Received: 13 November 2024 | Accepted: 25 April 2025

DOI: 10.1111/1365-2664.70092

Journal of Applied Ecology

RESEARCH ARTICLE

Knowledge from non-English-language studies broadens contributions to conservation policy and helps to tackle bias in biodiversity data

Filipe C. Serrano[1,2] | Valentina Marconi[3,4] | Stefanie Deinet[3] | Hannah Puleston[3] | Helga C. Wiederhecker[5] | Juan C. Diaz-Ricaurte[1,6] | Carolina Farhat[2,7] | Ricardo Luría-Manzano[1] | Marcio Martins[1] | Eletra de Souza[1] | Sergio Marques-Souza[8] | João Paulo dos Santos Vieira-Alencar[9] | Paula Valdujo[10] | Robin Freeman[3] | Louise McRae[3]

[1]Departamento de Ecologia, Instituto de Biociências Universidade de São Paulo, São Paulo, São Paulo, Brazil; [2]CEFE, Université de Montpellier, CNRS, EPHE, IRD, Montpellier, France; [3]Institute of Zoology, Zoological Society of London, London, UK; [4]Research Department of Genetics, Evolution and Environment (GEE), Division of Biosciences, Faculty of Life Sciences, University College London, London, UK; [5]WWF—Brasil, Brasília, Brazil; [6]Grupo de investigación en Biodiversidad y Desarrollo Amazónico (BYDA), Semillero de Investigación en Ecofisiología y Biogeografía de Vertebrados (EcoBioVert), Centro de Investigaciones Amazónicas Macagual—César Augusto Estrada González, Universidad de la Amazonia, Florencia, Colombia; [7]Departamento de Zoologia, Instituto de Biociências, Universidade de São Paulo, São Paulo, São Paulo, Brazil; [8]Instituto Salva Silvestres, São Paulo, São Paulo, Brazil; [9]Centro de Ciências Naturais e Humanas (CCNH), Universidade Federal do ABC (UFABC), São Bernardo do Campo, São Paulo, Brazil and [10]The Biodiversity Consultancy, Cambridge, UK

Correspondence
Filipe C. Serrano
Email: filipe.serrano@usp.br

Valentina Marconi
Email: valentina.marconi@ioz.ac.uk

Funding information
British Ecological Society, Grant/Award Number: SR21/1109; Coordenação de Aperfeiçoamento de Pessoal de Nível Superior, Grant/Award Number: Financial Code 001; Conselho Nacional de Desenvolvimento Científico e Tecnológico, Grant/Award Number: 309772/2021-4; Research England; WWF-UK; Fundação de Amparo à Pesquisa do Estado de São Paulo, Grant/Award Number: 2020/10189-7, 2020/12658-4, 2021/10402-5, 2023/03426-0, 2023/06999-1, 2023/07014-9, 2023/14087-2, 2024/08404-8 and 2024/10038-0

Handling Editor: Bárbara Langdon

Abstract

1. Local ecological evidence is key to informing conservation. However, many global biodiversity indicators often neglect local ecological evidence published in languages other than English, potentially biasing our understanding of biodiversity trends in areas where English is not the dominant language. Brazil is a megadiverse country with a thriving national scientific publishing landscape. Here, using Brazil and using a species abundance indicator as an example, we assess how well bilingual literature searches can both improve data coverage for a country where English is not the primary language and help tackle current biases in biodiversity datasets.
2. We conducted a comprehensive screening of articles containing abundance data for vertebrates published in 59 Brazilian journals (articles in Portuguese or English) and 79 international English-only journals. These were grouped into three datasets according to journal origin and article language (Brazilian-Portuguese, Brazilian-English and International). We analysed the taxonomic, spatial and temporal coverage of the datasets, compared their average abundance trends and investigated predictors of such trends with a modelling approach.

Filipe C. Serrano and Valentina Marconi contributed equally to this work.

3. Our results showed that including data published in Brazilian journals, especially those published in Portuguese, strongly increased the representation of Brazilian vertebrate species (by 10 times) and populations (by 7.6 times) in the dataset. Meanwhile, international journals featured a higher proportion of threatened species. There were no marked differences in spatial or temporal coverage between datasets, in spite of different biases towards infrastructures. Overall, while country-level trends in relative abundance did not substantially change with the addition of data from Brazilian journals, uncertainty considerably decreased. We found that population trends in international journals showed stronger and more frequent decreases in average abundance than those in national journals, regardless of whether the latter were published in Portuguese or English.

4. *Policy implications*. Collecting data from local sources markedly further strengthens global biodiversity databases by adding species not previously included in international datasets. Furthermore, the addition of these data helps to understand spatial and temporal biases that potentially influence abundance trends at both national and global levels. We show how incorporating non-English-language studies in global databases and indicators could provide a more complete understanding of biodiversity trends and therefore better inform global conservation policy.

KEYWORDS
biodiversity monitoring, Brazil, global biodiversity framework, inclusion, indicators, population abundance, vertebrates

1 | INTRODUCTION

The Kunming-Montreal Global Biodiversity Framework (GBF), and associated Global Monitoring Framework, adopted in December 2022 by Parties to the Convention on Biological Diversity, sets out an ambitious pathway to reach the global vision of a world living in harmony with nature by 2050 (UNEP, 2022a, 2022b). The overall aim of halting and reversing biodiversity loss is tracked by a number of indicators, some of which are included in the national reporting template (UNEP, 2022b). To ensure accurate tracking of progress towards goals and targets, any bias in these indicators needs to be understood and ideally mitigated (UNEP, 2018). Indicators based on global biodiversity databases, particularly those that largely rely on publicly available data from the scientific and grey literature, are prone to biases introduced through over-representation of well-studied groups and regions in monitoring schemes (Amano & Sutherland, 2013; Donaldson et al., 2017; Troudet et al., 2017; Yesson et al., 2007). In addition, this is intersected with a language bias resulting from the dominance of English as the language of science, which has led to most papers in the major (often global) ecological and conservation journals being written by English-speaking authors with affiliations in the Global North (Hazlett et al., 2020; Melles et al., 2019). In some cases, the geographic distance from organisations hosting the biodiversity databases behind major indicators, which are often in the Global North, is inversely correlated with the number of records within said databases, which also include fewer records for countries where English is not the main language (Amano & Sutherland, 2013). However, local ecological evidence is key to informing conservation and management efforts (Gutzat & Dormann, 2020), and this evidence is often published in local languages and journals (Amano et al., 2016; Konno et al., 2020). For example, nearly a third of all 75,513 scientific documents on biodiversity conservation published in 2014 were in languages other than English (from here onwards, non-English languages)—primarily Portuguese, Spanish, simplified Chinese and French (Amano et al., 2016). This, along with the lack of English titles and abstracts, hinders data inclusion in global studies and indicators. Omitting studies published in other languages can bias ecological meta-analyses (Konno et al., 2020) and limit the scope of 'global' reviews (Nuñez & Amano, 2021). The historic exclusion of biodiversity data published in non-English languages in databases such as the Global Biodiversity Information Facility (GBIF), which started using translators only in 2018 (https://www.gbif.org/en/translators), has exacerbated geographic biases present in biodiversity data.

Brazil, the largest country in Latin America and a signatory of the Aichi biodiversity target (CBD, 2010), is among the most biodiverse countries in the world (Lewinsohn & Prado, 2005) and home to two global biodiversity hotspots (Myers et al., 2000). It is also the only country in Latin America where Portuguese is the primary language (with over 200 million speakers). Furthermore, it has a thriving scientific community, and a publishing landscape with several national journals and country-wide incentives for baseline science (despite recent funding cuts; Guimarães et al., 2018; Kowaltowski, 2021; Mcmanus et al., 2020). Recent assessments suggest that biodiversity in Brazil is under pressure: 1257 vertebrate species are nationally threatened with extinction (Sistema de Avaliação do Risco de Extinção da Biodiversidade – SALVE, 2024), there is increasing and unprecedented deforestation (Assis et al., 2022; Pacheco et al., 2021) and, compared to other IPBES regions, vertebrate population abundance declines have been the most severe (−95% on average, Living Planet Report 2024 – A System in Peril, 2024) in the Latin America and the Caribbean region, especially for herpetofauna and freshwater fish. Yet, data are still lacking for most species in Latin America, including Brazil, which might be due in part to the lower availability of financial resources for monitoring, and limited accessibility of some areas of the region (Moussy et al., 2022) but may also be due to language bias (Karam-Gemael et al., 2018). This is despite the fact that conservation science publications in Portuguese are increasing, albeit at a slower rate than English-language studies (Chowdhury et al., 2022). These untapped data sources represent a huge opportunity to understand how data published in non-English languages might contribute to understanding local declines and how overlooking them may impact decision-making in policy and conservation.

Here, we use Brazil and a population abundance database as a case study to test the effectiveness of bilingual literature searches in addressing biases and improving data coverage in a global biodiversity dataset for a country where English is not the primary language used in scientific communication. We collected data on population abundance trends for Brazilian vertebrates suitable for entry into the Living Planet Index Database (LPD) from (a) Portuguese-language articles from Brazilian journals, (b) English-language articles from Brazilian journals and (c) English-language articles from international journals. We assessed the taxonomic, spatial and temporal coverage of these three subsets, comparing average relative abundance trends and investigating their predictors. With this work, we target a knowledge gap that has the potential to make a valuable contribution to policy and environmental agreements, specifically the Global Monitoring Framework.

