

EGU2020-20043

<https://doi.org/10.5194/egusphere-egu2020-20043>

EGU General Assembly 2020

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Understanding seed dispersal and germination in naturally disconnected stream networks to evaluate restoration success

Lovisa Lind^{1,2}, Xiaolei Su^{2,3}, Lina Polvi², and Christer Nilsson^{2,4}

¹Department of Environmental and Life Sciences, Karlstad University, Karlstad, Sweden (lovisa.lind@kau.se)

²Department of Ecology and Environmental Science, Umeå University, Umeå, Sweden

³Key Laboratory of Eco-Environments in Three Gorges Reservoir Region (Ministry of Education), Chongqing Key Laboratory of Plant Ecology and Resources in Three Gorges Reservoir Region, School of Life Sciences, Southwest University, Chongqing, China

⁴Department of Wildlife, Fish, and Environmental Studies, Swedish University of Agricultural Sciences, Umeå, Sweden

Stream networks both integrate abiotic and biotic landscape processes and transect the landscape, connecting different ecosystems and geologies longitudinally. The stream network can be divided into three process domains, as zones with distinct geomorphic processes: rapids, slow-flowing reaches, and lakes. Biotic recovery has been variable after stream restoration and it is therefore important to understand where in the catchment it is most beneficial to focus restoration and how the different process domains influence the restoration outcome. Along a stream network, potential for organism dispersal, usually by hydrochory for riparian plants, control riparian community organization. Thus, we wanted to determine whether differences in recovery of riparian vegetation after restoration are a function of seed dispersal or habitat conditions. Our main objective was therefore to predict how the local and upstream source of riparian vegetation influence the restoration outcome. Our study was located in the boreal region of northern Sweden in the Hjuksån catchment. Hjuksån is a tributary of the free-flowing Vindel River, which in turn is the largest tributary to the Ume River. We studied three major factors: dispersal, germination and establishment success of riparian vegetation. In consistence with previous studies that stagnant waterbodies, such as lakes and fens are efficient seed traps, our study indicate that lakes retain more seeds than rapids and slow-flowing reaches, which will influence the riparian community recovery as less species will continue to downstream restored reaches. However, while the germination experiment showed that lakes had the highest germination success there were no such indications for the establishment. The higher germination success might partly be explained by lakes having a higher soil moisture then rapids, which is important for the germination success. Overall, this study indicated that the dispersal, germination and establishment is very low in naturally disconnected stream networks in northern Sweden and further restoration effort might be needed to aid the slow recovery.