

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	Water loss and uptake studies were obtained from a systematic search from the Web of Science and Scopus with full detailed provided in the manuscript and supplementary information (https://nicholaswunz.github.io/global-frog-drought/supplementary_information.html).
Data analysis	Data were processed and analysed in R v4.2.2 with the following packages listed in the manuscript <code>ape</code> (v.5.8), <code>brms</code> (v.2.21.0), <code>performance</code> (v.0.11.0), <code>NicheMapR</code> (v3.3.2), <code>rasterSp</code> (v.1.0.0). Custom code developed in the study is provided in the GitHub web-link: https://nicholaswunz.github.io/global-frog-drought/supplementary_information.html

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](#)

Climate data were sourced from public database published in Abatzoglou et al. (2018) and Zhao and Dai (2022). Species richness database was sourced from the

IUCN Red List of Threatened Species platform (<https://www.iucnredlist.org/resources/spatial-data-download>). Phylogenetic data were sourced from Jetz and Pyron (2018). Water loss and uptake data to reproduce the study are available in the GitHub repository: <https://github.com/nicholaswunz/global-frog-drought> and in the Zenodo repository (<https://doi.org/10.5281/zenodo.13743578>)

Human research participants

Policy information about [studies involving human research participants and Sex and Gender in Research](#).

Reporting on sex and gender	N/A
Population characteristics	N/A
Recruitment	N/A
Ethics oversight	N/A

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](https://www.nature.com/documents/nr-reporting-summary-flat.pdf)

Life sciences study design

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

Sample size	Sample size was based on the sample sizes provided by the studies extracted from the systematic search. Differences in species sample sizes (study and species bias) across studies were accounted for in the meta-analysis as random effects (study ID, species ID).
Data exclusions	Studies were not included if: - Studies with languages that were not translatable on Google Translate. - Data from experimental treatments such as pathogen infection, pollutants or pesticide contaminants, and pharmacological manipulation (e.g., antidiuretic hormones). - Data presented as percentage change in body weight without the initial weight. - Data present with no time component. E.g. Change in body weight until 20% of water loss was reached (% change in mass). - Studies where units were not presented.
Replication	N/A, replication was not relevant to our synthesis study.
Randomization	N/A, randomisation was not relevant to our synthesis study.
Blinding	N/A, blinding was not relevant to our synthesis study.

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

Methods

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

Animals and other research organisms

Policy information about [studies involving animals](#); [ARRIVE guidelines](#) recommended for reporting animal research, and [Sex and Gender in Research](#)

Laboratory animals	No laboratory animals were used in this study
Wild animals	All species ages are unknown but are all post-metamorph adults. All animals were hand captured and transported back to the relevant facilities (next to each species name) to measure evaporative water loss and water uptake. Animals were released back to their environment after the experiments. Atelopus carrikeri (Universidad del Magdalena campus) - C. Navas Thoropa miliaris (University of São Paulo campus) - C. Navas Breviceps montanus (Stellenbosch University campus) - S. Clusella-Trullas Adenomera marmorata (Universidade Estadual Paulista Júlio de Mesquita Filho) - R. Parelli Bovo Ameerega flavopicta (Universidade Estadual Paulista Júlio de Mesquita Filho) - R. Parelli Bovo Aplastodiscus leucopygius (Universidade Estadual Paulista Júlio de Mesquita Filho) - R. Parelli Bovo Boana pardalis (Universidade Estadual Paulista Júlio de Mesquita Filho) - R. Parelli Bovo Boana raniceps (Universidade Estadual Paulista Júlio de Mesquita Filho) - R. Parelli Bovo Bokermannohyla alvarengai (Universidade Estadual Paulista Júlio de Mesquita Filho) - R. Parelli Bovo Bokermannohyla circumdata (Universidade Estadual Paulista Júlio de Mesquita Filho) - R. Parelli Bovo Bokermannohyla saxicola (Universidade Estadual Paulista Júlio de Mesquita Filho) - R. Parelli Bovo Brachycephalus pitanga (Universidade Estadual Paulista Júlio de Mesquita Filho) - R. Parelli Bovo Dendropsophus leucophaeus (Universidade Estadual Paulista Júlio de Mesquita Filho) - R. Parelli Bovo Dendropsophus sanborni (Universidade Estadual Paulista Júlio de Mesquita Filho) - R. Parelli Bovo Dermatonotus muelleri (Universidade Estadual Paulista Júlio de Mesquita Filho) - R. Parelli Bovo Elachistocleis cesarii (Universidade Estadual Paulista Júlio de Mesquita Filho) - R. Parelli Bovo Haddadus binotatus (Universidade Estadual Paulista Júlio de Mesquita Filho) - R. Parelli Bovo Ischnocnema guentheri (Universidade Estadual Paulista Júlio de Mesquita Filho) - R. Parelli Bovo Ischnocnema parva (Universidade Estadual Paulista Júlio de Mesquita Filho) - R. Parelli Bovo Leptodactylus fuscus (Universidade Estadual Paulista Júlio de Mesquita Filho) - R. Parelli Bovo Leptodactylus syphax (Universidade Estadual Paulista Júlio de Mesquita Filho) - R. Parelli Bovo Odontophrynus americanus (Universidade Estadual Paulista Júlio de Mesquita Filho) - R. Parelli Bovo Phyllomedusa megacephala (Universidade Estadual Paulista Júlio de Mesquita Filho) - R. Parelli Bovo Physalaemus atlanticus (Universidade Estadual Paulista Júlio de Mesquita Filho) - R. Parelli Bovo Physalaemus olfersii (Universidade Estadual Paulista Júlio de Mesquita Filho) - R. Parelli Bovo Pithecopus azureae (Universidade Estadual Paulista Júlio de Mesquita Filho) - R. Parelli Bovo Proceratophrys appendiculata (Universidade Estadual Paulista Júlio de Mesquita Filho) - R. Parelli Bovo Proceratophrys cururu (Universidade Estadual Paulista Júlio de Mesquita Filho) Rhinella diptycha (Universidade Estadual Paulista Júlio de Mesquita Filho) - R. Parelli Bovo Rhinella ornata (Universidade Estadual Paulista Júlio de Mesquita Filho) - R. Parelli Bovo Rhinella rubescens (Universidade Estadual Paulista Júlio de Mesquita Filho) - R. Parelli Bovo Scinax fuscovarius (Universidade Estadual Paulista Júlio de Mesquita Filho) - R. Parelli Bovo Trachycephalus mesophaeus (Universidade Estadual Paulista Júlio de Mesquita Filho) - R. Parelli Bovo
Reporting on sex	Sex was generally not provided or available from the literature search, and there was not enough data between sex for a formal statistical analysis.
Field-collected samples	No field collected samples were used in this study.
Ethics oversight	Unpublished data from Brazil were collected according to the experimental procedures approved by the Ethical Committee in Animal Use (CEUA) of the Biosciences Institute (#0820), affiliated with UNESP, Rio Claro, São Paulo, Brazil. License for animal capture and transport was provided by Instituto Brasileiro do Meio Ambiente e dos Recursos Naturais Renováveis (IBAMA, #29703-1 and 22028-1), and Secretaria do Meio Ambiente – Instituto Florestal (#26018 - 013.054/2011). Unpublished data from South Africa were collected in accordance to Western Cape Nature Permit AAA007-00073-0056, and all experimental procedures were approved by the University of Stellenbosch REC:ACU, Research Ethics Committee: Animal Care and Use (SU-ACUM13-00005).

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