



Interactions among ecological and hydromorphological processes in river floodplains and their role for river ecosystem functioning

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Introduction

Problem definition

- Interactions between hydrology, geomorphology and ecology create highly dynamic and diverse landscapes
- The effect of these interactions on landscape pattern and ecology is largely unknown
- Understanding these underlying processes is important for effective catchment management

This project

- PhD research in framework of EU-project REFORM
- Aims at fundamental understanding of eco – hydro – morphological interactions
- This will be done by hydromorphological modelling combined with vegetation - and habitat suitability modelling, (management) scenario`s and field visits



Erosion (left), sedimentation (right upper corner) and succession processes in the river Allier (France).



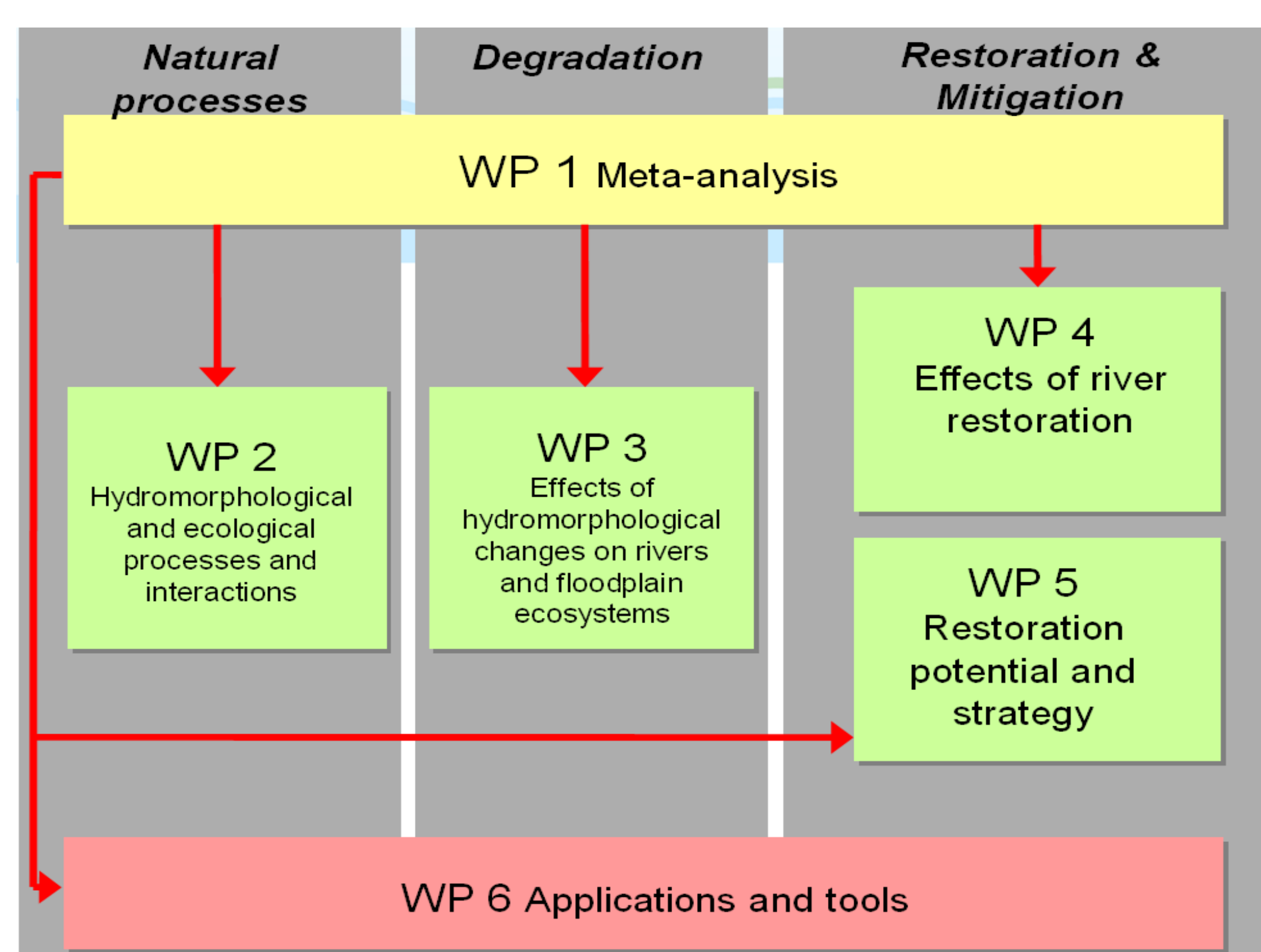
River Allier in France with dynamic and diverse habitat patterns.

EU-REFORM (2011 – 2015)

The REFORM (REstoring rivers FOR effective catchment Management) project focuses on the functioning of natural river systems and effects of pressures and measures on aquatic ecology in rivers.

