Expected effects of a dam removal or mitigation on the persistence of the Atlantic salmon population of the Allier river

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administrative, economic and social differences among the EU state members. While consolidated states as those in north and west Europe are performing advanced restoration practices, newly incorporated countries in east Europe show differences and difficulties to develop restoration programs. NGOs, farmer Unions and local authorities have important stake on restoration. The first group is made of conservation groups at local, national and European scales with direct interest on the restoration of degraded ecosystems and to provide habitat for species of interest. The second is a key actor interested on enhancing productive uses of the land which should integrate the restoration of degraded natural ecosystems after a number of potential actions delineated by the European Common Agricultural Politics. The third, local authorities, have strong potential for restoration actions derived from their authority to regulate land cover and land uses. So, major power capacity to stimulate and regulate restoration in newly EU members is based on the European Policies regulating productive uses and biodiversity conservation. It is foreseen and expected that the EU Government, Council and Parliament will continue figuring prominently in the power relationships for developing restoration at continental scale while economic-social integration of European human populations takes place.

SY59.1

The dam removal in the Sélune River (France): a long-term interdisciplinary program from the particle to the watershed scale

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Dam removal constitutes a major action to restore connectivity in rivers. However, the risks/benefits balance of such operations remains poorly documented, and long-term studies are lacking. In France, a 16-year scientific program has been initiated to monitor the removal of two dams in the Sélune River (flowing into the Bay of Mont Saint-Michel, UNESCO's world heritage site), and planned in 2019. The ultimate aim of the project is to characterize the nature and the dynamic of ecological changes due to dam removal, and to identify the underlying mechanisms. Involving 20 labs from complementary research fields, the scale of studies conducted in this program ranges from the particle to the watershed. Several studies are currently running according to four interconnected tasks. The first task relates on aquatic biota and its goal is to characterize the evolution of diadromous and resident fish, invertebrates, crayfish, and vegetal (including macro- and microalgae) communities after dam removal. It aims to evaluate the changes in water quality, identify successful evolutionary strategies for diadromous fishes, and highlight fundamental changes in the functioning of freshwater ecosystem after the ocean-river reconnection. The second task focuses on physical river dynamics and aims at characterizing changes in physico-chemical, fine sediments and water fluxes, and resulting impact on geomorphology and aquatic habitats. The third task deals with landscape ecology and intends to monitor changes of riparian vegetation and interactions with agricultural landscape. Finally, the fourth task relies on social geography and aims to study the appropriation process of dam removal by inhabitants of the valley, evaluate the success criteria of this large-scale restoration program and to assess the changes in current ecosystem services. This program constitutes a great opportunity to develop cutting edge technologies such as DIDSON camera, LIDAR full wavelength and optic fibers.

SY59.2

Expected effects of a dam removal or mitigation on the persistence of the Atlantic *salmon* population of the Allier river

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The Allier catchment is the last large European river populated with Atlantic salmon. This population is therefore a unique natural heritage. The Poutès dam located in the upstream section of the Allier is one of the major historical reasons for the decline of the Allier population. In 1986, the dam was equipped with a fish lift allowing once again, adult Atlantic salmon to move upstream of the dam. While

this has been a significant improvement, Poutès dam is still a major obstacle for the adult upstream migration as well as the juvenile downstream migration. In order to mitigate the negative impacts of the dam, a new development project is being considered. In 2012, a full life cycle hierarchical Bayesian model was developed to describe the population dynamics of the Atlantic salmon population in the Allier catchment. It uses various abundance data sets collected over the last 30 years. This model is used to make projections of the population's future for the next 20 years under 3 different scenarios, all assuming that no stocking would occur, to assess the potential impact of the Poutès dam development project:
(1) no improvement of the downstream and upstream migration at Poutès,
(2) 50% improvement of the downstream and upstream migration at Poutès,
(3) 100% improvement of the downstream and upstream migration at Poutès (equivalent to dam removal).
Our preliminary results indicate that by improving fish passage at only one strategic dam, the situation of the Allier salmon population can be improved significantly, even if this may not suffice to ensure the population persistence on the long term due to other adverse factors.
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SY59.3

Foreseeing reversibility of big dam regulation effects: riparian diversity patterns across semi-natural and emerging ecosystems

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Human actions such as big dam-building have markedly transformed landscape generating habitats with novel characteristics and functioning. These emerging ecosystems display both new potential threats and opportunities for the management and conservation of biodiversity. Alqueva dam (SW Iberian Peninsula) created a large impoundment in Guadiana river and an archipelago of permanent islands developed across the reservoir area. In the present study, we aimed at characterizing the biophysical features and floristic composition of Alqueva islands, interpreting the environmental drivers of different functional traits and diversity patterns, and assessing the effect of emerging habitats creation in richness and functional diversity changes over time. We used GIS and ground truth for the biophysical characterization and floristic surveys conducted from 2001-2012, to characterize the composition and structure of plant communities on a representative sample of 64 islands. A functional approach was used by analysing traits abundances across floristic inventories and by calculating a functional diversity index. To assess change in community diversity and structure, we analysed specific and functional diversity, species and trait composition by means of univariate and multivariate data analysis. Our results showed the development stage of emerging habitat colonization in the short and medium term after a reservoir creation. Community trait composition revealed shifts in dispersal traits associated to habitat and landscape change. The newly created water surface favoured hydrochory dispersal traits. Other traits like physiognomic plant type, seed weight and type of leaf were associated to islands physiography. Functional diversity showed a consistent temporal trend change, increasing in the short term, and stabilizing or decreasing in the medium term, across islands despite their different biophysical and floristic features. Understanding regulation effects on riparian functional diversity may add important information when planning regulated habitats management and restoration, since it may contribute considerably to foreseeing the ecosystem resilience against prospective disturbances.

SY59.4

Modeling vegetation colonization in the context of dam removal using remote sensing and *in situ* observations

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