

# Distribution of Element Concentration in an Aquatic Macrophtyes Community in a River

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## Introduction

Aquatic macrophytes community as well as microorganisms community in water column have purifying function in the river. However, the water purifying function in natural steam was not fully analyzed yet. Especially the aquatic macrophytes community in natural river system is quite heterogeneous and then the chemical and physical parameters of river water are strongly affected by the distribution of plants in the river. In this research, we focused on distribution of flow rate and element concentration by heterogeneously distributed aquatic macrophytes community, and we tried to analyze the function of aquatic macrophytes on the formation of water chemistry including the heterogeneity within a fine scale of river.

#### Study Site Iwatakegawa River in Buzen-city, Fukuoka, Japan

The basin of Iwatakegawa River is 36.9km<sup>2</sup> and the length is 20 km.

Iwatakegawa River is flowing through urbanized area of Buzen city into Suou-nada.

Vegetation Phragmites japonica Steud. dominated community accompanying Coix lacryma-jobi L., Impatiens textorii Miq. and Persicaria thunbergii Var..



Fig.1 Phragmites japonica Steud.

[Growth period] April ~ November [Plant height] 150 ~ 200 cm [Distribution area] Native breed, throughout Honshu, Kyushu, Shikoku, Okinawa.

# This study had conducted three times (spring: 27 May., summer: 11 Aug., autumn: 6 Nov. 2008).

**Methods** 



We have located the permanent 20 m long and 10 m wide plot in the middle-watershed at Iwatakegawa River with crowded vegetation of *Phragmites japonica* Stend. dominated community (Fig. 2).

We examined coverage, column diameter and column height of *P. japonica*, flow rate, water table depth, EC, pH and ionic concentration of water at every 1 m x 1 m quadrat in this area.





Fig.2 The image of the investigation design in the Iwatakegawa River



In the laboratory, we made chemical analysis by Ion chromatography (IC) and Inductiovely-coupled plasma atomic emission spectrometry (ICP-AES) to determine concentrations of major cations (Na<sup>+</sup>, K<sup>+</sup>, Mg<sup>2+</sup>, Ca<sup>2+</sup>) and anions (Cl<sup>-</sup>,SO4<sup>2-</sup>, NO3<sup>-</sup>).



Data were analyzed with 3-D graphics of cover degree, flow rate, each element concentration by G-sharp in order to clarify the relationship between vegetation, physical and chemical parameters of river water at 1 m resolution.



Fig.4 Distribution of each element concentration

Among chemical parameters,  $NO_3^-$  and  $Na^+$  showed characteristic distribution (Fig.4). Concentration of  $NO_3^-$  increased from the upper to the lower stream of the river.  $Na^+$  showed higher concentration within the aquatic marcophytes. These results showed that function of aquatic macrophytes community on chemical modification of river water depends on elements.

## Conclusion

In this study, we found that the distribution of element concentration and flow rate were heterogeneous due to heterogeneous distribution of Vegetation coverage and microtopography in the stream. By the accumulation of data with different water table and different season, we will get the more exact function of aquatic macrophytes community on physical and chemical environments of river water.