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# Impact of forest disturbance on the runoff response in headwater catchments. Case study: Sumava mountains, Czech republic

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The forest disturbance and stream modifications are important phenomenon affecting the natural dynamics of erosion and sedimentation processes on montane and submontane streams. The changes in land use, land cover structure, forest cover and stream modifications, occurring in the cultural landscape have significant effect on the dynamics of fluvial processes, especially in relation to the extreme runoff events.

The contribution discusses the relations between forest disturbance and fluvial dynamics, stemming from the research in Sumava Mountains, located at the border between Czech Republic and Germany, Central Europe. The study area is located in headwater region, affected by different types of forest disturbance in past three decades - bark beetle outbreak, repeated windstorms and clear-cut forest management. The streams in experimental catchments here displayed extensive dynamics of erosion and sedimentation after the extreme floods in 2002 and 2009 and were affected by artificial modifications. The analysis is based on the combination of different research techniques, including remote sensed data processing, network of automated high frequency rainfall-runoff monitoring or field survey of stream modifications and geomorphologic changes on riverbeds after extreme events.

Using landsat satellite data and aerial photographs we created model of Bark beetle dispersion and clear-cutting between 1985 and 2007. This model enables to describe disturbance dynamic, which is needed for understanding of nature those processes.
Next analysis of Landsat satellite data was used to detect the effect of forest disturbance on the wetness and temperature properties of land cover, affected by two significant different types of forest disturbance - bark beetle outbreak and clear cut. The rainfall-runoff analysis using multivariate geostatistical techniques was focused on experimental catchments with similar conditions of climate, physiography and topography but different type, extent and dynamics of forest disturbance.

The research proved that the different types of forest disturbance have distinctly diverse effect on distribution of moisture and temperature in the analyzed plots. The analysis of runoff response was carried out on the example of selected types of precipitation events, occurring across the experimental catchment. There were detected clear links among the selected properties of runoff response to the given situation, type of forest disturbance and selected physiographic features.

The research results help to better understand the impact of forest disturbance on runoff response. As the forest disturbance in montane environments is a widespread problem, new findings in the field can have implication in finding balance between the nature conservation, forest and water management.

Key words: forest disturbance, land cover, stream modi[U+FB01]cation, runoff, [U+FB02]uvial dynamics.