

Rehabilitation of exploited bogs in Switzerland : good surprises and hopes let down

Dr. Ph. Grosvernier
LIN'eco, Ph. Grosvernier
Case postale 80
2732 Reconvilier
Tel +41 32 481 29 55
e-mail ph.grosvernier@lineco.ch

A. Grünig
Eidgenössisches Volkswirtschaftsdepartement EVD
Forschungsanstalt Agroscope Reckenholz-Tänikon ART
Reckenholzstrasse 191
CH-8046 Zürich / Schweiz
Tel. +41 44 377 74 85 Fax +41 44 377 72 01
e-mail andreas.gruenig@art.admin.ch
www.art.admin.ch

There are some benefits (see fig. 1) for nature from secondary, i.e. exploited bogs, not the least being a much higher diversity of habitats and hence of species:

- i. Indeed, secondary mires most of the time included a set of habitats ranging from more or less rich fens to regenerated bogs, across poor fens and transitional mires. Thus there are several good examples in Switzerland of previously exploited mires where some regeneration has taken place and where the diversity of species, including most of the typical bog dwellers, is double so high as in pristine bogs.
- ii. Moreover, secondary mires often offer substitution niches to endangered species that have lost their primary habitat due to other human activities, such as intensive farming for example. This is particularly true for wet meadows and pastures in the surroundings of bogs, but also for wet heathlands and even dried out mires where one can encounter invertebrate species usually found in dry meadows with more or less sandy soils.
- iii. One can also argue that peat extraction enables some active management of mire habitats and can therefore be used as a tool to increase the diversity of structures and habitats.
- iv. Finally, peat extraction, through economical benefits, generates employment and welfare, and peatland restoration itself generates environmental (see above) and socio-economical benefits, e.g. extensive agricultural use, some opportunities of outdoor activities such as fishing or hunting, and other leisure or educative activities.

So why bother?

