Proceedings of Kick-off Workshop of APN-GCR Project on

New Water Supply Strategies and Vulnerability Assessment for Climate Change, Rapid Urbanization and Population growth

December. 16 (Friday), 2016

Lecture Hall, Natural Science & Technology Main Bldg., Kanazawa University.

Organizer: Project No. CRRP2016-06MY-Kumar by Asia-Pacific Network for Global Change Research

Co-organizer: Research Center for Sustainable Energy and Technology (RSET), Kanazawa University.

Kick-off Workshop of APN-GCR Project on "*New Water Supply Strategies and Vulnerability Assessment for Climate Change, Rapid Urbanization and Population growth in India and Sri Lanka*"
in Kanazawa on 16 December, 2016

Program

-Introduction-

13:30～13:40 **Welcome remark**, by Dr. Ryo Honda (Kanazawa University, Japan)

13:40～14:00 **Introduction of the project**, by Dr. Manish Kumar (Tezpur University, India)

- Session 1: Project background researches -

14:00～14:30 W**ater supply situation in Sri Lanka and Colombo City**,
by Dr. G.G. Tushara Chaminda (University of Ruhuna, Sri Lanka)

14:30～15:00 **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**, by Dr. Manish Kumar (Tezpur University, India)

15:00～15:30 **Fate of antibiotic resistant bacteria in water environment**,
by Dr. Ryo Honda (Kanazawa University, Japan)

-break(15:30～15:50)-

- Session 2: Invited lectures on project related researches -

15:50～16:20 **Challenges for sustainable water supply in developing countries**,
by Dr. Takashi Hashimoto (University of Tokyo, Japan)

16:20～16:50 **Eco-friendly technology for sewage treatment process,**
by Dr. Norihisa Matsuura (Kanazawa University, Japan)

16:50～17:20 **Simulations of heavy rainfall from a tropical cyclone in coastal regions of Vietnam under the global warming**, by Mr. Lap Quoc Tran (Kanazawa University, Japan)

-break(17:20～17:30)-

-Conclusion-

17:30～17:50 **Wrap-up discussion, coordinated**, by Dr. Manish Kumar (Tezpur University, India)

17:50～18:00 **Closing remark**, by Dr. Manish Kumar (Tezpur University, India)

Dear Colleagues

It is my pleasure and honor to present the proceedings of the kick-off meeting of the project (Ref: ***CRRP2016-06MY-Kumar****) entitled* "***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".*** First of all, I would like to thank Asia Pacific Network for Global Change Research for believing us and accepting our project with financial support I offer my gratitude to all the speakers who have accepted our invitation to be present here. I would also like to thank our collaborator Dr. Tushara Chaminda, G. G, University of Ruhuna, Galle, Sri Lanka and Prof. Ryo Honda, Kanazawa University, Japan, without whom the whole event would not have been possible. My special thanks to Kanazawa University, Japan especially Prof. Ryo Honda for making this possible.

The main objective of the kick-off meeting is to prepare the roadmap for this project. Well begun is half done, and a good beginning a project well makes it easier to do the rest. Under this program, we will have several other activities in the coming years 2017 and 2018. According to the roadmap, the kick-off meeting will be followed by workshops in India and Japan respectively in 2017 and 2018.

Finally, I would like to thank Tezpur University (India) administration and other members connected directly or indirectly to this project. Once again, thank you very much to all for your kind presence.

Looking forward to your support throughout the project

Thanking you

Dr.Manish Kumar
Assistant Professor
Dept of Environmental Science
Tezpur University

Collaborating Institute:

Tezpur University(Host Institute)

Tezpur University was established by an Act of Parliament in 1994 in Assam(India) with an objective to promote research in areas which are of special and direct relevance to the region and in emerging areas in Science and Technology. Tezpur University has appeared in the list of top 800 universities in the world according to the Times Higher Education World University Rankings that released the list of top 980 universities of the world for the year 2016-17 at midnight on Wednesday (September 21, 2016). Tezpur University also bagged the Visitor's "Best University" award 2016 and 5th among the universities in an assessment of higher education institutions in India conducted by the Ministry of Human Resource Development (MHRD), Government of India, through the National Institutional Ranking Framework (NIRF)

The department of Environmental Science was established in January 2004 with the objective of imparting education on regional and global environmental issues. The department offers two academic programs M.Sc. and Ph.D. in Environmental Science. The curriculum for M.Sc. and Ph.D. programs focuses on all-important aspects of Environmental Science, covering contemporary problems of nature conservation and environmental quality.

University of Ruhuna

The University of Ruhuna was established by a Special Presidential Decree on 1st September 1978, as Ruhuna University College, fulfilling a long cherished desire of the people of Southern Sri Lanka. Initially, it constituted with four faculties, namely, Agriculture, Arts, Medicine, Engineering and Science.

