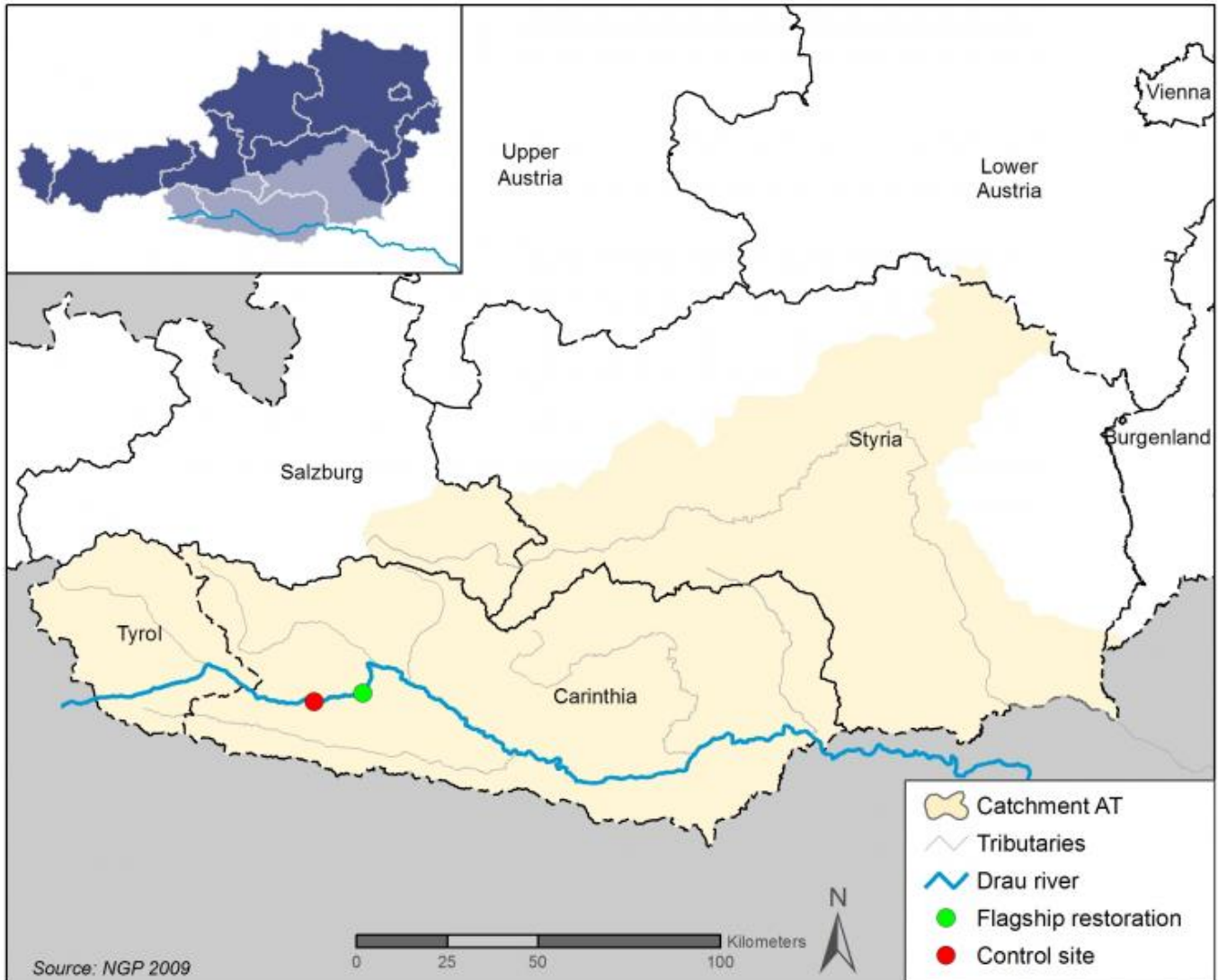


## The River Drava changes...

The Austrian River Drava (in German “Drau”) is part of the Danube catchment. The Drava flows 264 km along the border between the Central Alps and the Southern Alps and across the Austrian federal states Tyrol and Carinthia. In Osijek (Croatia), the river joins the Danube River.



