

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 Environmental Quality Prediction, Research Center for Environmental Quality Management, Kyoto University

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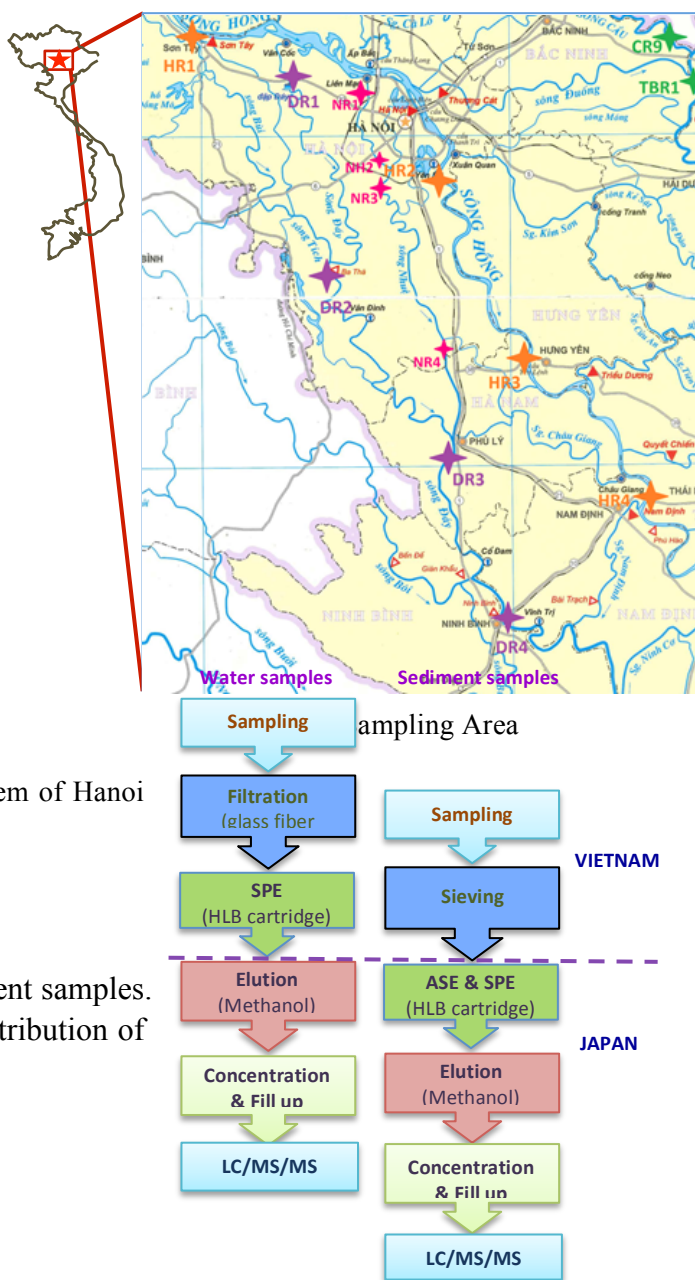
**Research background**

In recent years, presence of Pharmaceutical and Personal Care Products (PPCPs) in the aquatic environment has been referred as one of the most urgent environmental concerns. These compounds are released mostly through urban wastewater and many of them can further spread through water cycle due to hydrophilic character and low removal at wastewater treatment plants. 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 river system in Hanoi is complicated with the interconnection of drainage canals and connecting rivers. These rivers directly receive a portion wastewater and then run through main stream of Hong River. The dilution factor from wastewater of drainage canals, connecting rivers, and the main stream is different resulting in the different pollution level of PPCPs. However, the distribution and behavior of PPCPs in river system of Hanoi is still limited.

**Research purpose**

The purpose of this study is

- To study the analysis of PPCPs in sediment samples.
- To investigate the contamination and distribution of PPCPs in water environment in Hanoi



