Is non-English-language literature important in science?

Tatsuya Amano

translatE

Transcending language barriers to environmental sciences

Australian Government
Australian Research Council

The University Of Queensland
AUSTRALIA

@tatsuya_amano

Future Fellowship (FT180100354): Transcending language barriers to environmental sciences

Is non-English-language literature important in science?

93-100% of the references cited in eight IPBES assessments are in English

(Lynch et al unpublished)

106 (86.2%) out of the 123 Campbell Collaboration systematic reviews only include English-language studies (Neimann Rasmussen and Montgomery 2018)

Is non-English-language literature important?

YES because….

保全生態学研究 *(Japanese Journal of Conservation Ecology)* **22** : 5-20 (2017)

特　集　保全科学が挑む情報のギャップ

総　説

保全科学における情報のギャップと 3 つのアプローチ

天野　達也*

ケンブリッジ大学動物学部保全科学グループ

Information gaps in conservation science and three potential approaches

Tatsuya Amano*

Conservation Science Group, Department of Zoology, University of Cambridge

要旨：現在も進む生物多様性の喪失に対して科学が如何にして貢献できるのかは、保全科学にとって重要な問いである。科学が生物多様性の保全に貢献するためには、データを集積し、そこから科学的知見を得て、その知見を現場で活用するという情報利用の過程を経る。しかしこの過程にはいくつもの「ギャップ」が存在し、保全に対して科学が貢献する際の大きな障壁となっている。本稿では保全科学が直面する情報のギャップの特性と解決策について議論する。例えば、研究に利用できる一次データの量は、場所や年代、分類群、データの種類によって大きく異なる。これはデータ収集の対象が、保全上の需要のみならず、データの取得し易さ、基礎科学的な動機、地理的・社会的な制約などその他の要因によっても決定されることに起因する。一方、研究の成果が保全の現場で活用されないという研究－実務間ギャップの存在もよく知られている。これは研究が提供する知見と現場が必要とする知見が異なること、保全活動や政策の関係者にとって科学的情報がアクセスしにくいことなどが原因であると考えられる。本稿ではさらにこれらのギャップを克服するための三つのアプローチを紹介する。まず一つ目は、利用できる一次データの底上げを図る試みである。次に、限られた情報からモデリングによって有用な知見を得ようとする試みを紹介する。最後に、保全活動や政策の現場がどのような知見を必要とし、科学者がどうやって成果を提供できるのかを理解することも重要である。これら三つのアプローチについて具体的な事例も取り上げながら、今後保全科学における情報のギャップを解消していくために必要な取組みについて議論を行う。

キーワード：科学的根拠に基づいた保全、市民科学、情報の偏り、保全生物学

統計数理(2016)
第 64 巻 第 1 号 105–121

特集「生態学における統計モデリング」
[総合報告]

生態学・進化生物学のメタ解析のための統計モデル

中川 震一[1]・久保 拓弥[2]

6 月 30 日；改訂 2016 年 3 月 2 日；採択 3 月 25 日）

要　旨

生態学・進化生物学の分野において，いまやメタ解析は多くの一次研究(primary study)を定量的に統合するもっとも有望な手法となっている．この手法はもともとは医学・社会科学の分野で発展してきたもので，それは固定効果(fixed effects)モデルやランダム効果(random effects)モデルなどの適用から始まった．メタ解析で扱うデータとは効果量の集まりであるが，生態学・進化生物学の分野ではこれらはより不均質(heterogeneous)かつ相互依存的(inter-dependent)であるという特徴を持つので，効果量間の独立を仮定している上にあげた従来的なメタ解析モデルでは，うまくあつかえない．生態学・進化生物学分野におけるメタ解析では，一次研究内での効果量の非独立性，あるいは対象となる生物種(species)間の系統学的な近縁性といった非独立性(相関構造)をあつかわなければならないことが多い．これらの非独立性を扱うために提案されたメタ解析の統計モデルを紹介する．系統学的な比較法をくみこんだマルチレベルモデル，すなわち系統学的マルチレベルメタ解析は生態学・進化生物学分野で頻出するデータを解析するのに適している．またメタ解析の不均質性 I^2 とメタ回帰の R^2 の概念についても検討する．メタ解析のモデルは発展しつつあるが，生態学・進化生物学分野ではその利用は進んでいない．この分野の研究者たちに対する実効性のある教育プログラムが必要である．

