

Reporting Summary

Nature Portfolio wishes to improve the reproducibility of the work that we publish. This form provides structure for consistency and transparency in reporting. For further information on Nature Portfolio policies, see our [Editorial Policies](#) and the [Editorial Policy Checklist](#).

Statistics

For all statistical analyses, confirm that the following items are present in the figure legend, table legend, main text, or Methods section.

- | | |
|-------------------------------------|--|
| n/a | Confirmed |
| ☐ | ☒ The exact sample size (<i>n</i>) for each experimental group/condition, given as a discrete number and unit of measurement |
| ☐ | ☒ A statement on whether measurements were taken from distinct samples or whether the same sample was measured repeatedly |
| ☐ | ☒ The statistical test(s) used AND whether they are one- or two-sided
<i>Only common tests should be described solely by name; describe more complex techniques in the Methods section.</i> |
| ☐ | ☒ A description of all covariates tested |
| ☐ | ☒ A description of any assumptions or corrections, such as tests of normality and adjustment for multiple comparisons |
| ☐ | ☒ A full description of the statistical parameters including central tendency (e.g. means) or other basic estimates (e.g. regression coefficient) AND variation (e.g. standard deviation) or associated estimates of uncertainty (e.g. confidence intervals) |
| ☐ | ☒ For null hypothesis testing, the test statistic (e.g. <i>F</i> , <i>t</i> , <i>r</i>) with confidence intervals, effect sizes, degrees of freedom and <i>P</i> value noted
<i>Give P values as exact values whenever suitable.</i> |
| ☒ | ☐ For Bayesian analysis, information on the choice of priors and Markov chain Monte Carlo settings |
| ☐ | ☒ For hierarchical and complex designs, identification of the appropriate level for tests and full reporting of outcomes |
| ☐ | ☒ Estimates of effect sizes (e.g. Cohen's <i>d</i> , Pearson's <i>r</i>), indicating how they were calculated |

Our web collection on [statistics for biologists](#) contains articles on many of the points above.

Software and code

Policy information about [availability of computer code](#)

- | | |
|-----------------|--|
| Data collection | Literature records were retrieved from the Web of Science Core Collection and exported to Microsoft Excel (Microsoft 365). Abstract screening was assisted by GPT-4o (OpenAI) and conducted using custom workflows implemented in R version 4.4.1 (R Foundation for Statistical Computing). The full texts of potentially eligible studies were then manually screened, and data from eligible studies were manually extracted and organized in Microsoft Excel (Microsoft 365). |
| Data analysis | All statistical analyses were performed in R version 4.4.1 (R Foundation for Statistical Computing). |

For manuscripts utilizing custom algorithms or software that are central to the research but not yet described in published literature, software must be made available to editors and reviewers. We strongly encourage code deposition in a community repository (e.g. GitHub). See the Nature Portfolio [guidelines for submitting code & software](#) for further information.

Data

Policy information about [availability of data](#)

- All manuscripts must include a [data availability statement](#). This statement should provide the following information, where applicable:
- Accession codes, unique identifiers, or web links for publicly available datasets
 - A description of any restrictions on data availability
 - For clinical datasets or third party data, please ensure that the statement adheres to our [policy](#)

The dataset supporting the findings of this study has been deposited in the Zenodo and is publicly available at <https://zenodo.org/records/20716851>. World Bank

income group classifications were obtained from the World Bank Country and Lending Groups (<https://datahelpdesk.worldbank.org/knowledgebase/articles/906519-world-bank-country-and-lending-groups>). Köppen–Geiger climate classifications were derived from the high-resolution (1 km) Köppen–Geiger climate maps available through Figshare (<https://doi.org/10.6084/M9.FIGSHARE.21789074>).

Research involving human participants, their data, or biological material

Policy information about studies with [human participants or human data](#). See also policy information about [sex, gender \(identity/presentation\), and sexual orientation](#) and [race, ethnicity and racism](#).

