

Threatened plants in nature conservation areas with visitor load and nature tourism infrastructure: is a compromise possible?

A botanist's perspective

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LIFE-IP LatViaNature project

Tourism is generally acknowledged as negative impact on threatened plant species. Can the impacts be only negative *or* both positive and negative?

NEGATIVE IMPACTS

- **Trampling** >>> mechanical damage;
- **Soil eutrophication** >>> changes in vegetation >>> establishment of weedy and invasive species;
- **Visitors as propagule agents** >>> weedy and invasive species;
- **Collecting plants** (plucking flowers, digging out);
- **Pathogens** (visitors as their agents)

POSITIVE IMPACTS

- **Improved light conditions** (trampling, management, e.g. mowing along trails);
- **Soil disturbance** >>> soil openings >>> higher chance of seed germination and seedling survival;
- **Seed, spore transport** with visitor footwear, cloths, etc.



Habitats/vegetation that may co-exist with certain visitor load



Ancient pathways on a hill fort in West Latvia. The hill fort is known for with semi-natural dry calcareous grassland vegetation and rich species composition.

Most probably, the pathways exist for 800 or more years, still, today used by visitors. **The visitor impact is neutral—visible, but not detrimental.** Perhaps even beneficial for certain plant communities and species if they are disturbance-related.

Habitats/vegetation suffer from excessive visitor load

In this, case «excessive» means one orienteering event with several dozen of participants (left) or a few rather small group visits with bog shoes (right)



A valley slope with tufa-forming spring deposits (extremely dry summer, normally the area is wet). Damaged by one sport event.



A bog-shoeing trail in raised bog, used few times per year.

Ground and vegetation damage caused by illegal recreational activities

Bad. But it does not always mean an unfavourable impact on ALL plant species, as some of them may benefit from a certain level of disturbance.

The question is—what is an acceptable disturbance level and can it be controlled?



Pulsatilla patens



Gypsophila fastigiata



Dianthus arenarius



And... why blame recreation (even if illegal) for ecosystem damage if the common forestry practice is much worse?

The scale of impact (soil, vegetation damage) is not comparable.

Common, legal forestry practise, photo from West Latvia.

MATERIAL AND METHODS

The aim of this study (overview) was to explore the situation in Latvia to answer the question—is there a conflict between nature tourism and threatened vascular plant conservation?

To what extent tourism is/may be a serious threat?