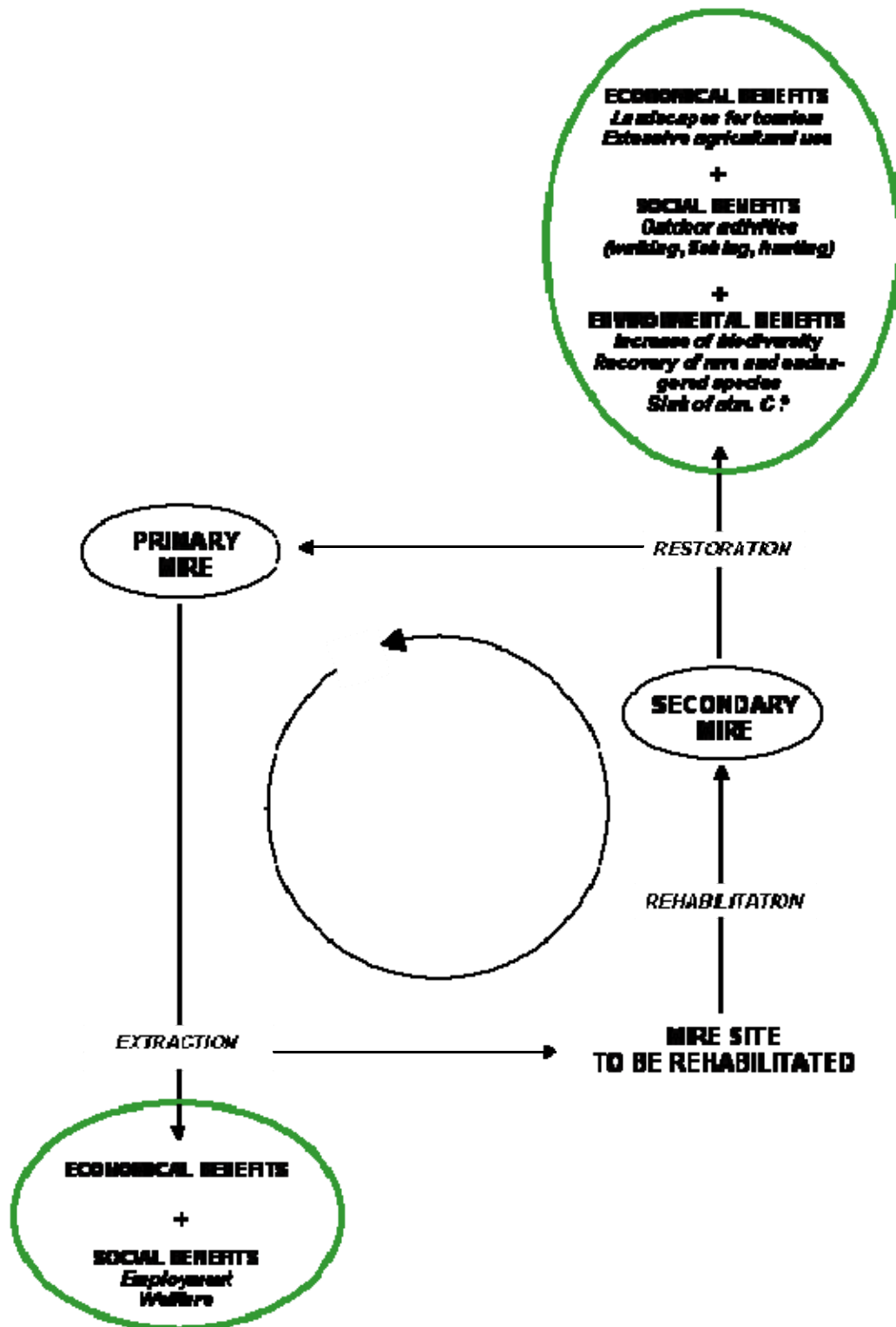


Fig. 1. Supposed and expected benefits from pristine and restored mires.

One important aspect of the discussion is to define how far we are able to effectively reconcile commercial peat extraction with the restoration **of peatlands, in terms of biodiversity and possibly towards peat accumulating systems.**

Up to now, probably the major problem with the restoration of bogs is that the whole restoration process was conducted totally independently from the extraction process and not by the same actors: extraction was done by private companies, functioning after economical rules along **a linear process**, while rehabilitation and restoration of exploited mires became the task of the state, as all the remaining mire areas were set under the protection of the federal state between 1991 and 1994 and peat extraction forbidden since then.

This means that the second part, the rehabilitation and restoration phases, of the supposed cycle from pristine to restored bogs is not integrated into the extraction plan and is not part of the economical process. **An exploited site must therefore be considered as a by-product**, if not a waste product, of the extraction process (see fig. 2).

Now, before talking about rehabilitation and restoration of a site, it must be clearly stated that peat extraction is bearing some costs with it. On the one hand, these are **environmental costs**, among which the loss of biodiversity, the loss of rare and endangered species, and the release of appreciable amounts of atmospheric C. On the other hand, they are **economical costs** as rehabilitating a site, in order to recreate favourable basic conditions for the development of a mire, and restoring the typical functions of a bog need the know-how of experts and skills of machinists. Such costs were not carried over in the economical process of peat extraction, so that there cannot be talked about a cycle within which exploited bogs return to a more or less original stage. And if peat extraction does not consider the costs of rehabilitation, it cannot either show off the benefits of a temporary increase in biodiversity and habitat structures.

Indeed, one must not forget that the high diversity in structures and habitats provided by former peat extraction mainly resulted from handcutting or so called "block-cutting". Nowadays, such an active and small scale management of habitat by peat extracting cannot be done at large scale and at a rhythm compatible with present-day commercial constraints of economical interest.

Moreover, even if considering the increase in biodiversity, one must not overlook that restored bogs still lack some of the most typical and rare bog species, and this more than 50 years after the regeneration processes took place.

Finally, most of the called up benefits from restored bogs, secondary mires or other re-uses of exploited mires would be available fairly as well by simply conserving primary mires, bogs, fens and transitional mires, instead of exploiting them and then trying to rehabilitate them!