The overall aim is to develop tools and protocols to :

- Monitor biological response to changes in hydromorphological conditions with greater precision
- Support the design of the Program of Measures (PoM) for the Water Framework Directive
- Provide a better Integration of restoration with socio-economic activities



Flowchart of workpackages with links in REFORM. More information: <http://www.reformrivers.eu/>

PhD research (sept. 2012 – sept. 2016)

- What are the key interactions between vegetation and hydromorphological processes in active floodplains of lowland rivers?
- What habitat patterns and dynamics arise from the interplay between vegetation, morphology and hydrology? How can we quantify these patterns and their dynamics?
- How do human pressures influence landscape patterns and dynamics?
- How can we design landscaping measures in such a way that they have a desired and sustainable result?



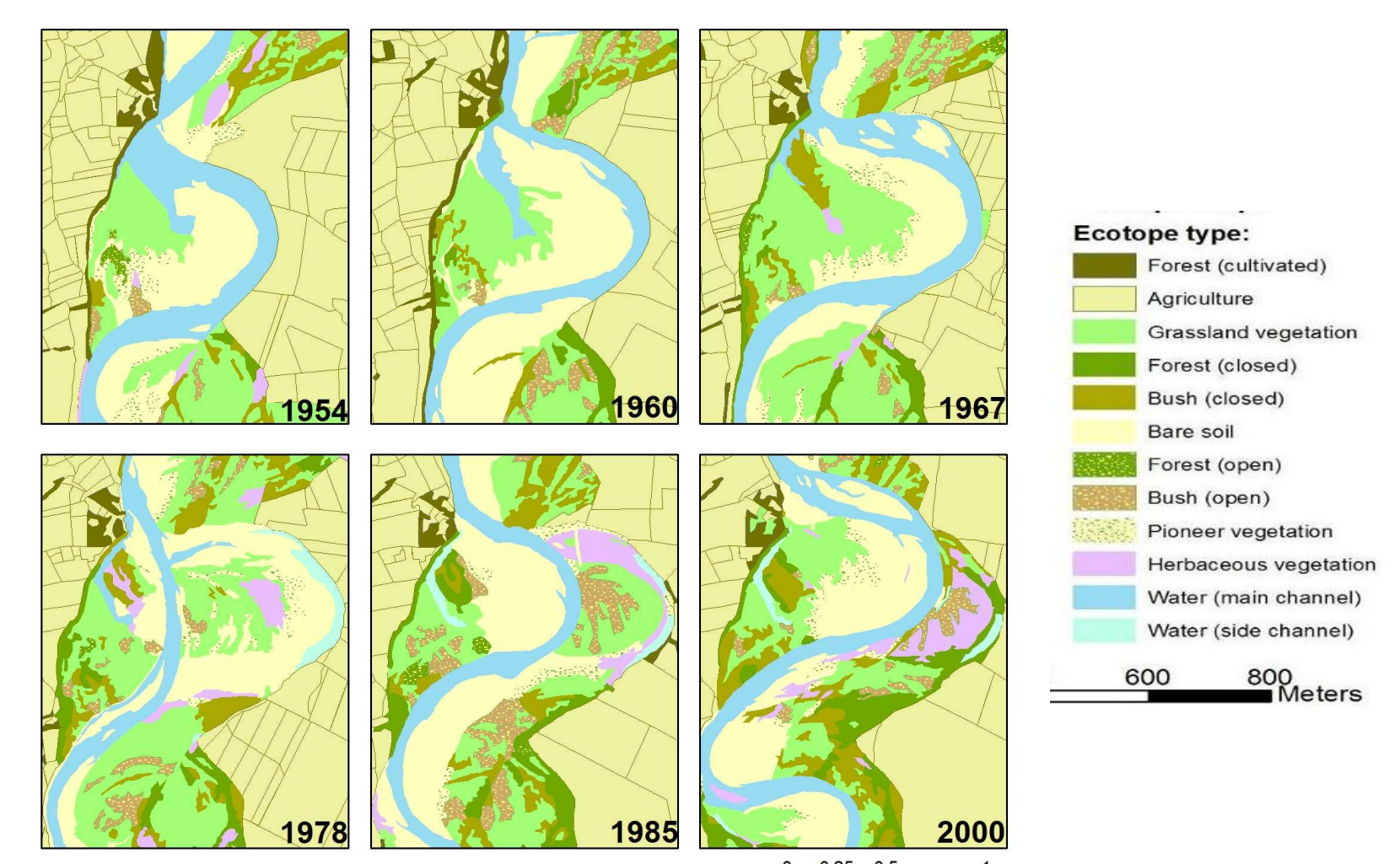
Constructing free eroding banks as a landscaping measure.

Methods

- Development of a process-based hydrodynamic model with an embedded vegetation module
- Dynamically linking hydromorphology to habitat suitability models
- Running generic scenario`s to investigate fundamental processes
- Use case study area(s) for validation of the model and prediction the effects of pressures and measures

Scenario`s

- Different flow regimes (timing, magnitude)
- Different sediment loads and types
- Different initial floodplain morphology
- Different landscaping measures
- Different human pressure sets
- Combination of scenario`s



Different habitat patterns and floodplain morphology can arise over time (e.g. Allier, France).

Acknowledgements

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