non-pragmatic and non-comprehensive, disconnected decision-making; (b) complex and often incomplete institutional arrangements; (c) inadequate and only partly accessible resource knowledge base; and (d) disillusionment by local communities of past efforts and their failure to deliver and hence a sense of alienation and non-cooperation. This can possibly be changed, among other options, with a targeted drive on local enterprise and involvement of local communities and stakeholders, appropriately supported by relevant technical departments and agencies, along with strong R&D back up by capable academic institutions and agencies. Key among these changes, among possibly other requirements, are (a) strong emphasis and wide participation in water and food security sustainability; (b) increased and non-negotiable accountability by the concerned agencies; and (c) decentralization of decision making. It is essential that these processes include mechanisms for fairly and equitably sharing the benefits to be derived from water resource development and management projects and focuses not only on bigger, long-term growth, but also on those corresponding activities that have immediate impact on social and environmental security of water resources at the community level. Institutions must be able to create and manage an environment of motivation and trust that encourages initiatives consistent with sound water safety and sustainability, and discourages activities that garner benefits only for an exclusive privileged group while inflicting social and environmental loss to the community at large.

Speaker's profile:

Prof. Chandan Mahanta

Professor, Department of Civil Engineering
Indian Institute of Technology – Guwahati 781039, INDIA

Field of Interest:

Water Quality, Sediment Dynamics in Fluvial Systems, Environmental Impact, Risk Assessment and Management, Environmental Geo-informatics.

Status of solid waste management in Guwahati/Assam and its impact on Water management

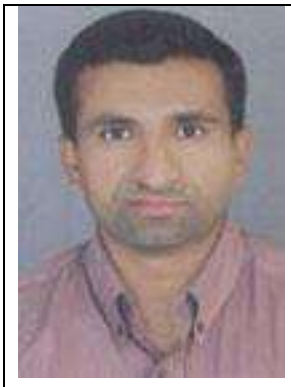
Dr. Ajay S. Kalamdhad[1]

1) Department of civil Engineering, IIT Guwahati, India

ABSTRACT:

Guwahati is the largest city of Assam and gateway to north-eastern states of India. Rapid industrialization and population growth in Guwahati has led to the increase in waste generation and per capita solid waste generation of has been reached to 0.461 kg/day in the city. Dumpsite is located at west Boragaon near Deepor Beel (beel means "lake" in the Assamese language). It is a permanent freshwater lake, designated as a Ramsar site in November 2002. Decision of setting up the garbage dumping site at its present location flouting all the rules related to conservation of the Deepor Beel, and badly affecting its ecosystem. Dumping of municipal solid wastes at Boragaon by the Guwahati Municipal Corporation (GMC) has pushed the wetland's pollution to alarming levels. The problem gets serious during the monsoons, with rainwater sweeping large amounts of garbage from the dumping site to the Beel. Unplanned and unscientific dumping of solid waste results in contamination of ground water systems besides affecting surface water sources. The rainfall over Guwahati occurs throughout the year and precipitation that falls into a landfill, cause the formation of leachate. Formation of leachate presents a major threat to the current and future quality of groundwater and surface water. Once leachate is formed and is released to the groundwater environment, it will migrate downward through the unsaturated zone until it eventually reaches the saturated zone. Although many of reactions have the capability to reduce the potential impact to groundwater, some can actually increase the toxicity by producing by-products that are more hazardous than original contaminant. Once the groundwater is polluted, the pollution may be difficult to correct or even to detect. By the time groundwater pollution is detected, it may be widespread and exact extent of the problem may not be readily determined. Therefore, the immediate need is to shift the land-filling site and construction of sanitary landfill site in order to evolve ways of protecting the groundwater and surface water and environment of lake.