2 | MATERIALS AND METHODS

2.1 | Data collection

We collected time-series of vertebrate population abundance suitable for entry into the LPD (livingplanetindex.org), which provides the repository for one of the indicators in the GBF, the Living Planet Index (LPI, Ledger et al., 2023). Despite the continuous addition of new data, LPI coverage remains incomplete for some regions (Living Planet Report 2024 – A System in Peril, 2024). We collected data from three sets of sources: (a) Portuguese-language articles from Brazilian journals (hereafter 'Brazilian-Portuguese' dataset), (b) English-language articles from Brazilian journals ('Brazilian-English' dataset) and (c) English-language articles from non-Brazilian journals ('International' dataset). For (a and b), we first compiled a list of Brazilian biodiversity-related journals using the list of non-English-language journals in ecology and conservation published by the translatE project (www.translatesciences.com) as a starting point. The International dataset was obtained from the LPD team and sourced from the 78 journals they routinely monitor as part of their ongoing data searches.

We excluded journals whose scope was not relevant to our work (e.g. those focusing on agroforestry or crop science), and taxon-specific journals (e.g. South American Journal of Herpetology) since they could introduce taxonomic bias to the data collection process. We considered only articles published between 1990 and 2015, and thus further excluded journals that published articles exclusively outside of this timeframe. We chose this period because of higher data availability (Deinet et al., 2024), since less monitoring took place in earlier decades, and data availability for the last decade is also not as high as there is a lag between data being collected and trends becoming available in the literature. Finally, we excluded any journals that had inactive links or that were no longer available online. While we acknowledge that biodiversity data are available from a wider range of sources (grey literature, online databases, university theses etc.), here we limited our searches to peer-reviewed journals and articles published within a specific time frame to standardise data collection and allow for comparison between datasets.

We screened a total of 59 Brazilian journals; of these, nine accept articles only in English, 13 only in Portuguese and 37 in both languages. We systematically checked all articles of all issues published between 1990 and 2015. Articles that appeared to contain abundance data for vertebrate species based on title and/or abstract were further evaluated by reading the materials and methods section. For an article to be included in our dataset, we followed the criteria applied for inclusion into the LPD (livingplanetindex.org/about_index#data): (a) data must have been collected using comparable methods for at least 2 years for the same population, and (b) units must be of population size, either a direct measure such as population counts or densities, or indices, or a reliable proxy such as breeding pairs, capture per unit effort or measures of biomass for a single species (e.g. fish data are often available in one of the latter two formats).

2.2 | Assessing search effectiveness and dataset representation

We calculated the encounter rate of relevant articles (i.e. those that satisfied the criteria for inclusion in our datasets) for each journal as the proportion of such articles relative to the total number of articles screened for that journal. We assessed the taxonomic representation of each dataset by calculating the percentage of species of each vertebrate group (all fishes combined, amphibians, reptiles, birds and mammals) with relevant abundance data in relation to the number of species of these groups known to occur in Brazil. The total number of known species for each taxon was compiled from national-level sources (amphibians, Segalla et al., 2021; birds, Pacheco et al., 2021; mammals, Abreu et al., 2022; reptiles, Costa et al., 2022) or through online databases (Fishbase, Froese & Pauly, 2024). We calculated accumulation curves using 1000 permutations and applying the rarefaction method, using the *vegan* package (Oksanen et al., 2024). These represent the cumulative number of new species added with each article containing relevant data, allowing us to assess how additional data collection could increase coverage of abundance data across datasets. To compare species threat status among datasets, we used the category for each species available in the Brazilian (Sistema de Avaliação do Risco de Extinção da Biodiversidade – SALVE, 2024) and IUCN Red List (IUCN, 2024), and calculated the percentage of species in each category per dataset.

To assess and compare the temporal coverage of the different datasets, we calculated the number of populations and species across time. To assess geographic gaps, we mapped the locations of each population using QGIS version 3.6 (QGIS Development Team, 2019). We then quantified the bias of terrestrial records towards proximity to infrastructures (airports, cities, roads and waterbodies) at a 0.5° resolution (circa 55.5 km × 55.5 km at the equator) and a 2° buffer using posterior weights from the R package *sampbias* (Zizka et al., 2021). Higher posterior weights indicate stronger bias effect.

2.3 | Generalised linear mixed models and population abundance trends

We used the *rlpi* R package (Freeman et al., 2024) to calculate trends in relative abundance. We calculated the average lambda (logged annual rate of change) for each time-series by averaging the lambda values across all years between the start and the end year of the time-series. We then built generalised linear mixed models (GLMM) to test how average lambdas changed across language (Portuguese vs. English), journal origin (national vs international), and taxonomic group, using location, journal name and species as random intercepts (Table 1). We offset these by the number of sampled years to adjust summed lambda to a standardised measure, to allow comparison across different observations with different lengths of time-series and plotted the beta coefficients (effect sizes) of all factors. Finally, we performed a post hoc test to check pairwise differences between taxonomic groups (Table S2).

To assess the influence of national-level data on global trends in relative abundance, we calculated the trends for both the International dataset and the two combined Brazilian datasets (Brazilian-Portuguese and Brazilian-English), using only years for which data were available for more than one species, to be able to estimate trend variation. We also plotted the trends for the Brazilian datasets separately. All analyses were performed in R 4.4.1 (R Core Team, 2024).

3 | RESULTS

3.1 | Datasets

More articles were screened for potential data to create the International dataset than the Brazilian-Portuguese and Brazilian-English datasets (over 30 and 100 times more articles, respectively) (Table 2). Despite this, the Brazilian-Portuguese dataset had nearly four times more relevant articles compared to the International dataset, while the Brazilian-English dataset had the fewest relevant articles. This was similarly reflected in the number of species and populations across datasets, with the Brazilian-English dataset having nearly the same number of species (albeit half the number of populations) as the International dataset. The International dataset had the highest ratio of populations to species, meaning that more than one time-series is often available for each species in this dataset.

TABLE 1 Description and type of effect for parameters included in the GLMM.

Parameter	Description	Type of effect
Language	Language (Portuguese or English) in which the article was written	Fixed effect
Origin	Origin of the journal (Brazilian or International) in which the article was published	Fixed effect
Taxonomic group	Broad taxonomic grouping at the class level (amphibians, reptiles, birds and mammals), and with all fishes combined into one group	Fixed effect
Journal name	Name of the journal in which the article was published, to account for differences in editorial policy	Random intercept
Species name	Species binomial name, to account for species-specific responses	Random intercept
Location	Unique ID based on the coordinates of the location where the population was monitored, included to account for site-specific effects	Random intercept
Length of time-series	Total number of years with population sampling	Offset

TABLE 2 Total number of screened articles, relevant articles (and the % of total screened articles), populations (and number of populations per article with relevant data), species (and number of species per relevant article) and population-to-species ratio for each dataset.

Dataset	No. of screened articles	No. of relevant articles (% of screened articles)	No. of populations (pop/relevant article)	No. of species (sp/relevant article)	Populations/species
Brazilian-Portuguese	15,185	104 (0.68%)	700 (6.7)	449 (4.3)	1.56
Brazilian-English	4882	14 (0.29%)	51 (3.6)	47 (3.4)	1.09
International	535,434	29 (0.01%)	103 (3.6)	51 (2.0)	2.02

For the same number of articles with relevant data, the Brazilian-Portuguese dataset adds more species than the other two datasets combined, as shown by the species accumulation curves (Figure 1a). Representation of vertebrate species known to occur in Brazil (9405 in total) was much higher for the Brazilian-Portuguese dataset (6.29%), compared to the International (0.58%) and Brazilian-English (0.49%) datasets (Figure 1b). This was true across all taxonomic groups, except for reptiles, which were better represented in the Brazilian-English dataset (2.67% of all reptile species in Brazil). For amphibians, species representation across datasets was more balanced, with the Brazilian-English (0.59% of 1185 species) and International (0.42%) datasets still containing fewer species than the Brazilian-Portuguese (0.93%) dataset. The overlap between datasets was minimal, with only two species (0.29% of all species with abundance data) present

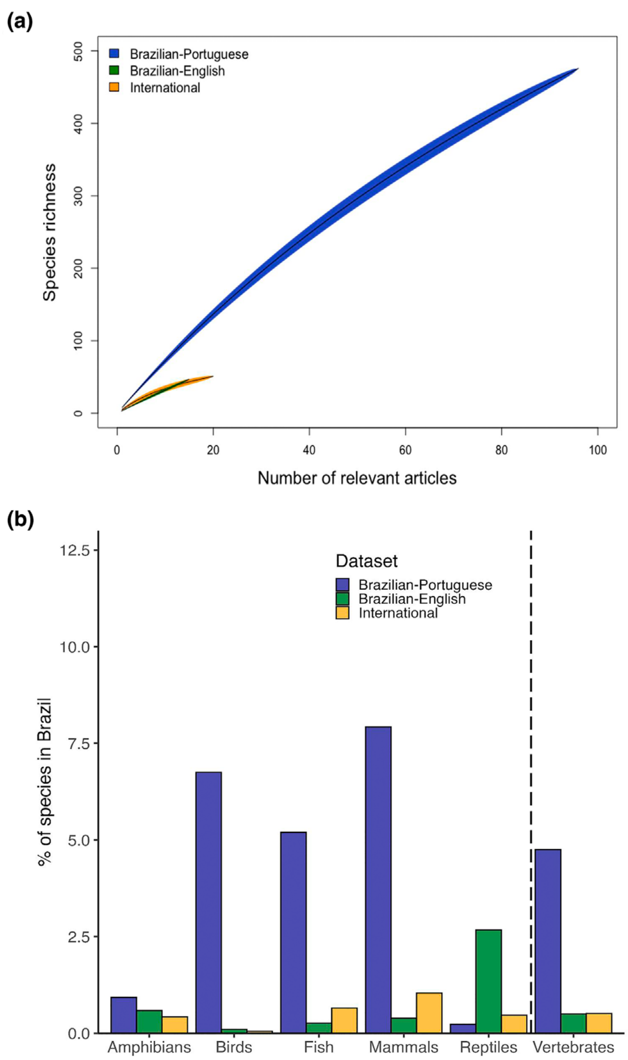

FIGURE 1 (a) Species accumulation curves showing the cumulative number of species added to the dataset for each relevant article screened in each dataset. (b) Percentage of species known to occur in Brazil that had relevant data on abundance trends within each vertebrate group, and for all vertebrate species combined.