The Faculty of Engineering of the University of Ruhuna was established on 1st July 1999 at Hapugala, Galle. The first batch of students was admitted on 27th March 2000. Admission to the Faculty of Engineering, University of Ruhuna, is subject to the University Grants Commission policy on university admissions. The present annual intake to the Faculty is 225. The Faculty of Engineering offers full-time courses leading to the Degree of Bachelor of the Science of Engineering (B.Sc.Eng.), which is accredited by the Institution of Engineers, Sri Lanka (IESL).

Research Center for Sustainable Energy and Technology(RSET)

Institute of Science and Engineering, Kanazawa University

Research Center for Sustainable Energy and Technology (RSET) has been established in April 2011 to be a core research center of green innovation for a recycle-oriented society supported by secure and sustainable energy production technology. RSET promotes research on efficient conversion, creation, and recycling of the energy that is produced and consumed locally in a so-called "local production and consumption" system, using renewable energy such as wind power, solar power and waste energy like biomass produced in Hokuriku region.

Water supply situation in Sri Lanka and Colombo City

G.G. Tushara Chaminda[1], S.K. Weragoda[2], G.H.A.C. Silva[1]

1) Department of Civil and Environmental Engineering, University of Ruhuna, Galle, Sri Lanka

2) National Water Supply and Drainage Board (NWS&DB), Sri Lanka

ABSTRACT:

Sri Lanka is endowed with rich water resources emanating from the central highlands that receive rain during the monsoons. However, surface inland waters in urban areas are polluted heavily with domestic sewage and industrial effluents, and in rural areas with agricultural runoff. Therefore, for sustainable water management in Sri Lanka, we need to adopt efficient water supply operating systems according to the availability and quality of water of a particular area. This research project mainly focused on Kelani River, which is the second largest river in Sri Lanka, which forms the most significant watershed in Sri Lanka due to various reasons. It flows through the economically important Western Province in which the capital city Colombo is located. Intake of water for the supply of water to the city of Colombo is located about 15 km from the river mouth. The river runs through densely populated areas and receives much organic pollution in the last 50 km stretch. Under this project, competing demands in Kelani River basin in Western Province to meet the needs of increasing urban population and the increasing demand of the industries and agriculture sector will be considered carefully while planning for sustainable water supply to the increasing urban population.

Speaker's profile:

Dr. Tushara Chaminda

Senior Lecturer

Department of Civil and Environmental Engineering,

Faculty of Engineering, University of Ruhuna, Galle, Sri Lanka

Field of Interest:

Sustainable water resource management, Micro-pollutant in urban waters (DOM, heavy metals, PPCPs), Water quality modeling,

Recent Research Topics:

- Relationship between water quality and Chronic Kidney Disease (CKDu) issue which is prevailing in dry zones in Sri Lanka
- Low cost and simple method to treat polluted groundwater in Sri Lanka

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 the available 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 a water shortage. In such areas, safe water supply might become unsustainable, because water pollution becomes severer by a decrease 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

Fate of antibiotic resistant bacteria in water environment

Ryo Honda[1]

1) Research Center for Sustainable Energy and Technology, Kanazawa University, Kanazawa, Japan

ABSTRACT:

Prevalence of antibiotic resistance is an emerging concern which threaten our healthy life in the future. In history of antibiotic agents since invention of penicillin, microorganisms have obtained resistance and increased their ratio of resistant strains as invention of new antibiotics and increase in use of the antibiotics. It is concerned that antibiotics would become less effective than present because pace of new antibiotic invention is slowing down. WHO recently endorsed a global action plan to tackle antimicrobial resistance in May 2015, concerning the urgent drug resistance trend. Our field survey in Chaophraya River and its tributatries in 2011 revealed that resistant E. coli prevailed widely in Chaophrhraya River basin, and that E. coli resistant to fluoroquinolones, which are relatively new antibiotics, were found high near urbanized area (Honda et al. 2015). In Kahokugata Lake in Japan, high ratios of E. coli isolates resistant to sulfamethoxazole and tetracycline possibly related to fecal contamination (Lin et al. 2015). Our interest is whether water environment or wastewater treatment process can be another place where antibiotic resistance occurs. Antibiotic resistance in a microorganism occurs in two steps: (i) acquisition of antibiotic resistance gene, and (ii) expression of the acquired resistant gene. Especially, expression of the resistant gene can be induced by exposure to a low concentration of antibiotics. We have found that norfloxacin-sensitive E. coli can become more resistant after exposure to a low concentration of norfloxacin which possibly occurs in surface water receiving wastewater by resistance induction test using E. coli isolates from Kahokugata Lake.

