Information sheet

Living systems, living solutions: Advancing Nature-based Solutions across European landscapes

Marion Ferrat was commissioned by Belspo (Belgium), on behalf of BiodivERsA, to produce an issue brief based on the results of four BiodivClim projects — NAPERDIV, PlantCline , NordSalt and FutureArcticLives— funded under the 2019 joint call on Biodiversity and Climate Change.

Knowledge and methodology used

This Issue Brief is part of a series aiming to inform on practical, science-based strategies to make Europe's soils, forests, and landscapes more resilient based on the key results of the BiodivClim research projects funded by Biodiversa+.

The brief was drafted by Marion Ferrat in consultation with the BiodivClim Issue Briefs Working Group. The Working Group reviewed the brief in three stages: first, to agree on its overall direction; second, to assess the quality and accuracy of the draft; and finally, to review the last set of modifications. This final review was carried out only by the project leads, who are members of the Working Group, to ensure the brief accurately reflected their research.

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Foot notes:

1. Full project title: *Nature-based perennial grain cropping as a model to safeguard functional biodiversity towards future-proof agriculture*.
2. Full project title: *Adapting plant genetic diversity to climate change along a continental latitudinal gradient*.
3. Full project title: *Climate change impacts & biodiversity interactions in Nordic salt marshes*.
4. Full project title: *Future Arctic livelihoods and biodiversity in a changing climate*.
5. Institute for European Environmental Policy (IEEP), ICLEI, International Union for Conservation of Nature (IUCN); UNEP-WCMC, & Biodiversa+. (2024). *NetworkNature nature-based solutions policy screening and analysis of needs and gaps for 2024–2030 with 6 priority policy themes* (EU HORIZON-CL6-2022-BIODIV-01, Project ID 101082213).
6. Act of 17 June 2005 No. 85 relating to legal relations and management of land and natural resources in the county of Finnmark (Finnmark Act). (2005). WIPO Lex. https://www.wipo.int/wipolex/en/legislation/details/11129
7. International Union for Conservation of Nature (IUCN). (2024). *Sustainable agriculture and nature-based solutions*. Sustainable agriculture and Nature-based Solutions
8. El Harrak, M., & Lemaitre, F. (2023). *European roadmap to 2030 for research and innovation on nature-based solutions*. NetworkNature. https://networknature.eu/sites/default/files/uploads/eu-ri-roadmapweb.pdf
9. IPBES & IPCC. (2021). *IPBES–IPCC co-sponsored workshop report on biodiversity and climate change*. https://files.ipbes.net/ipbes-web-prod-public-files/2021-06/20210609_workshop_report_embargo_3pm_CEST_10_june_0.pdf
10. Wild, T., and al. (2024). Valuation of urban nature-based solutions in Latin American and European cities. *Urban Forestry & Urban Greening, 91*, 128162. https://doi.org/10.1016/j.ufug.2023.128162
11. European Commission. (2021). *Communication on a new approach for a sustainable blue economy in the EU: Transforming the EU's blue economy for a sustainable future*.

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Institute for European Environmental Policy (IEEP), ICLEI – Local Governments for Sustainability, International Union for Conservation of Nature (IUCN), UNEP-WCMC, & Biodiversa+. (2024). *NetworkNature nature-based solutions policy screening and analysis of needs and gaps for 2024–2030 with six priority policy themes* (EU HORIZON-CL6-2022-BIODIV-01, Project ID 101082213). Nature-based Solutions policy screening and analysis of needs and gaps for 2024-2030 with 6 priority policy themes.

For further information, project publications:

NAPERDIV

- Fagnant, L., Duchene, O., Celette, F., & Dumont, B. (2024). Maintaining grain yield of Th. intermedium across stand age through constant spike fertility and spike density: Understanding its response to various agronomic managements. European journal of agronomy, 152, 127038. https://doi.org/10.1016/j.eja.2023.127038
- Förster, A., David, C., Dumont, B., Mårtensson, L. M. D., Rasche, F., & Emmerling, C. (2023). Earthworm populations and diversity under annual and perennial wheat in a North to South gradient in Western Europe. European Journal of Soil Biology, 119, 103561. https://doi.org/10.1016/j.ejsobi.2023.103561
- Förster, A., Hohberg, K., Rasche, F., & Emmerling, C. (2024). Nematode community structure suggests perennial grain cropping cultivation as a nature-based solution for resilient agriculture. Journal of Sustainable Agriculture and Environment, 3(3), e12112. https://doi.org/10.1002/sae2.12112
- Ginot, C., Bathellier, C., David, C., Rossing, W. A. H., Celette, F., & Duchêne, O. (2024). Introducing intermediate wheatgrass as a perennial grain crop into farming systems: Insights into the decision-making process of pioneer farmers. Agronomy for Sustainable Development, 44, Article 58. https://doi.org/10.1007/s13593-024-00993-1
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- Michl, K., David, C., Dumont, B., Mårtensson, L.-M. D., Rasche, F., Berg, G., & Cernava, T. (2024). Determining the footprint of breeding in the seed microbiome of a perennial cereal. Environmental Microbiome, 19, Article 40. https://doi.org/10.1186/s40793-024-00584-3

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- De-la-Cruz, I. M., Batsleer, F., Bonte, D., Diller, C., Hytönen, T., Luis Izquierdo, J., ... & Stenberg, J. A. (2025). Genotypic responses to different environments and reduced precipitation reveal signals of local adaptation and phenotypic plasticity in

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- Toivainen, T., Salonen, J. S., Kirshner, J., Lembinen, S., Kort, H. D., Lyyski, A., ... & Hytönen, T. (2024). Late Quaternary climatic impact on the woodland strawberry genome: a perennial herb's tale. bioRxiv, 2024-10. https://doi.org/10.1101/2024.10.09.617376

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- Gaspers, A., Banta, G., Veylit, L., Vehmaa, A., Lanari, M., Quintana, C. O., ... & Tiller, R. (2024). Do citizens value climate change mitigation over biodiversity protection? Exploring citizen support for salt marsh management. Ocean & Coastal Management, 253, 107109. https://doi.org/10.1016/j.ocecoaman.2024.107109
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- Vehmaa, A., Lanari, M., Jutila, H., Mussaari, M., Pätsch, R., Telenius, A., ... & Boström, C. (2024). Harmonization of Nordic coastal marsh habitat classification benefits conservation and management. Ocean & Coastal Management, 252, 107104. https://doi.org/10.1016/j.ocecoaman.2024.107104

FutureArcticLives:

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- Brattland, C., Holmgaard, S. B., & Sundsvold, B. (2023). Kartlegging av høsting og utmarksbruk i Finnmark til bruk i planlegging og forvaltning. Ottar, 345, 17–26.

- Helgesen, I. S., Johannesen, A. B., & Sandorf, E. D. (n.d.). Climate change and Saami reindeer herding in Norway and Sweden: Impact of climate change on slaughter profits. [Manuscript in preparation / publication details not available].

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