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Biodiversa+ Policy Brief Information Sheet: 'Biodiversity Mitigating Health Risks'

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 Biodiversa+ 2018-2019 [BiodivHealth](#) research call results. 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 (Lsovakia), SNSF (Switzerland).

Knowledge and methodology used

The Policy Brief 'Biodiversity Mitigating Health Risks' is based on the scientific results of six out of the ten research groups funded by this call: [Biodiv-AFREID](#), [BioRodDis](#), [Dr.FOREST](#), [DiMoC](#), [ANTIVERSA](#), and [SuppressSoil](#).

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 Miri Tsalyuk Ecological Consulting (MT, hereafter) 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 in policy briefs 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, MT, and members of Biodiversa+.

The research results in the brief are based on scientific manuscripts from the research groups and were drafted 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 to prepare 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:

¹ Ulrich, W. *et al.* From biodiversity to health: Quantifying the impact of diverse ecosystems on human well-being. *People Nat.* 5, 69–83 (2023).

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- ⁴ Tolsá-García, M. J., Wehmeyer, M. L., Lühken, R. & Roiz, D. Worldwide transmission and infection risk of mosquito vectors of West Nile, St. Louis encephalitis, Usutu and Japanese encephalitis viruses: a systematic review. *Sci. Reports* 2023 131 13, 1–13 (2023).
- ⁷ Meta Djoms, D. *et al.* Coronaviruses Are Abundant and Genetically Diverse in West and Central African Bats, including Viruses Closely Related to Human Coronaviruses. *Viruses* 15, (2023).
- ¹⁰ Peeters, M. *et al.* Extensive Survey and Analysis of Factors Associated with Presence of Antibodies to Orthoebolaviruses in Bats from West and Central Africa. *Viruses* 15, (2023).
- ¹¹ Lacroix, A. *et al.* Investigating the Circulation of Ebola Viruses in Bats during the Ebola Virus Disease Outbreaks in the Equateur and North Kivu Provinces of the Democratic Republic of Congo from 2018. *Pathogens* 10, (2021).
- ¹⁹ Ferraguti, M. *et al.* A field test of the dilution effect hypothesis in four avian multi-host pathogens. *PLOS Pathog.* **17**, (2021).
- ²⁰ Roiz, D. *et al.* Evidence that Passerine Birds Act as Amplifying Hosts for Usutu Virus Circulation. *Ecohealth* **16**, 734–742 (2019).
- ²¹ Bourdin, A. *et al.* Forests harbor more ticks than other habitats: A meta-analysis. *For. Ecol. Manage.* **541**, 121081 (2023).
- ²² Bourdin, A. *et al.* Forest Diversity Reduces the Prevalence of Pathogens Transmitted by the Tick *Ixodes ricinus*. *Front. Ecol. Evol.* **10**, 891908 (2022).
- ²³ Bouilloud, M. *et al.* Exploring the potential effects of forest urbanization on the interplay between small mammal communities and their gut microbiota. *Anim. Microbiome* **6**, 16 (2024).
- ²⁴ Bouilloud, M. *et al.* Three-way relationships between gut microbiota, helminth assemblages and bacterial infections in wild rodent populations. *Peer Community J.* **3**, e18 (2023).
- ²⁵ Todorović, I., Moëne-Loccoz, Y., Raičević, V., Jovičić-Petrović, J. & Muller, D. Microbial diversity in soils suppressive to Fusarium diseases. *Front. Plant Sci.* **14**, (2023).
- ²⁶ Harmsen, N. *et al.* Natural plant disease suppressiveness in soils extends to insect pest control. *Microbiome* **12**, 1–16 (2024).
- ²⁷ Klümper, U. *et al.* Environmental microbiome diversity and stability is a barrier to antimicrobial resistance gene accumulation. *Commun. Biol.* **7**, 706 (2024).
- ²⁸ Bagra, K. *et al.* Environmental stress increases the invasion success of antimicrobial resistant bacteria in river microbial communities. *Sci. Total Environ.* **904**, (2023).