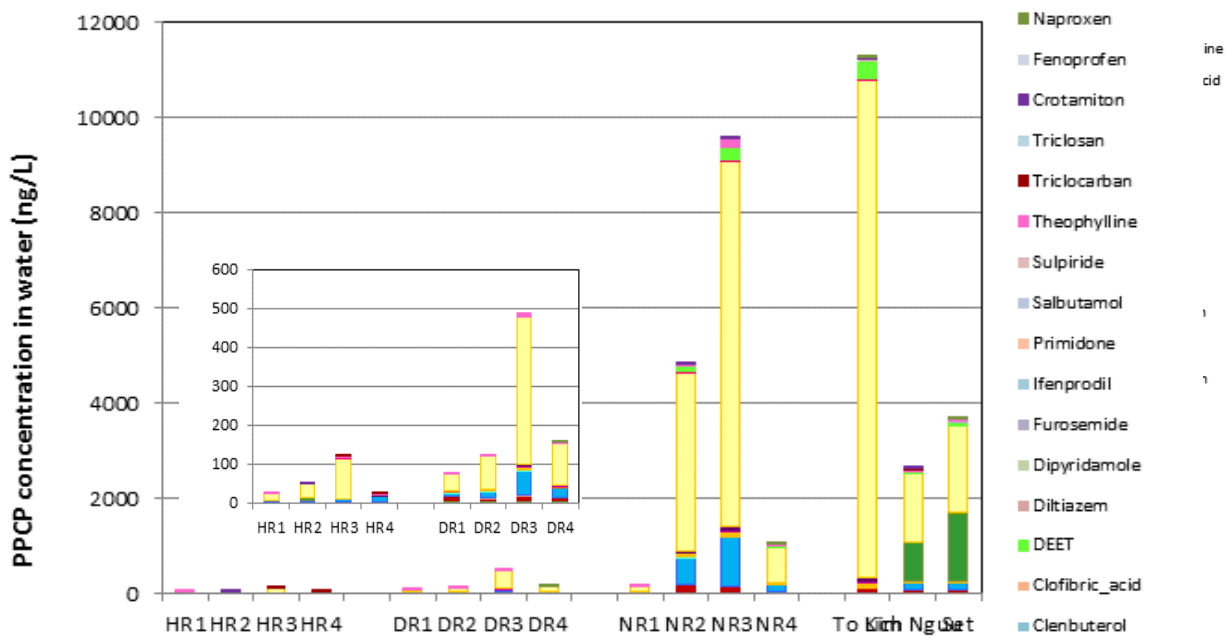
**Fig 2** PPCP analysis methods

## Samples

Surface water samples in Hanoi including drainage canals (3 samples), connecting rivers (7 samples), main stream (5 samples) and pond water (2 samples) were collected for determination PPCP levels in water phase and sediment samples including drainage canals (1 sample), connecting rivers (1 sample), main stream (3 samples) and pond water (2 samples) ) were collected for determination PPCP levels in sediment phase. Samples were collected and pretreatment in Hanoi. Pretreated samples were brought to Japan for more treatment and analysis PPCPs by HPLC/MS/MS system.

## Results

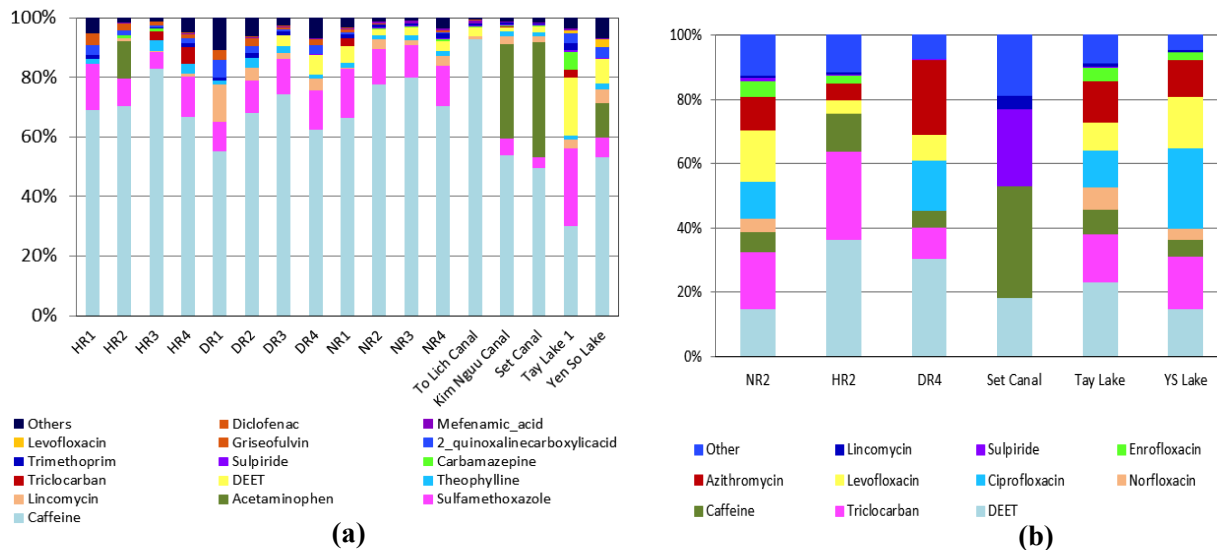
The analysis result showed the detection 13-30 out of 61 PPCPs in surface water samples and 15-28 out of 61 PPCPs in sediment samples of water environment in Hanoi. The total concentration of PPCPs in water phase varied in a wide range from tenths to thousands of ng/L and found highest in the urban canals which directly received urban wastewater. PPCP in sediment samples was found highest at the in lakes where there is accumulation of material in sediments.



**Fig.4.** PPCP concentration in sediment samples

**Fig.3.** PPCP concentration in water samples

The distribution of individual PPCP in water phase and sediment was different. In water phase, among detected PPCPs, Caffeine, Sulfamethoxazole and Acetaminophen were major compounds while in sediment phase the predominant PPCPs were DEET, Triclocarban and Caffeine and Sulfamethoxazole were found at low level in sediment samples. The low level of Caffeine and Sulfamethoxazole in sediment samples could be explained by the easily decomposing of Caffeine and the hydrophilic character of Sulfamethoxazole.



**Fig.5.** Predominant PPCPs in (a) water and (b) sediment in Hanoi, Vietnam

### Implications and impacts on future research

For the future research, factors affecting the occurrence of PPCPs in water environmental including sources, dilution factor, PPCP characteristics ... need to be investigated. It would be necessary to explore the partition of PPCPs between water and sediment phases to evaluate the distribution and fate of PPCP in water environment in Hanoi.