# Restoration of raised bog Aklais in Latvia

### Year of issue

2025

### Summary

The Aklais Mire is a degraded raised bog located in western Latvia, within the Aklais Mire Nature Reserve, part of the Natura 2000 network. Covering approximately 2003 hectares, the site suffered significant drainage during the 20th century, which disrupted its natural hydrology and led to a decline in typical bog habitats and biodiversity.

From 2010 to 2013, Aklais was one of four sites restored under the EU-funded LIFE+ project “Restoration of Raised Bog Habitats in the Especially Protected Nature Areas of Latvia” (LIFE08 NAT/LV/000449). The project was led by the University of Latvia, with several national partners including the Nature Conservation Agency, the Latvian Fund for Nature, ELM Media, and the municipal company Rīgas meži. Restoration actions at Aklais focused primarily on blocking old drainage ditches using peat dams to raise the water table and restore natural bog hydrology. The project also involved the development of a management plan, ecological monitoring of vegetation, birds and invertebrates, and outreach activities such as exhibitions and public communication.

The goal was to enable the regeneration of active raised bog habitats and associated species, particularly *Sphagnum* mosses. Some edges of the site are adjacent to former peat extraction areas, which have further altered local conditions. By restoring hydrology, the project sought to create favourable conditions for long-term peat accumulation and biodiversity recovery.

Follow-up assessments between 2013 and 2017 showed that the rewetting actions were effective in raising the water table, but changes in vegetation composition were still limited in the short term. No significant increase in typical bog species or *Sphagnum* mosses was observed during the first years after restoration. This suggests that full ecological recovery will take longer or may require additional active interventions.

Although Aklais was not directly included in the later LIFE REstore project (2015–2019), this initiative offered valuable complementary knowledge for Latvian peatland restoration. It emphasized the importance of combining rewetting with plant reintroduction and of monitoring greenhouse gas fluxes in restored peatlands. The case of Aklais thus contributes to a broader understanding of peatland restoration dynamics in the Baltic region, highlighting both the opportunities and challenges of large-scale hydrological rehabilitation.

### Photo Gallery



### Location

56.5032, 25.107

### Project

NWRM

### National ID

Latvia_03

### Sector

Hydromorphology

### Installation Date

2012

### Implementation status

Completed

## Overview

### Location of the project

Peat bog Aklais in Latvia

### Country

Latvia

### NUTS2 Code

Latvija

### Sponge measures implemented in the case study

Wetland restoration and management

### Objectives

The project aimed to restore active raised bog habitat (7110*) in four Natura 2000 sites, including Aklais Mire. It initially targeted 290 ha of degraded bog, but ultimately improved hydrology over 488 ha by constructing 156 peat dams. Objectives also included raising groundwater levels, halting habitat degradation, preparing four site management plans, and increasing public awareness through outreach materials, exhibitions, and a documentary.

### Involved partners

| Authority type | Authority name | Authority role | Comments |
|---|---|---|---|
| Other | University of Latvia | Initiation of the measure | Project manager, iniciator of the measure, monitoring |
| Other | SJSC Latvian state forests | Monitoring | Manager of state-owned forest lands and Aklais Mire is located in state-owned forest land |

## Site Information

### Climate Zone

Cool temperate moist

### Precipitation

520.00 mm

### Temperature (°C)

6.00 °C

### Elevation range

66

### Vegetation class

Raised bog

### WFD Ecological status

Good

### WFD Chemical status

Failing to achieve good

## Design and Implementation

### Project scale

Micro

### Project scale specifications

Although it covers a relatively large area (around 2003 ha), it focuses on the restoration of a specific degraded bog site within a defined nature reserve. The interventions—ditch blocking, hydrological monitoring, and vegetation recovery—are localized within the Aklais Mire and do not span multiple catchments or regions. The involvement of national actors like the University of Latvia and Latvijas valsts meži supports implementation and monitoring, but the project remains geographically limited in scope. Therefore, it fits the micro-scale category: a targeted ecological restoration at a site level.

