European Network for Rural Development

Re-naturalisation of the "Mandlinger Moor"

EAFRD-funded projects

Using the Rural Development Programme (RDP) to support the re-establishment of a moor by restoring its original hydrology and the propagation of the natural moor vegetation.

AUSTRIA

Biodiversity's restoration, preservation & enhancement

Location
Salzburg

Programming period
2014 – 2020

Priority
P4 – Ecosystems management

Measure
M07 - Basic services & village renewal

Funding (EUR)
Total budget 167 000
EAFRD 37 583
National/Region. 39 605
Other 89 812

Project duration
2014 – 2018

Project promoter
Federal Province of Salzburg

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Website
https://www.salzburg.gv.at/themen/natur/naturprojekte/projekttypen/renaturierung-mandlinger-moo

Summary

The Mandlinger Moor, situated in a mountainous region in the Federal Province of Salzburg in Austria, was like many other moors, used for peat exploitation. This caused a degradation of the original and unique moor fauna and flora. Peat extraction ended in 1993 and statutory nature conservation measures were applied in 1998.


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Over several programming periods, between 2004 and 2018, the Austrian Rural Development Programmes (RDP) have supported a far-reaching re-naturalisation process. These actions, particularly in the central area of the moor, resulted in the restoration of the original moor hydrology and propagation of the previous natural moor vegetation was clearly visible.

Results

Peat-building vegetation and peat mosses were restored and grew abundantly.

Within six months, peat extraction sites that had been vegetation-free were extensively covered with the white beak-sedge (rhynchospora alba) and beaded sedge (carex rostrata). Duckweed (lemna minor) and common bladderwort (utricularia vulgaris) were found in flooded, stagnant water bodies.

Lessons & Recommendations

- ❑ Relying solely on natural precipitation to ensure the re-wetting process of the moor would not have permitted the rapid reconstitution and propagation of the moor vegetation to the same extent.
- ❑ Monitoring was useful to effectively mitigate unexpected developments. For example, it was thanks to this process that backwater accumulating in the adjoining agricultural areas was rectified. In turn this ensured that the landowners gave their seal of approval to the re-naturalisation measures.

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Context

The 'Mandlinger Moor' is the most western moor in a series of upland moors in the 'Ennstal', a valley running approximately 250 km along the banks of the river 'Enns'. The last preserved, large scale mire landscape in a valley is located in 'Pongau', a district of the Federal Province of Salzburg. The 'Mandlinger Moor' covers an area of some 27 hectares, of which about 19 have been classified as a nature conservation site since 1998. The Mandlinger Moor is the result of a postglacial landslide which due to the backflow of tributaries, combined with additional precipitation, created a mire formation. This process resulted in the development of a large-scale raised bog.

Like many other moors, the Mandlinger Moor was exploited to extract peat to be used as fuel. At first, the extraction was done traditionally but later gave way to industrial peat mining. Peat extraction stopped in 1993. However, due to the drainage systems used for peat extraction, water levels in the moor dropped and threatened to dry it out and cause the extinction of the rare and unique plants and animals in the habitat.

The Federal Province of Salzburg first considered restoring the moor back to its original natural state in 2004. After an intensive planning and coordination phase, which took several years, the re-naturalisation process was launched in 2013 and lasted two years.

In total, some 19 hectares were re-naturalised. The objective was to re-wet the moor, which had dried out as a result of the peat extraction process and restore the unique fauna and flora of the habitat.

Objectives

The objective of the re-naturalisation of the 'Mandlinger Moor' was to improve the hydrological situation of the moor, to encourage the restoration, growth and propagation of the typical vegetation of raised bogs.

To achieve this the old drainage systems were sealed and the nutrient-rich seepage water was cleared from the surrounding slopes. After the re-naturalisation process the vegetation and the hydrological situation of the moor were monitored and assessed over several years to analyse the results of the measures undertaken.

Activities

After an intensive planning and coordination phase a total of some 19 hectares of the 'Mandlinger Moor' were renatured. The project was financed using funds from the Austrian RDP under Measure 7.6.1.a Studies and investments for the preservation, restoration and enhancement of the natural heritage – nature conservation. It received additional support due to its status as a nature conversation site. The project started in 2004 and ended 2018 and was divided into three phases:

- The preparation phase during previous programming periods (from 2004 to 2010) which included intensive planning and coordination activities;
- The core re-naturalisation phase (from 2013 to 2014) under the 2007-2013 RDP. Follow up re-naturalisation measures were also implemented between 2015 and 2017 to be in line with the project evaluation results; and
- The monitoring and evaluation phase following the project's results which took place between 2014 and 2018.

Specifically, the three project phases included the following activities:

Project phase 1:

- Preliminary investigation;
- Agreement with the local peat-association of the 'Mandlinger Moor' to make the site available for the re-naturalisation measures;
- Developing and designing the permit application for the re-naturalisation activities; and
- Identifying the permit procedures for water and forestry issues.