キーワード：システマティックレビュー，定量的研究，データ統合，階層モデル，混合効果モデル，系統樹．

Is non-English-language literature important in science?

translate

Transcending language barriers to environmental sciences

https://translatesciences.com/

Three common assumptions

1. Most scientific knowledge is available in English

2. Non-English-language literature is diminishing

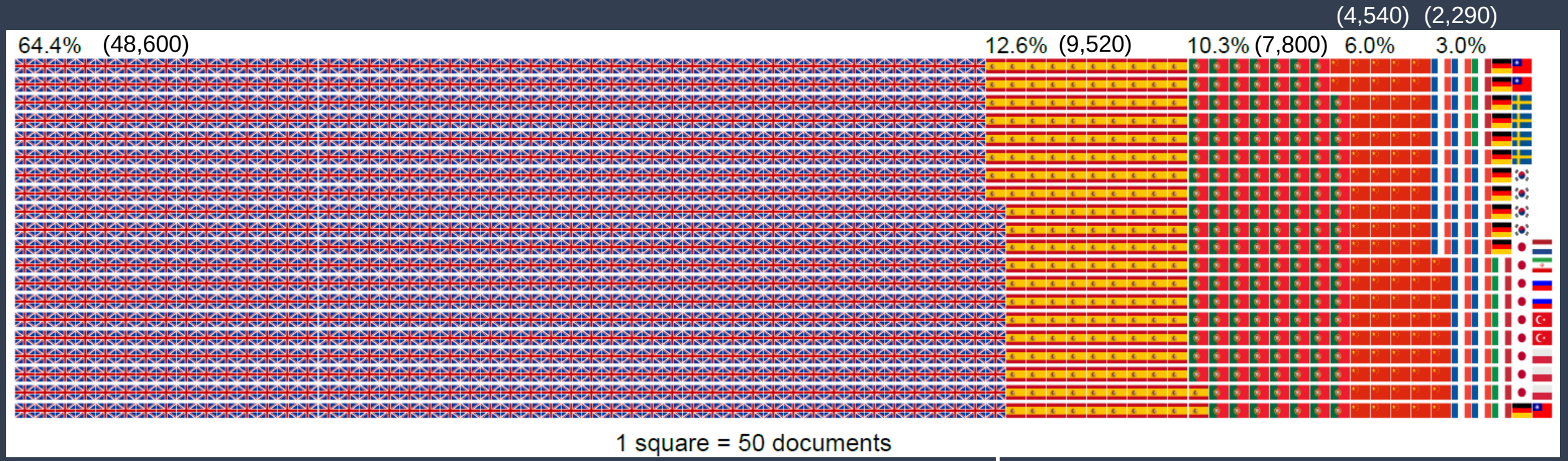
3. English-language science represents a random subset of non-English-language science

1. Is most scientific knowledge available in English?

“biodiversity” “conservation”
“biodiversidad” “conservación”
"biodiversidade" "conservação"
“生物多样性” “保护”
"biodiversité" "conservation"
"biodiversità" "conservazione"
"biodiversität" "naturschutz"
“生物多様性” “保全”
"생물 다양성" "보전"
"biologisk mångfald" "bevarande"
"生物多樣性" "保育"
"bioróżnorodność" "ochrona"
"biyolojik çeşitlilik" "koruma"
"биоразнообразие" "охрана природы"
"تنوع زیستی" "حفاظت"
"biodiversiteit" "natuurbehoud"

~~1. Is most scientific knowledge available in English?~~

Number of scientific documents in 2014 searched with “biodiversity” and “conservation”



