

## Distribution of biogeochemical compounds in interstitial and surface standing water bodies in the gravel bar of the Kizu River, Japan

Kaori Anbutsu<sup>1</sup>\*, Takuo Nakajima<sup>2</sup>, Yasuhiro Takemon<sup>3</sup>, Kazumi Tanida<sup>4</sup>, Naoshige Goto<sup>1</sup> and Osamu Mitamura<sup>1</sup>

With 5 figures and 3 tables

**Abstract:** Distributions of biogeochemical constituents in interstitial water and isolated standing water bodies (or pools) were investigated in gravel bars 1 km in length to assess the ability of these waters to serve as a sink or source for nutrients. The temperature and concentration of major ions in interstitial water differed very little from those of river water. DO concentrations in interstitial waters were  $5.7 \pm 2.2$  mg O<sub>2</sub>/l and  $3.5 \pm 1.8$  mg O<sub>2</sub>/l at the side and dried-up channels, respectively. Concentrations of ammonium and nitrite of both interstitial waters at the side ( $0.50 \pm 0.17$  μM and  $0.13 \pm 0.09$  μM, NH<sub>4</sub><sup>+</sup> and NO<sub>2</sub><sup>-</sup>) and dried-up channels ( $0.90 \pm 2.14$  μM and  $0.27 \pm 0.37$  μM) were lower than those of river water ( $1.7 \pm 0.8$  μM and  $0.73 \pm 0.22$  μM), whereas nitrate ( $85 \pm 25$  μM at the side channel and  $79 \pm 36$  μM at the dried-up channel) did not differ on average from those of river water ( $70 \pm 12$  μM), though they were often very low (< 10 % of those of river water) at shallow depths of the vegetated areas in the dried-up channel. Soluble reactive phosphorus (SRP) concentrations in interstitial waters at the dried-up channel ( $0.84 \pm 0.53$  μM) were lower than those at the side channel ( $1.9 \pm 0.5$  μM) and those of river water ( $1.5 \pm 0.5$  μM), and decreased downstream. These results suggest that this aerobic hyporheic zone can serve as a sink for ammonium, nitrite and SRP and to a lesser extent of nitrate. Concentrations of these nutrients in pool water varied greatly but did not differ on average from those of river water. Dissolved inorganic nitrogen (DIN) and SRP concentrations were negatively related to the algal biomass. Pool waters also had lower DIN concentrations at the vegetated areas and higher SRP concentrations at the bar head. These results suggest that nutrient

<sup>1</sup> **Authors' addresses:** Limnological Laboratory, School of Environmental Sciences, University of Shiga Prefecture, 3165 Hassaka-cho, Hikone, Shiga 522-0057, Japan.

<sup>2</sup> Lake Biwa Research Institute, 1–10 Uchidehama, Otsu, Shiga 520-0806, Japan.

<sup>3</sup> Disaster Prevention Research Institute, Kyoto University, Gokasho, Uji, Kyoto 611–0011, Japan.

<sup>4</sup> Laboratory of Ecology, College of Integrated Arts and Sciences, Osaka Prefecture University, 1–1 Gakuen-cho, Sakai, Osaka 599-8531, Japan.

\* Corresponding author: E-mail: i10kanbutsu@ec.usp.ac.jp