Project phase 2:

- Removing types of trees that are non-native to moors (especially spruce);
- Releasing nutrient-rich seepage water from the surrounding slopes through drainage ditches; and
- Closing the old drainage systems for peat exploitation, with the aid of peat-dams reinforced by wood.

Project phase 3:

- Monitoring and evaluation of the hydrological and ecological achievements.

To provide more detail, the first step in the implementation of the re-naturalisation activities was to ensure the discharge of several smaller water streams. These were closed off and relocated under a near-by road and railway line, and lead into the river 'Enns' under the 'Mandlinger Moor'. Formerly, these streams had been used to drain the moor to make the exploitation of peat possible.

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After peat exploitation ended, two major drainage systems remained unchanged. To ensure the re-wetting of the moor, these major drainage systems, as well as several other, smaller drainage trenches, were sealed off. On the south end of the 'Mandlinger Moor', peat dams with wooden enforcements were built to avoid the moor flooding in the event of high water coming from the river 'Enns'.

To evaluate the effects of the re-naturalisation measures, ecological and hydrological monitoring was carried out between 2014 and 2018.

A combination of the original drainage systems, former water channels and the exploitation of peat have changed the natural relief of the landscape completely. In the central part of the moor, instead of raised bogs, a concave landscape form emerged, which created an inverse relief in places where peat had been extracted. Artesian (i.e. confined) groundwater surged into the moor. As a result of the relief's new shape, water was overflowing all year round. The result was that the adjoining agricultural land, located in the south of the moor, suffered from the resulting backwater. Additional mitigation actions were therefore implemented. An additional trench was dug in the south-eastern end of the moor and other additional trenches lead the backwater away from the agricultural areas and into the river 'Enns'. These mitigation actions reduced the impact of the backwater on the agricultural areas.

The groundwater level is controlled on a regular basis for monitoring and evaluation purposes. Permanent monitoring areas were also installed to check the vegetation's development. This will allow detailed inventories and further documentation in the coming years.

Main results

Five years after the implementation of the first re-naturalisation actions, the project's results were monitored and evaluated to check the evolution of the moor's hydrological situation and the re-introduction of typical moor vegetation. The first results in the former central peat-extraction sites, show that:

- Peat-building vegetation and peat mosses were able to grow and spread. Allowing the confined artesian moderately nutrient-rich mineral groundwater to flow onto the moor accelerated the re-wetting process and the spreading of water-loving moor-vegetation;
- Within six months, the white beak-sedge (rhynchospora alba) and the beaded sedge (carex rostrata) had spread extensively on peat extraction sites which has previously been vegetation-free;
- Additionally, a mosaic of peat-mosses had spread in-between the white beak sedge;
- Birch-seedlings were observed;
- In open patches, the great sundew (dorsera anglica) had re-established itself;
- Duckweed (lemna minor) and common bladderwort (utricularia vulgaris) were found in flooded, stagnant water bodies; and
- The remaining trees, which had not been removed prior to the re-naturalisation process, died off and remained as deadwood on the moor.

The first results in the unexploited peat sites in the west of the moor show that:

- In areas where the flooded stagnant water bodies did not reach unexploited peat sites, a mosaic of peatmosses, heathland and woodland growth was observed;
- In other areas where the backwater had infiltrated the soils re-wetted, leading to the return of moisture-loving vegetation. In these areas transitional bog vegetation increased.

First results in the unexploited peat sites in the south and the southeast of the moor show that:

- The soils in these areas were irreversibly compacted and therefore, a re-wetting of the complete soil cover was no longer possible. Nevertheless, in these areas, a mosaic of peat-mosses, wetland meadow grasses, heathens and woodland was observed.

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Key lessons

- Due to the actions implemented in the course of the re-naturalisation-process, a large-scale re-wetting of the ‘Mandlinger Moor’ was achieved. The subsequent ecological monitoring and evaluation showed that peat-building vegetation and peat mosses were able to spread and re-establish. With artesian confined groundwater pouring into the moor, the re-wetting process was accelerated, and the moisture-loving moor-vegetation spread rapidly. Unlike the very nutrient-rich surrounding surface water bodies, this additional source of artesian groundwater supplied moderately nutrient-rich mineral water. This, not only prevented eutrophication but also helped the growth of the moor-vegetation.
- If the re-wetting process had been limited to natural precipitation only, the introduction and growth of the moor vegetation would not have been possible to the same extent.
- The monitoring and evaluation verified the success of the re-naturalisation measures, especially with respect to the former peat-extraction fields. An important requirement for the successful implementation of the re-naturalisation process was the continued and ongoing observation and maintenance of the ‘Mandlinger Moor’. Due to the monitoring process, unexpected developments like the accumulation of backwater in the adjoining agricultural areas could be effectively mitigated. This ensured that landowners gave their approval for the re-naturalisation measures.

Additional sources of information

Evaluation report on the monitoring and success of the re-naturalisation measures (in German):
https://www.salzburg.gv.at/umweltnaturwasser_/Documents/Publikationen%20Natur/NaturLandSalzburg-2019-2.pdf

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