



Schneifel, Germany

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Organisation responsible for the site:
RWTH Aachen University, Institute of Hydraulic
Engineering and Water Resources Management (IWW);
Stiftung Natur und Umwelt Rheinland-Pfalz (SNU);
Forstamt Prüm / Landesforsten Rheinland-Pfalz

- The Schneifel is a largely forested ridge in the southern Eifel with extensive state forest areas and protected Natura 2000 / FFH context.
- The wider landscape is largely degraded by historical drainage and spruce forestry, but still contains patches of wet, stagnic and groundwater-influenced habitats.
- The RWTH focus catchment is the small Klöckersfenn / Moorheide headwater catchment, where runoff can be monitored at a defined outlet beneath a forest road culvert.
- Main problems:** artificial drainage ditches, spruce stands on waterlogged soils, loss of open wetland habitats, reduced habitat connectivity, and potentially faster runoff generation.

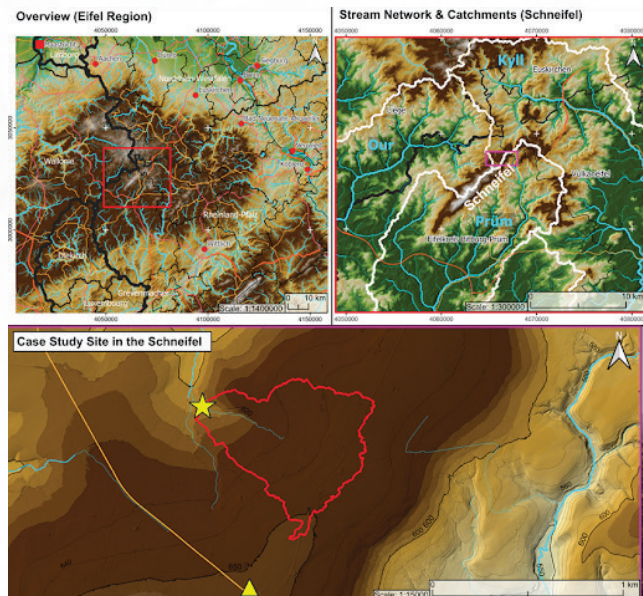


Country: Germany

Region: Rhineland-Palatinate, southern Eifel,
Schneifel ridge near Prüm and the Belgian border

Type of Sponge territory: Forested headwater catchment with drained wet-
heath areas, fen-like and moorland patches, and wet-forest remnants

Geographic coordinates of the site centroid point:
50.304222° N, 6.423511° E



Approximately 150 small retention structures or ditch plugs were planned within a monitored headwater catchment of about 0.423 km². Ditch-blocking works were completed in mid-April 2026, creating a rare opportunity to combine restoration, outlet monitoring and process-based hydrological modelling.



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Views and opinions expressed are those of the author(s) only and do not necessarily reflect those of the European Union or the European Climate, Infrastructure and Environment Executive Agency (CINEA). Neither the EU nor CINEA can be held responsible for them.

Site characteristics

Climate

Humid Atlantic low-mountain climate; approx. 800 to 1,000 mm annual precipitation; high wetness due to orographic uplift.

Soil

The model represents the organic and humic upper soil material and the rooted silty-loam horizon as active soil layers above a dense stagnic silty-clay lower boundary. Peat and organic-rich layers are present but spatially variable and often shallow.

Hydrology

Small responsive headwater catchment, approx. 0.423 km². Runoff is monitored at one outlet. Drainage ditches and forest tracks increase local connectivity. In the calibrated model, delayed flow is represented as effective interflow and shallow groundwater flow contributing to baseflow, while deep percolation losses are assumed to be minor.

Vegetation

Mixed landscape of spruce-dominated forest, mixed forest, birch and other deciduous trees, wet heath and moorland remnants. Typical taxa include *Sphagnum* spp., *Eriophorum* spp., *Molinia caerulea*, *Erica tetralix*, *Calluna vulgaris*, *Vaccinium oxycoccos* and *Betula pubescens*.

Stakeholders

- Stiftung Natur und Umwelt Rheinland-Pfalz (SNU): restoration planning and implementation lead, together with local partners.
- Forstamt Prüm / Landesforsten Rheinland-Pfalz: forest land management, implementation support, site data and forestry context.
- RWTH Aachen University, IWW: hydrological monitoring and modelling
- Nature conservation and water authorities: permitting, conservation context and coordination.
- Büro für Naturschutz und Landschaftsökologie (bnl), on behalf of SNU: baseline vegetation monitoring.



Figure 1. Klöckersfenn / Moorheide focus area before restoration. The drone image shows the central wetland area within the modelled headwater catchment, with small moorland and wet-heath patches surrounded by spruce-dominated and mixed forest stands. The photographs below show the Moorheide area (left) and a spruce stand with a drainage ditch before restoration (right). Drone image credit: Stiftung Natur und Umwelt Rheinland-Pfalz (SNU).