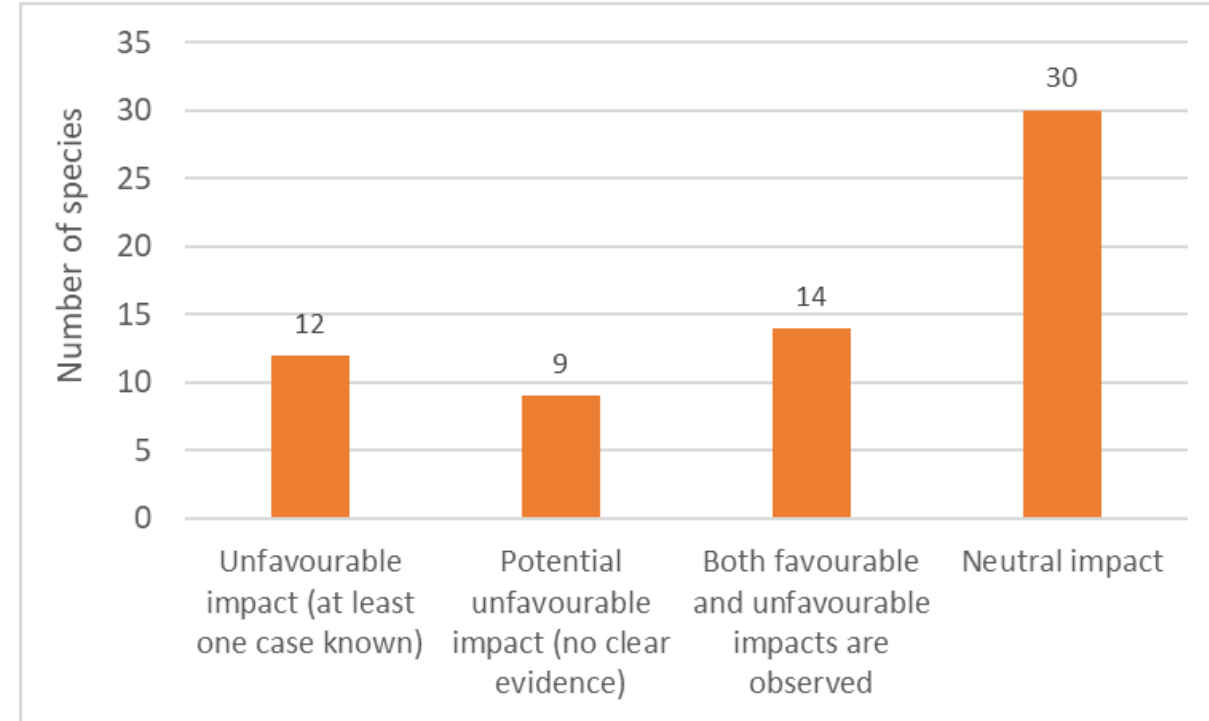
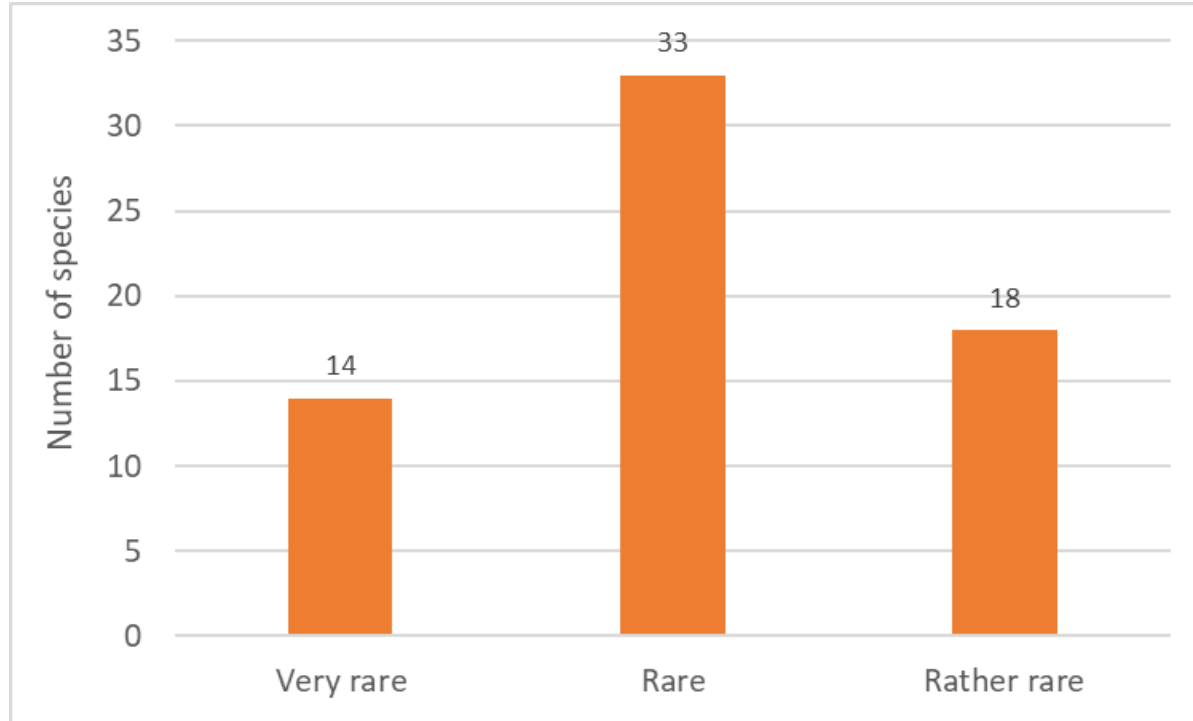
What was done?

- GIS analysis of co-occurrence of protected plant species* and nature tourism infrastructure;
- Questionnaire (nature conservation managers);
- Some selected sample areas including field surveys.