Speaker's profile:

Dr. Ryo Honda

Assistant Professor

Research Center for Sustainable Energy and Technology (RSET),

Institute of Science and Engineering, Kanazawa University, Japan

Field of Interest:

Health-related water microbiology, biological wastewater treatment

Research Topics:

- Fate of antibiotic resistant bacteria in water environment and wastewater treatment
- Role of quorum sensing in wastewater treatment processes

Invited Lecture

Challenges for sustainable water supply in developing countries

Takashi Hashimoto[1]

1) Department of Urban Engineering, the University of Tokyo, Tokyo, Japan

ABSTRACT:

Sustainable Development Goals (SDGs), built on the success of the Millennium Goals agenda, has been adopted by countries in September 2015, and the new targets for water and sanitation are stated in Goal 6. Although number of people who don't have access to safe drinking water have been decreasing, world water demand in 2030 is predicted to double and exceed available water supply by more than 40% due to rapid growth in developing countries. The IPCC 5th assessment report (Working Group II) concluded that many countries would face serious water resource shortage and water quality deterioration due to climate change. Especially in non-urban area of developing countries which are vulnerable to rapid environmental change, risks associated with treated drinking water are expected to arise. In this presentation, water supply situations in non-urban area of Southeast Asian countries are summarized from presenter's experience and the challenges for development of membrane based small-scale water purification system in developing countries are presented.

Speaker's profile:

Dr. Takashi HASHIMOTO

Assistant Professor

Department of Urban Engineering, the University of Tokyo, Japan

Field of Interest:

Urban water system, Water purification technology, Membrane filtration,

Research Topics:

- Sustainable water supply system in developing country.
- Visualization and identification of foulants inside membrane with super-resolution microscopy.

Invited Lecture

Eco-friendly technology for sewage treatment process

Norihisa Matsuura[1], Masashi Hatamoto[2], Takashi Yamaguchi[3], Akiyoshi Ohashi[4]

1) Faculty of Environmental Design, Kanazawa University, Kanazawa, Japan
2) Department of Environmental System Engineering, Nagaoka University of Technology, Nagaoka, Japan
3) Department of Science of Technology Innovation, Nagaoka University of Technology, Nagaoka, Japan
4) Department of Social and Environmental Engineering, Hiroshima University, Higashi-Hiroshima, Japan

ABSTRACT:

Anaerobic sewage treatment technology has several advantages over the conventional aerobic treatment system, such as a lower energy requirement and reduced production of excess sludge. In recent years, anaerobic treatment process has been focused not only on its cost-saving advantages but also its eco-friendly nature in terms of the energy recovery as methane gas and reduction in CO_2 emissions. However, the anaerobic process discharges unrecovered methane as dissolved methane in the effluent. Methane is a greenhouse gas with a 25-fold greater effect on global warming than CO_2. It is therefore necessary to develop a new technique to economically recover or degrade dissolved methane in effluents from anaerobic treatments to make such processes truly eco-friendly. In this lecture, to prevent the emission of greenhouse methane gas from anaerobic wastewater treatment plants, we propose a post-treatment system consisting of two closed downflow hanging sponge (DHS) reactors for the recovery and oxidation of dissolved methane from effluents after anaerobic treatment processes.

Speaker's profile:

Dr. Norihisa Matsuura

Assistant Professor

Faculty of Environmental Design,

Institute of Science and Engineering, Kanazawa University, Japan

Field of Interest:

Wastewater treatment, Microbial community analysis

Research Topics:

- Eco-friendly wastewater treatment process
- Development of microbial community analysis tools

Invited Lecture

Simulations of heavy rainfall from a tropical cyclone in coastal regions of Vietnam under the global Warming

Lap Quoc Tran and Kenji Taniguchi

Division of Environmental Design, Graduate School of Natural Science and Technology,

Kanazawa University, Kanazawa, Japan

ABSTRACT:

The central regions of Vietnam often receive heavy rainfall by tropical cyclones in the Western Pacific. A tropical cyclone with strong winds inflicts direct damage to infrastructure, causing losses to both the economy and human life. Heavy rains from a tropical cyclone also cause substantial destruction. Furthermore, because of global warming, the intensity of rainfall is expected to increase in the future. In this study, a record of heavy rainfall event in the central region of Vietnam from Tropical Cyclone Lekima, which hit Vietnam in 2007, was simulated by a Weather Research and Forecast model (WRF), using an ensemble simulation method. Rainfall variability in future climate scenarios was investigated using numerical simulations based on pseudo global warming (PGW) conditions, constructed using global warming experiments. Under certain future climate scenarios, the intensity of rainfall from Tropical Cyclone Lekima would have been heavier than in the present climate. The simulation results show that maximum six-hourly and total precipitation would increase significantly in the future. The spatial distribution of heavy rain from Tropical Cyclone Lekima would tend to shift from North to Southwest Vietnam. Simulation results suggest that global warming may correlate with a significant increase in rainfall.

Speaker's profile:

Mr. Lap Quoc Tran

Doctoral student

Division of Environmental Design,

Graduate School of Natural Science and Technology, Kanazawa University

Field of Interest:

Water resources planning and management, meteorology, hydrology and climate change

Research Topics:

- Simulations of Heavy Rainfall from a Tropical Cyclone in Coastal Regions of Vietnam under the Global Warming