

Links between stream reach hydromorphology and land cover on different spatial scales in the Adour-Garonne Basin (SW France)

We report an investigation aimed at improving the understanding of the relationships between hydromorphology and land cover, and in particular aimed at identifying the spatial scale on which land cover patterns best account for the hydromorphology at a stream reach. This investigation was carried out in the Adour-Garonne basin. Several key findings emerged from the use of a new modeling procedure called "Random Forests". Firstly, we established a typology of sites showing an upstream/downstream gradient structured by geographical descriptors and catchment hydromorphological features. Secondly, we found that the relationships between hydromorphology and the different spatial scales of land cover responded to a longitudinal gradient. Upstream, no noticeable difference was observed whatever the land cover pattern considered, whereas downstream, larger scales were strongly related to the hydromorphology. Thirdly, a specific land cover effect on each hydromorphological type was seen. Along the gradient, the contribution of the land cover variables structuring the hydromorphological types decreased and become homogeneous. Fourthly, stronger correlations were established with individual hydromorphological variables using the larger scales of land cover. This paper contributes to a better understanding of landscape ecology and fits well with the European Water Framework Directive that requires long-term sustainable management. In the context of natural conditions, we advise that the catchment scale should be given high priority when connected with land cover/uses; local and riparian environments being more valuable and complementary in the case of impacted sites.

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