

RIPARIAN VEGETATION DYNAMICS

AFTER CLEAR CUTTING

Dynamique de la végétation riveraine après la coupe à blanc

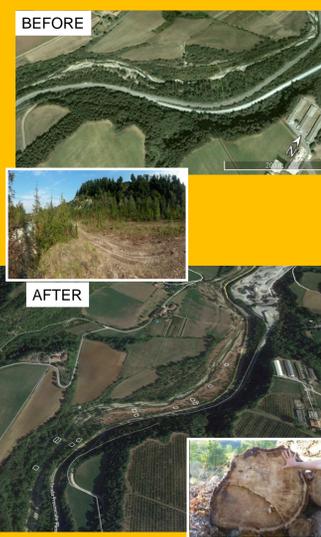
Native riparian vegetation is a key condition for a healthy functioning river ecosystem. It performs many important ecological functions of direct economic and social and environmental value. Because they provide so many services, riparian habitats can be thought of as a “conservation bargain”—a small investment that yields large returns. Among its functions it affects flood hydrology by attenuating the flood wave, enhancing deposition and reducing bank erosion

However, in August 2014, 10 km of riparian wood along the Savena river (Italy) was subject to clear cutting with the declared aim to avoid any risk arising from possible floods. In order to feed into future decision-making processes, since now three years of monitoring campaigns were carried on to verify the resilience, the variations of structure and phyto-diversity, as well as the turn-over of riparian plant species.



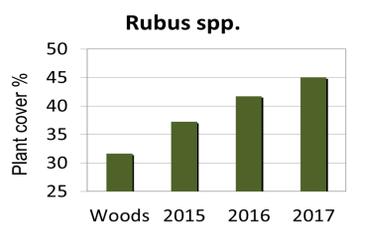
Study Site and Methods

In order to evaluate the “clear cutting” impact, physiognomic-structural and phytosociological survey are carried out since 2015. 12 georeferenced sample plots (100 m² each), 7 placed in deforested area and 5 within no impacted riparian wood, were selected.

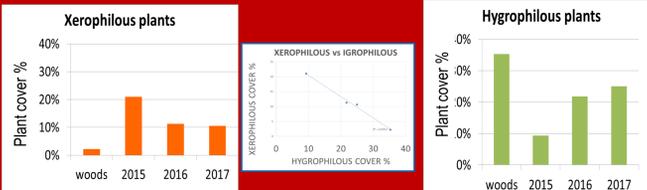


5 Wooded plots

1 was Hygrophilous wood characterized by *Alnus glutinosa*, *Salix alba*.
4 were dominated by Black Poplar and *Ostrya carpinifolia*, with *Fraxinus ornus* and some xerophilous species in the undergrowth, such as *Asparagus acutifolius*, *Coronilla emerus* and *Quercus pubescens* seedlings. So we can define them as meso-hygrophilous woods.

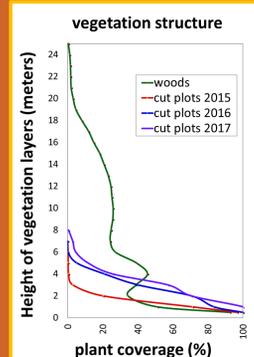


The extensive cut of the forest and the increased availability of nutrient (due to higher quantity of plant debris and solar radiation) have allowed the fast development of the bramble (*Rubus* species).

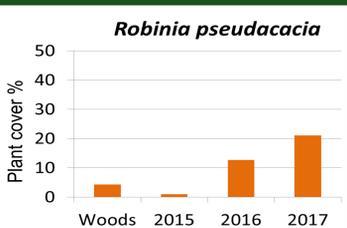


Xerophilous vs hygrophilous: a temporary effect

The disappearance of the wooded cover has changed the microclimate, with negative impacts on typical undergrowth species and on the renewal of hygrophilous trees more sensitive to aridity and to sunlight (especially sciaphilous species), such as alder (*Alnus*). On the other hand the spread of annual herbaceous, xerophilous and cosmopolitan species one year after the forest cut was a transitory phenomenon. Even the cosmopolitan and subcosmopolitan species, able to adapt to disturbed environments, appear temporarily in the cut areas.



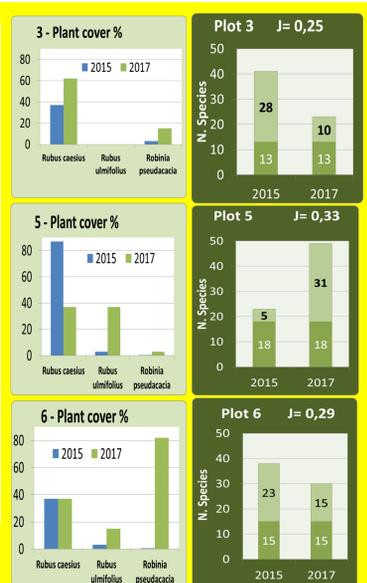
The evolution of wood structure, after the clear cut, is compared to the forest. Though the woody component shows a significant resilience, this analysis does not discriminate whether this resilience has affected all species or has only favoured some of them.



The cover of *Robinia pseudoacacia* increases significantly from year to year causing the development of a low ecological value forest.

Robinia is a heliophilous species, which is never found in dense woods, on the contrary, it quickly spreads in areas affected by vegetation clear cutting. The species can therefore disappear only by the closure of the forest, which is however difficult since *Robinia* has a faster growth rate than other wood species. Where its presence is high, it is extremely difficult to limit its development.

Rubus caesius and *Robinia pseudoacacia* can be considered key species, able to influence the turnover of the other species, making it difficult to recover the natural riparian forest.



Looking at the details of the individual plots we have seen that with the increase of their cover the species richness decreases and vice versa

CONCLUSIONS

The results of the first three years show how, not only exotic invasive species, but also autochthonous invasive species can effect significant changes in vegetation development after a large clear cut of riparian woods. We have clearly recorded, although not uniformly in all plots, the tendency for invasive species to increase their cover, moving further away from pre-impacted condition.

The next two questions we would like to answer are:

- 1 - how long this disturbance will remain before the woods return to the previous conditions (hygrophilous or meso-hygrophilous forest)?
- 2 - Given the tendency of the riparian wood of the study site to become less hygrophilous over time (due to the strong reduction of the floodings, and the lowering of the aquifer), how this trend may also affect the wood evolution after cutting?

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