

The analysis of the community composition of riverine bacteria and microalgae in relation to nutrient status and diversity: the case in irrigation season in the Yasu River, Japan

*Tohru Ikeya¹, Takuya Ishida¹, Yoshitoshi Uehara¹, Satoshi Asano², Ichiro Tayasu¹, Noboru Okuda¹, Masayuki Ushio^{3,4,5}, Shohei Fujinaga⁴, Chia-Ying Ko⁶, Elfritzson Martin Peralta⁷, Naoto F. Ishikawa⁸, Tomoya Iwata⁹

1. Research Institute for Humanity and Nature, 2. Lake Biwa Environmental Research Institute, 3. Hakubi Center, Kyoto University, 4. Center for Ecological Research, Kyoto University, 5. PRESTO, Japan Science and Technology Agency, 6. National Taiwan University, 7. University of Santo Tomas, 8. Department of Biogeochemistry, Japan Agency for Marine-Earth Science and Technology, 9. Faculty of Life and Environmental Sciences, Yamanashi University

The previous our analysis based on the community composition of microalgae and bacteria have shown that; 1) the beta diversity distances of algae and bacteria were significantly different between the four categories of land use in the Yasu River, 2) the ordinations of the sampling sites by the riverine microbial composition can be regressed by the environmental gradients between the sites in the watershed, 3) the diversity indices of bacteria increased with diversity index of algae. The further analyses of elemental composition of epilithic matter, most of which may be constituted from algae and bacteria, were made in order to assess the internal nutrient status of the epilithon. Both phosphorus amount per unit area and chlorophyll per carbon showed a significant positive correlation with phosphorus per carbon ($P < 10^{-8}$). Such ordination may help to realize whether phosphorus availability is limited to sustain the biofilm abundance or microbial activities so as to consider the possible impact of land use on the community composition and diversity of algae and bacteria. The richness of algae decreased with the decline of phosphorus per carbon of epilithic matter whereas that of bacteria was bifurcated. So, the richness and the Shannon diversity index (H) of algae showed a significant positive relationship with the phosphorus per carbon (possible index of phosphorus availability) ($P < 10^{-4}$), whereas those of bacteria showed insignificant relationship ($P > 0.2$). Most of low bacteria richness sites at low phosphorus per carbon corresponded to those where chlorophyll abundance per unit area is relatively high in spite of low phosphorus availability.

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