

## **LJUBLJANICA CONNECTS - Restoration of the Ljubljanica River corridor and improvement of the river's flow regime**

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The project Ljubljanica connects is focused on improving connectivity and living conditions in Ljubljanica River which flows through capital city of Slovenia, Ljubljana. It represents living environment for endangered and Natura 2000 targeted fish species Danube Salmon (Hucho hucho), Danube Roach (Rutilus pigus) and Striped Chub (Leuciscus souffia). The project consists of four sets of activities: concrete restoration actions including improvement of two fish passes, monitoring of fish migration, monitoring of eco-hydrological parameters, and raising of public awareness.

To improve living conditions the concrete restoration measures were performed. The reconstructions of sill and two fish passes on the Ljubljanica River have been implemented and barrier's lifting system on the weir was modernized. Above the sill in Zalog there is an oxbow which was disconnected with main river channel during the low flows. Interrupted inflow of fresh water caused very poor living conditions for animals in the oxbow. The raise of the sill helped to improve this situation. One of the fish passes included in the project is more than 100 years old whereas both are protected as cultural and technical heritage. None was working properly and due to the protection no visible nor drastic measures were allowed. With smaller improvements we managed to re-establish their operation. A lifting system of the barrier at the Ambrožev trg gate was outdated and did not allow precise regulation of the water level. Too fast raising of the barrier instantly caused deterioration of eco-hydrological conditions downstream. With modernization of the electromechanical equipment the situation is improved.

The fish monitoring helps us to evaluate success of concrete restoration actions. The fish population status is monitored with marking the fish with Visible Implant Elastomer (VIE) tags. Regarding the location of catch we implant tags beneath transparent or translucent tissue combining different tag locations (dorsal fin, post ocular tissue) and colours (red, yellow). The success of restoration of fish passes is monitored with the use of on line connected cameras installed in the fish passes. Records from the camera are analysed to evaluate number and type of fish using the fish passes.

For further evaluation of living conditions the eco-hydrological monitoring of water temperature, its level, and oxygen concentration is continuously implemented on 17 measurement stations. Occasionally near those permanent measurement stations we also measure the discharge. On a few locations temperature was additionally measured also with optical cable.

We would like to present our activities and results of the project to a broader public so that they would be aware of what is happening around them. One of the most popular activities are thematic presentations and field workshops for school children and students.