Speaker's profile:



Dr. Ajay S. Kalamdhad

Associate Professor, Dept. of Civil Engineering, IIT Guwahati, Assam, India

Field of Interest:

Solid waste management, Mechanical composting and vermicomposting Anaerobic digestion, Analysis of solid wastes, Microbiology of composting Biosorption, Water & wastewater Treatment

An introduction to Wetlands of Assam

Kali Prasad Sarma[1]

1) Department of Environmental Science, Tezpur University
Corresponding author: sarmakp@tezu.ernet.in

ABSTRACT:

Wetlandsare a major feature of the landscape in almost all parts of the state of Assam. Assam has 3,513 wetlands covering a total area of 101,231.6 ha. Of these, 3,388 wetlands are natural with a total area of 98,819.6 ha. This is close to 4 per cent of the total floodplain area and 1.3 per cent of the total area of the state. Most of the swampy lands in Assam are formed as ox-bow lakes or abandoned channel scattered all over the active flood plains of the river systems. Besides the wetland (Deepor beel) can also be described as the Kidney of the landscape of Guwahati as they function as the down-stream receivers of almost all domestic and industrial waste through mora Bharalu and Basistha river. Wetlands, under favorable conditions, have been shown to remove organic and inorganic nutrients and toxic materials from water that flows across them. One of the most important functions of wetland is the Ground water recharge and facilitates the flow of water between the ground water system and surface water system. Wetlands, under favorable conditions, have been shown to remove organic and inorganic nutrients and toxic materials from water that flows across them. A variety of anaerobic and aerobic processes removes chemical species from the water. Plants and soils in wetlands play a significant role in purifying water, removing high levels of nitrogen and phosphorus, and in some cases, removing toxic chemicals. Some wetland plants have been found to accumulate heavy metals in their tissues at 100,000 times the concentration in the surrounding water. They improve water quality by filtering out pollutants. Through the biogeochemical cycling process, transformation of chemicals in wetland ecosystems takes place. Wetland of Assam is expected to be highly prone to consequences to climate change because of its sensitive geo-ecological set-up. Wetland systems are vulnerable and particularly susceptible to changes in quantity and quality of water supply.

Speaker's profile:

Prof. Kali Prasad Sarma

Department of Environmental Science, Tezpur University,
Napaam, District: Sonitpur, Assam-784028

Field of Interest:
Environmental Chemistry, Environmental Pollution & Remediation, Waste management and Instrumentation.

Water Supply, Sanitation and Health: Special reference to Assam and Guwahati

Dr. Ritusmita Goswami[1]

1) SERB-DST Young Scientist, Tezpur University

ABSTRACT:

Drinking Water forms an integral part of the national health policy and a strategy for improvement of health and nutritional status of people. The Primary Health Care strategy, among others, considers safe drinking water and appropriate sanitation, as the cornerstone of basic `Health For All (HFA)' for water is essential for survival and necessary for good health and sustainable development. Thus, these exists a synergistic relationship between water availability, health and development. It is true that providing drinking water to a country like India with a large population (1.252 billion) is an enormous challenge. With increased population and associated pressure on resources led to over-exploitation of water resources and water scarcity. However, the water supply systems in most cities of India are poorly operated with weak infrastructure and poor resource management. The provision of clean drinking water has been given priority in the Constitution of India, conferring the duty of providing clean drinking water and improving public health standards to the State. On one hand the pressures of development is changing the distribution of water in the country, access to adequate water has been cited as the primary factor responsible for limiting development. In Assam, availability of drinking water began to hit the people hard more specially in the urban areas due to rapid increase of population and unreliable nature of public water supply in most cities including Guwahati. Considering the extent of the problem there is an urgent need of an integrated approach with Sustainable Water Management and Sanitation which aims at designing and managing the urban water system in a holistic manner.Concerted efforts in nurturing the positive effects of these complex but interrelated components would determine to a major extent the future path and pace of development in as much as the overall `quality of life'.

Speaker's profile:

Dr. Ritusmita Goswami

Principal Investigator, DST-SERB Fast Track Young Scientist Project, Dept. of Environmental Sciences, Tezpur University, Assam, India

Field of Interest:

Hydro-geochemistry, Environmental monitoring and Risk Assessment, Remediation, Environment-contamination interfaces.