64% in English

36% in non-English

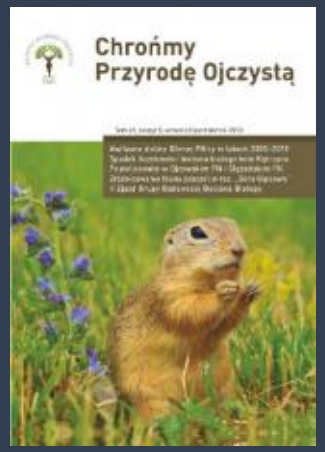
Amano et al (2016) PLOS Biology

~~1. Is most scientific knowledge available in English?~~

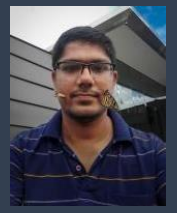
List of non-English-language journals in ecology & conservation (466 peer-reviewed journals in 19 languages)

https://translatesciences.com/resources/#journals

	A	B	C	D	E	F	G	
1	Language	Country/Region	Journal title in English	Journal title in the non-English language	First publication yea	Latest publication year	URL	Research areas/taxa
2	Arabic	Lebanon	Journal of King Abdulaziz University .Environmental Design Science	مجلة جامعة الملك عبد العزيز: علوم تصاميم البيئة	2003	2017	https://wwv	Environmental Design, Urban desi
3	Arabic	Lebanon	The Arab Journal for Arid Environments	المجلة العربية للبيئات الجافة	2009	2018	https://acsa	Biodiversity, desertification, range
4	Arabic	Lebanon	Afak Ilmia journal	مجلة آفاق علمية	2017	2020	https://afak	literature; linguistics; humanities;
5	Arabic	Lebanon	Marsh Bulletin	مجلة الاهوار	2006	2020	https://wwv	Biology; Ecology and nature conse
6	Arabic	Lebanon	Journal of Agricultural, Environmental and Veterinary Sciences	مجلة العلوم الزراعية والبيئية والبيطرية	2017	2020	https://wwv	environment, agriculture and Vete
7	Arabic	Lebanon	Baghdad Science Journal	مجلة بغداد للعلوم	2004	2020	http://bsj.uc	biology, chemistry, computer scie
8	Arabic	Lebanon	Journal of King Abdulaziz University: Economics and Administration	مجلة جامعة الملك عبدالعزيز: الاقتصاد والإدارة	1988	2020	https://wwv	Economics, law and Administratio
9	Arabic	Lebanon	Journal of King Abdulaziz University: Marine Sciences	مجلة جامعة الملك عبدالعزيز: علوم البحار	1990	2018	https://wwv	marine geology, marine biology ar
10	Arabic	Lebanon	Tishreen University Journal for Research and Scientific Studies - Biologi	مجلة جامعة تشرين للبحوث والدراسات العلمية _ سلسلة العلوم البيولوجية	2001	2020	http://journ	Biology, enviroment, ecology, bio
11	Arabic	Lebanon	Journal of Marine Sciences and Environmental Techniques	مجلة علوم البحار والتقنيات البيئية	2015	2019	https://wwv	Marine science
12	Arabic	Lebanon	Journal of thi-qar science	مجلة علوم ذي قار	2008	2018	http://www	Science, medicine, pharmacology.
13	Arabic	Lebanon	Journal of Plant Protection	مجلة وقاية النبات العربية	1983	2020	https://ajpp	Plant sciences (especially crops)
14	Dutch	Belgium		Mededelingen van de Faculteit Landbouwwetenschappen Universiteit Gent			https://www.tib.eu/en/search/id/TIBKAT:1307	
15	Dutch	Netherlands		Natuurhistorisch Maandblad				
16	Finish	Finland		Memoranda Societatis pro Fauna et Flora Fennica				
17	French	Africa	African Agronomy	Agronomie Africaine	2000	2019	https://wwv	Agronomy, environment
18	French	Canada	The Canadian Naturalist	Le Naturaliste Canadien	1868	2020	https://wwv	Ecology, biology, conservation
19	French	France	Alauda	Alauda	1929	2020	https://biblio	Ornithology
20	French	France	Rural alternatives	Alternatives rurales	2014	2019	http://alterr	Agronomy, forestry
21	French	France	Annals of the national water and forest school and of the research and	Annales de l'école nationale des eaux et forêts et de	1923	1963	http://docur	Forest science
22	French	France	Sientific annals of Limousin	Annales Scientifiques du Limousin	1985	2019	https://wwv	Ecology
23	French	France	Biotechnology, Agronomy, Society and Environment	Biotechnologie, Agronomie, Société et Environneme	2004	2020	https://doaj	Biotechnology, Agronomy, Society
24	French	France	Tropical Woodlands and Forests	Bois et Forêts des Tropiques	1947	2020	https://revu	Forest science
25	French	France	Bulletin of the French herpetological society	Bulletin de la société herpétologique de France	1976	2020	http://lashf	Herpetology