* Terrestrial vascular plant species listed in the national regulation on protected species (No. 396, 14/11/2000), micro-reserve species (No. 940, 18/12/2012) and Latvian Red Book (Andrušaitis (ed.) 2003). *Gypsophila paniculata* was excluded (lately considered an invasive alien).

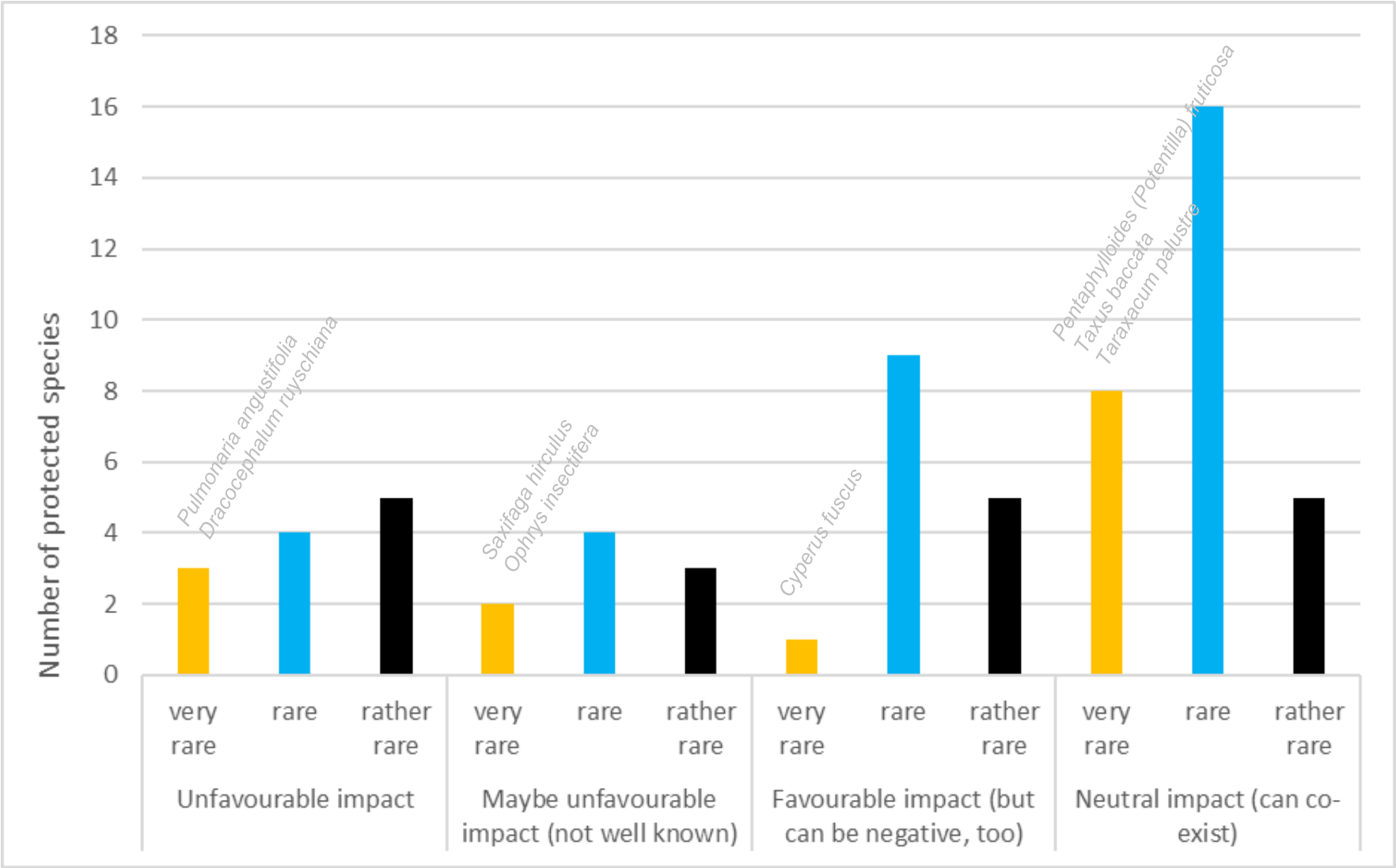
RESULTS

65 (19.7%) protected vascular plant species occur on/around tourism trails and related infrastructure (n=329).