RESTORATION EFFORTS

Conservation program

Pilot project within the Rhineland-Palatinate State Peatland Conservation Programme (Moorschutzprogramm Rheinland-Pfalz), implemented by Stiftung Natur und Umwelt Rheinland-Pfalz (SNU) on behalf of the Ministry for Climate Protection, Environment, Energy and Mobility (MKUEM). The programme supports the protection and restoration of moors and wetland areas, including ditch blocking, water retention and forest restructuring.

Economic investment

The measures are implemented within the Rhineland-Palatinate State Peatland Conservation Programme, coordinated by SNU on behalf of the state environment ministry and implemented in cooperation with Landesforsten Rheinland-Pfalz and Forstamt Prüm. Detailed investment figures are not available.

Restoration program

Spruce was removed from wet and sensitive areas, using cable-crane harvesting to limit soil disturbance where site conditions allowed. Drainage ditches blocked using small retention structures/ditch plugs, with ditch-blocking works completed in mid-April 2026. Additional opening or maintenance of wet heath and moorland remnants where needed.



Figure 2. Implementation of restoration measures in the Klöckersfenn / Moorheide area. Upper picture: Aerial view after spruce removal and ditch blocking. Bottom: excavator works for the construction of ditch plugs. Machinery images: Stiftung Natur und Umwelt Rheinland-Pfalz (SNU).

SPONGEBOOST'S ROLE








The Horizon Europe project SpongeBoost aims to identify effective ways to enhance or restore landscapes' natural water-retention capacity. In the span of four years, the project tests best-practice approaches and innovative sponge solutions at selected case study sites, including the Schneifel. The Schneifel was selected because it combines active restoration, historical drainage, wet habitat remnants, a small monitorable catchment and a clear hydrological restoration hypothesis.

What the site can demonstrate:

- How ditch blocking and spruce removal may change drainage connectivity, runoff timing and delayed release in a small forested headwater catchment.
- How a calibrated HEC-HMS status quo model can be used to compare current, degraded, rehabilitated and partial-restoration scenarios.
- How event-scale indicators such as peak flow reduction, time to peak and recession behaviour can be used to quantify sponge-function changes.

Interpretation and analysis

- 🌿 The current model provides a calibrated status quo baseline, not yet a measured before-and-after restoration effect.
- 🌿 The catchment behaves as a small, responsive headwater system with a strong delayed-flow component.
- 🌿 The key hydrological hypothesis is that ditch blocking reduces rapid drainage connectivity, increases local ponding/residence time and may support more infiltration into the active soil layers.
- 🌿 Because the implemented restoration area is currently estimated to cover less than approximately 10% of the modelled catchment, measurable effects at the outlet may be limited. Scenarios Analysis will be used to quantify the full restoration potential.
- 🌿 Main uncertainties: short calibration period, no complete before-and-after time series yet, very small catchment boundary sensitivity, experimental culvert-based HyQuant monitoring setup, and uncertainty in internal process separation from outlet discharge alone.
- 🌿 Priority KPIs: peak flow reduction, time to peak and recession behaviour. Supporting indicators include direct runoff volume, runoff coefficient, soil wetness and delayed-flow contribution.

Technique	
 Rainfall	10 min; German Weather Service (DWD) station Schneifelforsthaus, station ID 04508, approx. 850 m from the catchment centre. Used as incremental precipitation input.
 Air temperature	10 min; DWD-Station Schneifelforsthaus. Used for the Temperature Index snow routine and evapotranspiration
 Water flow	20 min processed discharge; HyQuant radar-based water level and velocity sensor at outlet culvert/pipe, with iRIS UC logger. Discharge calculated from partly filled circular pipe geometry and measured velocity.
 Soil moisture and soil temperature	Triplet monitoring for natural, degraded and restored conditions planned. Equipment ordered; installation delayed due to supplier delivery times.
 Vegetation cover	Land cover classification for the hydrological model was based on orthomosaics and field observations. In addition, baseline vegetation monitoring was conducted on five permanent plots in July 2025 by BNL on behalf of SNU. Main plots and subplots document habitat structure and species composition.
 Surface elevation and spatial mapping	1 m digital elevation model, GIS layers, official geodata, drone imagery and site photos. Used for catchment delineation, measure mapping and land-cover interpretation.
 Hydrological model	HEC-HMS status quo model calibrated for 03 February 2026 to 28 April 2026. Components: Simple Canopy, Temperature Index Snow, Layered Green and Ampt, Clark Unit Hydrograph and Linear Reservoir. Performance: NSE = 0.945; percent bias = -0.21%.

