FLOODPLAINS AND RIVERBEDS TRANSFORMATION OF THE RUSSIAN AMUR-RIVER LEFT-BANK INFLOWS UNDER URBANIZATION

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Formation and development of riverbeds are determined by a flow of water and detritus, relief, climate, soil and vegetative cover features of a region, and the ecological floodplain condition. At the same time, the nature-caused processes in riverbeds are more and more influenced by the effects of economic activities, which is especially apparent in urbanized territories. We have studied the Amur-river left-bank inflows floodplains and riverbeds transformation occurring under the influence of natural and anthropogenic factors. In the report we analyze in detail influence of the built-up area on the processes of riverbed change and ecological condition in the Bira-river basin. The Bira-river flows across the territory of Birobidzhan – a town, which is an administrative center of the Jewish autonomous region in Russian Federation. The analysis of the built-up area of the Bira-river basin has been carried out, basic directions for drain of atmospheric precipitation calculated, main sources of the pollution and the areas of most probable pollutants inflow to the Bira-river determined. Resistance of coastal slopes to washouts is estimated by means of the following factors: lithologic structure, cross-section profile form and its morphometric characteristics, ratio of stream and bank dynamic axises, disposition to forming ice jams, the state of flood-plain vegetation. The steadiest banks are those consisted of monolithic rocks, or consolidated with bank-protection constructions. Their structure is non-uniform, basically belonging to the formations changed by man's impact that would have high degrees of washout in natural conditions. However, in consolidated areas, there occurs the washout of opposite banks previously considered to be steady and the island formations accelerated displacement, as compared to that in natural conditions. A change in the ecological condition of the floodplain and its vegetation is observed in both built-up areas and industrial zones. The sources of pollution located in the urban territory, lead to accumulation of heavy metals (copper, zinc, lead, nickel, cobalt, cadmium and iron) in the water, inundated soils and vegetation. Vegetative cover degradation manifests itself in a plant growth deceleration, emergence of foliage necrosis and green sickness, intensive growth of lichens into the bark, marked salvage increase, produced by illnesses and insects.

The floodplain vegetation damage caused by anthropogenic factors leads to the reduction of fastening effect in the root system, thus accelerating the bank slopes washout and strengthening spatial heterogeneity display. We have elaborated an original mathematical model of the vegetative communities spatial-temporal dynamics (based on the integral-differential equations) provided to trace and analyze the processes of degradation in vegetative communities and development of the expressed spatial heterogeneity.