* Rarity—approximate estimation according to the data available in the national biodiversity database “Ozols” and recent studies.

Does tourism cause more negative pressure on very rare species? Are they more vulnerable in cases when the occur in sites with visitor infrastructure?



What are the conditions/traits that make a species vulnerable to visitor impact?

Small population

Low production of seeds

Long time from seed
germination until
flowering

Low seed viability

Highly specialised to
certain ecological
conditions

Short period of seed viability

Short-lived seed bank

Herbaceous (not woody)

Low dispersal capability

Edible

Looks beautiful

Medicinal plant

Eastern
pasqueflower
Pulsatilla
patens



Wild garlic
Allium
ursinum



What conditions/traits support species survival and dispersal under visitor impacts?

Large population

Ephemeral

Modest appearance

Low specialisation in habitats

High seed production

Somehow dangerous, unpleasant to humans

High seed viability

No practical use known

Woody

Short seed dormancy period

Clonal growth

Short period from germination to flowering



Great fen-sedge *Cladium mariscus*



Fumewort *Corydalis intermedia*

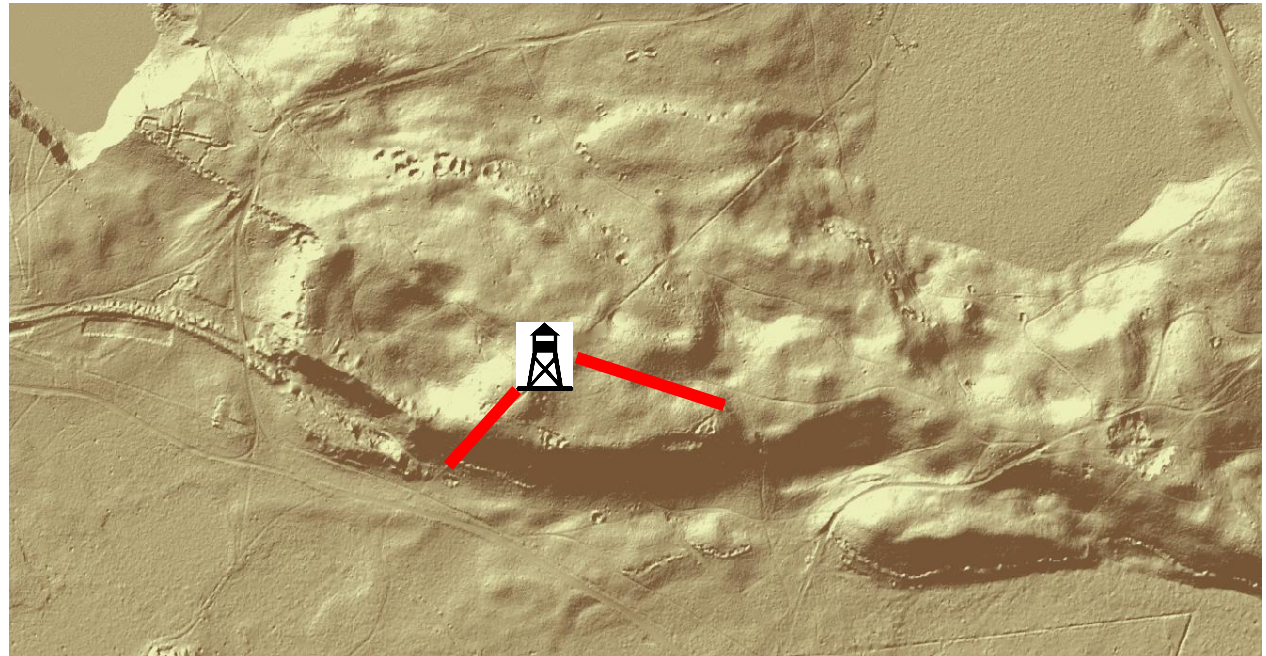
Bad examples

Good examples

Neutral examples

Northern dragonhead *Dracocephalum ruyschiana*

Since the 19th century, the number of localities in Latvia has decreased more than twice (from 18 to 8). Still declining. Only 3 vital populations in the country.