Reporting on sex and gender	This study did not involve human participants or the collection of human data; therefore, sex and gender reporting were not applicable.
Reporting on race, ethnicity, or other socially relevant groupings	This study did not involve human participants or human populations; therefore, information on race, ethnicity, and other socially relevant groupings were not applicable.
Population characteristics	This study did not involve human participants. The study units were ecological systems and biodiversity datasets extracted from published studies.
Recruitment	No human participants were recruited for this study.
Ethics oversight	This study did not involve human participants, human data, or human biological material; therefore, ethics approval was not required.

Note that full information on the approval of the study protocol must also be provided in the manuscript.

Field-specific reporting

Please select the one below that is the best fit for your research. If you are not sure, read the appropriate sections before making your selection.

☐ Life sciences ☐ Behavioural & social sciences ☒ Ecological, evolutionary & environmental sciences

For a reference copy of the document with all sections, see nature.com/documents/nr-reporting-summary-flat.pdf

Ecological, evolutionary & environmental sciences study design

All studies must disclose on these points even when the disclosure is negative.

Study description	This study is a global quantitative meta-analysis of the impacts of urbanization on multiple dimensions of wetland biodiversity and evaluates variation in responses across taxa, wetland types, climatic regions and socioeconomic contexts.
Research sample	343 comparisons from 124 studies
Sampling strategy	No a priori sample-size calculation was performed because this was a meta-analysis. All eligible peer-reviewed studies identified through the predefined literature search and meeting the inclusion criteria were included in the analyses. The final sample size was determined by the number of studies that satisfied the eligibility criteria and provided sufficient data for effect size calculation.
Data collection	Peer-reviewed literature was identified through systematic searches of the Science Citation Index Expanded in the Web of Science Core Collection. The initial search was conducted on 14 February 2025 using predefined search terms related to urbanization and wetlands, and an updated search using the same search strategy was performed on 9 December 2025. Only English-language research articles were considered. Abstract screening was assisted by GPT-4o (OpenAI) using custom workflows implemented in R version 4.4.1 (R Foundation for Statistical Computing), after which all potentially eligible studies were manually assessed through full-text screening by the authors. Eligibility was determined using predefined inclusion and exclusion criteria. Data, including biodiversity metrics, sample sizes and study characteristics, were manually extracted from eligible studies and recorded in Microsoft Excel (Microsoft 365).
Timing and spatial scale	The literature search included studies published up to 2025. The compiled dataset represents observations collected across multiple years and geographic regions worldwide, as reported in the original publications. Analyses were conducted at the spatial scales reported in the primary studies, including local and regional scales.
Data exclusions	Studies and effect sizes were excluded only if they failed to meet the predefined eligibility criteria or lacked sufficient information to calculate effect sizes. All exclusion criteria were established before data extraction and are described in the Methods. No additional data were excluded during statistical analyses.
Reproducibility	The extracted dataset and R scripts have been made publicly available, allowing the analyses to be reproduced.
Randomization	Randomization was not performed because this study is a systematic review and meta-analysis of published studies.
Blinding	Blinding was not performed because this study is a systematic review and meta-analysis of published studies.

Did the study involve field work? ☐ Yes ☒ No

Reporting for specific materials, systems and methods

We require information from authors about some types of materials, experimental systems and methods used in many studies. Here, indicate whether each material, system or method listed is relevant to your study. If you are not sure if a list item applies to your research, read the appropriate section before selecting a response.

Materials & experimental systems

n/a	Involved in the study
☒	☐ Antibodies
☒	☐ Eukaryotic cell lines
☒	☐ Palaeontology and archaeology
☒	☐ Animals and other organisms
☒	☐ Clinical data
☒	☐ Dual use research of concern
☒	☐ Plants

Methods

n/a	Involved in the study
☒	☐ ChIP-seq
☒	☐ Flow cytometry
☒	☐ MRI-based neuroimaging

Plants

Seed stocks

The program does not apply to this study.

Novel plant genotypes

The program does not apply to this study.

Authentication

The program does not apply to this study.