Biodivres+ funded Publications under review:

- ⁸ Dutra, L. Diversity of coronaviruses circulating among small mammals and bats from Europe. *In prep.*
- ⁹ Van Vredendaal, R. *et al.* A multidisciplinary investigation of an Ebola virus reservoir in Inkanamongo, Democratic Republic of Congo. *In prep.*
- ¹² Bouilloud, M. *et al.* Relationships between the biodiversity of small mammal communities and multi-pathogens prevalence along a gradient of forest urbanization. *In prep.* (2024).
- ¹⁴ Sluydts, V. *et al.* Drivers of host-pathogen community assemblies in European forests and urban green spaces. *In prep.*
- ¹⁸ Wehmeyer, L.M., José Tolsá-García, M., Gregor Sauer, F., Roiz, D. & Lühken, R. Global database of mosquito host feeding patterns. *In prep.*
- ²⁹ Catao, E. C. P. *et al.* The alteration of microbial biodiversity in the receiving

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environment promotes its invasion by anthropogenic antibiotic resistance genes. *In prep.*

Other research papers consulted to contextualise and corroborate the Biodiversa+ research findings:

² Jones, K. E. *et al.* Global trends in emerging infectious diseases. *Nature* 451, 990–993 (2008).

⁵ Mahon, M. B. *et al.* A meta-analysis on global change drivers and the risk of infectious disease. *Nat.* 2024 1–7 (2024).

⁶ Keesing, F. & Ostfeld, R. S. Impacts of biodiversity and biodiversity loss on zoonotic diseases. *Proc. Natl. Acad. Sci. U. S. A.* 118, e2023540118 (2021).

¹⁵ Civitello, D. J. *et al.* Biodiversity inhibits parasites: Broad evidence for the dilution effect. *Proc. Natl. Acad. Sci. U. S. A.* 112, 8667–8671 (2015).

¹⁶ Ostfeld, R. S. & Keesing, F. Effects of host diversity on infectious disease. *Annual Review of Ecology, Evolution, and Systematics* vol. 43 157–182 (2012).

Other publications cited;

³ IPBES. Workshop Report on Biodiversity and Pandemics of the Intergovernmental Platform on Biodiversity and Ecosystem Services. <https://www.ipbes.net/events/ipbes-workshop-biodiversity-and-pandemics> (2020) doi:10.5281/zenodo.4147317.

¹³ Bouilloud, M. Impact of anthropization on the links between small mammal communities, their microbiota and zoonotic dangers (2023). PhD Thesis. INRAE, Montpellier France.

¹⁷ Canet, A. Contributions of epidemiological modeling to the study of rodent management with reciprocal benefits for public health and biodiversity. MSc thesis (2023). University of Picardie Jules-Verne.

³⁰ WWF. *Medium rare or rare? The hidden side of the illegal wild meat trade in Europe.* <http://projets.wwf.fr> (2023).

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Relevant International and EU policy instruments:

- One health joint plan of action (2022–2026): working together for the health of humans, animals, plants and the environment. <https://www.who.int/publications/i/item/9789240059139>
- Kunming-Montreal Global Biodiversity Framework (GBF). <https://www.cbd.int/gbf>
- EU Biodiversity Strategy for 2030 Bringing nature back into our lives. <https://eur-lex.europa.eu/legal-content/EN/TXT/?qid=1590574123338&uri=CELEX:52020DC0380>
- Council Regulation (EC) No 338/97 Protection Of Species Of Wild Fauna And Flora By Regulating Trade Therein. <https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A01997R0338-20230520>
- The Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES). <https://cites.org/eng/disc/what.php>

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- Regulation (EU) 2024/1991 Nature Restoration Law. <https://eur-lex.europa.eu/eli/reg/2024/1991/oj>
- Regulation (EU) 2022/2371 Serious Cross-Border Threats To Health. <https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A32022R2371>
- Regulation (EU) 2016/429 Transmissible Animal Diseases ('Animal Health Law'). <https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A32016R0429>
- Regulation (EU) 2019/6 Veterinary Medicinal Products. <https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A02019R0006-20220128&qid=1716153666716>
- EU Soil Strategy for 2030: Reaping the benefits of healthy soils for people, food, nature and climate. <https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A52021DC0699&qid=1637656572074>