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Mitigation opportunities for obstructed river reaches by combining RES-E and WFD objectives

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Hydropower has a prominent position in the production of electricity in Austria. Varying with the hydro-meteorological conditions of the particular year, hydropower contributed between 59 and 75% to the total production of electric energy in the past 25 years (1980-2004, Austrian Energy Agency).
The Directive on Electricity Production from Renewable Energy Sources (RES-E, Res 2001/77/EC), and the European Climate and Energy Package (EP 17.12.2008) lead the way to the increase of Renewable Energy Production. Also in the context of achieving the Kyoto goals, an increase of hydro-electric power production is one of the most popular options discussed in the public (see, e. g., Masterplan Wasserkraft 2008). As proposed, increases should be achieved by improvements in the efficiency of existing hydropower plants, as well as by construction of new plants. At the same time potential operators of new hydropower plants often face problems due to the ecological impact of a new lateral structure in the river continuum. This is one of the impacts of the EU Water Framework Directive (WFD, Res 2000/60/EC).
The two directives, the RES-E and the WFD, are still often seen as to be contradicting because they have competing interests. The presented on-going study aims at fulfilling the goals of both directives, restoration of the river continuum and generating electricity from a renewable energy source, by revealing the unused hydro electrical potential within the existing lateral structures. Comprehensive data on these lateral structures (abandoned weirs, ground ramps etc.) in the Austrian rivers were collected due to the EU Water Framework Directive (WFD).
A win-win situation for both, ecology and energy sector is possible: ecological measures can be implemented and financed by the developers of new hydropower plants, while construction of the power stations benefits from the existing lateral structures. This project will help to identify sites, where the required actions to improve river continuity can be combined with hydropower generation. Utilizing this potential can help mitigate the impacts of river regulation.
The scientific challenge of the project was in the joint use of a variety of very diverse morphological, hydrological, ecological, infrastructural and socio-economic data. The main steps were the definition and set-up of a consistent database, the derivation of site-specific hydrological information from the hydrological water balance model, the classification of the lateral structures according to the project objectives, and the evaluation of representative sites. In contrast to large scale approaches that estimate potentials derived from the mean runoff potential the presented Hypo-last study combined existing information in order to get a detailed study of the feasible potential according to the requirements of the WFD.
The results can be used for strategic decision making concerning the Austrian energy and climate policy in the federal as well as in the province governments. At the same time the study output is detailed enough to be used as a guideline for the development of hundreds of new hydropower project sites.