### Project area

60

### Area subject to Land use change or Management/Practice change (ha)

60.00 ha

### Size

60.00

### Size unit

ha

### Constraints

Due to natural conditions, there was no possibility to use technique and dams were built by hand. Unfortunately the part of the dams is partly washed out by water now and in a result raised bog is not restored as expected.

### Favourable preconditions

Location in Especially Protected Nature Area and Natura 2000 site

## Financing

### Total cost

852759.00 €

### Total cost information

Total eligible budget for the LIFE+ project “Restoration of Raised Bog Habitats in Latvia” (LIFE08 NAT/LV/000449)—which includes site restoration works at Aklais Mire.

### Costs investment information

EUR 6000 for technical design, EUR 12 0000 dam building

### Administrative annual costs

4100.00 €

### Administrative annual cost information

EUR 4000 for hydological monitoring , EUR 100 for vegetation/habitat monitoring

### Economic costs, income loss - unit

€/ha

### Financing authorities

| Authority name | Type of funding | Comments | Financing share |
|---|---|---|---|
| European Union | EU-funds: LIFE+ | LIFE08 NAT/LV/000449 EU Contribution: 545,035 € | 75 % |
| — | National funds | — | 25 % |

### Compensations

No

## Policy and Governance

### Policy description

Restoration of degraded area of raised bog thus providing appropriate living conditions for plant and animal species, many of them rare and protected in EU

### Land ownership

State-owned land

### Policy targets

Increase Water Storage

Improved Biodiversity

Peak-flow reduction

Runoff control

### Part of a wider plan

No

### Public consultation

Yes

### Consultation activities

| Activity stage | Activity type | Key issues | Comments |
|---|---|---|---|
| Other | Stackholder consutation | Location of dam sites, changes of groundwater level, impact on habitats | In total 4 stakeholders meetings were organised during the whole elaboration process of nature management plan (elaboration of technical design of the measures is included). Meeting were attended by local governance, inhabitants, relevant state institutions ect. |
| Other | Exhibition and guided visits | — | A mobile photo exhibition showing the bogs and restoration process was displayed in schools, libraries, and cultural centres. Some site visits and field days were organized to show restoration in practice, including for students and decision-makers. |

### Has contractual arrangements

Yes

### Contractual arrangements

| Arrangement type | Responsibility | Name | Role |
|---|---|---|---|
| Contractual agreement | Development of nature management plan | Latvijas Fund for nature | Development of nature management plan |
| Contractual agreement | Development of technical design and construction of NWRM | Melioprojekts | — |

## Impacts and Monitoring

### Monitoring System

### Monitoring requirements

The University of Latvia and Latvijas valsts meži are involved, especially in hydrological and ecological monitoring.

### Monitoring parameters

Monitoring includes groundwater level measurements using installed wells and vegetation surveys to track the recovery of Sphagnum mosses and bog species.

### Upstream station

-

### Downstream station

-

## Maintenance

### Maintenance requirements

Nature Conservation Agency is responsible for maintaining the peat dams, with inspections planned at least every six years.

## Impact Assessment Methodology

### Performance impact assessment method

Catchment outlet

### Performance impact estimation information

Monitoring of the groundwater level was carried out in 13 groundwater monitoring well. Vegetation/habitat monitoring was carried out in 35 habitat monitoring plots.

## Biophysical impacts: Hydrology

### Information on retained water

After construction of 156 peat and wood dams across the four project sites (including Aklais), the groundwater table rose and stabilized across approximately 488 ha of degraded raised bog habitat. The increase in water levels was observed immediately after dam construction, confirming effectiveness of the rewetting measures. Although detailed figures for Aklais only are not available, the project-wide monitoring reported a clear elevation of the water table in monitored wells, by about 2–4 cm in profiles at Aklais (e.g. Ak1-1, Ak1-2) in late 2012.

### Increased groundwater level

0.17 m

### Information on increased groundwater level

0.15-0.2 according hydrological motioring data in 2013.