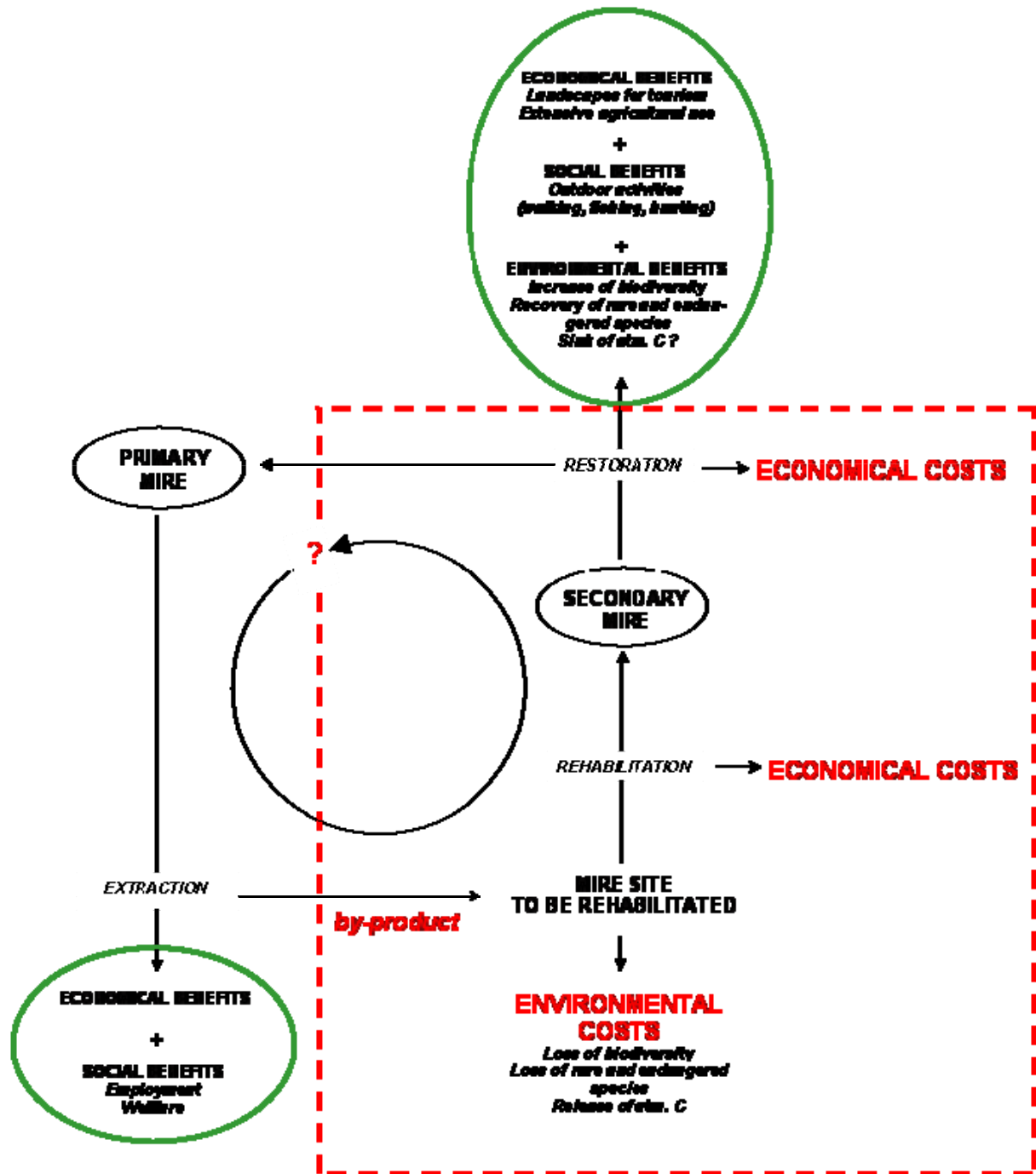


Fig. 2. Downsides from rehabilitation of secondary and restoration of pristine mires.

There are certainly some thresholds beyond which not many kind of restoration processes are still possible, if any (see fig. 3). Depending on the intensity of the disturbances caused by peat extraction, one may expect a given site to be restored into:

- i. a bog
- ii. a transitional fen
- iii. some sort of peat accumulating system
- iv. something else that has no longer to do with a peatland (other re-use options).

The restoration potential of a peatland will not only depend on the intensity of the disturbances it underwent during peat extraction but also on the time scale that is considered. If we consider the process in a time scale of thousands of years, nearly anything is possible! At human life scale though, the set of options is much more restricted.