Abstracts

for

Poster Presentation

P1: Water management in the Brahmaputra flood plain (BFP) in response to geogenic contaminants with special reference to Guwahati, Assam, India

Nilotpal Das[1*] Manish Kumar[2]

1) Department of Civil Engineering, IIT Guwahati, Assam, India
2) Department of Environmental Sciences, Tezpur University, India
*Corresponding author: nilotpald05@gmail.com

ABSTRACT:

The Brahmaputra flood plain (BFP) is the lifeline of Assam, India; most of the agricultural activities and more than half of the population is concentrated in this region. Population increase, along with urbanization has put tremendous pressure on the state's groundwater reserves. Detection of geogenic contaminants like arsenic (As), fluoride (F^-) and in recent times uranium (U) has added to the problem. Arsenic and F^- as high as 700 μL^{-1} and 20 mgL^{-1} respectively have been reported in the BFP, while one of our study found U in the sediments of the BFP. Arsenic appears to be released due to reduction of Fe (hydr)oxides, while dissolution of minerals like apatite could contribute to groundwater F^-. Diversion of the river waters at regular intervals could not only reduce dangers of flood, but could also be a sustainable source of freshwater. Installing proper water treatment technology in the BFP could help in utilization of the diverted river water along with waste water. Another option is rainwater harvesting, as the monsoon is quite strong in the BFP. Speaking of climate, any change will have a drastic impact on the current scenario. Global warming could lead to a drier condition which could enhance F^- level due to higher mineral dissolution, which can further lead to possible conditions of co-contamination with As under oxidizing conditions. Localized incidence of high groundwater F^- has also been detected in Narengi, Bonda and some other parts of eastern Guwahati. A proper network of water treatment plants as mentioned earlier could abate the situation. The state government's decision to dredge the Brahmaputra could help indirectly, as the recovered land could provide groundwater unaffected by F^-. The recovered fertile sediments could add to the agricultural productivity of not only the city, but the entire state. As Guwahati is a highly unplanned city, improving the drainage network could actually help in groundwater recharge especially in the newly developing regions of the city like Azara and Santipur. Lastly, wetlands of the city, like Deepar Beel have degraded steadily, restoring these would be a great initiative towards improving the groundwater quality of Guwahati.

Keywords: Arsenic, fluoride, uranium, Brahmaputra flood plains

Presenter's profile: *PhD, Environmental Science, NPDF Fellow, IIT Guwahati*

Ph.D research topic: *Understanding arsenic phase distribution and co-contamination perspective with fluoride in the Brahmaputra flood plains, Assam, India*

A sentence on climate change and water management policy:*It's time we realize that climate change is not a myth.*

P2: Development of framework for public consultation in a water supply project

Rakhee Das*, Mohammad Jawed, L. Boeing Singh

Department of Civil Engineering, Indian Institute of Technology Guwahati, Guwahati-781039, India

*Corresponding author: rakhee@iitg.ernet.in

ABSTRACT:

The piped water supply in Guwahati city is provided by Guwahati Municipal Corporation and Guwahati Metropolitan Development Authority which covers only 30% of the population. To improve the accessibility of piped water supply, four new water supply projects are being undertaken under the initiative of Government of India through various schemes. But astonishingly, these projects are facing public opposition, plausibly public are not taken into confidence or consulted a priori. As per the Environmental Impact Assessment (EIA) notification, 2006, all projects undertaken by the government should carry out public consultation as part of the project development exercise. However, projects relating to water supply schemes have not been included within the scope of this notification. This study, therefore, attempts to develop a framework for public consultation in water supply projects, with specific reference to Guwahati water supply scheme.The framework has been developed based on the review of worldwide trends in implementation of water supply project reports, EIA reports as well as public hearing proceedings. This framework is then applied to examine the public participation and public consultation process carried out for Guwahati water supply schemes in the form of public meetings while public protest and construction was in progress simultaneously.The purpose of these meetings were to create public awareness about upcoming water supply project and its benefits. It has been observed that that the authority had missed to create awareness about the quality of the freely available existing groundwater sources.It is of the opinion thatpublic hearing with focus on groundwater quality awareness could have become a potential tool in overcoming the public opposition to the projects. The developed framework for water supply project focuses on having mandatory public consultation, effective understandable invitation/notice for public hearing with convenient time and venue, sufficient time for written comments and raising concerns, choosing appropriate methods for consultation and increasing knowledge about project benefits, consideration of public concerns in the final reports and final decisions.