## Biophysical impacts: Biodiversity

### Improved biodiversity

Yes

### Information on improved biodiversity

Changes in vegetation are insignificant yet as it takes more time for plants to restore. However, typical raised bog species like bog-moss Sphagnum cuspidatum and cotton-grass Eriophorum vaginatum have begun to dominate percentage cover while the cover of heather Calluna vulgaris has begun to decrease.

Monitoring from 2010 to 2013 across Aklais, Rožu and Aizkraukle mires (71 survey plots) found no statistically significant increase in Sphagnum cover or in species typical of raised bog habitats during that early post-restoration period. Cover of drainage-tolerant species (e.g. heather Calluna vulgaris) persisted, and overall vegetation response remained limited in the short term. No quantitative data on invertebrate or bird responses at Aklais are reported in the sources consulted.

## Biophysical impacts: Water & Soil Quality

### Water quality overall improvements

Not relevant for this application

### Soil quality overall improvements

Not relevant for this application

### Information on soil quality overall improvements

no surveys

## Biophysical impacts: Others

### Ecosystem impact climate regulation

Not relevant for the specific application

### Information on ecosystem impact GHG soil carbon

The initial LIFE Raised Bogs project did not include measurements of greenhouse gas fluxes. However, later LIFE REstore studies in comparable Latvian raised bog restorations emphasize that rewetting reduces $CO_2$ emissions and may enhance methane uptake in the medium to long term, highlighting a gap in the original scope rather than a documented impact at Aklais.

## Lessons Learned

### Key lessons

The main goal of the implemented measure was to restore natural hydrological regime in the drained raised bog located in nature reserve and included in Natura 2000 site. Building of a dam was chosen as most appropriate method to stop artificial drainage. Due to natural conditions, there was no possibility to use technique and heavy machinery, therefore dams were built by hand. Unfortunately a part of the dams is destroyed by waters now and in a result raised bog is not restored as expected. The main lesson for future is to use proper technology for constructing a safer dam.

Recent evaluations emphasize that while hydrological restoration - via construction of peat-dam dams - consistently succeeded in raising groundwater levels, vegetation response remained limited in the short term. Monitoring of 71 plots in Aklais (and two other sites) from 2010 to 2012 revealed no significant increase in Sphagnum cover or decline in drainage-tolerant mosses; even typical indicators such as heather vitality showed little change by 2012

The behaviour at Aklais aligns with outcomes from other restored bogs (Rožu, Aizkraukle), where vegetation dynamics lagged behind hydrological improvement, indicating that ecological recovery of raised bog habitats often requires more time or active reintroduction measures .

Follow-up initiatives, notably the LIFE REstore project, underscore the need to integrate hydrological rehabilitation with GHG flux monitoring and active species reintroduction to maximize climate mitigation and biodiversity benefits—strategies that were not included in the original LIFE Raised Bogs scope but are now considered best practice in peatland restoration in Latvia.

### Drivers

| Driver type | Driver role | Comments |
|---|---|---|
| Other | Main driver | izmaiņas hidrol režīmā un biotopa/ veģetācijā |

### Success factors

| Success factor type | Success factor role | Comments |
|---|---|---|

| | | |
|---|---|---|
| Attitude of relevant stakeholders | Main factor | common understanding about nature assets maintenece |

### Transferability

The project also demonstrated that good practices developed are applicable at national and regional scales - indeed, the methods and lessons from LIFE Raised Bogs were recognized as transferable models across Latvia and even in broader European contexts

## Sources

### Sources


Restoration in a Changing Landscape – Latvia’s Experience

Impact of restoration measures on the raised bog habitats in Rožu, Aklais and Aizkraukle Mires

Zema izskritrspeja – Sustainable and responsible after-use of peat extraction areas

Inception Report

About the Project

LIFE08 NAT/LV/000449 – Restoration of Raised Bog Habitats in the Especially Protected Nature Areas of Latvia

After-LIFE Conservation Plan: Restoration of Raised Bog Habitats