

The research proposed in the project is aimed to determine the role of soil creep and landslides in transforming forested slopes in mid-mountains on the example of selected areas in the Beskidy Zachodnie Mts. Detailed aims include determination of the extent and frequency of soil creep and landsliding and determination of the differences in record of shallow (soil creep) and deep (landsliding) mass movements. The aims will be realized by application 4 research methods, including analysis of the digital terrain model from LiDAR data, dendrochronological methods, micromorphological method and electrical resistivity method. Research include selection of research sites, field work (e.g. sampling of wood and from soil profiles, performing electrical resistivity tomography), preparatory lab work (preparation of collected samples), laboratory work (e.g. measuring tree-ring widths and microscopic observation of deposit characteristics) and analysis and interpretation of results.

Each tree growing on a landslide is a separate sensor of the ground movement, which enables the analysis of the temporal and spatial variability of the course of geomorphological processes. Trees growing on the area wherein morphological events take place are subject to mechanical stress, which is recorded as anatomical changes, in this case tree-ring widths, eccentricity and reaction wood development. In sampled cores will be studied eccentricity and the structure of both normal and reaction wood. The anatomical features characterizing the wood of the trees growing on landslide slope, slope with soil creep and reference slope will be compared. The analysis of textural and structural characteristics in the deposit samples will be made, that allows distinguishing the primary characteristics of the deposit from the features that have been altered by the soil-forming and diagenetic processes – so far such analysis have been rarely performed for the slopes currently undergoing soil creeping. In addition, the image of the electrical resistivity tomography in order to recognition of the geological structure of the studied slopes will be made, in turn, detailed observations of the relief of studied area (LiDAR image) allow the selection of the slopes covered by soil creep and landslides. The proposed set of the research methods has not been used so far, which means that the project is innovative.

Project implementation will allow the development of guidelines for differentiating between the impact of landslides and soil creeping on the same slope, will help to show precisely the differences in the soil susceptibility to landsliding and soil creeping, and determining the extent of both of the processes. Works dealing with similar problems have been scarce so far, while recognizing and comparing the role of landslides and soil creep in shaping the relief in forested areas is of great significance for the thorough understanding of the development of the relief of mid-mountains. Studies conducted in recent years have indicated that forested mountain areas are geomorphologically more active than it was previously assumed. At the same time soil creeping in comparison to landsliding has been researched less intensely and its role in shaping the relief of the slopes of mid-mountains may be underestimated.

What constitutes an additional motivation for undertaking the research planned in the project is the need to distinguish the dendrochronological record of shallow and deep mass movements. Obtaining this type of information will make it possible to refine the results of dendrochronological dating and to distinguish in the dendrochronological record the characteristics resulting from the impact of the two different groups of processes, which often overlap. Project implementation will be used to refine the landslide analysis method on the basis of tree rings, as well as checking the possibility of their wide application not only in basic research but also in practice (e.g. in efficient and sustainable forest management in mountain areas, for local spatial development plans or detecting areas with large range of landslide hazard).