

September 17, 2024

## **Biodiversa+ Policy Brief Information Sheet: ‘Landscape Diversity Enhances Human Health’**

Dr. Miri Tsalyuk (MT Ecological Consulting), was contracted on behalf of Biodiversa+ by the Swedish Environmental Protection Agency (SEPA) to produce a policy brief based on the results of the [Biodiversa+](#) 2018-2019 [BiodivHealth](#) research call. The BiodivHealth call on “Biodiversity and its influence on animal, human and plant health” aimed to support research projects at the nexus of biodiversity and health issues.

The call was supported by 16 national/regional funding organisations from 11 countries: FWF (Austria), FWO, BELSPO, F.R.S.-FNRS (Belgium), BNSF (Bulgaria), ETAg (Estonia), ANR, GUA-REG (France), DFG, VDI/VDE-IT (Germany), Irish EPA (Ireland), RCL (Lithuania), NCN (Poland), UEFISCDI (Romania), SAS (Slovakia), SNSF (Switzerland).

### **Knowledge and methodology used**

The Policy Brief ‘Landscape Diversity Enhances Human Health’ is based on some of the scientific results of three out of the ten research groups funded by this call: [FUNPROD](#), [Dr.FOREST](#), and [ANTIVERSA](#).

The Brief summarises some key results of the projects and provides relevant policy recommendations linked to current EU policy processes. The Brief was drafted by Dr. Miri Tsalyuk ecological consulting, in consultation with the SEPA working group, Biodiversa+ Science & Policy Work Group, and with researchers from the respective projects.

Two clustering workshops were held in 2023 to select the main themes and key messages of the policy briefs based on the BiodivHealth research call and to determine the main results that will be featured in each brief. Participants included coordinating professors of the research group and members of Biodiversa+.

The research results in the brief were based on scientific manuscripts from the research groups and were summarized in close collaboration with the scientists of each manuscript. General scientific literature was used to provide context and corroboration for the presented results. All sources used are listed below. Key messages and policy recommendations were reviewed by a policy advisory group summoned for the preparation of this brief.

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**Sources of information consulted for key research findings**

(Numbers denote citation number within the brief)

**Biodiversa+ funded peer-reviewed scientific publications:**

2. Ulrich, W. et al. From biodiversity to health: Quantifying the impact of diverse ecosystems on human well-being. *People Nat.* 5, 69–83 (2023).
3. Birkhofer, K. et al. Relationships between multiple biodiversity components and ecosystem services along a landscape complexity gradient. *Biol. Conserv.* 218, 247–253 (2018).
4. de la Riva, E. G. et al. From functional diversity to human well-being: A conceptual framework for agroecosystem sustainability. *Agric. Syst.* 208, 103659 (2023).
7. Gillerot, L. et al. Forest structure and composition alleviate human thermal stress. *Glob. Chang. Biol.* 28, 7340–7352 (2022).
8. Steinparzer, M., Schaubmayr, J., Godbold, D. L. & Rewald, B. Particulate matter accumulation by tree foliage is driven by leaf habit types, urbanization- and pollution levels. *Environ. Pollut.* 335, 122289 (2023).
9. Bourdin, A. et al. Forest Diversity Reduces the Prevalence of Pathogens Transmitted by the Tick *Ixodes ricinus*. *Front. Ecol. Evol.* 10, 891908 (2022).
10. Steinparzer, M., Haluza, D. & Godbold, D. L. Integrating Tree Species Identity and Diversity in Particulate Matter Adsorption. *For.* 2022, Vol. 13, Page 481 13, 481 (2022).
11. Gillerot, L., Landuyt, D., De Frenne, P., Muys, B. & Verheyen, K. Urban tree canopies drive human heat stress mitigation. *Urban For. Urban Green.* 92, 128192 (2024).
12. Gillerot, L. et al. Forests are chill: The interplay between thermal comfort and mental wellbeing. *Landsc. Urban Plan.* 242, 104933 (2024).
13. Rozario, K. et al. The more the merrier? Perceived forest biodiversity promotes short-term mental health and well-being—A multicentre study. *People Nat.* 6, 180–201 (2023).
16. Goryluk-Salmonowicz, A. & Popowska, M. Factors promoting and limiting antimicrobial resistance in the environment – Existing knowledge gaps. *Front. Microbiol.* 13, 992268 (2022).
17. Cacace, D. et al. Antibiotic resistance genes in treated wastewater and in the receiving water bodies: A pan-European survey of urban settings. *Water Res.* 162, 320–330 (2019).

