

Program for Advancing Strategic International Networks to Accelerate the Circulation of Talented Researchers  
Japan-ASEAN Collaboration Research Program on Innovative Humanosphere in Southeast Asia:  
In search of Wisdom toward Compatibility Growth and Community in the World

**REPORT**

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Place of accepted: - Laboratory for Environmentally-friendly Industries for Sustainable Development  
- Laboratory for Environmental Quality Prediction, Research Center for Environmental Quality Management  
Kyoto University

Name: Van Dieu Anh

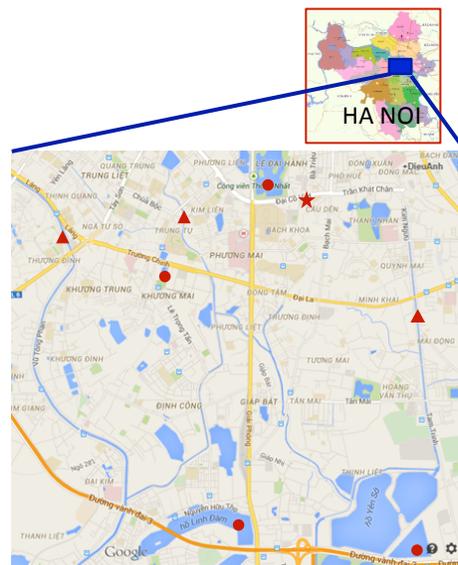
Institute/University: School of Environmental Science and Technology, Hanoi University of Science and Technology

**Research background**

Pharmaceutical and Personal Care Products (PPCPs) are biologically active compounds designed to interact with specific pathways and processes in target humans and animals. Concerns have therefore been raised about the potential effects of active PPCPs in the environment on human and environmental health. In recent years, PPCP contamination is recognized as an emerging environmental pollution in aquatic environments. Majority of PPCPs used for human, plants and animals are excreted into the environment as decomposed form via wastewater effluent discharge, runoff from agriculture land, and leaching. The ubiquitous application and release of antibiotics to the environment can result in antibiotic resistance of bacteria, which in turn can be a serious health risk to human and animals.

In Hanoi, Vietnam the drug abuse in human health and chemicals abuse in agriculture and the overload of the wastewater treatment system result in the release of PPCPs into environment especially aquatic environment. The occurrence of PPCPs was observed in water environment in Hanoi. However, systematic studies on the distribution of PPCPs in aquatic environment, the fate of these compounds in the environment and associated risk assessment are still limited.

**Research purpose and aim**



**Fig.1. Sampling Area**

The goal of this study is to identify the contamination level of PPCPs in water environment in Hanoi, Vietnam and to evaluate the adverse effect of the presence these compounds on ecology and human.

In order to achieve the overall goal, following objectives are proposed

- Investigate the contamination and distribution of PPCPs in water environment in Hanoi
- Clarify factors affecting the occurrence of PPCPs in water environment
- Assess the effects of PPCPs to ecology

### Results and achievements by fieldwork

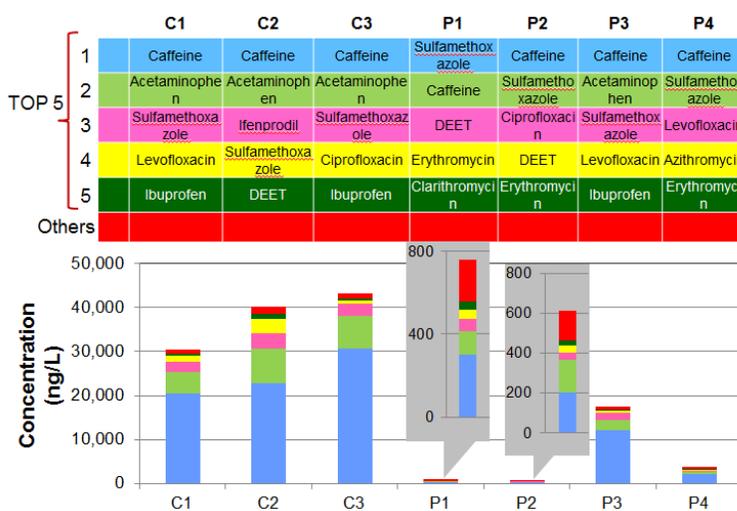
Surface water samples in Hanoi including tap water (1 sample) urban canal water (3 samples) and pond water (4 samples) were collected for initial screening the PPCPs in water environment in Hanoi. Samples were collected and pretreatment in Hanoi. Pretreated samples were brought to Japan for more treatment and analysis PPCPs by HPLC/MS/MS system.

**Table1.** Number of PPCPs detected in surface water samples

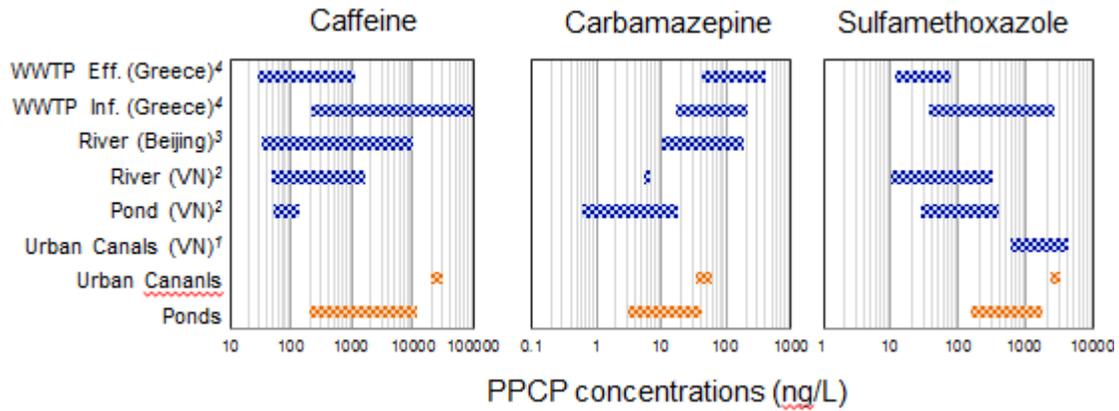
	Number of PPCPs detected					Total PPCP concentration (ng/L)
	Anti-biotics	Anti-Inflamatory	Antiarrthmic agents	Others	Total	
Tap water	3	0	0	3	6	3.5
Ponds	8-15	3-9	1-3	5-10	26-32	610 - 17,366
Urban canals	7-8	8-9	2	11-12	29-30	30,485 - 43,182

The analysis result showed the detection 6 out of 61 PPCPs in tap water and 26-32 out of 61 PPCPs in surface water in some urban canals and ponds in Hanoi. Among detected PPCPs, Caffeine, Sulfamethoxazole and Acetaminophen were major PPCPs found in surface water. The concentrations of PPCPs in urban canals were highest among 3 groups of samples and ranged 30,485 - 43,182ng/L.

PPCP source identification by Caffeine/Carbamazepine Ratio showed that the ratio observed in urban canals was similar with the ratio of influent of wastewater treatment.



**Fig.2.** Majority of PPCP in samples



**Fig.3.** PPCP level comparison

### Implications and impacts on future research

For the future research, it would be necessary to clarify the distribution and fate of PPCP in water environment in Hanoi including spatial and temporal variation of PPCPs in water environment and sources and factors affecting the occurrence of PPCPs in water environment. The resulting level of PPCP contamination will be used for risk assessment of these contaminants by estimating PPCP expose dose and exploring the relation between PPCP occurrence and antibiotic resistance genes.