Keywords: Piped water supply, Water supply projects, EIA, Public hearing, Public protest, Groundwater

Presenter's profile: *Research Scholar, Environmental Engineering*

Course enrolled:*Ph.D (Environmental Engineering)*

Ph.D research topic:*Stakeholder management in Water Supply Projects*

A sentence on climate change and water management policy:

Water resources are directly impacted by climate change, and the management policy of these resources would alleviate future scarcity in terms of quality and quantity to ecosystems, socio-economic activities and human health.

P3: Impact of climate change and sustainable management of the river system with special reference to the Brahmaputra River.

Pallavi Das[1*], Manish Kumar[1*]

[1]Department of Environmental Sciences, Tezpur University, India
Corresponding author: pallavienv@gmail.com

Abstract

Climate change is one of the biggest challenge and likely to have significant impact on the hydrology.Due to increase in urbanisation, industrialisation and climate change, availability and requirement scenario of fresh water has been changing. Water availability and water security are becoming more uncertain through changes in temperature and precipitation, shifts in the timing and intensity of the monsoon, increased frequency of extreme events such as droughts and floods, and accelerated melting of the Himalayan glaciers resulting in changes in short- and long-term runoff, snow cover, and melting. The Brahmaputra River basin is one of the most vulnerable areas in the world as it is subject to the combined effects of glacier melt, extreme monsoon rainfall and sea level rise. For years, the river has been serving as one of the most important freshwater resources for agriculture, irrigation, transportation, electricity and habitat for aquatic organisms in the North-Eastern India. People residing along its banks are heavily dependent on the river for their livelihood and thus making them a highly vulnerable riverine community. As climate change is a major concern we should reduce both greenhouse gas emissions and develop effective management strategy for freshwater resource.

Keywords: Climate change, Freshwater system, Sustainable development

Presenter's profile:

Dr. Pallavi Das

Ph.D research topic: Assessment of heavy metal behavior in the context of sediment-water interaction and climate change: A study on the Brahmaputra River, Assam

A sentence on climate change and water management policy:

Promote sustainable development to reduce the risk of climate related damages and take advantage of climate related opportunities

P4: Impact of Human Development Activities on Natural Wetland Ecosystem

Mayur Shirish Jain* Ajay S Kalamdhad

1) Department of Civil Engineering, Indian Institute of technology Guwahati, Guwahati, Assam-781039, India
*Corresponding author: mayur.jain0111@gmail.com

ABSTRACT:

Fifty five percent (55%) of the Earth's population will live in urban areas by 2025 as the expanding increase in population has lead to remarkable demographic shift. With the growth in population, the consumption of natural resources and its use has achieved an ecological footprint. The urbanization, industrialization and agricultural activities etc. are covering the land, which has an impact on the natural ecosystems. These activities occupy lower landscape positions and are linked to other ecosystems through rainfall, runoff, etc. The avalanching effects of habitat alteration on nutrient cycling and watershed hydrology are particularly disturbing to wetland ecosystems. Wetlands are serving as home to a wide range of plant and animal life and hence considered as the most biologically distinct of all ecosystems. Wetlands function as sponge sometimes by holding floodwaters and keeping rivers at normal levels. Due to the urbanization and other human development activities pollution of wetlands is becoming a serious concern and caused significant changes in the functions and qualities of many wetlands. These changes have resulted in alteration of their physical, chemical and biological components. In this study, effects of urbanization on the function of wetlands are reviewed. Moreover, reason for the growth of invasive species over the local flora and fauna are also discussed.

Keywords: Human activities, pollution, wetlands, weeds, BOD, metals, viruses

Presenter's profile: *Research Scholar*

Course enrolled: *Ph.D.*

Ph.D research topic: *Solid Waste Management*

A sentence on climate change and water management policy: *Climate change is warning us to stop warming the earth.*

P5: Phase distribution of metals in a Tropical River of India in the context of climate change

Anindita Gogoi[1*] Manish Kumar[1]

2) Department of Environmental Sciences, Tezpur University, India
*Corresponding author: gogoi.anindita@yahoo.com

ABSTRACT:

