

Interactive comment on “Spatio-temporal heterogeneity of riparian soil morphology in a restored floodplain” by B. Fournier et al.

Anonymous Referee #3

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Preliminary remarks: I'm not a native English speaker, thus I will focus only on the content.

Beyond its specific objectives (spatial and temporal heterogeneity of soils in a restored river reach) this article addresses an important global topic i.e. assessment of restoration projects which are carried out at floodplains as in this study but should also be undertaken in another ecosystems. Soils, as an integrating part of ecosystem processes, could certainly be considered as a useful tool to measure the effects of restorations projects and this article provides a clear demonstration of its effectiveness.

Such tools based on previous results are necessary in order to design or modify further implementations. It is therefore necessary to establish the quality evaluation criteria

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and the key indicators have to be simple to measure, to understand, and to communicate. Moreover, they have to be cost-efficient. In this sense, the authors have demonstrated a very promising and innovative approach which should be extended.

The first reviewer has already highlighted some major points (study site insufficient description, results tables 3 and 5) thus I will focus my remarks on some other key areas.

General comments

The time scale is a key issue when dealing with highly instable environment submitted to rapid and short-term unpredictable changes. My first concern is related to the time elapsed since the restoration. The authors have rightly noted they studied the relatively short-term effects (P4351/L11) only 5 years after restoration and that soils may respond slowly to perturbations (P4351/L1-2) even if in this case soil morphology has been quickly modified within the first 30m from the river (P4349/L12-13). A more detailed insight in spatio-temporal features would be needed here, related to the Thur river fluvial regime to truly assess the success of the restoration. It is obvious that the more frequent floods HQ5 or HQ10, but with a lesser spatial extent, would have prominent impact on sites closer to the river. Therefore, it is not clear why the authors mean that this restoration project was only a partial success (P4350/L8-9).

The relationships between soils and vegetation could have been more detailed taking into account the feedback effects between soil evolution (topsoil, depth, number of horizons) and the litter provided by vegetation (vegetation cover, biomass). Moreover, these relationships are only considered as resulting from linear interactions and the time factor (driving both soils evolution and vegetation successional stages but at different scales) is not clearly mentioned. In fact, in regularly disturbed habitats as are active floodplains, direct relationships between soils and vegetation could be questionable as the vegetation depends on an array of complex and interacting factors (cited by the authors P4349/L22-23). Rather than consider soil morphology as a predictor

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of successional patterns of vegetation (P4345/L13-14) I would suggest envisaging the consistency between vegetation and soil type as an indicator of successful restoration when the dynamic ecological balance has been reached.

Specific comments

P4341/L19: "Restoration had the highest impact..." The highest and fastest? (see comments on time scale)

P4348/L14-15: "Plant species diversity and evenness were higher in the forest whereas the open habitats and forest had similar values of species diversity." Contradiction?

P4350/L6-7: "...but the lack of typical hydromorphic soils could have been improved by integrating soil morphology in early project planning." How? Rewording?

Table 1a: Number of horizons, example group 1: I don't understand how 7 loam horizons, 47 sandy loam horizons could lead to an average of 2-4 horizons per profile?

Table 1b: possible to provide link between "low" (or medium, ...) organic matter content and percentage of organic matter (as quoted in text P4342/L17)?

Figure 4: do not appear in text

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