Monitoring the condition of montane meadows in the Krkonoše Mts against a pre-defined target status

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Krkonoše Mts are the highest mountains of the Czech Republic. They rise up to 200-300 m above the timber-line. Due to their geographical position they make home for plants both from Northern and Southern Europe.
The Krkonoše Mountains National Park:
- established in 1963
- 549.7 km$^2$ large
- 5-8 mil. visitors / year
- managed by the Authority of the NP (NPA)

SCI and SPA Krkonoše:
- designated 2004
Species-rich *Nardus* grasslands, on siliceous substrates in mountain areas
A lot of the grasslands have been without management since the World War II.
LIFE CORCONTICA

Grasslands and streams restoration in SCI Krkonoše: Future of Nardus grasslands, Dwarf gentian & Bullhead

1. 6. 2012 – 30. 4. 2018
Restoration by one-time measures
Establishing the regular management
Main tasks:

To assess the change in condition of meadows during the project.

To establish functional feedback between management and monitoring.
Simple, clear and objective indicator of condition of the meadows?
Solution:

(i) to monitor the sites of greatest natural value / the sites with predicted problems

(ii) to use the positive and negative plant species
Condition indicator: the size of „high quality“ vegetation fragments.
High quality vegetation

- Presence of endangered and diagnostic species
- Small amount of tall grasses and herbs
- Fine-scale structure of vegetation
- Species diversity
Change in condition of meadows = Change of the size of the high quality fragments.

- a) increase
- b) without change
- c) decrease
Unambiguous and site-specific definition of high quality vegetation in the fragment (or cliving 😊).

Vegetation where at least two of the following four positive indicator species coexist in any sampling plot of size 0,5 x 0,5 m: CampBohe, PoteAure, HomoAlpi, CallVulg and where the negative indicator species are absent.
Change in size of the fragment = Change in number of plots with the high quality vegetation on a permanent transect.

Starting point of the transect
First data collection at the beginning of the project

three possible scenarios for repeated data collection

Without change

Significant positive change

Significant negative change

Starting point of the trasnect
The amount of change in indicator assessed relative to its starting value. The direction of changes symbolised by traffic lights colours.

Number of high quality plots recorded at the beginning

Number of high quality plots recorded during the repeated data collection

three possible scenarios:

a) zone without sign. change

b) zone of sign. negative change

c) zone of sign. positive change

The amount of change in indicator assessed relative to its starting value.

The direction of changes symbolised by traffic lights colours.
Other two condition indicators:

(i) Frequency of diagnostic species for the habitat

(ii) Frequency of selected high-priority species (both desired and not-desired ones)
Total number of monitored localities: 21

Total number of transects with repeated data collection: 88
Distribution of transets mirrors both the conservation priority of locality and variability of management measures.
Change in size of „high quality“ fragments

Meadows involved in the project LC

- vyznamná negativní změna, 18 % případu
- bez vyznamné zmeny, 64 % případu
- vyznamná pozitivní změna, 18 % případu

n=50
Change in size of „high quality“ fragments

Meadows without management

významná negativní změna, 38 % případu

významná pozitivní změna, 0 % případu

bez významné změny, 62 % případů

n=8
Change in frequency of not-desired species *Lupinus polyphyllus, Rumex alpinus, Veratrum album ssp. lobelianum*

![Pie chart showing frequency changes](image)

- **významná pozitívni zmena, 14 % pripadu**
- **významná negativní zmena, 14 % pripadu**
- **bez významné zmeny, 73 % pripadu**

*n=44*
Change in frequency of desired plant species *Anemone narcissiflora*, *Campanula bohemica*, *Viola lutea* ssp. *sudetica* etc.

- významná negatívna zmena, 20% prípadu
- významná pozitívna zmena, 13% prípadu
- bez významnej zmeny, 67% prípadu

n=97
The influence of the form of management

Differences not significant, $p = 0.22$
The influence of manuring

Difference not significant, $p = 0.36$

Change in size of "high quality" fragments (%)
Changes in size of high quality fragments on individual localities.
Change in size of high-quality fragments

change -25 %
NO MNG

change 0 %
SHEEP GRAZING
Change in size of high-quality fragments

change +27 %
RESTORATION

změna -2 %
MAINTANANCE

Lahrovy Boudy
Change in size of high-quality fragments

MANAGEMENT EARLY IN THE SEASON
- change +51 %

MANAGEMENT IN THE MIDDLE OF THE SEASON
- change 0 %

MANAGEMENT LATE IN THE SEASON
- change -25 %

Sklenářovice
Change in size of high-quality fragments

change +22 %
MANURING

Modrý důl
Conclusions

The assessment of changes of vegetation relative to its starting condition (and its representation by colours) clearly enhanced transfer of information between people doing management and monitoring of meadows.

The most appreciated attribute of the approach is a combination of its objectivity and simplicity.

The approach is strongest in discussions bound to individual sites and in connection with other types of information (ie. phytosociological relevés).
Thank you for attention...
...and thank Clive Hurford for inspiration.