We report aspects of metal speciation and transport, seldom assessed in densely populated Brahmaputra River system in Assam, India. An evaluation of the phase distribution for Cu, Cd, Cr, Pb and Zn along with its chemical speciation, covariance with different water quality parameters and toxicity were carried out from upstream to downstream from July 2014 to 2015. Various physico-chemical properties of water were also analyzed and used as input for geochemical speciation modeling using MINTEQA2 to establish the distribution of the metal as free ions, organic and inorganic complexes. Though, the metals were substantially higher in the particulate fractions. Thus, there is no specific trend in metal speciation variation in the Brahmaputra River from upstream to downstream. Metal transport in the river is mainly influenced by pH, organic matter and anionic ligands. Zn has higher probability to contaminate the groundwater of the floodplains. Q and R mode cluster analyses seem to be promising tool to investigate metal behavior. Health risk is higher due to particulate metal content of the river water. The study aptly demonstrated that binding of metals with naturally occurring dissolved organic matter or suspended particulate matter affects metal bioavailability in river during wet periods when sediment load is significantly high. The study therefore opens new avenues for overcoming water management problems made critical by deterioration of surface water.

Keywords: Speciation, Brahmaputra River, Health Risk Index, Heavy metals, MINTEQA2

Presenter's profile:

Course enrolled: Ph.D in Environmental Science

Ph.D research topic:"Metal Transport and complexation in Fresh and Waste Water Systems using Sequential extraction, Biotic Ligand and Speciation Models"

A sentence on climate change and water management policy:

Adaptation to climate change is closely linked to water and its role in sustainable development.

P6: Impact of Unsanitary Landfills on Surface Waterand Ground Water Quality

Kunwar Raghvendra Singh[1*] Dr. Ajay Kalamdhad[1]

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ABSTRACT:

Municipal solid waste (MSW) disposal is a global concern, especially in developing countries. Most common method of waste disposal in developing countries is unsanitary landfill. Unsanitary landfill is generally characterized by open dumping of wastes, lack of monitoring of the site, absence of leachate or methane collection systems and wastes exposed to environment. Unsanitary landfills cause extensive public health and environmental mutilation. One of the major environment threats is water quality degradation. Leachate produced from landfills are adversely affecting the surface water and ground water quality. Another problem is the generation of landfill gases. Once deposited in a landfill, the carbon in waste containing organic materials, such as food, paper etc. is consumed by microorganisms, causing decomposition. Because the microorganisms gradually decompose organic matter over time, methane (CH_4), carbon dioxide (CO_2), and other trace amounts of gaseous compounds are generated and form landfill gas. CH_4 and CO_2 are greenhouse gas (GHGs), whose presence in the atmosphere contributes to global warming and climate change. CH_4 is a particularly persuasive GHG and is currently considered to have a global warming potential 28 times (over a 100-y observation period) that of CO_2. Various studies showed that global warming and climate change are also responsible for deterioration of water quality. The aim of present study is to identify the extent of threat of unsanitary landfills on water resources and provide the recommendations to overcome risk posed by it.

Keywords: MSW, unsanitary landfill, leachate, GHGs, water quality

Presenter's profile:

Course enrolled:Ph.D.

Research topic: Surface Water Quality Modelling

A sentence on climate change and water management policy: For policymakers "Inclusion of climate change in water management policy" is a like fighting with flip flopper.

P7: Assessment of synergistic impact of urbanization, population growth and climate change on nutrient dynamics of the Brahmaputra River

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ABSTRACT:

In India urban population accounts for 32.7% of total population and the rate of urbanization accounts for 2.38% annual rate of change. Level of urbanization increased from 27.81% in 2001 Census to 31.16% in 2011 Census. An unprecedented wave of urban growth not only leads to water crisis in the major cities but also an equally unprecedented hydrologic change due to global climate change. In the present study we have focused on hydrologic changes occurring due to changes in nutrient concentration and tried to correlate with demographic projections and landuse landcover scenarios in the Brahmaputra basin. Freshwater provision to urban or rural residents has three major components: water availability, water quality, and sustainability. Brahmaputra is one of the largest rivers in the world which has created a thick extensive valley in the state of Assam, India. The valley supports huge population by providing land for agriculture and human habitat. The floodplains are known to be exploited for the agricultural practices throughout the world resulting in deterioration of the water quality severely. Brahmaputra River is the life line of the north-eastern region of India. But still huge population is dependent on groundwater and preferred over surface water due to easy access. Effective reduction of dependency on the groundwater is present need of the Brahmaputra Basin as most of the areas are reported with toxic pollutants such as arsenic and fluoride. Thus use of surface water can be promoted as an alternative by reducing nutrient concentration through source identification and finding measures to effectively manage the impact of these complex environments on water quality of the Brahmaputra River. The high intra-seasonal variability of flow, as influenced by the southwest monsoon (which contributes about 60-70% of total annual average flow) gives rise to a complex water management challenges. Thus, in such a complex topography and hydrological environment, the exchange of information among stakeholders to form cooperative frameworks for the management of the river is essential.