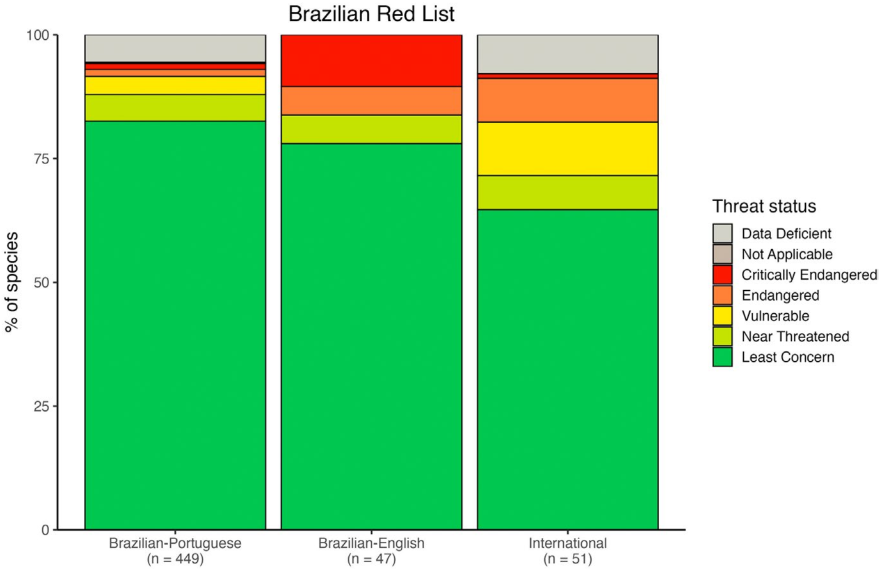

FIGURE 2 Percentage of species in each threat category, according to the Brazilian Red List, with data on population trends published between 1990 and 2015 for each dataset. The colour scheme follows IUCN categories and the number of species in each dataset is indicated in brackets.

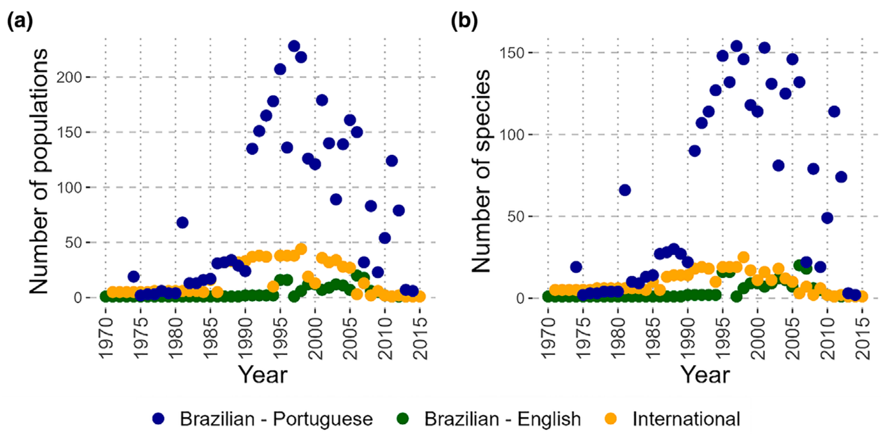

FIGURE 3 Number of populations (a) and species (b) with data in a particular year for each of the three datasets.

in all three datasets—being commercial fish (the Yellowfin tuna, *Thunnus albacares* and the Blue runner, *Caranx crysos*).

When analysing the threat status of species represented in the datasets, we found that the International dataset had the lowest relative number of 'Least Concern' species, as well as the highest relative number of both 'threatened' species (e.g. assessed as Vulnerable, Endangered or Critically Endangered, see Borgelt et al., 2022) and species classified as 'Data Deficient' (Figure 2). On the other hand, the Brazilian-English dataset had the highest relative number of Critically Endangered species. The Brazilian-Portuguese dataset had the highest relative number of Least Concern species. Similar patterns were obtained with the threat status category for each species in the IUCN Red List (Figure S2).

3.2 | Temporal coverage

Temporal coverage patterns were similar across datasets (Figure 3). Both the Brazilian-Portuguese and the International datasets peaked in number of populations (228 and 44, respectively) and species (154 and 25, respectively) around the late 1990s, while the Brazilian-English dataset peaked (20 populations, 20 species) in 2006.

3.3 | Spatial biases

The three datasets had similar patterns of geographical distribution, with clusters of records close to major cities such as state capitals—especially evident for the Brazilian-Portuguese dataset (Figure 4a)—and a poor sampling of the Amazon Forest. The Brazilian-Portuguese dataset had a larger spatial coverage with a higher representation of northeastern Brazil than the other datasets. However, all datasets were still majorly clustered towards the coast, strongly overlapping in southeastern Brazil.

Biases towards infrastructures also differed between the three datasets (Figure 4b). Both Brazilian datasets were mainly biased towards roads, with the Brazilian-English dataset being especially biased towards waterbodies. By comparison, the International dataset appeared overall less biased towards infrastructures except for airports. Proximity to urban agglomerations was not a strong biasing factor for any of the datasets.

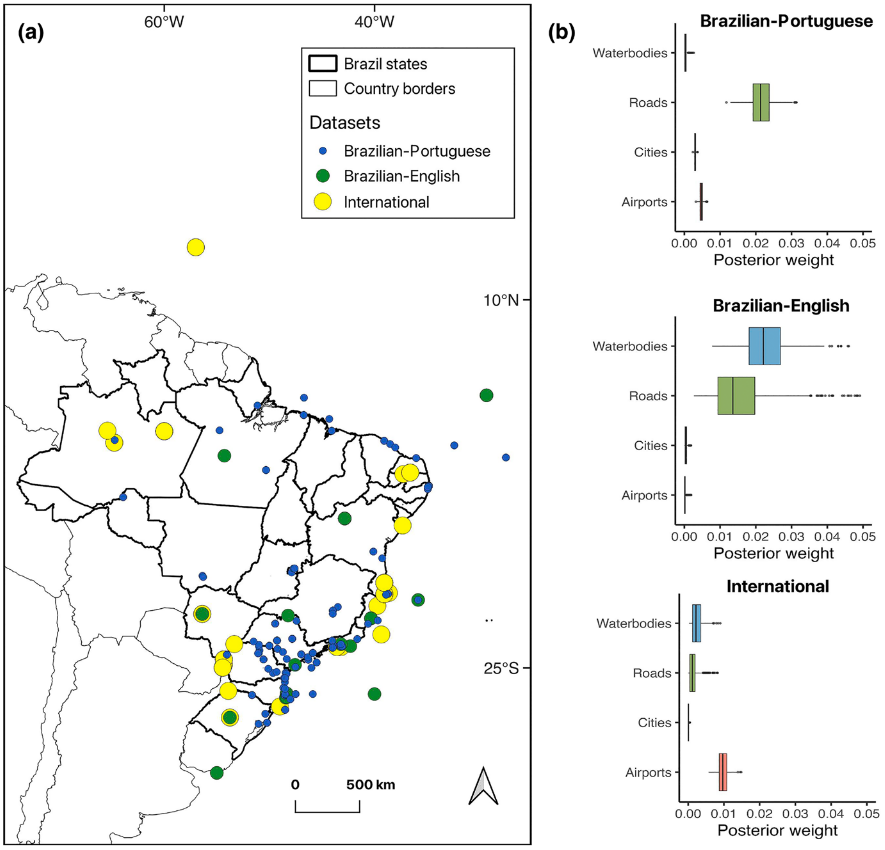

FIGURE 4 (a) Distribution of populations in Brazil, coloured according to language and origin. (b) Posterior weights of bias towards infrastructures for the Brazilian-Portuguese (top), Brazilian-English (middle) and International (bottom) datasets. Higher posterior weights indicate a stronger biasing factor (oversampling) close to a particular infrastructure type.

The GLMM model showed that data in Portuguese had more negative average lambdas (albeit not significantly) than data in English, while international journals had significantly more negative lambdas than data from Brazilian journals (Figure 5; Table S1). Compared to amphibians (the group intercept), only reptiles had significantly more positive logged annual rates of change. These factors explained 59.4% of the variance of the data. Our post hoc comparisons between taxonomic groups showed that the average annual change for reptiles is significantly more positive than that of amphibians, while the average annual change for fish is significantly more negative than that of mammals and reptiles. Every other pairwise comparison was non-significant. The random effect of the journal in which data was published was negligible (beta coefficient of <0.001, SD = 0.06). On the other hand, there were moderate levels of variability in the responses among species (beta coefficient = 0.03, SD = 0.17) and locations (beta coefficient = 0.79, SD = 0.88).

Trends in average relative abundance across time more negative for the Brazilian datasets (a decline of 96% in the index; final LPI value = 0.04, range = 0.01–0.14) than for the International dataset (a decline of 78% in the index; final LPI value = 0.22, range = 0.05–1.52; Figure 6). Overall, the combined Brazilian datasets exhibited lower variation than the International dataset, which overlaps with the baseline (1 which implies no change in abundance) for the majority of the considered time frame. The trend for the International dataset reached negative values before 1980, with a decline in abundance starting around 1975 and a slight increase from 2012 onwards (although this may be due to fewer data points in later years and could change if later data were added). On the other hand, the trend for the Brazilian datasets only reached negative values after 1990. Abundance trends across time were also different for the Brazilian datasets in each language (Figure S1). Population data in the Brazilian-Portuguese dataset span 40 years (1974–2014), while data in English in Brazilian journals is only available from 1990 onwards. Both datasets showed decreasing trends in abundance, reaching negative values after 1990. The Brazilian-Portuguese dataset attained a lower final LPI value (0.04, range = 0.01–0.15) than the Brazilian-English dataset (0.10, range = 0.02–0.44).