2013



2015



2022

Northern dragonhead *Dracocephalum ruyschiana*

Since the 19th century, the number of localities in Latvia has decreased more than twice (from 18 to 8). Still declining. Only 3 vital populations in the country.



An example of inappropriate management!

A planning mistake, where tourism development interests did not respect rare species conservation as a priority in this area.

Here, the tourism infrastructure does not help to diminish the existing visitor pressure (trampling, eutrophication). The tourism infrastructure attracts more visitors, i.e. increases the pressure.



2013



2015



2022

Northern dragonhead
Dracocephalum
ruyschiana



Since 19th century, the number of localities in Latvia has decreased more than twice. Still declining. Only 3 vital populations in the country.



2015



2022



2015



2022



The trail recently established



2022



2015



2022

Shrubby cinquefoil
Pentaphylloides fruticosa
 (syn. *Dasiphora*, *Potentilla fruticosa*)

Only one locality in Latvia, rare in the surrounding region.

During the 15 years since the trail is established, the trampling has created soil openings on the trail.

The visitor impact is visible but not detrimental. Even **beneficial** for several light-demanding plant species.





Military orchid
Orchis militaris



Hawk's beard
Crepis praemorsa

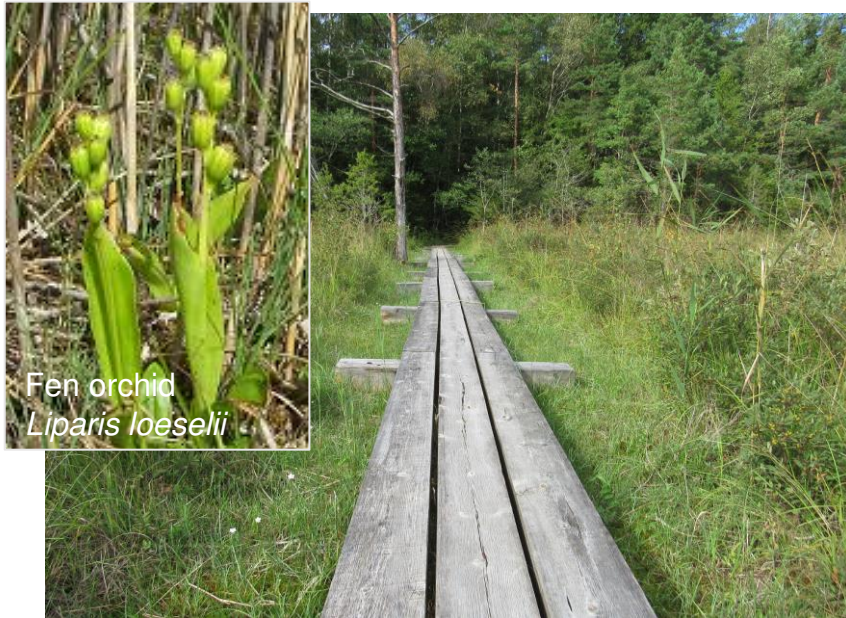


Birds-eye primrose
Primula farinosa



In some sections of the same trail, the management is inappropriate or insufficient!

Not only visitor-caused trampling but also **related management of trails** and surroundings of towers, fireplaces, etc. (most often mowing, rarely grazing) can be beneficial or detrimental to threatened plants



Mowing along the trail in calcareous fen. Beneficial for several small-sized light-demanding species, e.g. *Primula farinosa*, *Liparis loeselii*.



Trail (partly on wooden planks, partly on bare ground) in grazed area. Either beneficial or detrimental for certain plant species, grazing is the dominating pressure on vegetation in this area. Grazing supports small-sized, light-demanding and creeping plants, e.g. *Hydrocotyle vulgaris*.

