ECOLOGICAL RESEARCHES FOR RIVER RESTORATION PROJECTS USING EXPERIMENTAL STREAM IN JAPAN

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The River Restoration Project in Japan started in 2002 with the initiative of the River Bureau under the Ministry of Land, Infrastructure and Transport. In comparison to conventional river rehabilitation projects, this project offers a broader spectrum of measures

River ecosystems can be divided into 2 components, namely, internal and external. The internal components include the organisms and their surrounding environment, which directly affects their inhabiting conditions such as dissolved oxygen, pH, current velocity, light intensity or photon flux, etc. On the other hand, the external components do not have a direct influence on the inhabiting conditions; rather they act as determinants of the internal components. In practice, river management through the manipulation of the internal components is difficult; therefore, it is governed by the manipulation of the external components alone. The external components of the river ecosystem can be manipulated by the river engineers and provide the impetus for the river restoration projects. The following representative external components are assumed: 1) structure, 2) flow regime, 3) sediments, and 4) energy and nutrient dynamics.

The experimental streams were constructed as a part of the restoration projects in order to develop new techniques, and particular focus has been laid on the external components by treating them as research subjects. This paper comprises three short reports and the result of a research conducted in the experimental streams; these pertain to a rehabilitation technique for stream margin vegetation, the quality of attached algae as food resources associated with turnover, organic matter dynamics, and the habitats for cyprinid larvae and juveniles, respectively.

In terms of habitats for cyprinid larvae and juveniles, it has been pointed out that lateral habitats, such as slack waters, backwaters, and secondary channels, play an important role in cases where current velocity and depth are low, organic matter is deposited densely, and macroinvertebrates are abundant(Moore & Gregory 1988a, b; Gaudin & Sempeski, 2001). These researches provide information on habitat types for the larvae and juveniles.

However, detailed physical characteristics of these habitats have not yet been realized. Moreover, it is difficult to design the shoreline of the stream in river rehabilitation projects.

In this research, fish and physical characteristics were surveyed in thalweg, stream shore and backwater in the experimental stream. As a consequence, the larvae and juveniles were found along the shoreline of the stream; however, their density (0.12-0.25/cell) is remarkably lower than that in the backwater area (11.5/cell). No individuals were confirmed along the thalweg. Current velocity and submerged cover were thought to influence on the abundance of larvae and juveniles. However, the submerged cover did not function well for the larval and juvenile habitat with the mean velocity of 6.6cm/s. In order to secure the ecological function, the current velocity seems to be slowed down near 1cm/s even in submerged cover.

REFERENCES

Gaudin P. & Sempeski P. (2001). "The role of river bank habitat in the early life of fish: the example of grayling, *Thymallus thymallus*," *International Journal of Ecohydrology & Hydrobiology* ,vol.**1**, pp.203-208.

Moore K. M. S. & Gregory S. V. (1988a). "Summer habitat utilization and ecology cutthroat trout fry (*Salmo clarki*) in cascade mountain streams," *Canadian Journal of Fisheries and Aquatic Sciences*, vol.**45**, pp.1921-1930.

Moore K. M. S. & Gregory S. V. (1988b). "Response of young-of-the-year cutthroat trout to manipulation of habitat structure in a small stream". *Transactions of the American Fisheries Society,* Vol.**117**, pp.162-170.