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Bluff characterization on a mountain reservoir after 20 years of operation

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The main effect of abrasion is cutting hillsides which leads to development and creation of the bluffs. Evolution of the bluffs within the shore zone of a reservoir is dependent on many environmental factors. In this study, a characterization of bluffs was presented with reference to the entire shore zone of a mountain reservoir. The research was conducted on the Czorsztyn Reservoir - one of the largest functioning reservoirs (total capacity 231.9 mln m^3) within the Polish Carpathians, created in 1997. The analysis was based on the field study conducted at the turn of 2015 and 2016 with the use of the Terrestrial Scanning Laser (TLS). The TLS allows description the morphology of the area in great detail. The objectives of this study was to characterize the height of bluffs in the mountain reservoir shoreline and assess the impact of various environmental factors on bluff development. The focus was on determining the relationship between the height of bluffs and chosen environmental factors. Environmental factors were assessed using statistical methods. After 20 years of operation, bluffs on the Czorsztyn Reservoir covered 90% of the shoreline. The maximum height reaches about 1000 cm, although most often does not exceed 200 cm. The most developed bluffs in the south-west and west exposure (considering the height) are found on the shoreline of the reservoir. Amongst analyzed factors affecting the development of bluffs on the Czorsztyn Reservoir, slope inclination, lithology, openness of the reservoir, and height of waving were identified as the dominant factors based on the statistical analysis.