

# Peatland Restoration

## A DOI Nature-Based Solutions Roadmap Fact Sheet



**Peatlands** are inland wetlands where waterlogged soils prevent plant material from fully decomposing.<sup>1</sup> They have thick layers of sphagnum moss and peat soils that store large amounts of carbon.<sup>2</sup> About 35% of peatlands globally have been lost since 1970, often mined for peat or drained for agriculture.<sup>3</sup> Peatland restoration aims to reverse this trend, usually by altering hydrology to rewet drained and degraded peat soils, and restore peatlands to their natural state as carbon sinks.<sup>4</sup>

### TECHNICAL APPROACH

The specific approach used will depend on a site's condition and history, but generally uses these techniques:

- Removing drivers of peatland degradation such as invasive species, grazing pressure, and airborne and waterborne pollutants.<sup>5-7</sup>
- Restoring hydrology by blocking drainage outlets to raise the water table. This is frequently done using dams made of peat, wood, metal, or stone.<sup>4</sup>
- Reintroducing plants via transplant of moss from a donor site or seeding trees if the desired final state is a peat swamp.<sup>8-9</sup>
- Clean up damage caused by heavy equipment, including restoration of temporary access roads to limit future vehicle access to the site.<sup>10</sup>

### BENEFITS

#### Climate Threat Reduction

- Reduced wildfire risk
- Carbon storage and sequestration
- Reduced flooding
- Heat mitigation
- Drought mitigation

#### Social and Economic

- Jobs
- Recreational opportunities
- Cultural values
- Mental health and well-being
- Reduced erosion

#### Ecological

- Enhanced biodiversity
- Improved water quality
- Reduced runoff

## SITE SUITABILITY FACTORS

- ✓ Peat has been previously mined
- ✓ Ample water supply
- ✓ At least 50 cm of peat remaining
- ✓ Water pH of 5.1 or lower
- ✓ Flat topography
- ✗ Limited site access
- ✗ Mineral-rich soils
- ✗ Near sources of nutrient pollution
- ✗ Near waste disposal sites
- ✗ Site is completely inundated

## EXAMPLE PROJECT

Peatlands in Pocosin Lakes National Wildlife Refuge in North Carolina were drained for agriculture more than 100 years ago. The drained peatlands slowly release carbon and are vulnerable to fires that emit tons of carbon to the atmosphere. The US Fish & Wildlife Service has worked over the past 20 years to restore the hydrology of these peatlands by installing adjustable dams in the existing canals.<sup>11</sup>



A drainage canal with a water control structure in Pocosin Lakes National Wildlife Refuge. Photo credit: NC Wetlands. Public domain.

## REFERENCES

- 1 IPS. n.d.a. "What Are Peatlands?" *International Peatland Society*. <https://peatlands.org/peatlands/what-are-peatlands/>
- 2 Andreozzi, Haley. 2009. "Peatlands." *University of New Hampshire Extension*. <https://extension.unh.edu/resource/peatlands>
- 3 Kopansky, Dianna. 2019, February 1. "Peatlands Store Twice as Much Carbon as All the World's Forest." *UN Environment Programme*. <https://www.unep.org/news-and-stories/story/peatlands-store-twice-much-carbon-all-worlds-forests>
- 4 IPS. n.d.b. "Peatland Restoration." *International Peatland Society*. <https://peatlands.org/peatlands/peatland-restoration/>
- 5 Cohen, J.G., M.A. Kost, B.S. Slaughter, D.A. Albert, J.M. Lincoln, A.P. Kortenhoven, C.M. Wilton, H.D. Enander, and K.M. Korroch. 2020. "Michigan Natural Community Classification: Bog." *Michigan Natural Features Inventory, Michigan State University Extension, Lansing, Michigan*. <https://mnfi.anr.msu.edu/communities/description/10666/bog>
- 6 Ward, Susan E., Richard D. Bardgett, Niall P. McNamara, John K. Adamson, and Nick J. Ostle. 2007. "Long-Term Consequences of Grazing and Burning on Northern Peatland Carbon Dynamics." *Ecosystems* 10 (7): 1069–83. <https://doi.org/10.1007/s10021-007-9080-5>.
- 7 Monteverde, S., M. G. Healy, D. O'Leary, E. Daly, and O. Callery. 2022. "Management and Rehabilitation of Peatlands: The Role of Water Chemistry, Hydrology, Policy, and Emerging Monitoring Methods to Ensure Informed Decision Making." *Ecological Informatics* 69 (July): 101638. <https://doi.org/10.1016/j.ecoinf.2022.101638>.
- 8 Hugron Sandrine, Méline Guéné-Nanchen, Noémie Roux, Marie-Claire LeBlanc, Line Rochefort. 2020. "Plant reintroduction in restored peatlands: 80% successfully transferred – Does the remaining 20% matter?" *Global Ecology and Conservation*, 22, e01000. <https://www.sciencedirect.com/science/article/pii/S2351989419306973>.
- 9 Joosten, Hans and Duene, e.V. 2021. "Practical Peatland Restoration." *Secretariat of the Ramsar Convention on the Wetlands*. [https://www.ramsar.org/sites/default/files/documents/library/bn11\\_practical\\_peatland\\_restoration\\_e.pdf](https://www.ramsar.org/sites/default/files/documents/library/bn11_practical_peatland_restoration_e.pdf)
- 10 NatureScot. 2020. "Peatland ACTION – Technical Compendium." *NatureScot: Scotland's Nature Agency*. <https://www.nature.scot/doc/peatland-action-technical-compendium>
- 11 "Pocosin Lakes NWR Hydrology Restoration | U.S. Fish & Wildlife Service." 2007. September 27, 2007. <https://www.fws.gov/project/pocosin-lakes-nwr-hydrology-restoration>.

## CITATION

Warnell, K., Mason, S., Siegle, A., Merritt, M., & Olander, L. 2023. "Fact Sheet: Peatland Restoration." *NBS Roadmap Project*. Durham, NC: Nicholas Institute for Energy, Environment & Sustainability, Duke University. [www.nicholasinstitute.duke.edu/roadmap](http://www.nicholasinstitute.duke.edu/roadmap).

## KEY RESOURCES

Title and Link	Site Suitability	Design and Construction	Monitoring Guidance	Example Projects
<a href="#">Global Peatland Restoration Manual (Greifswald University)</a>	✓	✓	✓	–
<a href="#">An Overview of Peatland Restoration in North America (Chimner et al.)</a>	✓	–	–	✓

## LEARN MORE

Visit the DOI Nature-Based Solutions Roadmap for more information on peatland restoration, other nature-based solutions, and principles and considerations broadly relevant for nature-based solutions projects. The peatland restoration summary includes additional details on each section included in this fact sheet, plus information on operations and maintenance, common barriers, and more resources and example projects.

### Explore the Roadmap



Full Roadmap Document



Peatland Section

[www.nicholasinstitute.duke.edu/roadmap](http://www.nicholasinstitute.duke.edu/roadmap)