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DYNAMICS OF MACROINVERTEBRATES COMMUNITY IN RESPONSE TO RIVER RESTORATION IN DIFFERENT HYDROLOGICAL REGIMES

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INTRODUCTION

The most of the Alpine rivers have undergone significant changes during the last two centuries. Accessible riverside areas have been subjected to strong anthropic use, so rivers have been controlled and stabilized in order to prevent erosion of agricultural lands. Moreover, engineering works carried out for ensuring flooding protection and the exploitation of gravel resources have led to morphological modifications; the resulting river morphological changes have led to a disruption of biotic and abiotic characteristics. The current critical management situation has made river restoration a major issue all over the world; this approach is reinforced by the European Framework Directive which aims to ensure that rivers attain a good ecological status by 2015, through the use of biological quality elements.

STUDY AREA AND MATERIALS AND METHODS

The study area lies in South Tyrol (Italian Alps) and is composed by two rivers that flow in adjacent valleys: Ahr/Aurino River (glacial regime, drainage area = 630 km^2) and Antholz/Anterselva River (non-glacial regime, drainage area = 112 km^2). In both rivers bank protections were removed and cross-sections widened during the last years. Furthermore, the Ahr riverbed was raised through the introduction of sediment removed from the banks.

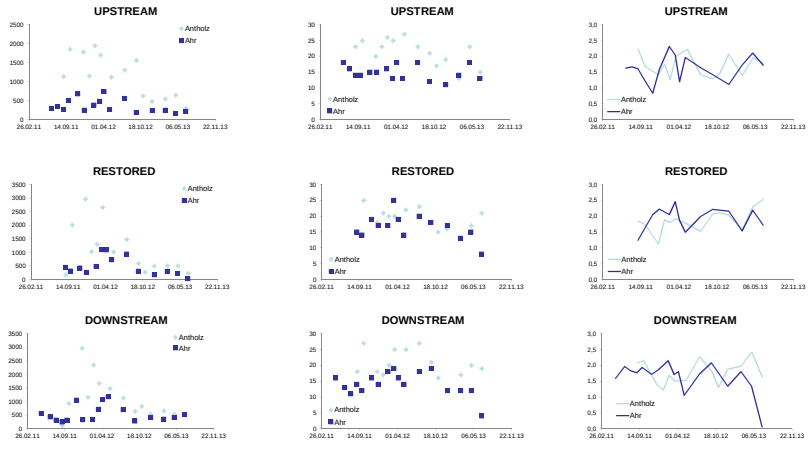
The response of the macroinvertebrates community has been assessed for two years. In each river three sampling sites have been surveyed, one inside of the restored area, one downstream and one in the degraded reach upstream. In Ahr river the sampling has been carried out monthly since May 2011, while in Antholz river monthly since August 2011. All the samples were taken by the means of a Surber net and analysed afterwards in laboratory.

Degraded and restored reaches of Ahr River (respectively a) and b)) and of Antholz River (respectively c) and d)).

RESULTS

SEASONAL VARIATIONS

INDIVIDUALS ABUNDANCE (ind./m^2) | TAXA ABUNDANCE (-) | SHANNON INDEX (-)

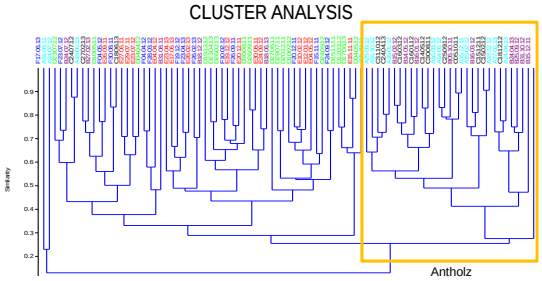


The abundance in individuals is always higher in Antholz River.

The number of taxa is almost always higher in Antholz River.

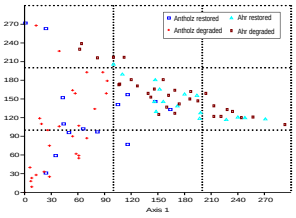
The diversity index shows a complex pattern with comparable values in the two rivers.

CLUSTER ANALYSIS



The Bray-Curtis dendrogram of the similarity of the macrobenthonic structures shows two main clusters: the cluster on the right is composed by the samples taken form the Antholz River (colors black, violet and light blue) and the one on the left is mainly composed by the samples taken in the Ahr River (colors blue, red and green).

DETRENDED CORRESPONDENCE ANALYSIS



The DCA results show two main groups of samples, one corresponding to the Antholz samples (bottom left of the graph) and the other one corresponding to the Ahr samples (middle of the graph). No clear separation is visible between restored and degraded reaches.

CONCLUSIONS

The higher abundance of individuals and number of taxa shown in the Antholz River is definetely due to the hydrological regime, since Ahr River is influenced by the glaciers. The Shannon index vary greatly over time but there are no interpretable trends. A difference response to the hydrological regime is shown in the similarity of the populations grouped into two different clusters. There is no apparent difference between restored and degraded reaches. The seasonal trends dictate the macrobenthos dynamics rather than the modified channel morphology. These conclusions agree with findings from others European rivers.

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