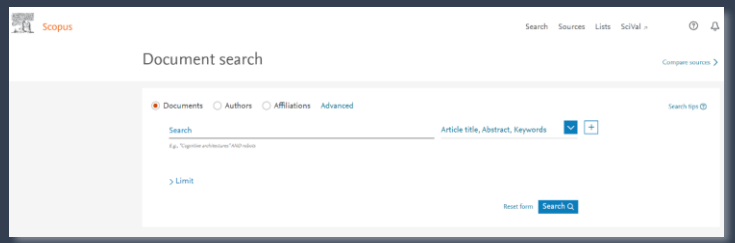
2. Is non-English-language literature diminishing?

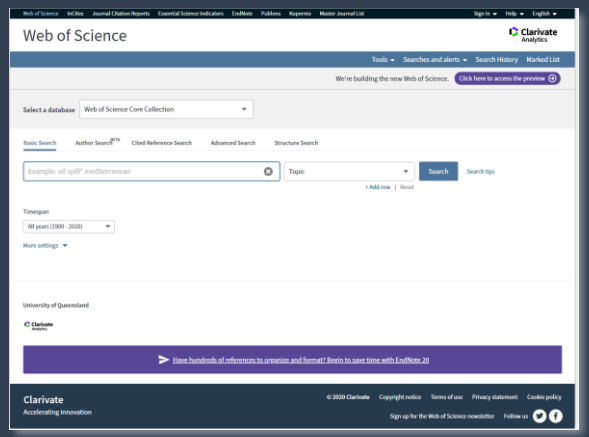


Shawan Chowdhury

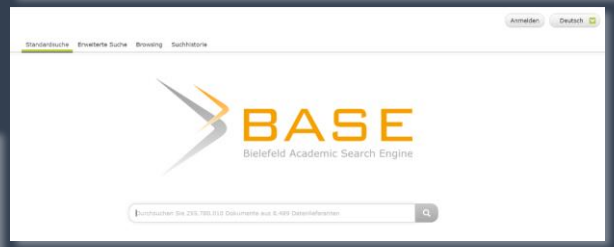
"biodiversity" "conservation"
"biodiversidad" "conservación"
"biodiversidade" "conservação"
"生物多样性" "保护"
"biodiversité" "conservation"
"biodiversità" "conservazione"
"biodiversität" "naturschutz"
"生物多樣性" "保全"
"생물 다양성" "보전"
"biologisk mångfald" "bevarande"
"生物多樣性" "保育"
"bioróżnorodność" "ochrona"
"biyolojik çeşitlilik" "koruma"
"биоразнообразие" "охрана природы"
"تنوع زیستی" "حفاظت"
"biodiversiteit" "natuurbehoud"

