Climbing impact on the relief and vegetation of the Tatra National Park

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Abstract — The Tatra Mts. are the only high-mountain range in Poland, protected as a national park since 1954. The environment of rock cliffs, and especially the vegetation is unique within the mountain ecosystem. However, harsh environmental conditions result in high level of ecosystem vulnerability. In the Tatra National Park climbing activity encompasses all of its disciplines: sport climbing on equipped routes, both short and multi-pitched, traditional climbing as well as the alpine climbing. Recently, new climbing disciplines, such as dry-tooling and bouldering, have also became popular. The climbing impact has been a subject to competitive debate between national park managers, naturalists and climbers, although it has been relatively weakly studied. This study focuses on the landscape changes resulting from climbing activities on the cliff ecosystems located in forest, subalpine and alpine geoecological belts, both on carbonate and crystalline substrate. Within some crags climbing activity is permitted by law, however the others are a subject to illegal exploration. The basis for this study was surveying the existing climbing routes (and state of protection. e.g. bolts and pitons) as well as monitoring of the climbing intensity on specific crags. The landscape changes were identified by geomorphic mapping of cliffs and adjacent slopes as well as botanical studies. Observed landscape changes caused by climbers result mainly in mechanical damage of vegetation, growing instability of slope covers, and micro-relief alteration. The impact significantly differs with reference to climbing disciplines and geological substrate. The largest changes encompassing complete removal of vegetation layer and soil cover result from dry-tooling on limestone cliffs, whereas sport climbing on granite cliffs causes only limited removal of weathered rocks and restraining of lichens succession.

Index Terms — Tatra National Park, climbing impact, relief, vegetation.

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