Island river levelling: a favorable situation to explore ground beetles (Coleoptera : Carabidae) ability to recolonize pioneer riparian habitats

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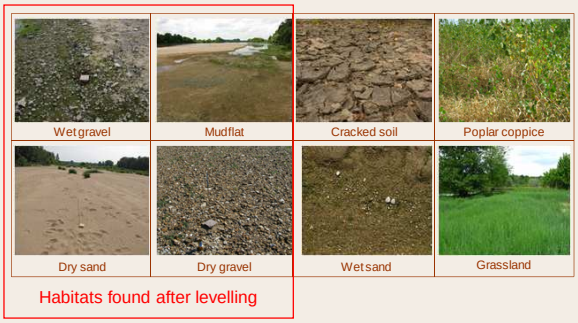
Introduction

The Loire, the last wild river in Western Europe, undergoes recurrent maintenance operations of bed to improve flow and to avoid reduction of the main stem. In autumn 2012, the territorial collectivities carried out levelling of one island in the Natural Reserve of Saint-Mesmin (Centre region, France). We took advantage of this work to launch a long term survey of the island recolonization by plants, birds, beavers and insects. We report here the impact on insect populations taking ground beetles (Coleoptera : Carabidae) as a model. We compared species (communities) before and just after the levelling.

Methods

Habitats

In 2012, before levelling, we identified 8 pioneer habitats on the island Loire valley. After levelling, 4 pioneer habitats were found and selected on the island.



Ground beetles sampling

We used pitfall traps to sample ground beetles between June and September 2012 – 2013 in the habitats under study.

Analyses

Species richness

We report the observed species richness and its bootstrap estimator with the associated standard error in each pioneer habitats (Colwell & Coddington, 1994).

Indicator species

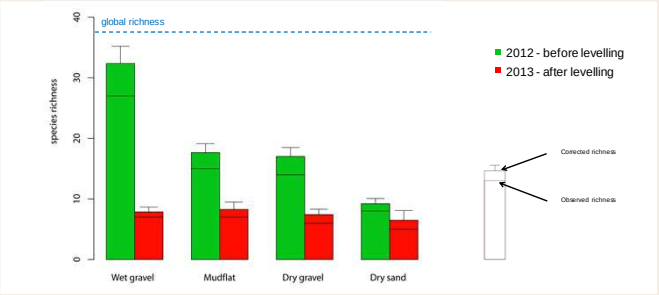
We explored the indicator value of each species with regards to the habitats surveyed in 2012 by means of the IndVal index developed by Dufrêne & Legendre (1997).

We present here IndVal values >0.25 associated to probabilities <0.001.

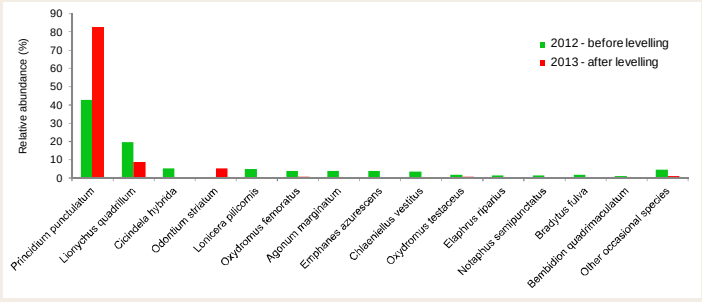
Results

Species richness and abundance

We identified 36 species in 2012 (869 individuals) and 17 species in 2013 (1022 individuals). Only 15 species were found again after levelling. For each habitat, the specific richness decreased sharply after levelling.

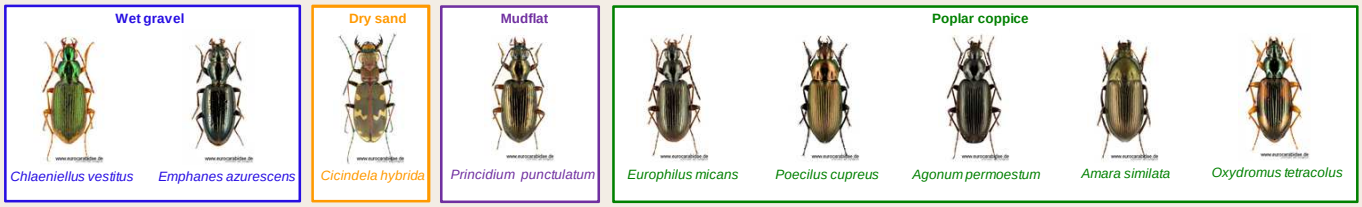


The species absent in 2013 were occasionally encountered before levelling. The ripirian species *Principium punctulatum* and *Lionychus quadrillum* were both dominant before and after levelling.



Indicator species

We identified 9 characteristic species of different habitats before levelling in 2012.



Conclusions

The pioneer island habitats have an important species richness. A decrease of the species richness was observed just after levelling, however this decline concerned infrequent species (1 to 5 individuals) and may be explained by a lower sample intensity in 2013 as compared to 2012. The predominant species in 2012 were also abundant after levelling works.

Three species, *Chlaeniellus vestitus*, *Cicindela hybrida* and *Principium punctulatum,* typical of riparian communities on Loire river and characteristic of wet gravel, dry sand and mudflat were found before and just after levelling.

References : Colwell, R.K. and J.A. Coddington, 1994. Estimating terrestrial biodiversity through extrapolation. *Philosophical Transactions of the Royal Society of London.* Series B-Biological Sciences. 345 :101-118
Dufrêne M. & Legendre P., 1997. Species assemblages and indicator species: the need for a flexible asymetrical approach. *Ecological Monographs* 67 : 345-366.

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