

FAR EAST BRANCH - RUSSIAN ACADEMY OF SCIENCES
AND
AMERICAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE
(Arctic and Pacific Divisions)

**BRIDGES OF THE SCIENCE
BETWEEN NORTH AMERICA
AND THE RUSSIAN FAR EAST
45th ARCTIC SCIENCE CONFERENCE**

ABSTRACTS, BOOK 1

25-27 AUGUST, 1994, ANCHORAGE, ALASKA
29 AUGUST - 2 SEPTEMBER, 1994, VLADIVOSTOK, RUSSIA



VLADIVOSTOK
DALNAUKA
1994

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Printed in the Publishing House «Dalnauka» 690041, Vladivostok, Radio st.,7

FUNCTIONING OF RIVER COMMUNITIES UNDER THE EXTREME ENVIRONMENTAL CONDITIONS OF RUSSIAN FAR EASTERN

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An examination of the literature sources and the experimental results obtained by the author allow to conclude that the vital activity of a considerable amount of species of river animals (first of all some fishes) and also the floodplain plant communities is closely connected with the extreme natural phenomena that define the conditions of their inhabitation. For many stream organisms the extreme natural phenomena represent an important limiting factor of their development. During the floods, draughts or river-bed freezing an incredible amount of hydrobionts dies. The survivorship of many populations under such conditions is allowed by the presence of natural refugia in the environment, which represent buffers preventing the system from destruction. Certain species of organisms acquire adaptations to survive the unfavourable conditions, these, for example, a capability of some invertebrates and amphibians to freeze into the ice or an ability to survive these unfavourable conditions on certain stages of development (cyst, egg, imago, etc.).

It was found that the stream communities may function independently through a long periods of time in isolated parts of a river-bed in drought periods. This capability shows evidently that some minimal links exist between subsystems within a river system. This allows to organisms to maintain their activity and organisation pattern in certain parts of a stream when neighbouring parts are highly disturbed. It is important that the existence of just such a structure of links is confirmed by relatively inconsiderable size of the drift distance for benthic animals and suspended organic matter under the absence of floods.

As it was shown before, the specific abundance of a river community rises as the area and spatial complexity of a habitat increases (Hart, 1978). In the River Continuum Concept the increasing of the specific diversity of hydrobionts, which might be observed usually from headwaters to ritral, is related to the changes in the water temperature, degree of illumination of the biotop, and the structure of food supply (Vannote et al., 1980). These factors may support undoubtedly the arising of the river continuum, but under the conditions of a repeated influence of extreme natural phenomena the specific diversity depends to a considerable extent on the amount of

different refugia, which could provide the survivorship of new members of the community. In this case the mechanisms of the settling cycles of hydrobionts acquire a particular ecological importance for the functioning of the river systems (Muller, 1954; Kubicek, 1978; Carl, 1989, and others). It is important that many stream organisms turned out to be able to recognize the «alarm» signals arising within the system and leave the dangerous zones in advance. This ability of animals represents one of the components of the regulation in a biological system, which provide the survivorship of the system itself.

It is obvious that the regular succession of low and high water periods influences favourably the general ecological situation in rivers. On the one hand, some groups of hydrobiont may reach in a low water period a high quantitative development, but in the same period the silting happens of their certain habitats and the processes of eutrophication may arise. On the other hand, during a flood river-beds are flushing from deposited «silt», leaf litter and other organic matter and also a negative or extreme drift of hydrobionts happens that results in the decrease of the density and degree of domination of certain species. Thus, river ecosystems or, at least, the considerable part of these may be referred to a particular group of natural systems where the extreme natural phenomena play a leading role in the regulation processes within the system. Thus, the regular succession of the extreme natural phenomena represents evidently a necessary condition for existing of such ecosystems, because only under such a condition they can maintain their unique dynamic pattern.