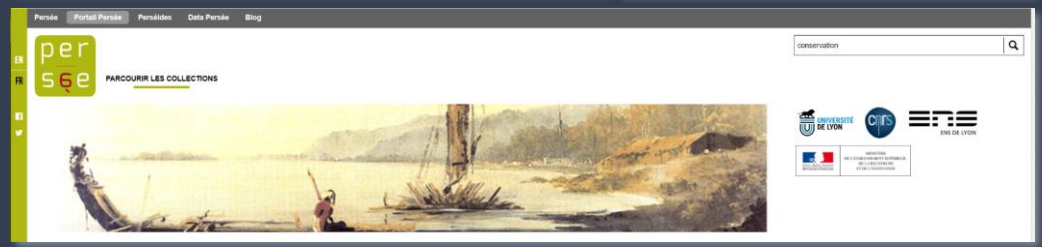
International search engines



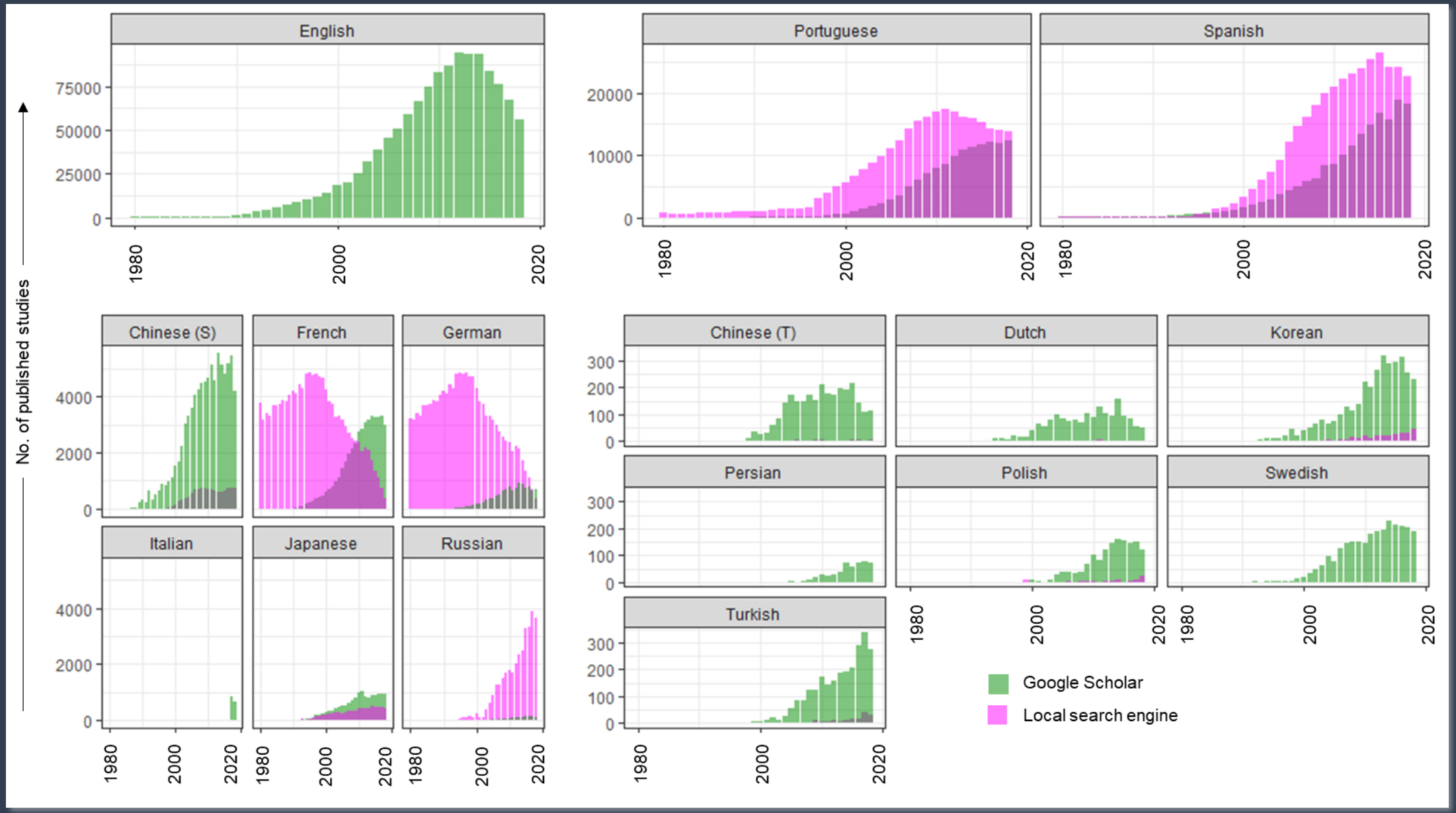


Domestic literature database for 12 languages

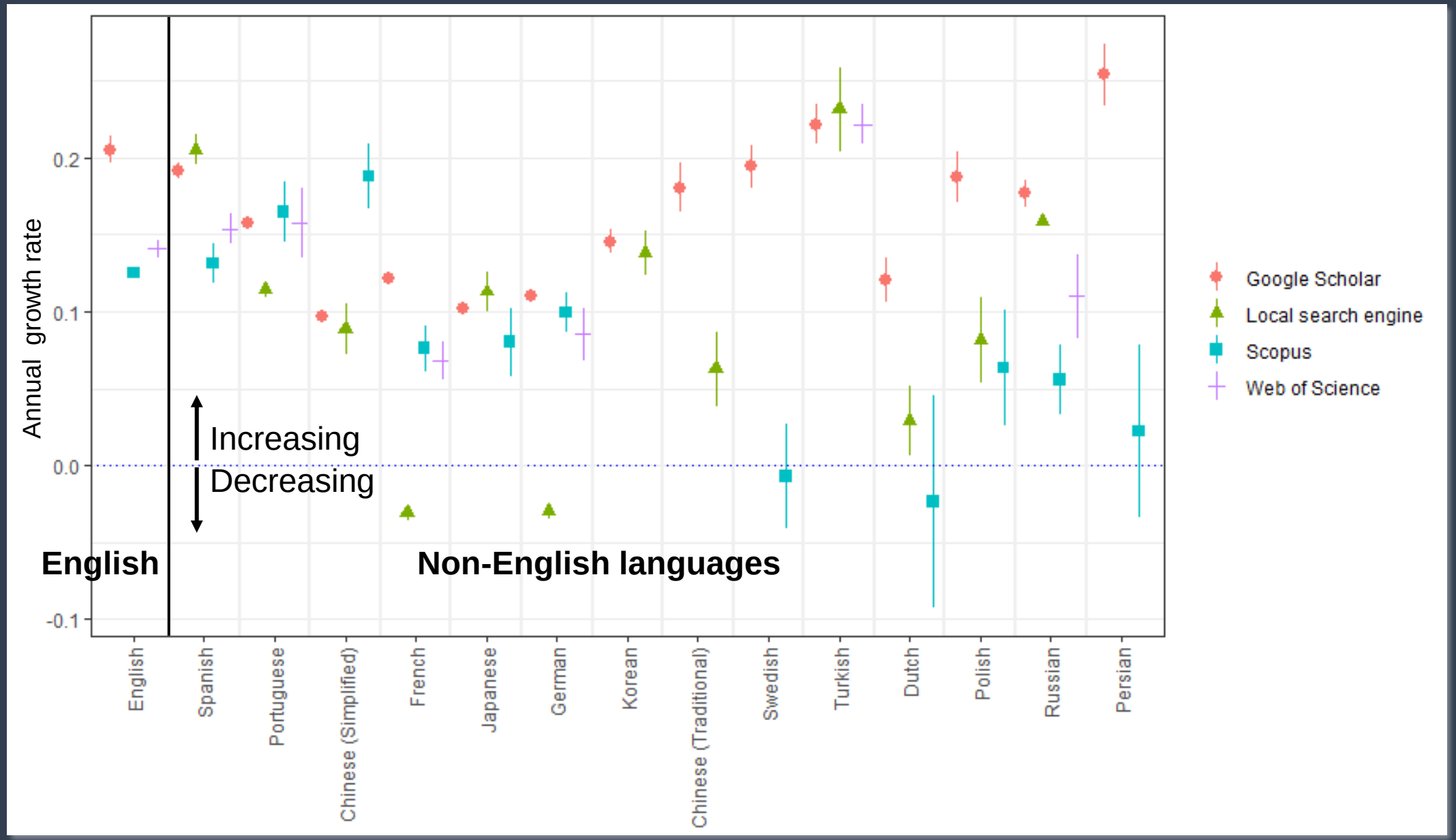




2. Is non-English-language literature diminishing?



2. Is non-English-language literature diminishing?

