

Windthrows, that is trees thrown with the whole root system, are ubiquitous in the forest landscapes. The main cause of windthrow creation is the strong wind activity, which is also an frequent phenomenon in the mountain areas. In Poland particularly strong winds occur in the Tatra Mountains, which are the orographic barrier for the air masses traveling from the south, and results in the occurrence of foehn wind. In some years this phenomenon is sufficiently strong to cause the destruction of large forest areas. The creation of extensive windthrow areas is important from the point of view of geomorphology, because along with the root system of thrown trees also the soil material is transported. Therefore, this process may be included in the set of denudational processes, which, in the long time scale, are leading to the lowering of the landscape. Additionally, root plates, and pits in places left by fallen trees are devoid of vegetation, and thus are exposed to the erosion processes. After they become overgrown with vegetation a pit left by the thrown tree, and a mound formed from the soil material fallen from the root plate are created.

For many years the topic of geomorphological consequences of uprooting was rarely undertaken in the literature. In the recent years publications considering the impact of windthrows on the changes in the relief, and transport of soil material have appeared, which in a large degree raised the level of knowledge of this process. However, there still are some issues which are, so far, not solved. One of them is the impact of extensive windthrow areas on the dynamics of the geomorphic processes occurring on slopes and in channels within windthrow areas. Research carried out so far did not provide unequivocal answer to the question how slope and fluvial system react on such an abrupt destruction of the forest stand.

The main aim of the project is to recognize the geomorphological consequences of tree uprooting by determining how the creation of windthrow influences the dynamics of the geomorphic processes in the mountain catchment. The research will be realized in the Tatra Mountains, where, during the foehn wind in 2013, almost 300 ha of forests were destroyed. For the purpose of the research a selection of several catchments with the large areas covered by windthrow, and several forested catchments, used for comparison, is planned. In the catchments measurements of the rate of debris transport by using the marked debris method. For this purpose study plots will be designated in different parts of catchments. To allow comparison in the intensity of debris transport between forested and windthrow-affected catchments study plots will be selected in a way that their morphometric parameters, which in large degree may influence the dynamics of the geomorphic processes, are similar. That is why the designation of study plots will be conducted basing on the GIS analysis, using high-resolution digital elevation model. Results of the debris transport will be analyzed by statistical methods.

Additionally geomorphological mapping of windthrow-affected catchments, and mapping of windthrow pits are planned in order to determine the impact of windthrow creation on the intensity of landsliding, and possible changes in the surface runoff on the slopes.

The study of geomorphic consequences of tree uprooting is very important, because this process is widespread in many mountain areas all over the world. This type of research is interdisciplinary, and links the knowledge from different scientific disciplines. This connection often allows to better understanding of the natural phenomena. The research on the dynamics of slope and fluvial system affected by such radical change that is the creation of windthrow will provide deeper recognition of the functioning of forested mountain catchment inseparably connected with the biotic world.