

Mendel University in Brno

Faculty of Forestry and Wood Technology
Department of Landscape Formation
and Protection

**Public Recreation and Landscape
Protection - hand in hand?**

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**Skiing and Its Influence on Specific Environment
Components on The Ski Centre Chopok-South Example
(NP Low Tatras)**



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Introduction



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- alpine areas land use for recreation
- recreational potential of alpine areas
- recreation in forest
- economic positive – ecologic negative effect
- direct and undirect action of recreation activities on ecosystem
 - (resorts building, tourism – trampling down the vegetation, skiing – ski pistes preparation, abrading by ski edges, etc.)



Analysis of The Problems, Terminology



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- Forest and its function for recreation
- By low no. 326/2005 forest is an ecosystem composed of forest land with forest growth and factors of its air environment, plant species, animal species and soil with its hydrological and air mode.
- Ski piste preparation
- Soil erosion - Protection against
- Changes of plant species composition
- Habitats fragmentation





Objectives of our Work:

Research is focused on determination of recreation impact (focusing on skiing) on specific environment components on Chopok-South area

- To find out phytocoenosis composition on selected ski pistes and species diversity
- To measure and quantify amount of transported soil on surveyed plots
- Determine through the PCA analysis dependence between species composition, abundance and soil transport.
- To analyse influence of ski pistes existence on ecological stability of adjoined forest
- Comprehensively assess influence on soil, vegetation and forest

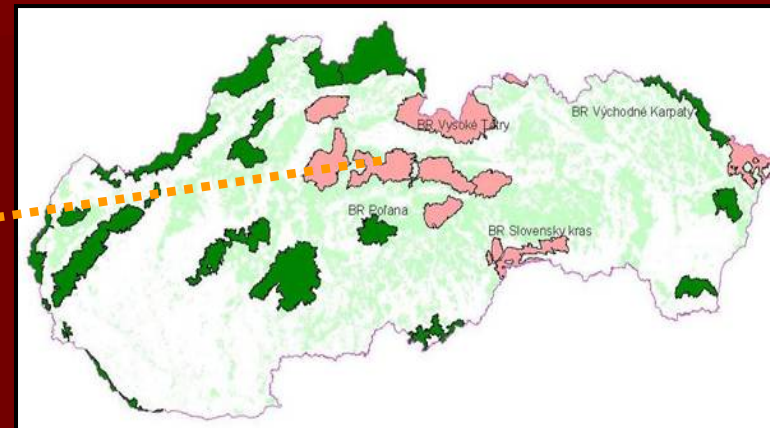
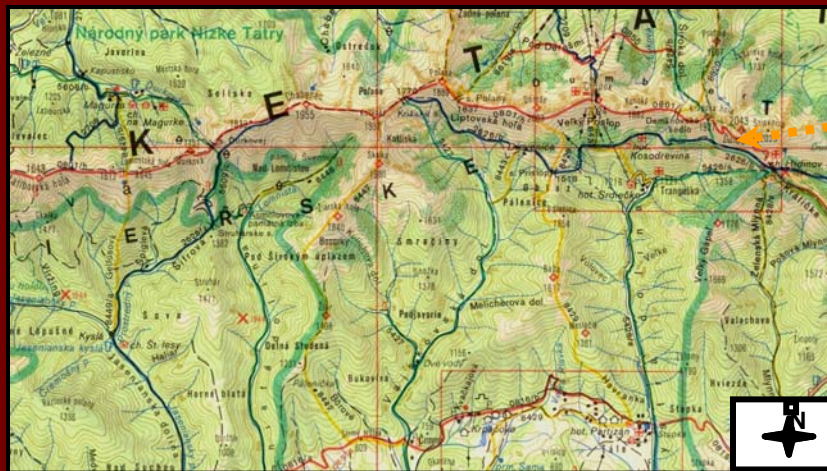


Characteristics of The Investigated Territory



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Low Tatras National Park



- - established in 1978
- - extent - 81 095 ha
- - dynamics of the Relief: 360 - 2043 m a.s.l.
- - habitats of european importance:
- - Spruce forests (SKUEV0302)
- - Protected bird area Low Tatras

Geomorfologické začlenenie územia:

Sústava: Alpsko – Himalájska

Podsústva: Karpaty

Provincia: Západné Karpaty

Subprovincia: Vnútorne Západné Karpaty

Oblasť: Fatransko – tatranská

Celok: Nízke Tatry

Podcelok: Ďumbier



Positioning of Phytocoenosis Research Plots

- - spatial distribution of vegetation, which abundance is influenced by soil cover destructive impact
- - age of ski pistes (different originality degree of phytocoenosis)
- principles: a) distance between plot and forest stand edge
b) different age of phytocoenosis
c) presence of nearby tourist paths

Phytosociological registration as well as soil transport measurement on established 2x2 m/4x4 m plots was made.



Methodology – phytosociological registration

- Zurich-Montpellier school approach (according to Brun-Blanquet scale of abundance and dominance)
- Calculation of species diversity (Hill's index of diversity)

$$N_2 = \frac{\left(\sum_{i=1}^n Kvi \right)^2}{\sum_{i=1}^n Kvi^2}$$

N_2 - Hill's index of diversity

Kvi - coefficient of species significance



Methodology – phytosociological registration



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Methodology – phytosociological registration



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Methodology – approach to soil transport quantification



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- On plots of phytosociological registration
- To figure out the volume of (erosion) furrows – according to scheme:

$$S = \frac{a \cdot v_a}{2} \cdot p$$

a – length of the furrow side

v_a – depth of the furrow

p – length of the furrow



Methodology – determination of ecological stability of adjacent forest



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- Proceed under methodology of Vološčuk (2000)

„Determination of forest ecosystem stability“

$$ES = 5a + 3skv + ko + šk + kv$$

ko – korunovost'

šk - štíhlostný koeficient

skv - sanitárny kvocient

kv - koeficient vrstevnatosti

a - aproximácia

- According to adapted methodology of Danko, Garaj (1983)

„Determination of visitors negative impact on forest ecosystem“

- evaluation of dendrit cover damage: state of the tree – damaged/un...

No. of wounds – acc. to extent

localization of wounds

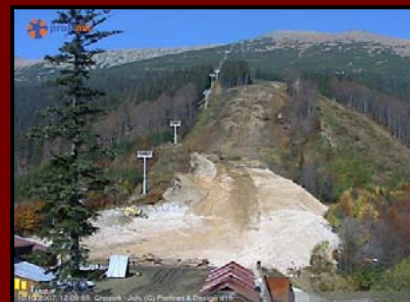
degree of damage – wood, bark

Conclusion



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- Changes in species composition of phytocoenosis
- Quantification of transported soil – support tool for modeling in GIS as well as for melioration measures action planning
- Definition of ecological limits in connection with recreational land use
- Environmental impact assessment (By law No. 26/2004)





Thank you for your attention

Questions?...

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