It means that, before beginning with any restoration program, we shall need to define what kind of restoration/rehabilitation can reasonably be induced after what kind of peat extraction. This is exactly the kind of issue addressed to by the PROMME-checklist exposed by Gert-Jan van Duinen & colleagues.

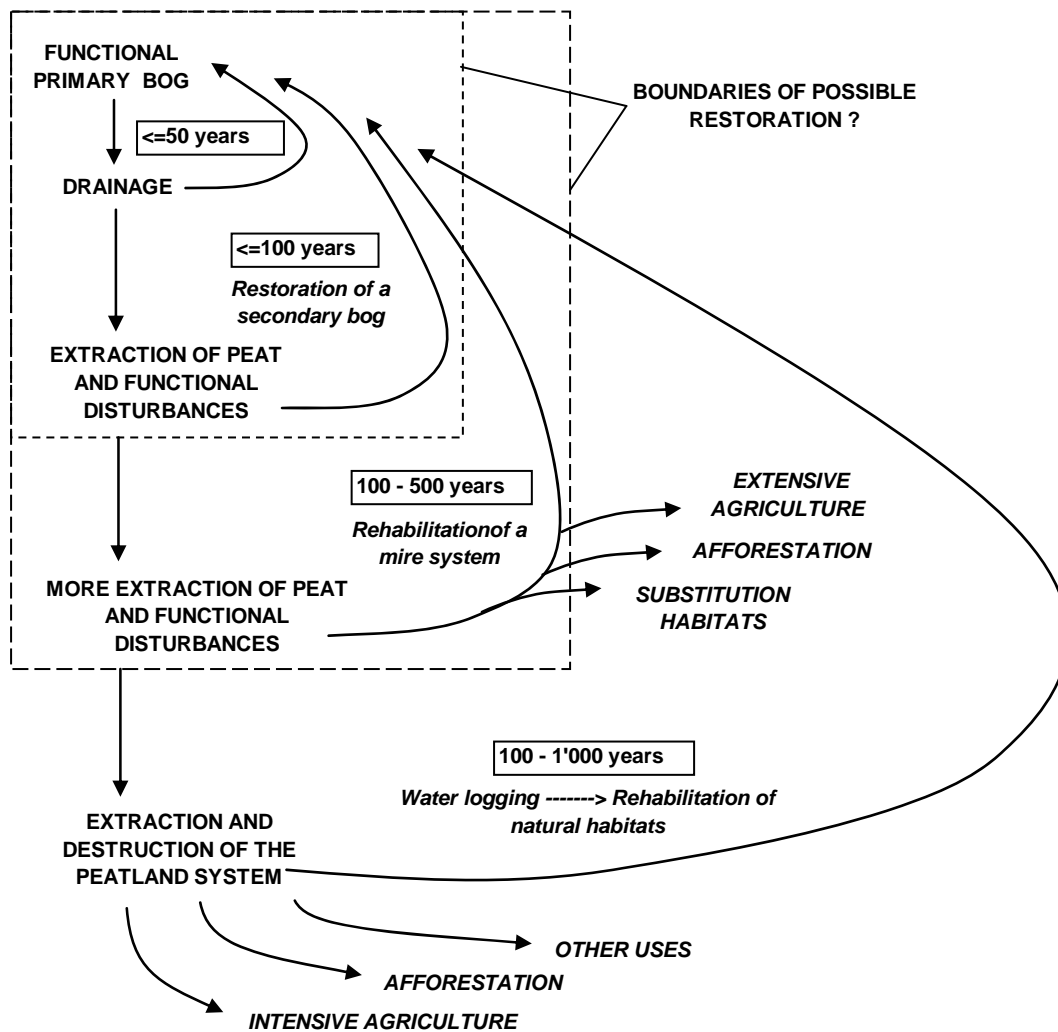


Figure 3. Thresholds and timescales in relation to possible restoration/rehabilitation processes depending on the intensity of peat extraction and disturbances to the peatland system.

Now, we had a dream! Or merely some hopes!