### **Biodiversa+ funded publications under review**

- <sup>6</sup>. Gillerot, L. et al. Forest biodiversity and structure modulate human health benefits and risks. *In Prep.*
- <sup>14</sup>. Cuentas, A. G. R. et al. Wellbeing effects of acoustic forest diversity in local and non-local soundscapes. *In prep.*
- <sup>15</sup>. Müller, S. et al. Temporal dynamics of acoustic diversity in managed forests. *In prep.*
- <sup>19</sup> Catao, E. C. P. et al. The alteration of microbial biodiversity in the receiving environment promotes its invasion by anthropogenic antibiotic resistance genes. *In prep.*

### **Other publications cited**

- <sup>1</sup> IPBES. Global assessment report on biodiversity and ecosystem services of the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services. (2019).
- <sup>18</sup>. Merlin, C. Fate of mobile genetic elements and antibiotic resistance genes during wastewater treatment and water-reuse processes. treWAG Conf. (2022).
- Dose of Nature <https://www.doseofnature.org.uk/>

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European Court of Auditors. Biodiversity on farmland: CAP contribution has not halted the decline. Special Report 13/2020, Figure 1. Available from:  
<https://www.eca.europa.eu/en/publications?did=53892>

### **Relevant EU policy instruments**

- The common agricultural policy: 2023-27. [https://agriculture.ec.europa.eu/common-agricultural-policy/cap-overview/cap-2023-27\\_en#keyareasofreform](https://agriculture.ec.europa.eu/common-agricultural-policy/cap-overview/cap-2023-27_en#keyareasofreform)
- 3 Billion Trees initiative. <https://forest.eea.europa.eu/3-billion-trees/introduction>
- The European Green Deal: Striving to be the first climate-neutral continent. [https://commission.europa.eu/strategy-and-policy/priorities-2019-2024/european-green-deal\\_en](https://commission.europa.eu/strategy-and-policy/priorities-2019-2024/european-green-deal_en)
- EU Nature Restoration Law. [https://environment.ec.europa.eu/topics/nature-and-biodiversity/nature-restoration-law\\_en](https://environment.ec.europa.eu/topics/nature-and-biodiversity/nature-restoration-law_en)
- Communication from the Commission Guidelines for State aid in the agricultural and forestry sectors and in rural areas 2022/C 485/01. <https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=celex%3A52022XC1221%2801%29>
- EU Forest Strategy For 2030. <https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A52021DC0572>
- Guidelines on closer-to-nature forest management. <https://op.europa.eu/en/publication-detail/-/publication/2d1a6e8f-8cda-11ee-8aa6-01aa75ed71a1/language-en>
- Urban Agenda for the EU. <https://futurium.ec.europa.eu/en/urban-agenda>

- Green City Accord.  
[https://environment.ec.europa.eu/topics/urban-environment/green-city-accord\\_en](https://environment.ec.europa.eu/topics/urban-environment/green-city-accord_en)
- Water Framework Directive.  
[https://environment.ec.europa.eu/topics/water/water-framework-directive\\_en](https://environment.ec.europa.eu/topics/water/water-framework-directive_en)
- Urban wastewater treatment (C/2024/1204)  
<https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A52023AP0355&qid=1726353431740>