4 | DISCUSSION

4.1 | Improving coverage of biodiversity datasets

Our results show that collecting local data in Portuguese can help boost coverage of biodiversity data (here, abundance trends) for Brazil. Prior to this research, the LPD contained 103 time-series for 51 Brazilian species. By including data from national journals, we substantially increased the number of species and populations by 10.1 times and 7.6 times, respectively, with data from Portuguese language journals contributing to these increases by 8.8 times for species and 7.0 times for populations. Rodríguez-Caro et al. (2024) analysed locally sourced data from peer-reviewed and grey literature for the Iberian Peninsula and similarly obtained twice the number of vertebrate populations currently in

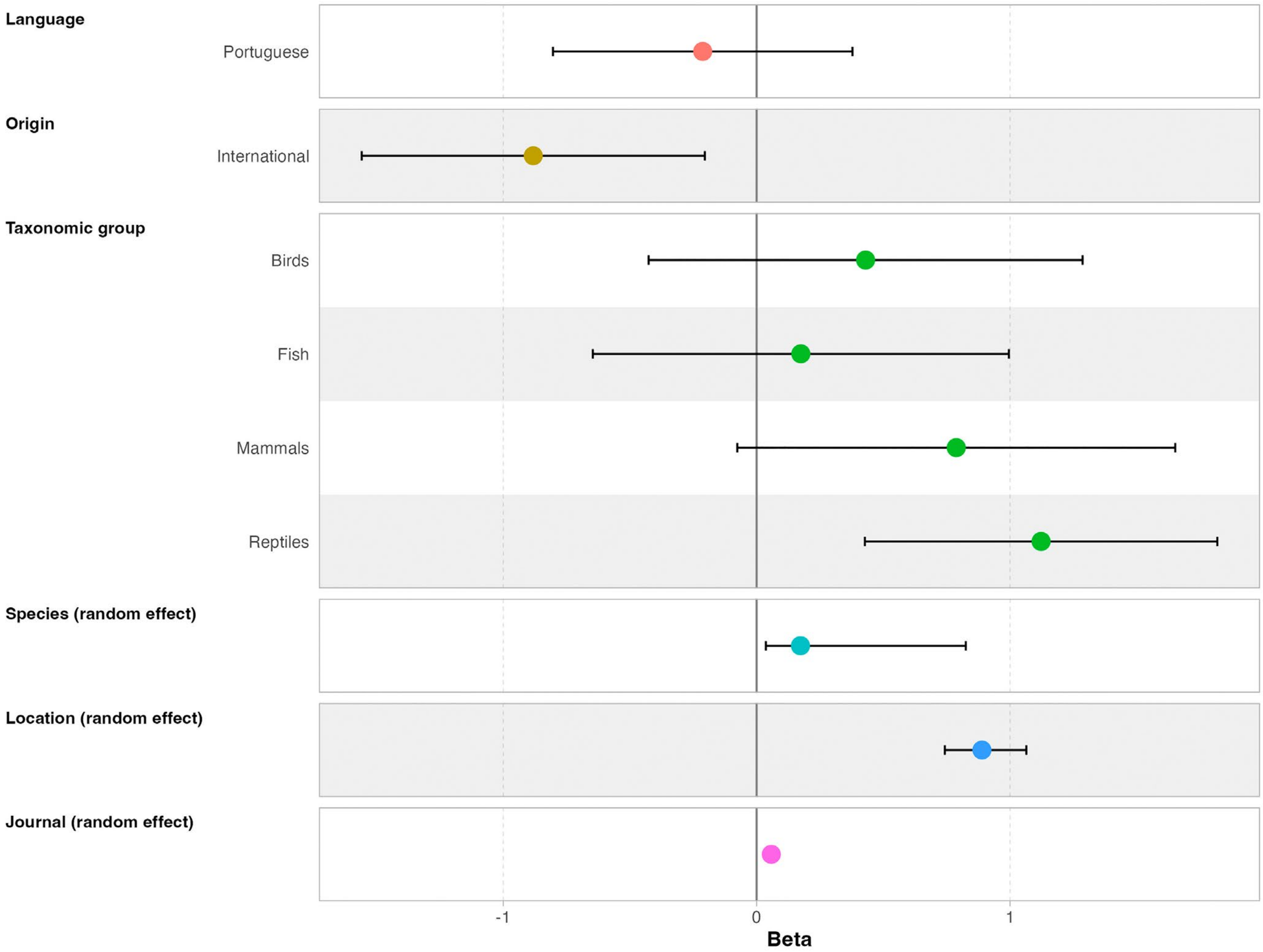

FIGURE 5 Beta coefficients of the GLMM. Positive values indicate positive average lambdas (increasing logged annual rate of change) while negative values indicate negative average lambdas (decreasing logged annual rate of change). Effects where confidence intervals overlap 0 are non-significant.

the LPD, highlighting the importance of local data sources in assessing trends in biodiversity change. Here, we also demonstrate that incorporating data from local sources enhances the temporal coverage and robustness of population trend calculations, though in this case, it only modestly extends spatial coverage. Finally, we also show that local data in other languages can make a useful contribution to biodiversity datasets as data in Portuguese in local journals are the most taxonomically representative and show high levels of complementarity to data in international English-language journals.

4.2 | Species representation

International journals are expected to inherently have a lower encounter rate of articles containing monitoring data for any given country, as the data of interest will inevitably be diluted among the data for all other countries. However, collecting data from local sources and in non-English languages does not simply increase the number of records available per species, but unveils important information for a set of species that is not covered by the international literature. Our datasets are highly complementary, with the two datasets from Brazilian journals adding 513 species that are not included in the International one. This, combined with the markedly higher representation of most taxonomic groups in the Brazilian-Portuguese dataset, further reinforces how data from national journals and in a local language may contribute to a better understanding of the trends in abundance of megadiverse countries. While differences in species composition among datasets are expected given each dataset only covers a small proportion of the country's biodiversity, certain patterns appear to emerge—such as a tendency for international funding to prioritise high-profile, iconic, data-deficient or threatened species (McGowan et al., 2020). This is further reinforced by the International dataset having the highest population to species ratio, which suggests that most studies are focussed on few species. Baseline science often lacks appeal for researchers and funders, compared to hypothesis-driven studies. This is partly due to the substantial funding required for

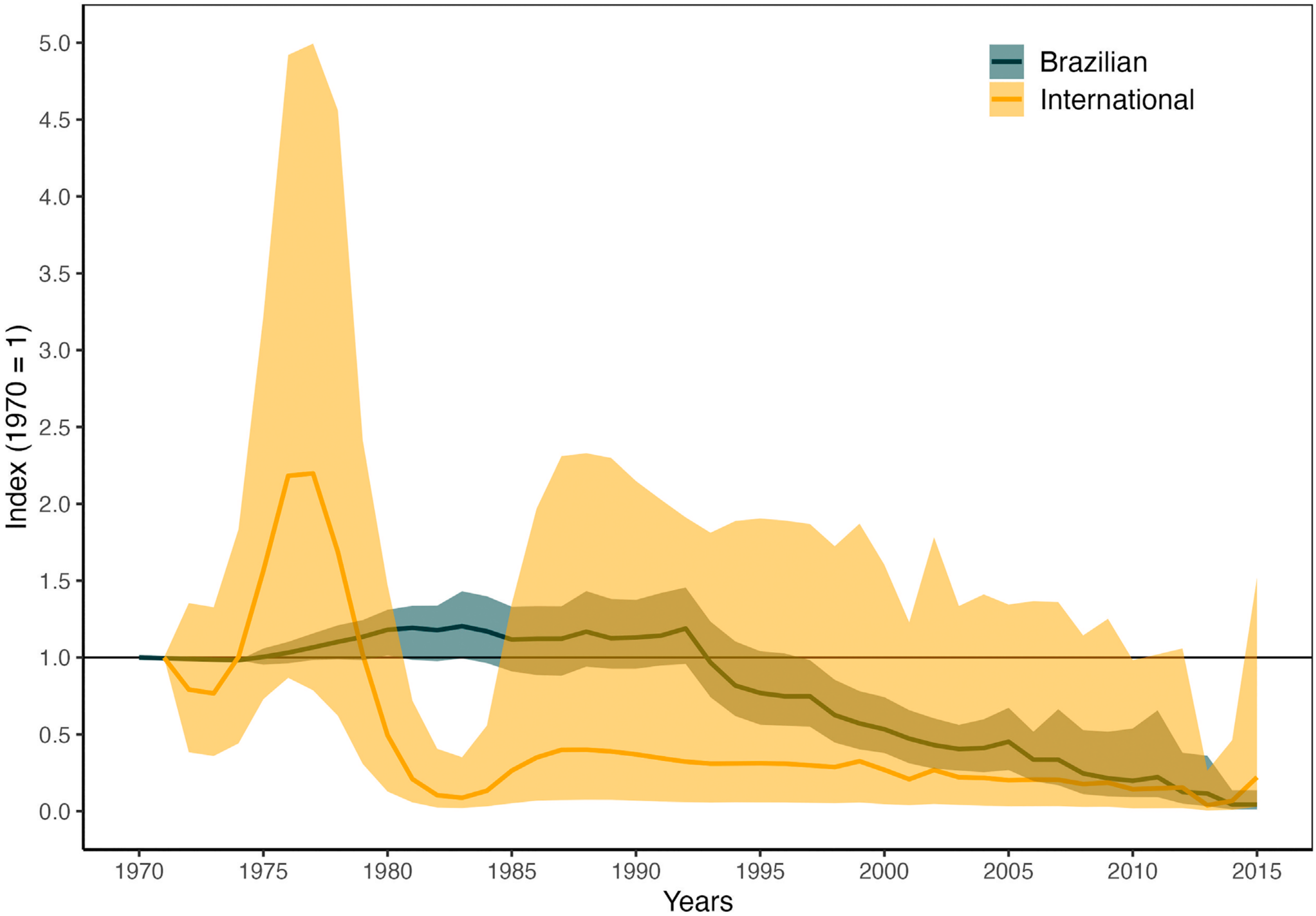

FIGURE 6 Population trends of abundance for the time-series included in the International dataset (yellow) and the two Brazilian datasets combined (dark green) from 1970 to 2015, calculated following the LPI methodology. Changes in abundance were calculated in relation to the 1970 baseline (which is assigned a value of 1).