All the bogs greater than 675m² and fens greater than 1ha are strictly protected in Switzerland since 1991 and 1994 respectively. Buffer zones are to be delimited around mires to protect them against further fertilization or drainage, and restoration has to be undertaken wherever sound. Millions of swiss francs have been spent for the last 15 years in protection, management and restoration programs. One could therefore reasonably expect that the situation of swiss mires would at least not worsen and rather even improve.

20 years after the national referendum that put all the mires of Switzerland under protection, where are we staying? Besides the millions that have been spent for protection and restoration, the Federal Agency for Environment has set up a monitoring program. The program is based upon a randomized stratified sampling design, enabling periodic statements on the evolution of swiss mires at a national scale. The very first results, presenting the changes that affected swiss mires over an observation period of 5 years have just been published a few days ago. And the situation looks bad!

The areas of mires of national importance have approximately been maintained (minus 1%) in total. However, **the quality** of the mires has clearly declined (see fig. 4):

- more than 25% have become drier
- 20% have become poorer in peat
- 25% have become richer in nutrients
- 30% underwent an increased amount of woody plant growth
- bogs lost 10% of their total area
- fens lost 6% of their total area
- the lost bog and fen areas changed into wet meadows that are no longer accumulating peat, but are still considered as "mires" according to the law

As a result, the "mire character" (based upon the presence of a given set of typical mire plant species) declined in 15% of the mires.

In the same time, regeneration measures have been successful, but they were too infrequent and at too small a scale to compensate for the qualitative losses.

Considering that these changes occurred in a 5 years period, if the trends continue at the same pace, all the bogs might have disappeared in 50 years and all the fens in 70 years! (see fig 5).

