

Early stages of island development in a mountain river recovering from channelization and channel incision

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Development of islands in the Raba River, Polish Carpathians was investigated to document its early stages in a mountain river recovering from channelization and channel incision and verify whether islands can significantly contribute to the overall plant diversity of the river corridor. In the 20th century the heavily channelized Raba incised deeply in its mountain course, but a few years ago an erodible river corridor was established in its 3 km-long reach. Resignation from the maintenance of channelization structures in the reach about 10 years ago and the passage of two large floods in 2010 and 2014 resulted in up to a threefold increase in channel width, re-establishment of a multi-thread channel pattern and development of islands in the widened channel. Similar to other European mountain rivers, in the Raba islands originate as a result of deposition and sprouting of living driftwood of Salicaceae. Monitoring of islands in the study reach performed each year between 2011 and 2016 documented an increase in the number of islands from 28 to 42, in average island age from 2.8 to 5.0 years, in total island area from 0,39 ha to 1,75 ha and in average island area from 139 m² to 418 m². However, the increase in these parameters was not steady, but moderated by processes of island erosion by flood flows, island establishment shortly after major floods (increasing the number and reducing the average age and area of islands) and island coalescence in the years without major floods (with the opposite effects on the island parameters). The total number of vascular plant species fluctuated between 142 and 202 in particular years. An inventory of plant species on islands and plots of riparian forest performed in 2012 indicated that islands supported a greater total number of species than the adjacent riparian forest and that particular islands supported a significantly greater number of biennial and annual plants than riparian forest plots. An inventory performed in 2015 documented similar total numbers of plant species in the two types of habitats and indicated that for any life form of plants, the number of their species on islands did not exceed that on riparian forest plots. This study indicates that (i) island re-establishment in the river was initiated by substantial channel widening, (ii) varying flood magnitudes exert a considerable influence on the trajectory of island development, and (iii) the contribution of islands to the overall species richness of the riparian corridor can be highly variable at early stages of island re-establishment depending on hydrological conditions and the state of islands in a given year.

This study was performed within the scope of the Research Project 2015/19/N/ST10/01501 financed by the National Science Centre of Poland.