long-term studies, but also because researchers need to maintain consistent productivity, which can be challenging when involved in studies that demand intensive effort over extended periods before yielding publishable results. However, there are international and national funds available for long-term monitoring of threatened species (e.g. Rufford's foundation, https://www.rufford.org; EDGE, https://www.edgeofexistence.org). Such studies often result in articles either published in English or in international journals, reflecting global interest in threatened species. Baseline monitoring studies focusing on 'Least Concern' species tend to attract more interest from local audiences than international ones, and as a result, they are mostly published in local journals. This is in line with what has been observed for Brazil in other areas of science: Despite an improvement in scientific performance (measured in scientific paper production) over a similar time frame to the one used in our study, the impact of Brazilian research (measured in number of citations by the scientific community) is comparatively low (Strehl et al., 2016). This has been explained in part with the low level of international collaborations of Brazilian researchers, and the more regional nature of the research problems in certain knowledge areas and the fact that studies of this nature are mainly published in Brazilian journals. It is estimated that at least half of the papers by Brazilian scientists are published in Brazilian journals (CNPq, 2023).

Population trends published in international journals tend to be further from most infrastructures and thus may likely represent range-restricted species, which are less commonly reported in Brazilian journals, in which sampled populations usually occur closer to cities and access routes (Oliveira et al., 2016). These differences in sampling bias may reflect a stronger financial resource limitation for locally published articles (Boakes et al., 2010; Meyer et al., 2015). This is further corroborated by the International dataset having the highest relative number of 'threatened' and Data Deficient species, which usually depend on international funding (Morais et al., 2012) and often have smaller distributions, mostly distant to urban areas (Bland et al., 2015; Bland & Böhm, 2016).

4.3 | Temporal and spatial coverage

Data published in international journals has greater temporal coverage as it spanned the full 1970–2015 period. Data from Brazilian journals (especially from articles published in Portuguese), however, greatly increased in availability over recent years, making up the majority of the data in our dataset from 1990 onwards. Interestingly, data published in English in Brazilian journals has increased in the last three decades, and this overlaps with a decrease in the number of populations and species published in international journals. We do not know if these trends are related and there are likely several reasons operating in parallel. For example, an increase in the impact factor of some Brazilian journals may attract Brazilian researchers away from international towards national ones, while international journals may have become more oriented to species of conservation interest, thereby limiting access to studies from Brazil on non-threatened species. Furthermore, grey literature (such as technical reports or biodiversity assessments prior to development of infrastructure) is widespread but overlooked in Brazil, although it may provide a valuable source of data on abundance (Alves Ribeiro de Carvalho Junior et al., 2024).

The substantial overlap in spatial coverage across all datasets confirmed that most regions in Brazil are undersampled, with most of the monitoring locations concentrated in coastal areas, especially in the southern portion of the country, or around major cities. These mainly overlap with the Atlantic Forest biodiversity hotspot (Myers et al., 2000), where ~70% of the Brazilian population live (De Marques et al., 2016). Research in these areas may allow for more funding and decrease logistics costs (e.g. travel, experimental setup), thus increasing the over-representation of coastal Brazil. There are some major gaps in areas of high ecological integrity, such as the northern part of the Amazon, where populations are supposedly stable due to high habitat intactness and connectivity. However, Cerrado Savannas—the other biodiversity hotspot in Brazil (Myers et al., 2000)—lack abundance data, with significant gaps in regions with intense deforestation (e.g. the so-called 'deforestation arc', especially in the contact zones with southwestern Amazon Forest and in the MATOPIBA region—an acronym which includes the states of Maranhão, Tocantins, Piauí and Bahia—in the northeast; Schneider et al., 2021). Worryingly, there is also evidence of decreasing conservation opportunities for endemic terrestrial vertebrates as a function of habitat loss and fragmentation in the Cerrado Savannas, which are included in the 'deforestation arc' (Vieira-Alencar et al., 2023). Therefore, our results confirm not only that international data are overlooking them but also that national-level local language publications are not assessing how much the abundance of vertebrates is changing in these critical regions, preventing the establishment of a proper baseline that allows for effective conservation actions, before affected species become threatened.

4.4 | Abundance trends of Brazilian vertebrates

Both the data available in international journals and the combined data from the Brazilian datasets showed negative abundance trends for Brazilian vertebrate species. From 1980 onwards, the trend for the international dataset was more negative than for the Brazilian datasets combined (except for the latter years), albeit with higher uncertainty. International journals might be more likely to publish more significant results, which in the case of conservation might equate to stronger negative changes in abundance. This has been reported for other ecological trends (Konno et al., 2020). Abundance trends sourced from Brazilian journals strongly declined after 1990, a pattern which was not observed in the International dataset. As non-threatened species are predominantly represented in both Brazilian datasets, the declines observed in these two subsets point to a potentially overlooked decrease in abundance in species not yet threatened with extinction. Population declines can be a prelude to local or—in the case of range-restricted species—species extinctions, and should therefore be monitored and investigated. Overall, including data from Brazilian journals to the data sourced from international journals strongly reduced variation around the overall abundance trend for Brazilian vertebrates. While the confidence bounds of trends calculated using the LPI methodology are descriptive and only indicative of the range of trends that could be obtained using the data available (rather than a measure of statistical uncertainty), a trend based on a larger number of populations sampled over a longer period will be more robust.

When investigating predictors of average rates of change in abundance, we found that publications in international journals had significantly more negative trends in abundance than those in Brazilian journals. Studies that find negative population trends, rather than stable or increasing population trends, may be more easily publishable in international journals ('publication bias', Wood, 2020), as these are often published more quickly (Jennions & Møller, 2002). Language barriers might also have an effect before the submission stage, as for some researchers it could be easier or cheaper (due to translation costs) to submit to local journals in Portuguese. A real or perceived higher acceptance rate in local journals in relation to international ones could also partially explain this pattern (Meneghini, 2010). Our models also indicate that location has a moderate influence on the rate of change in abundance, suggesting local variation in abundance change. While this primarily captures site-specific differences, these local variations may contribute to broader spatial patterns at regional or larger scales, which warrant further investigation.

4.5 | Policy relevance beyond the Brazilian context

Here, we show that coverage of vertebrate abundance data can be substantially improved by considering local sources in a local language for a specific country. Other countries where English is not the main language may also benefit from this approach, especially those with several national journals. This may be especially relevant for tropical countries as local journals may contain population abundance for a large number of species still not included in English-language databases. We recognise that each context is unique in terms of geography, politics, recent conflict and availability of resources, and that national publishing landscapes are influenced by different combinations of funding challenges, infrastructure limitations and access to international networks (Loescher et al., 2022; Salager-Meyer, 2008). However, our results highlight that conservation research and policy would benefit from systematically incorporating evidence published in different languages. This approach may also be particularly more efficient for countries with the same language (e.g. Spanish-speaking Latin American countries or French-speaking African countries). A multilingual approach will provide a broader and more representative picture of biodiversity, as it enhances the coverage of datasets and can better inform policy and conservation interventions.

As our study demonstrates, the LPD and other similar global repositories may be limited by a linguistic bias, as they primarily rely on data searches and data published in English. This potentially influences our assessments of biodiversity trends over time. While English remains the lingua franca of science, the rate of publication of scientific documents in other languages is not slowing down (Chowdhury et al., 2022). An analysis of biodiversity assessment reports across 100 countries/territories found that non-English-language literature was a major source of information, representing on average 65% of the references cited (Amano et al., 2023). Incorporating these data into global biodiversity datasets can be an important first step to increase coverage of biodiversity data. This, in turn, would improve the accuracy and representativeness of biodiversity indicators and assessments at the national and global level. The LPI, which we used here to test our approach, is a component indicator in the monitoring framework of the GBF for tracking progress towards Goals A and B and Targets 4, 5 and 9. It is also used to calculate regional-level (Galewski et al., 2011; McRae et al., 2012) and as the basis for the development of national biodiversity indicators (Bayraktarov et al., 2021; Marconi et al., 2021). Other indicators reliant on synthesising data from scientific publications such as the Biodiversity Intactness Index (Purvis et al., 2018) will likely be affected by a language bias in a comparable way. Without similar data search efforts in other languages and countries, these important measures of the state of the planet may be missing crucial data. Our work also has implications from an equality and diversity perspective. The language barrier in science is often exacerbated by socio-economic disparities between countries, and between areas of the same country. For example, in countries where English is not the primary language, researchers and especially those from marginalised communities may have limited access to the education, resources and opportunities required to be able to publish in English (Ramírez-Castañeda, 2020; Salager-Meyer, 2008). By including articles in languages other than English, global biodiversity datasets would be more representative of work from researchers and conservation practitioners from a diverse range of backgrounds.