Keywords:*Brahmaputra, Urbanization, demography, Monsoon, Nutrient.*

Presenter's profile: *Research Scholar, Environmental Science*

Course enrolled*:*Ph.D

Ph.D research topic*:Coupled application of geochemistry, Isotope and SWAT modeling to understand nutrient dynamics in the Brahmaputra River System.*

A sentence on climate change and water management policy:*Human induced ecosystem-level changes resulting in climate change often require more progressive understanding and for solving water management issues require recognizing their commonality and understanding can only result from continued interdisciplinary efforts.*

P8: Systems Approach to Public Policy for the Sustainable Water Management

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ABSTRACT:

Climate change in association with population growth pose a serious threat on providing the basic need like water to the condensed population in urban areas. For more than a decade, environmental policy-makers have been struggling to move from fragmented end-of-the pipe and end-of-product-life approaches toward more integrated approaches that reflect the complexity of technology and environmental systems. Pollution prevention, priority-setting for risk reduction, whole facility, cross-media and landscape or watershed approaches are among the many examples of overlapping efforts to move toward a systems approach. The shift towards more integrative public policy tools is occurring at all levels of government and around the world. At the local level in Assam, communities and industrial facilities should start using public, multimedia data on toxic chemicals as the basis of communication and negotiation. There is a need of establishing and developing the pollution register on the state level through various ways including series of international workshops. Such facilities should be integrative with focus on becoming an eco-labeling program. In addition to moving policy selection upstream, life cycle offers a framework which can organize information developed by other tools such as risk assessment or pollution prevention planning that focus on narrower questions applied for the case of the Brahmaputra River or Guwahati city. Last but not the least, there is a need to frame a relationship between natural resources like water and pollution and between energy and materials questions both of which are now usually addressed separately.

Keywords: Life Cycle Analyses, Public Policy, Sustainable Water Supply, Climate Change

Presenter's profile:

Course enrolled: Ph.D.

Ph.D research topic: Speciation and bioavailability study of heavy metals in the contaminated regions of Assam and bioremediation of contaminated soil and water using microorganisms

A sentence on climate change and water management policy:Climate changes the water rules, coping up with today's climate variability and tomorrow's climate change is crucial.

P9: Limitation of Groundwater supply due to Arsenic and Fluoride problem in Guwahati, Northeast India

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ABSTRACT:

Groundwater quality is of utmost importance the world over, primarily because of the fact that it is the crucial source of drinking water in most places. Contamination of groundwater by both Arsenic (As) and fluoride (F^-) has proved to be a problematic aspect. In order to examine the quality of groundwater and the underlying hydrogeochemical processes associated, sampling was conducted in Guwahati, Assam, India. A total of 17 groundwater samples were collected during pre-monsoon season, June 2014 and post-monsoon season, January 2015**.** The standard methods prescribed by the American public health association (APHA) were used for all the hydrochemical analyses. Silicate weathering was shown to be quite dominant in the region as a shift was observed from Mg^{2+}-Cl^- in the pre-monsoon to Na^++K^+-HCO_3^--Cl^- water type in the post- monsoon by the Piper diagrams. Arsenic was found at much lower levels in the pre-monsoon season while the levels were significantly higher in the post-monsoon season. Arsenic also showed close grouping with Fe in the Hierarchical cluster analysis (HCA) during the pre-monsoon. This indicates that, reductive hydrolytic processes involving hydroxides of Fe in the process of As enrichment in the groundwater of Guwahati. Only one sampling sites show the F^- concentration above WHO permissible limit. There was no variation with depth. However, like As, F^- levels were not associated with Fe in groundwater. While F^- levels have been reported to increase with pH and an alkaline condition, no clear association was observed in our study. Overall, the drinking water quality in the groundwater water samples was found to be suitable in relation to the various parameters analysed except one place. However, as the number of samples analysed was quite small therefore a detailed study is necessary to accurately predict the present scenario and monitor the groundwater quality for the future.