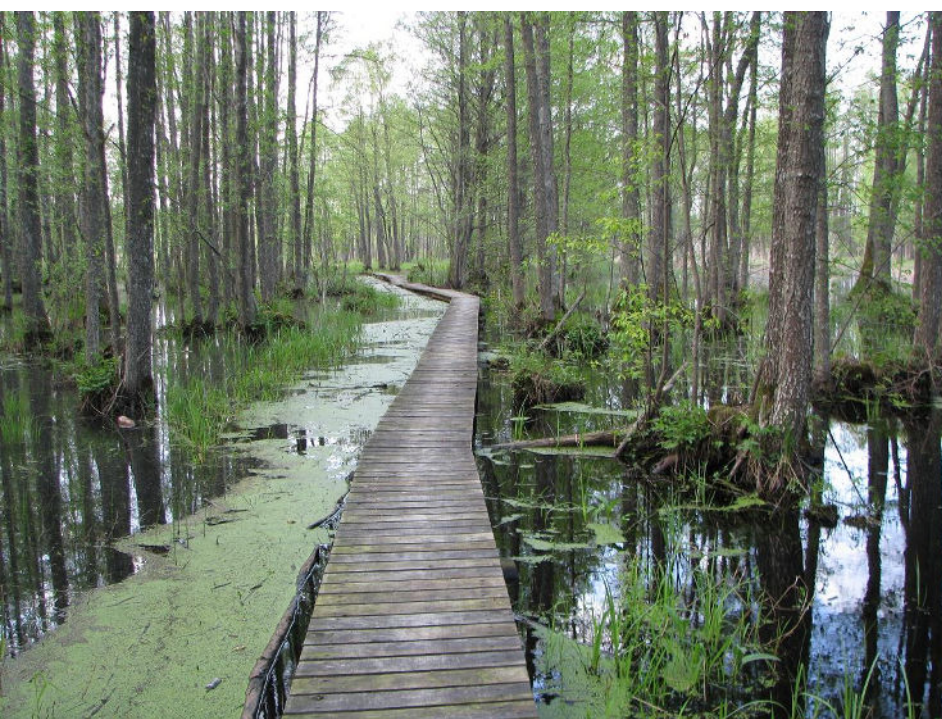


Regular mowing along forest trail has caused loss of *Pulmonaria angustifolia*, a forest plant species that is not adapted to mowing disturbance.



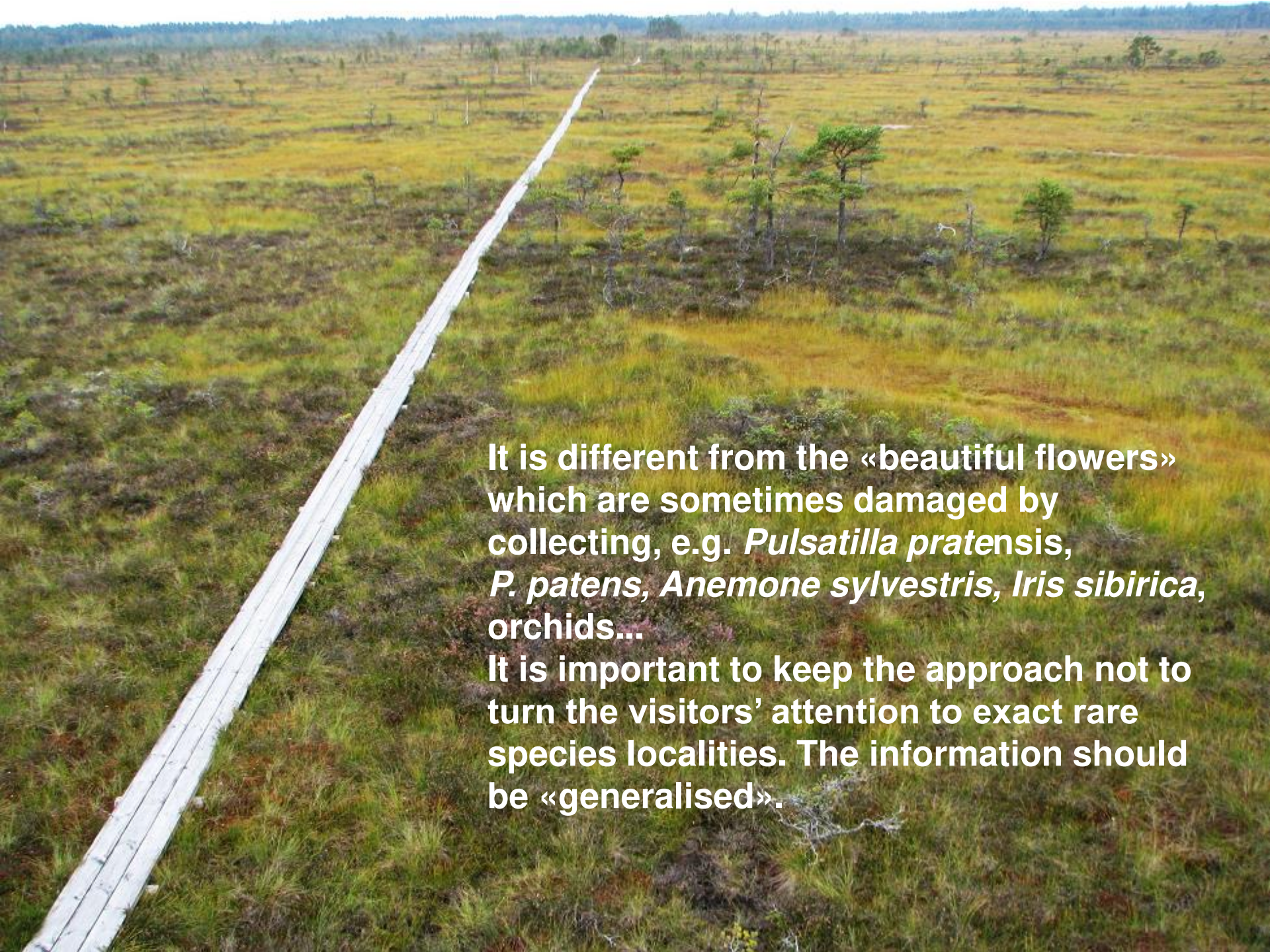
Wetland boardwalks
are almost always
successful.

