

Inter-relationships among the habitats of forests, rivers and coastal sea, with reference to the important function of nutrient transportation by anadromous fishes

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Summary

River system is an ecotone between the two defined habitats, land area and inland water region. It is also an ecotone between inland water region and coastal sea. These habitats, which are usually adjacent to each other, are thought to be mutually influenced in the aspects of the nutrient cycling and food webs. In the present study, we researched on 1) the seasonal dynamics of nutrient budget and food webs in the ecotone between the forest and river, 2) the community structure and the dynamics of material budget in the intertidal zone of coastal bedrocks, and 3) the function of nutrient transportation from the ocean to land ecosystems performed by anadromous salmonid fishes.

1. In the ecotone between the forest and river of southwestern Hokkaido, the biomass of tree leaves in the broad-leaved forest and algae in the stream showed the maximum in summer and in the period from autumn to spring, respectively. Corresponding to these seasonal dynamics, the terrestrial invertebrates had the maximum biomass in summer, while the riverine invertebrates did in the period from autumn to spring. As a result, forest birds abundantly utilized riverine invertebrates as their foods in spring, whereas riverine fishes highly utilized terrestrial invertebrates in summer. These data suggest that the riverine products appear to supply forest birds the nutrients in the period from autumn to spring, while the forest products seem to supply riverine fishes the nutrients in summer.

2. To elucidate the community structure and dynamics of organisms in the intertidal zone of coastal bedrocks, chlorophyll-a and N (nitrite and nitrate) concentrations were measured in 6 coastal sites of southern Hokkaido. The relationships were also analysed between the mean density of phytoplanktons and the mean N concentration, and between the phytoplankton density and the percentage cover of sessile organisms. The chlorophyll-a and N concentrations showed a significant difference between the sites examined, respectively, but no significant correlations were found between these two variables in each site. Although there was a significant correlation between N concentration and the biomass of algivores, no significant correlations were found among the density of phytoplanktons, N concentration and the biomass of carnivorous animals.

3. Based on the comparison of Pacific salmon biomass in river and ocean phases, it was reconfirmed that anadromous fishes such as salmonids had an important function in upstream transportation of oceanic nutrients onto land ecosystems.