Presenter's profile: *Research Scholar**, Environmental Science***

Course enrolled*:*Ph.D

Ph.D research topic*:Hydrogeochemical investigation of Arsenic contaminated alluvial aquifer of Ganga and Brahmaputra Flood plains,India*

A sentence on climate change and water management policy:*Imprints of climate change can be explored further and substantiated if other indicators are not satisfactory for some sections.*

P10: Vanishing Wetlands in Assam: A threat to environment

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According to Ramsar Convention, Wetlands are defined as: "areas of marsh, fen, peatland or water, whether natural or artificial, permanent or temporary, with water that is static or flowing, fresh, brackish or salt, including areas of marine water the depth of which at low tide does not exceed six metres". Assam is a one of the eight north-eastern state of India, known for its rich biodiversity and natural resources. Wetlands are life line of Assam as they are repositories of diversity, ecology and livelihood support system of local people. There are 3513 numbers of wetlands are identified in Assam by Assam Remote Sensing Application Centre, Assam. Wetlands in Assam, as elsewhere are increasingly facing several anthropogenic pressures. Population explosion, large scale changes in land use, mushrooming development projects and improper use of watersheds have all caused a substantial deterioration of wetland resources in the region.Wetland loss negatively affect's environment. Algae blooms are extremely harmful for lakes. Algae blooms are an indication of increased nutrients transported from upstream watersheds. In various cases, these watersheds have withstood significant wetland drainage, allowing nutrients to flow into rivers and lakes without the assistance of the natural filtration of wetland systems. On top of that, once wetlands are lost, substantial volumes of greenhouse gases are released and the landscape's ability to accumulate carbon is reduced.Thus, there is animmediate need to safeguard the state's wetlands from over utilization and infringement and provide livelihood options for people dependent solely on wetlands for their daily needs.

Keywords: *Wetland, livelihood, natural filtration.*

Presenter's profile:

Course enrolled*: Ph.D.*

Ph.D research topic*: Ph.D Scholar*

A sentence on climate change and water management policy*:_____*

P11:Consequences of climate changes on watershed and its effect on Urban Environment

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ABSTRACT:

Water **management is those** practices which deal with the protection and improvement of the quality of the water and other natural resources within a **watershed** by **managing** the use of those land and water resources in a comprehensive manner. Watershed management is an adaptive measure of managing natural resources on the basis of a physiographic nature of watershed boundary within its region.Over the current decades, the World has seen an expanding number of climate phenomenon, for example, wind and rain storms, dust storm and dry spells, all exacerbated by climate change. Climate change will convey changes to the atmospheric components of the cycle. Environmental change is a result of a result of primarygreenhouse releases inside our climate and from changes in the watershed. The increased consummation of petroleum products and the continued loss of natural resources worldwide have prompted these changes and we are just now starting to understand some of the future consequences of these actions. Ice caps andglaciers are vanishing all the more rapidly, diminishing this essential freshwater hold and changing down-incline streams. In the meantime, the World additionally witnesses general deforestation and land debasement because of modern, cultivating and statistic weight on timberland. Taken together, all urban communities and urban ranges overall utilize 75% of the world's vitality and are in charge of 75% of worldwide ozone harming substance discharges, 60% of private water utilize, and 76% of wood utilized for a mechanical reason. At the point when the deforestation prompts watershed destruction around human settlements and urban communities, life-saving fresh water supply also dries up. In the current scenario, more than one billion city-dwelling people lack access to clean and healthy water, because of the lack of integrated land use in urban and urban watershed management. Present day need is for a holistic management of watershed and improves public awareness on sustainable management of watersheds.

Keywords: *Climate change, pollution burst, Urbanization, demography, deforestation.*

Presenter's profile: *Research Scholar, Environmental Science*

Course enrolled*: Ph.D*

Ph.D. research topic*:Imprints of long-range transported pollution on Eastern Himalayan high altitude lakes through geochemical, isotopic and anthropogenic signature.*

A sentence on climate change and water management policy:

Climate change is natural Phenomenon.