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The glinscica stream experimental watershed

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Watercourses are complex ecosystems with high dynamics of ecological processes. Despite their dynamics, natural reaches of watercourses reveal a certain level of self-regulating processes and maintenance in a certain range of ecological conditions. Modification or prevalence of a certain function of a watercourse above the rest may lead to instability in the watercourse as a system and to degradation of the water environment and reduction of its ecological potential. Characteristic examples are rivers in the urban environment. The impact of urbanisation on hydrologic, hydraulic, chemical and biological state of urban watercourses is complex and mainly depends on the scale of the watershed area and magnitude of urban development. Small-sized watercourses in urbanised watersheds are usually more affected by modified ecohydrological and hydromorphological conditions than large-sized rivers, where the local urbanization-induced hydrological characteristics contribute towards a rather small proportion of the entire river flow. Hence for the study of the effects of urban environment on the ecohydrological state of watercourses, small urban streams are more fitting. For the purpose of monitoring the impacts of the urban environment on urban streams, the monitoring system has been established on the Glinscica stream experimental watershed. The Glinscica stream watershed area is situated in the central part of Slovenia and reaches into the eastern part of the urban area of the capital city of Ljubljana. The precipitation watershed area of the Glinscica comprises 16.7 km2. The position of the runoff within the urban area is determined by the removal of rainfall water by way of a sewage system therefore the orographic barrier does not coincide with the Glinscica drainage area. The total drainage area of the Glinscica up to its outlet into the Gradascica river is larger and comprises 19.3 km2 of the watershed area. New, sophisticated measuring equipment was introduced, which

enabled tracing of seasonal and short-term changes of in-stream hydraulic and water chemistry changes. The equipment included a one-dimensional ultrasonic Doppler instrument, 2D/3D handheld Doppler velocimeter, Flo-tracer dilution flowmeter, water quality multiprobe and three rain gauge stations. The one-dimensional Doppler instrument is placed at the bottom of streams and records water level (limnigraph), water velocity and temperature. The water quality multiprobe, designed for in-situ and flow-through applications, measures parameters simultaneously. The multiple parameters include: nitrate, ammonium, temperature, conductivity, depth, dissolved oxygen, total dissolved solids (TDS), oxidation reduction potential (ORP) and pH. 19 sampling points were chosen for the monitoring of spatial and temporal variations of the water quality in the Glinscica stream and its tributary, the Przanec creek. The results of the monitoring raised some new questions about the role of the stream hydromorphological alterations as a consequence of past channel regulations, interactions between the urban environment and surrounding areas and the effects of these interactions on eco-hydrological state of the Glinscica stream. The impacts of urbanization on biological state of watercources are detected on macroinvertebrate communities. This assemblages respond to both pollution and habitat changes. The impact of organic pollution was excluded in the GlinŽèica stream as all five experimental sites were previously assessed as moderately polluted. Differences in morphological degradation of river banks and channel enable us to relate hydromorphological stress and biotic metrics and taxa. River habitat survey (RHS) was a basic methodology used to assess physical habitat quality. Habitat degradation downstream was related to macroinvertebrate and partially to periphyton community characteristics. The composition of macroinvertebrate assemblages did not follow the longitudinal pattern of habitat modification detected by RHS methodology.