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Ecosystem-level effects of Korean freshwater bivalves in a eutrophic lake: Mesocosm study

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Ecosystem-level effects of filter-feeding freshwater bivalves (*Corbicula leana*, *C. fluminea*) were evaluated with a eutrophic lake water. Experiments were conducted in mesocosms (scale: 2m x 2m x 2m, water volume: 6 m³) with and without mussels for three months, and various parameters were evaluated at biweekly intervals. Feeding experiment was started with the addition of 100 individuals. During one month after the experiment was onset, Chl-*a*, total phosphorus (TP), and total nitrogen (TN) concentrations gradually increased in the experimental mesocosm, whereas those parameters in the control were stabilized in a bit lower levels than the starting levels. Thus, there were significant differences of all of Chl-*a*, TP, and TN concentrations between the treatment and the control mesocosm at that time. The inorganic nutrients, including soluble reactive phosphorus (SRP), nitrite, and ammonium were also significantly higher in the treatment, and showed a similar trend of change. Net primary productivity (NPP) showed a similar increasing trend during the first month. After one month, another 500 individuals added to the treatment mesocosm to make total 600 individuals, and the same parameters were evaluated. Within a month after the addition of 500 mussels, Chl-*a* concentration decreased from 77.82.1 g/L to 29.62.2 g/L, whereas Chl-*a* concentration in the control gradually increased from 17.40.5 g/L to 31.50.48 g/L. In a similar manner to Chl-*a* change, not only was transparency enhanced from 0.48m to 1.0m but also were suspended solids and TP concentration decreased from 221.0 mg/L to 7.50.5 mg/L and from 1330.8 g/L to 700 g/L, respectively ($p < 0.001$, $r^2 > 0.71$, $n = 11$) in the mesocosm with mussels. Unlike those in the first half feeding period with 100 individuals, the change of inorganic nutrients concentrations was not much different between both the mussel addition (600

individuals) and the control mesocosm. NPP change showed a similar trend to the decrease of Chl-*a* concentration. These results indicate that filter-feeding mussels have an efficient grazing effect on the suspended sestons including phytoplankton and thereby recycling nutrients, and their different densities exert varying effects on the ecosystem-level.