*Catchment of the Austrian River Drava*

Until approximately 140 years ago, the Upper Drava was a free flowing, meandering mountain river with numerous braiding stretches due to alluvial cones of the tributaries. In this dynamic river system with its annual floods and high bedload transport, the river course frequently changed. A braiding river - floodplain system with large gravel banks, grey alder, willow wetlands, and wetland meadows characterized the valley bottom (cp. Amt der Kärntner Landesregierung, 2004).



*Side arm restoration measure, Kleblach - Lind (S. Kaufmann / A. Loach)*

### **Human impacts**

The first substantial human changes began with the building of the railroad line through the Upper Drava valley in 1868. In the following years, river-engineering channelized the river to reduce flood risk, as well as to allow intensive agricultural land use and the expansion of settlements. When the river was forced into a single main channel, the river dynamics were restricted and the number of side arms, gravel banks, wetland water bodies, and other natural habitats decreased.

Due to the regulation processes and reduced sediment supply by the tributaries caused by torrent control structures, river bed incision occurred. This incision resulted in a decreased ground water level, causing desiccation of the remaining wetlands (cp. Amt der Kärntner Landesregierung, 2004).



River bed widening, Kleblach - Lind (A. Loach)

### Restoration measures

In 1998, the river and its riparian zones became protected by designation as a Natura 2000 area. From 1999 to 2003 two EU LIFE projects were initiated under the title "Restoration of the wetland and riparian area on the Upper Drau River" and 2006 to 2011 ("Life vein - Upper Drau river").

These projects defined goals such as species and habitat protection and water management interests. Approximately 15 km of bank protection structures were removed, and several large scale river bed widening measures including new arms were realised.

Furthermore, the development of new wetland water bodies and floodplain forests was initiated, providing adequate habitats for formerly typical animal and plant species. In total, approximately 42 hectares of alpine river habitats were created.

The restored river stretches comprise habitat types according to the EU Habitats Directive (e.g., dynamic gravel banks (3220) and tamarisk and willow pioneer communities (3230, 3240)), which will further develop to alluvial forests (91 E0). These sites provide:

- improved spawning habitats for amphibians and fish, in particular the Danube salmon (*Hucho hucho*), Souffia (*Leuciscus souffia*), European bullhead (*Cottus gobio*), Ukrainian brook lamprey (*Eudontomyzon mariae*), and Atlantic stream crayfish (*Austropotamobius pallipes*);
- extended habitats for 140 bird species, including 51 red listed species, and resting places for migrating birds crossing the Alps. Typical species that will benefit include the common kingfisher (*Alcedo atthis*), the common sandpiper (*Actitis hypoleucos*), the grey wagtail (*Motacilla cinerea*), the lesser spotted woodpecker (*Dendrocopos minor*), and the golden oriole (*Oriolus oriolus*);
- extended habitats for two plants which were both nearly extinct in Austria: German tamarisk (*Myricaria germanica*) and the dwarf bulrush (*Typha minima*);

In the framework of the project, an additional 5 hectares of water bodies in the floodplain area were created. These areas connect habitats for amphibians, such as the Italian crested newt (*Triturus carnifex*) and yellow-bellied toad (*Bombina variegata*). They provide important habitats for small fish species, such as the Amur bitterling (*Rhodeus sericeus*) and crucian carp (*Carassius carassius*) and improve valuable food supply for the white stork (*Ciconia ciconia*). The European otter (*Lutra lutra*) re-settled in the region, also benefitting from the Life Nature restoration measures.



The River Drava in the Austrian federal state Carinthia is one of the flagship restoration case study sites in work package 4 of REFORM. The project aimed to increase flood retention, to reach good ecological status, and to provide an appropriate river landscape for recreational use. The restoration measures were implemented in 2003 as part of the already mentioned LIFE Nature project "Restoration of the wetland and riparian area on the Upper Drau River". Bank stabilization structures were removed and the river bed was widened. Lateral erosion increased the sediment input and initialized the development of gravel / sand bars and islands. One of the former side arms was reconnected to the river for annual flooding, and a second side arm was widened to a width of 30 m, creating diverse instream structures and increasing aquatic habitat diversity. This project was designed to reduce human intervention as much as possible and to promote dynamic, self-sustaining river processes.

**Reference:**

AMT DER KÄRNTNER LANDESREGIERUNG (2004): LIFE-Projekt Auenverbund Obere Drau, Endbericht; Klagenfurt; 2004

**For further information:**

Susanne Muhar and Andreas Loach, BOKU Vienna - University of Natural Resources and Life Sciences

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