4.6 | Final remarks

Monitoring trends in population abundance across time-series is an essential tool to understand how biodiversity is changing. Such data can be helpful for finding patterns that might reflect natural processes over ecological and evolutionary time, as well as the influence of anthropic pressure on the environment and species populations. Species richness (Ceballos et al., 2017) and threats to species (Allan et al., 2019) are not uniformly distributed across realms and regions, with large numbers of species and high levels of threats in areas where English is not the only or main language used for scientific communication. These species-rich at-risk areas are systematically under-represented in biodiversity data (Ceballos et al., 2017), even for comparatively well-studied groups such as vertebrates (Titley et al., 2017). While ideally regional-level trends should be based on a random sample stratified within the area of interest, these data are rarely available so efforts should focus on attaining better geographic, temporal and taxonomic representation and developing methods to address the bias in the data. Here, we demonstrated how including data published in non-English languages and in local journals can boost the number of species and populations for a regional dataset, complementing international datasets and thus improving the geographic and taxonomic coverage of biodiversity data. We hope our workflow will be replicated in other national and regional contexts, thus contributing to a better flow of information between local sources and international global-level assessments of biodiversity trends. This approach also fosters international collaboration and brings the work of in-country researchers and practitioners to the attention of international publications and into policy processes. However, this does not solve the South–North data availability bias for population trends or biodiversity data more generally. Reducing this bias requires a broader approach, involving funding bodies, research institutions and English-language and non-English-language journals (Arenas-Castro et al., 2024; Pettorelli et al., 2021). For example, efforts should be supported to mobilise and publish data currently present in the grey literature, via multilingual papers and/or papers with an English abstract; this enables evidence not only to be available in local languages to local practitioners but also searchable in English for synthesis. Conversely, abstracts of English-language articles should more frequently be made available in other languages, as authors of national biodiversity assessments acknowledge struggles in understanding English-language literature (Amano et al., 2023). Strengthening research and publishing partnerships to expand collaboration networks beyond academia and across a broader range of countries would also help us gain a better understanding of how biodiversity is changing, thus advancing ecological sciences and providing more robust information to conservation and policy decision makers at a critical time for our planet.

AUTHOR CONTRIBUTIONS

Conceptualisation: Valentina Marconi, Filipe C. Serrano, Louise McRae, Robin Freeman, Helga C. Wiederhecker, Paula Valdujo and Marcio Martins. Data curation: Filipe C. Serrano, Valentina Marconi, Stefanie Deinet, Louise McRae, Hannah Puleston, Sérgio Marques-Souza, João Paulo dos Santos Vieira-Alencar, Juan C.

Díaz-Ricaurte, Eletra de Souza, Carolina Farhat and Ricardo Luria-Manzano. Formal analysis: Filipe C. Serrano. Funding acquisition: Valentina Marconi, Stefanie Deinet, Louise McRae and Marcio Martins. Investigation: Filipe C. Serrano, Valentina Marconi, Stefanie Deinet, Louise McRae and Hannah Puleston. Methodology: Filipe C. Serrano, Valentina Marconi, Stefanie Deinet, Louise McRae, Robin Freeman, Hannah Puleston, Helga C. Wiederhecker, Eletra de Souza and Marcio Martins. Project administration: Valentina Marconi, Filipe C. Serrano and Marcio Martins. Resources: Louise McRae, Robin Freeman and Marcio Martins. Software: Filipe C. Serrano and Robin Freeman. Supervision: Louise McRae and Robin Freeman. Validation: Valentina Marconi, Filipe C. Serrano, Hannah Puleston, Louise McRae and Sérgio Marques-Souza. Visualisation: Valentina Marconi, Filipe C. Serrano and Robin Freeman. Writing—original draft: Filipe C. Serrano, Valentina Marconi, Stefanie Deinet, Louise McRae and Hannah Puleston. Writing—review and editing: Valentina Marconi, Filipe C. Serrano, Stefanie Deinet, Louise McRae, Hannah Puleston, Marcio Martins, Helga C. Wiederhecker, Paula Valdujo, Sérgio Marques-Souza, João Paulo dos Santos Vieira-Alencar, Juan C. Díaz-Ricaurte, Eletra de Souza, Ricardo Luria-Manzano and Carolina Farhat.

ACKNOWLEDGEMENTS

We thank Tatsuya Amano and Violeta Berdejo-Espinola for their helpful comments in the initial stages of this project. The initial data collection effort for this project was funded by a British Ecological Society Small Research grant (SR21/1109). F.C.S. is funded by Fundação de Amparo à Pesquisa do Estado de São Paulo (FAPESP #2023/06999-1 and #2024/10038-0) and Coordenação de Aperfeiçoamento de Pessoal de Nível Superior (CAPES) Financial Code 001. V.M., L.M., S.D. and H.P. are funded by WWF-UK. R.F. is funded by Research England. E.d.S. is funded by Fundação de Amparo à Pesquisa do Estado de São Paulo (FAPESP #2021/10402-5). S.M.-S. is funded by Fundação de Amparo à Pesquisa do Estado de São Paulo (FAPESP #2023/03426-0 and #2024/08404-8). J.C.D.-R. is funded by Fundação de Amparo à Pesquisa do Estado de São Paulo (FAPESP #2023/14087-2) and Coordenação de Aperfeiçoamento de Pessoal de Nível Superior (CAPES) Financial Code 001. M.M. is funded by Fundação de Amparo à Pesquisa do Estado de São Paulo (FAPESP #2020/12658-4, CNPq #309772/2021-4). J.P.d.S.V.-A. is funded by Fundação de Amparo à Pesquisa do Estado de São Paulo (FAPESP #2023/07014-9) and Coordenação de Aperfeiçoamento de Pessoal de Nível Superior (CAPES) Financial Code 01. R.L.-M. is funded by Fundação de Amparo à Pesquisa do Estado de São Paulo (FAPESP #2020/10189-7).

CONFLICT OF INTEREST STATEMENT

The authors declare no conflicts of interest.

DATA AVAILABILITY STATEMENT

Data are available from the Dryad Digital Repository: https://doi.org/10.5061/dryad.ngf1vhj68 (Serrano et al., 2025).

ORCID

Filipe C. Serrano https://orcid.org/0000-0002-8568-678X
Juan C. Diaz-Ricaurte https://orcid.org/0000-0002-4659-0865

REFERENCES

Abreu, E. F., Casali, D., Costa-Araújo, R., Garbino, G. S. T., Libardi, G. S., Loretto, D., Loss, A. C., Marmontel, M., Moras, L. M., Nascimento, M. C., Oliveira, M. L., Pavan, S. E., & Tirelli, F. P. (2022). Lista de Mamíferos do Brasil (Version 2022-1) [Data set]. *Zenodo*. https://doi.org/10.5281/ZENODO.7469767

Allan, J. R., Watson, J. E. M., Di Marco, M., O'Bryan, C. J., Possingham, H. P., Atkinson, S. C., & Venter, O. (2019). Hotspots of human impact on threatened terrestrial vertebrates. *PLoS Biology*, *17*(3), e3000158. https://doi.org/10.1371/journal.pbio.3000158

Alves Ribeiro de Carvalho Junior, E., Sampaio, R., Buss, G., de Souza Fialho, M., & Reis, M. L. (2024). Tendências populacionais de vertebrados de médio e grande porte em áreas protegidas da Amazônia brasileira. *Biodiversidade Brasileira*, *14*(3), 163–176. https://doi.org/10.37002/biodiversidadebrasileira.v14i3.2484

Amano, T., Berdejo-Espinola, V., Akasaka, M., de Andrade Junior, M. A. U., Blaise, N., Checco, J., Çilingir, F. G., Citegetse, G., Corella Tor, M., Drobniak, S. M., Giakoumi, S., Golivets, M., Ion, M. C., Jara-Díaz, J. P., Katayose, R., Lasmana, F. P. S., Lin, H. Y., Lopez, E., Mikula, P., … Zamora-Gutierrez, V. (2023). The role of non-English-language science in informing national biodiversity assessments. *Nature Sustainability*, *6*(7), 845–854. https://doi.org/10.1038/s41893-023-01087-8

Amano, T., González-Varo, J. P., & Sutherland, W. J. (2016). Languages are still a major barrier to global science. *PLoS Biology*, *14*(12), e2000933. https://doi.org/10.1371/journal.pbio.2000933

Amano, T., & Sutherland, W. J. (2013). Four barriers to the global understanding of biodiversity conservation: Wealth, language, geographical location and security. *Proceedings of the Royal Society B: Biological Sciences*, *280*(1756), 20122649. https://doi.org/10.1098/rspb.2012.2649

Arenas-Castro, H., Berdejo-Espinola, V., Chowdhury, S., Rodríguez-Contreras, A., James, A. R. M., Raja, N. B., Dunne, E. M., Bertolino, S., Emidio, N. B., Derez, C. M., Drobniak, S. M., Fulton, G. R., Henao-Diaz, L. F., Kaur, A., Kim, C. J. S., Lagisz, M., Medina, I., Mikula, P., Narayan, V. P., … Amano, T. (2024). Academic publishing requires linguistically inclusive policies. *Proceedings of the Royal Society B: Biological Sciences*, *291*(2018), 20232840. https://doi.org/10.1098/rspb.2023.2840

Assis, T. O., Aguiar, A. P. D., von Randow, C., & Nobre, C. A. (2022). Projections of future forest degradation and CO_2 emissions for the Brazilian Amazon. *Science Advances*, *8*(24), eabj3309. https://doi.org/10.1126/sciadv.abj3309

Bayraktarov, E., Ehmke, G., Tulloch, A. I. T., Chauvenet, A. L., Avery-Gomm, S., McRae, L., Wintle, B. A., O'Connor, J., Driessen, J., Watmuff, J., Nguyen, H. A., Garnett, S. T., Woinarski, J., Barnes, M., Morgain, R., Guru, S., & Possingham, H. P. (2021). A threatened species index for Australian birds. *Conservation Science and Practice*, *3*(2), e322. https://doi.org/10.1111/csp2.322

Bland, L. M., & Böhm, M. (2016). Overcoming data deficiency in reptiles. *Biological Conservation*, *204*, 16–22. https://doi.org/10.1016/j.biocon.2016.05.018

Bland, L. M., Collen, B., Orme, C. D. L., & Bielby, J. (2015). Predicting the conservation status of data-deficient species. *Conservation Biology*, *29*(1), 250–259. https://doi.org/10.1111/cobi.12372