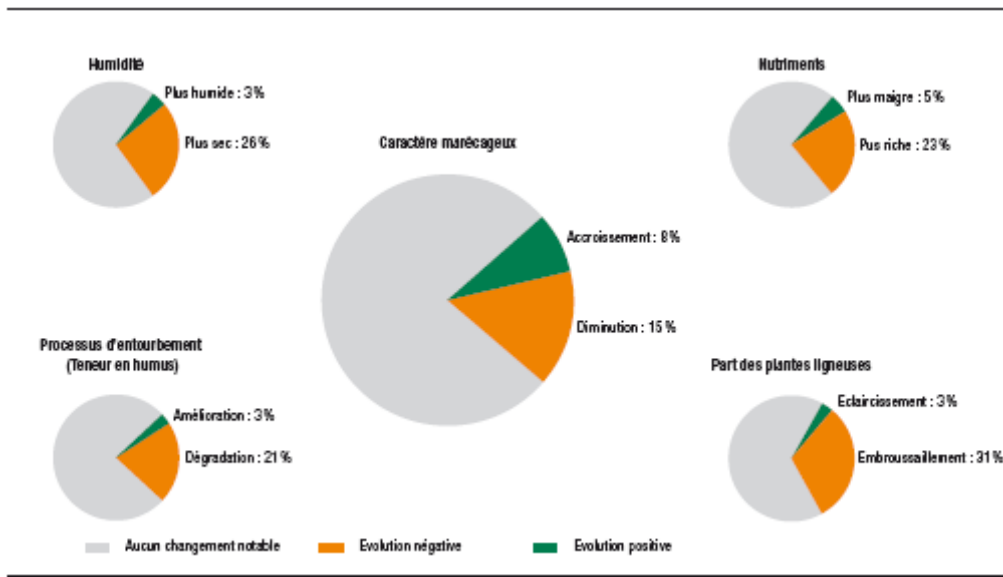


Figure 4. Qualitative evolution of mires over a five years period

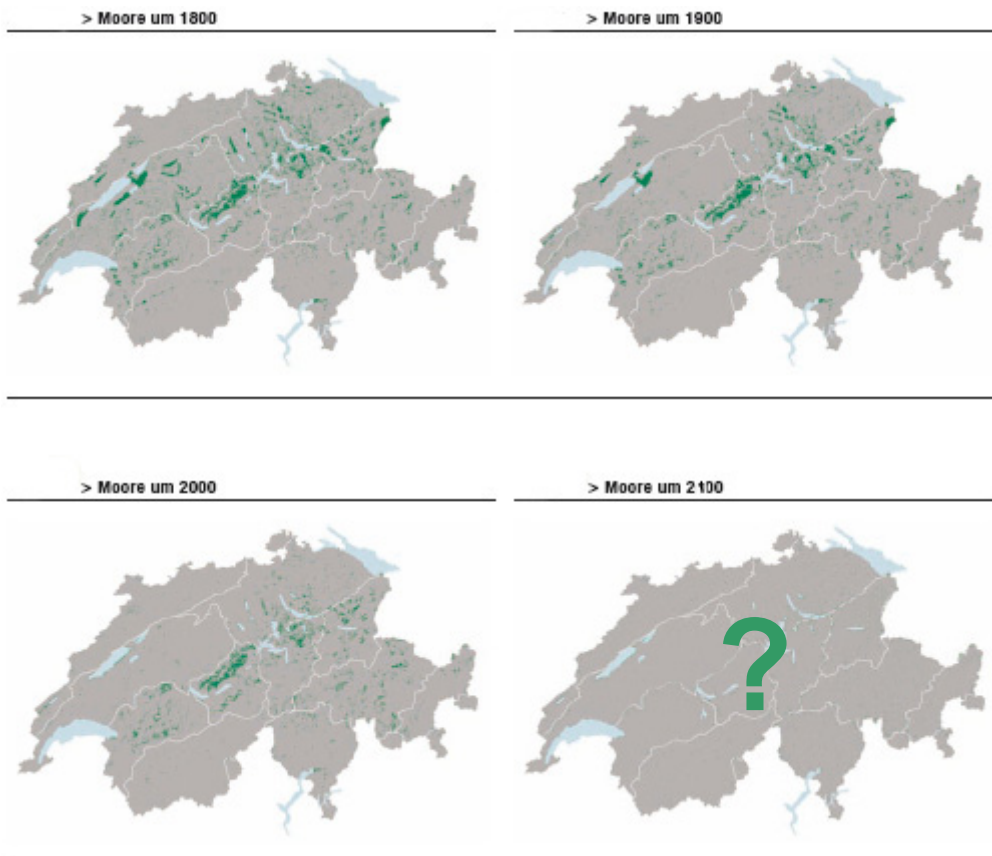


Figure 5. The decline of mire areas over the centuries (1800, 1900, 2000 and 2100?).

Among the factors driving the decline of mires, the five following are considered to be of a critical importance:

- i. Existing trenches and drainage systems
- ii. Nutrients inputs from neighbouring intensively used land
- iii. Atmospheric nutrients inputs
- iv. Inadequate management (too intensive agricultural use of fens)
- v. Abandonment (no management after cessation of peat extraction in bogs, or no more agricultural use of fen meadows)

There is little to expect in a reasonable laps of time regarding changes in atmospheric inputs. Deficiencies in the implementation and execution of buffer zones should be manageable, but remediation may take a long time to produce any noticeable change. The same is true for more adequate agricultural uses of fens.

Of much more importance is the fact that all these efforts will be no worth if we are unable to considerably reduce the number of existing trenches and underground drainage systems that continue to drain bogs and fens throughout the country. This sounds some like evidence, but isn't at all! We are indeed facing the challenge to dig out or block thousands of kilometres of drains and trenches, and this raises such problems as:

- Because of steep slopes in mountain areas, where mires mainly remain, it is often merely impossible to restore the original hydrology.
- The remaining mire areas are most of the time much smaller than originally, but only the areas bearing mire vegetation are protected, and buffer zones are mainly designed to filter out nutrients inputs. It is hence impossible to work at the scale of the original water catchment area, most of the surrounding areas being constructed and/or privately owned.
- By blocking trenches or digging out drains, it is possible to restore functional bogs, as assessed by the swiss monitoring program. But it is no longer possible for the farmers to use the rewetted areas with their too heavy machines (or too heavy cows!). As a result, some rewetted fen areas are abandoned by farmers and undergo an increase in brushwood, thus losing their mire character.
- Last but not least, even Switzerland, one of the richest countries in the world, does not have the financial means to restore all the remaining mires!