The visitors prefer to stay
on the official route, as
the ground is wet and
seems dangerous.



Sometimes it does not work if the ground is dry enough to walk and there is something particularly interesting... Extra barriers and information signs are needed.





It is different from the «beautiful flowers» which are sometimes damaged by collecting, e.g. *Pulsatilla pratensis*, *P. patens*, *Anemone sylvestris*, *Iris sibirica*, orchids...

It is important to keep the approach not to turn the visitors' attention to exact rare species localities. The information should be «generalised».



Deergrass
Trichophorum cespitosum

The abundance and «beauty» of certain species matters

No significant damage was found on species that are abundant in the particular sites.
«It is just grass!»

The reasons for local extinction may be combined (thus uncertain)
e.g. trampling + natural habitat transformation + small population size

The species is extinct in this area



Marsh saxifrage *Saxifraga hirculus*

Photo: F. Le Driant,
<https://www.florealpes.com/>

Conclusions (I)

- ❖ In Latvia, **tourism is a threat** to some plant species, however, **its impact is not critical yet**. Still, there is a risk that some species may vanish (locally or from the flora of Latvia), largely due to direct visitor impact combined with other factors (e.g. inappropriate management, bad planning, natural or human-caused habitat transformation, small population size).
- ❖ **Trampling effects can be favourable and unfavourable**. Depends not only on the number of visitors per certain time unit but also on the intensity, frequency of visits, and visitor behaviour. The effect of visitors is not always predictable, not perfectly manageable.
- ❖ **The actual effects are combined**—not only visitors but also related management (mowing, population size and stability, etc.).
- ❖ **The species' vulnerability is related to certain conditions/traits**. However, no strong correlations were found (further studies are needed).

Conclusions (II)

- ❖ One of the key parameters to be included in the planning stage is **soil stability**. Species conservation **can co-exist with visitors on stable (e.g. shallow soils on dolomite) grounds**, but it is **often detrimental on peaty and sandy soils**.
- ❖ In areas **where it is not possible to fully prevent visitor impact** on threatened plants, transplantation of a certain proportion of the population may be applied as an *exceptional* solution. Better than doing nothing and hoping «that all will be fine».
- ❖ Controlled visitor pressure could be used as a management measure for disturbance-**dependent species** (creating and maintaining niches). However, it requires regular surveillance and monitoring.



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Thanks for your attention!

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