Boakes, E. H., McGowan, P. J. K., Fuller, R. A., Chang-qing, D., Clark, N. E., O'Connor, K., & Mace, G. M. (2010). Distorted views of biodiversity: Spatial and temporal bias in species occurrence data. *PLoS Biology*, *8*(6), e1000385. https://doi.org/10.1371/journal.pbio.1000385

Borgelt, J., Dorber, M., Høiberg, M. A., & Verones, F. (2022). More than half of data deficient species predicted to be threatened by extinction. *Communications Biology*, *5*(1). https://doi.org/10.1038/s42003-022-03638-9

CBD. (2010). *Aichi biodiversity targets of the strategic plan 2011–2020*. Secretariat of the Convention on Biological Diversity. http://www.cbd.int/sp/targets/

Ceballos, G., Ehrlich, P. R., & Dirzo, R. (2017). Biological annihilation via the ongoing sixth mass extinction signaled by vertebrate population losses and declines. *Proceedings of the National Academy of Sciences of the United States of America*, *114*(30), E6089–E6096. https://doi.org/10.1073/pnas.1704949114

Chowdhury, S., Gonzalez, K., Aytekin, M. Ç. K., Baek, S. Y., Bełcik, M., Bertolino, S., Duijns, S., Han, Y., Jantke, K., Katayose, R., Lin, M. M., Nourani, E., Ramos, D. L., Rouyer, M. M., Sidemo-Holm, W., Vozykova, S., Zamora-Gutierrez, V., & Amano, T. (2022). Growth of non-English-language literature on biodiversity conservation. *Conservation Biology*, *36*(4), e13883. https://doi.org/10.1111/cobi.13883

CNPq. (2023). *Diretório dos Grupos de Pesquisa*. http://lattes.cnpq.br/web/dgp

Costa, H. C., Guedes, T. B., & Bérnils, R. S. (2022). *Lista de Répteis do Brasil: padrões e tendências*. https://doi.org/10.5281/ZENODO.5838950

De Marques, A. A. B., Schneider, M., & Peres, C. A. (2016). Human population and socioeconomic modulators of conservation performance in 788 Amazonian and Atlantic Forest reserves. *PeerJ*, *4*, e2206. https://doi.org/10.7717/peerj.2206

Deinet, S., Marconi, V., Freeman, R., Puleston, H., & McRae, L. (2024). *Living Planet Index technical supplement 2024*. https://doi.org/10.17605/OSF.IO/6TE9H

Donaldson, M. R., Burnett, N. J., Braun, D. C., Suski, C. D., Hinch, S. G., Cooke, S. J., & Kerr, J. T. (2017). Taxonomic bias and international biodiversity conservation research. *Facets*, *1*(1), 105–113. https://doi.org/10.1139/facets-2016-0011

Freeman, R., McRae, L., Deinet, S., Amin, R., Collen, B. (2024). rlpi: Tools for calculating indices using the Living Planet Index method. R package version 0.1.0. https://github.com/Zoological-Society-of-London/living_planet_index

Froese, R., & Pauly, D. (2024). FishBase. www.fishbase.org

Galewski, T., Collen, B., McRae, L., Loh, J., Grillas, P., Gauthier-Clerc, M., & Devictor, V. (2011). Long-term trends in the abundance of Mediterranean wetland vertebrates: From global recovery to localized declines. *Biological Conservation*, *144*(5), 1392–1399. https://doi.org/10.1016/j.biocon.2010.10.030

Guimarães, V. d. A., Ribeiro, G. M., & de Azevedo-Ferreira, M. (2018). Mapping of the Brazilian scientific publication on facility location. *Pesquisa Operacional*, *38*(2), 307–330. https://doi.org/10.1590/0101-7438.2018.038.02.0307

Gutzat, F., & Dormann, C. F. (2020). Exploration of concerns about the evidence-based guideline approach in conservation management: Hints from medical practice. *Environmental Management*, *66*(3), 435–449. https://doi.org/10.1007/s00267-020-01312-6

Hazlett, M. A., Henderson, K. M., Zeitzer, I. F., & Drew, J. A. (2020). The geography of publishing in the Anthropocene. *Conservation Science and Practice*, *2*(10), e270. https://doi.org/10.1111/csp2.270

IUCN. (2024). The IUCN Red List of Threatened Species. www.iucnredlist.org

Jennions, M. D., & Møller, A. P. (2002). Relationships fade with time: A meta-analysis of temporal trends in publication in ecology and evolution. *Proceedings of the Royal Society of London, Series B: Biological Sciences*, *269*(1486), 43–48. https://doi.org/10.1098/rspb.2001.1832

Karam-Gemael, M., Loyola, R., Penha, J., & Izzo, T. (2018). Poor alignment of priorities between scientists and policymakers highlights the need for evidence-informed conservation in Brazil. *Perspectives in Ecology and Conservation*, *16*(3), 125–132. https://doi.org/10.1016/j.pecon.2018.06.002

Konno, K., Akasaka, M., Koshida, C., Katayama, N., Osada, N., Spake, R., & Amano, T. (2020). Ignoring non-English-language studies may bias ecological meta-analyses. *Ecology and Evolution*, *10*(13), 6373–6384. https://doi.org/10.1002/ece3.6368

Kowaltowski, A. J. (2021). Brazil's scientists face 90% budget cut. *Nature*, *598*(7882), 566. https://doi.org/10.1038/d41586-021-02882-z

Ledger, S. E. H., Loh, J., Almond, R., Böhm, M., Clements, C. F., Currie, J., Deinet, S., Galewski, T., Grooten, M., Jenkins, M., Marconi, V., Painter, B., Scott-Gatty, K., Young, L., Hoffmann, M., Freeman, R., & McRae, L. (2023). Past, present, and future of the living planet index. *npj Biodiversity*, *2*(1), 12. https://doi.org/10.1038/s44185-023-00017-3

Lewinsohn, T. M., & Prado, P. I. (2005). How many species are there in Brazil? *Conservation Biology*, *19*(3), 619–624. https://doi.org/10.1111/j.1523-1739.2005.00680.x

Living Planet Report 2024 – A System in Peril. (2024). WWF.

Loescher, H. W., Vargas, R., Mirtl, M., Morris, B., Pauw, J., Yu, X., Kutsch, W., Mabee, P., Tang, J., Ruddell, B. L., Pulsifer, P., Bäck, J., Zacharias, S., Grant, M., Feig, G., Zhang, L., Waldmann, C., & Genazzio, M. A. (2022). Building a global ecosystem research infrastructure to address global grand challenges for macrosystem ecology. *Earth's Future*, *10*(5), e2020EF001696. https://doi.org/10.1029/2020EF001696

Marconi, V., McRae, L., Müller, H., Currie, J., Whitmee, S., Gadallah, F., & Freeman, R. (2021). Population declines among Canadian vertebrates: But data of different quality show diverging trends. *Ecological Indicators*, *130*, 108022. https://doi.org/10.1016/j.ecolind.2021.108022

McGowan, J., Beaumont, L. J., Smith, R. J., Chauvenet, A. L. M., Harcourt, R., Atkinson, S. C., Mittermeier, J. C., Esperon-Rodriguez, M., Baumgartner, J. B., Beattie, A., Dudaniec, R. Y., Grenyer, R., Nipperess, D. A., Stow, A., & Possingham, H. P. (2020). Conservation prioritization can resolve the flagship species conundrum. *Nature Communications*, *11*(1), 994. https://doi.org/10.1038/s41467-020-14554-z

Mcmanus, C. M., Neves, A. A. B., & Maranhão, A. Q. (2020). Brazilian publication profiles: Where and how Brazilian authors publish. *Anais da Academia Brasileira de Ciências*, *92*(2), e20200328. https://doi.org/10.1590/0001-3765202020200328

McRae, L., Böhm, M., Deinet, S., Gill, M., & Collen, B. (2012). The Arctic species trend index: Using vertebrate population trends to monitor the health of a rapidly changing ecosystem. *Biodiversity*, *13*(3–4), 144–156. https://doi.org/10.1080/14888386.2012.705085

Melles, S. J., Scarpone, C., Julien, A., Robertson, J., Levieva, J. B., Carrier, C., France, R., Guvenc, S., Lam, W. Y., Lucas, M., Maglalang, A., McKee, K., Okoye, F., & Morales, K. (2019). Diversity of practitioners publishing in five leading international journals of applied ecology and conservation biology, 1987–2015 relative to global biodiversity hotspots. *Écoscience*, *26*(4), 323–340. https://doi.org/10.1080/11956860.2019.1645565

Meneghini, R. (2010). Publication in a Brazilian journal by Brazilian scientists whose papers have international impact. *Brazilian Journal of Medical and Biological Research*, *43*(9), 812–815. https://doi.org/10.1590/S0100-879X2010007500073

Meyer, C., Kreft, H., Guralnick, R., & Jetz, W. (2015). Global priorities for an effective information basis of biodiversity distributions. *Nature Communications*, *6*(1), 8221. https://doi.org/10.1038/ncomms9221

Morais, A. R., Braga, R. T., Bastos, R. P., & Brito, D. (2012). A comparative analysis of global, national, and state red lists for threatened amphibians in Brazil. *Biodiversity and Conservation*, *21*(10), 2633–2640. https://doi.org/10.1007/s10531-012-0322-2

Moussy, C., Burfield, I. J., Stephenson, P. J., Newton, A. F. E., Butchart, S. H. M., Sutherland, W. J., Gregory, R. D., McRae, L., Bubb, P., Roesler, I., Ursino, C., Wu, Y., Retief, E. F., Udin, J. S., Urazaliyev, R., Sánchez-Clavijo, L. M., Lartey, E., & Donald, P. F. (2022). A quantitative global review of species population monitoring. *Conservation Biology*, *36*(1), e13721. https://doi.org/10.1111/cobi.13721