To conclude: if we are to find a way to continue peat extraction in a way compatible with the maintenance of the typical biocenoses of fens, transitional mires and bogs, before starting the extraction of peat, we absolutely have to take into account the environmental and economical costs that will be generated by this activity, and to plan the extraction in such a way that we are not facing the same often insolvable problems that are threatening swiss mires in the XXIst century.

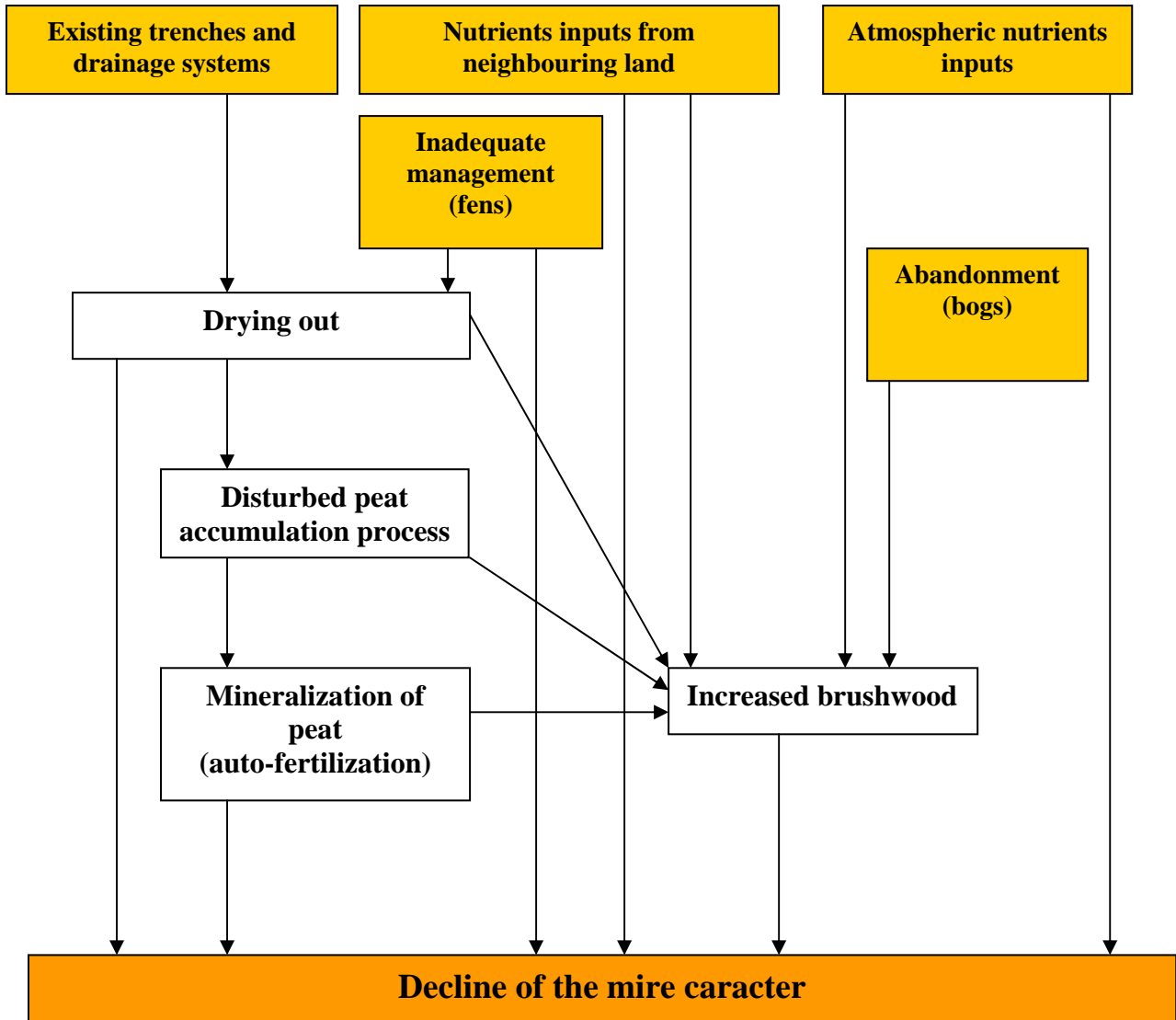


Figure 6. Causes and pathways to the decline of mire areas.