Myers, N., Mittermeier, R. A., Mittermeier, C. G., da Fonseca, G. A. B., & Kent, J. (2000). Biodiversity hotspots for conservation priorities. *Nature*, *403*(6772), 853–858. https://doi.org/10.1038/35002501

Nuñez, M. A., & Amano, T. (2021). Monolingual searches can limit and bias results in global literature reviews. *Nature Ecology & Evolution*, *5*(3), 264. https://doi.org/10.1038/s41559-020-01369-w

Oksanen, J., Simpson, G. L., Blanchet, F. G., Kindt, R., Legendre, P., Minchin, P. R., O'Hara, R. B., Solymos, P., Stevens, M. H. H., Szoecs, E., Wagner, H., Barbour, M., Bedward, M., Bolker, B., Borcard, D., Borman, T., Carvalho, G., Chirico, M., De Caceres, M., … Weedon, J. (2024). Package “vegan”. https://github.com/vegandevs/vegan

Oliveira, U., Paglia, A. P., Brescovit, A. D., de Carvalho, C. J. B., Silva, D. P., Rezende, D. T., Leite, F. S. F., Batista, J. A. N., Barbosa, J. P. P. P., Stehmann, J. R., Ascher, J. S., de Vasconcelos, M. F., De Marco, P., Jr., Löwenberg-Neto, P., Dias, P. G., Ferro, V. G., & Santos, A. J. (2016). The strong influence of collection bias on biodiversity knowledge shortfalls of Brazilian terrestrial biodiversity. *Diversity and Distributions*, *22*(12), 1232–1244. https://doi.org/10.1111/ddi.12489

Pacheco, J. F., Silveira, L. F., Aleixo, A., Agne, C. E., Bencke, G. A., Bravo, G. A., Brito, G. R. R., Cohn-Haft, M., Maurício, G. N., Naka, L. N., Olmos, F., Posso, S. R., Lees, A. C., Figueiredo, L. F. A., Carrano, E., Guedes, R. C., Cesari, E., Franz, I., Schunck, F., & de Q. Piacentini, V. (2021). Annotated checklist of the birds of Brazil by the Brazilian ornithological records committee—Second edition. *Ornithology Research*, *29*(2), 94–105. https://doi.org/10.1007/s43388-021-00058-x

Pettorelli, N., Barlow, J., Nuñez, M. A., Rader, R., Stephens, P. A., Pinfield, T., & Newton, E. (2021). How international journals can support ecology from the global south. *Journal of Applied Ecology*, *58*(1), 4–8. https://doi.org/10.1111/1365-2664.13815

Purvis, A., Newbold, T., De Palma, A., Contu, S., Hill, S. L. L., Sanchez-Ortiz, K., Phillips, H. R. P., Hudson, L. N., Lysenko, I., Börger, L., & Scharlemann, J. P. W. (2018). Modelling and projecting the response of local terrestrial biodiversity worldwide to land use and related pressures: The PREDICTS Project. *Advances in Ecological Research*, *58*, 201–241. https://doi.org/10.1016/bs.aecr.2017.12.003

QGIS Development Team. (2019). *QGIS geographic information system*. Open Source Geospatial Foundation Project.

R Core Team. (2024). *R: A language and environment for statistical computing*. R Foundation for Statistical Computing. https://www.R-project.org/

Ramírez-Castañeda, V. (2020). Disadvantages in preparing and publishing scientific papers caused by the dominance of the English language in science: The case of Colombian researchers in biological sciences. *PLoS One*, *15*(9), e0238372. https://doi.org/10.1371/journal.pone.0238372

Rodríguez-Caro, R. C., Morales-Reyes, Z., Aguión, A., Arias-Real, R., Arrondo, E., Aspillaga, E., Boada, J., Campos-Candela, A., Expósito-Granados, M., Forcada, A., Freeman, R., Gómez-Serrano, M. Á., Gutiérrez-Cánovas, C., Pascual-Rico, R., Marconi, V., Montseny, M., Rotger, A., Rovira, G., Segura, A., … Capdevila, P. (2024). The importance of locally sourced data in identifying population trends: Insights from Iberian vertebrates. *Biological Conservation*, *298*, 110755. https://doi.org/10.1016/j.biocon.2024.110755

Salager-Meyer, F. (2008). Scientific publishing in developing countries: Challenges for the future. *Journal of English for Academic Purposes*, *7*(2), 121–132. https://doi.org/10.1016/j.jeap.2008.03.009

Schneider, M., Biedzicki de Marques, A. A., & Peres, C. A. (2021). Brazil's next deforestation Frontiers. *Tropical Conservation Science*, *14*, 19400829211020470. https://doi.org/10.1177/19400829211020472

Segalla, M., Berneck, B., Canedo, C., Caramaschi, U., Cruz, C. A. G., Garcia, P. C. A., Grant, T., Haddad, C. F. B., Lourenço, A. C., Mangia, S., Mott, T., Nascimento, L., Toledo, L. F., Werneck, F., & Langone, J. A. (2021). List of Brazilian Amphibians. https://doi.org/10.5281/ZENODO.4716176

Serrano, F. C., Marconi, V., Deinet, V., Puleston, H., Wiederhecker, H., Diaz-Ricaurte, J. C., Farhat, C., Luría-Manzano, R., Martins, M., Souza, E., Marques-Souza, S., Vieira-Alencar, J. P. S., Valdujo, P., Freeman, R., & McRae, L. (2025). Data from: Knowledge from non-English-language studies broadens contributions to conservation policy and helps to tackle bias in biodiversity data. *Dryad Digital Repository*. https://doi.org/10.5061/dryad.ngf1vhj68

Sistema de Avaliação do Risco de Extinção da Biodiversidade – SALVE. (2024). https://salve.icmbio.gov.br/.

Strehl, L., Calabró, L., Souza, D. O., & Amaral, L. (2016). Brazilian science between national and foreign journals: Methodology for analyzing the production and impact in emerging scientific communities. *PLoS One*, *11*(5), e0155148. https://doi.org/10.1371/journal.pone.0155148

Titley, M. A., Snaddon, J. L., & Turner, E. C. (2017). Scientific research on animal biodiversity is systematically biased towards vertebrates and temperate regions. *PLoS One*, *12*(12), e0189577. https://doi.org/10.1371/journal.pone.0189577

Troudet, J., Grandcolas, P., Blin, A., Vignes-Lebbe, R., & Legendre, F. (2017). Taxonomic bias in biodiversity data and societal preferences. *Scientific Reports*, *7*(1), 9132. https://doi.org/10.1038/s41598-017-09084-6

UNEP. (2018). *CBD/COP/14/INF/40 12 November 2018 Developing indicators for the post-2020 global biodiversity framework: Lessons from the biodiversity indicators partnership*. Convention on Biological Diversity (CBD). https://www.cbd.int/doc/c/7217/00d0/a9328110a490b7a8957a0cd9/cop-14-inf-40-en.pdf

UNEP. (2022a). *Decision 15/4 Kunming-Montreal Global Biodiversity Framework*. Convention on Biological Diversity (CBD).

UNEP. (2022b). *Decision 15/5: monitoring framework for the Kunming-Montreal Global Biodiversity Framework*. UNEP. https://www.cbd.int/doc/decisions/cop-15/cop-15-dec-05-en.pdf

Vieira-Alencar, J. P. S., Bolochio, B. E., Carmignotto, A. P., Sawaya, R. J., Silveira, L. F., Valdujo, P. H., Nogueira, C. C., & Nori, J. (2023). How habitat loss and fragmentation are reducing conservation opportunities for vertebrates in the most threatened savanna of the world. *Perspectives in Ecology and Conservation*, *21*(2), 121–127. https://doi.org/10.1016/j.pecon.2023.02.004

Wood, K. A. (2020). Negative results provide valuable evidence for conservation. *Perspectives in Ecology and Conservation*, *18*(4), 235–237. https://doi.org/10.1016/j.pecon.2020.10.007

Yesson, C., Brewer, P. W., Sutton, T., Caithness, N., Pahwa, J. S., Burgess, M., Gray, W. A., White, R. J., Jones, A. C., Bisby, F. A., & Culham, A. (2007). How global is the global biodiversity information Facility? *PLoS One*, *2*(11), e1124. https://doi.org/10.1371/journal.pone.0001124

Zizka, A., Antonelli, A., & Silvestro, D. (2021). Sampbias, a method for quantifying geographic sampling biases in species distribution data. *Ecography*, *44*(1), 25–32. https://doi.org/10.1111/ecog.05102

SUPPORTING INFORMATION

Additional supporting information can be found online in the Supporting Information section at the end of this article.

Figure S1. Population trends of abundance for the time-series included in the Brazilian-Portuguese dataset (blue), Brazilian-English dataset (green) and International dataset (yellow) from 1970 to 2015, calculated following the LPI methodology.

Figure S2. Percentage of species in each threat category, according to the IUCN Red List, with data on population trends published between 1990 and 2015 for each dataset.

Table S1. Output of GLMM model for the response of average lambda regarding language of the article, origin of the journal and taxonomic group.

Table S2. Post-hoc comparison of differences in average lambda values between taxonomic groups.

Data S1. A list of the journals scanned for this work. Metadata are provided in the second tab of the spreadsheet.

How to cite this article: Serrano, F. C., Marconi, V., Deinet, S., Puleston, H., Wiederhecker, H. C., Diaz-Ricaurte, J. C., Farhat, C., Luría-Manzano, R., Martins, M., de Souza, E., Marques-Souza, S., dos Santos Vieira-Alencar, J. P., Valdujo, P., Freeman, R., & McRae, L. (2025). Knowledge from non-English-language studies broadens contributions to conservation policy and helps to tackle bias in biodiversity data. *Journal of Applied Ecology*, *00*, 1–15. https://doi.org/10.1111/1365-2664.70092