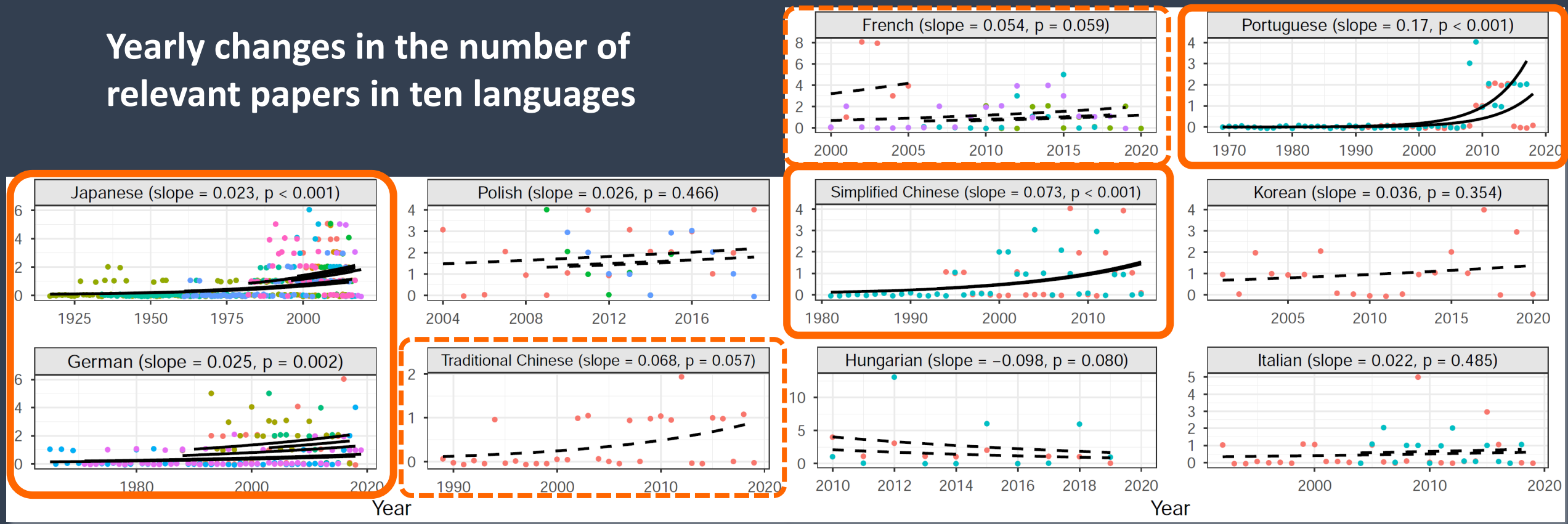


~~2. Is non-English-language literature diminishing?~~

Discipline-wide literature searches for studies that test the effectiveness of conservation interventions

(Sutherland et al 2019 Biol Cons)

Yearly changes in the number of relevant papers in ten languages



3. Does English-language science represent a random subset of non-English-language science?

Language bias in evidence synthesis (in healthcare)

p for main endpoint	German language (n=40)	English language (n=40)
p⩾0·05	26 (65%)	15 (38%)
0·01⩽p<0·05	8 (20%)	14 (38%)
0·01⩽p<0·05	3 (8%)	4 (8%)
p<0·001	3 (8%)	7 (18%)

Table 2: **Distribution of p values among RCT pairs**

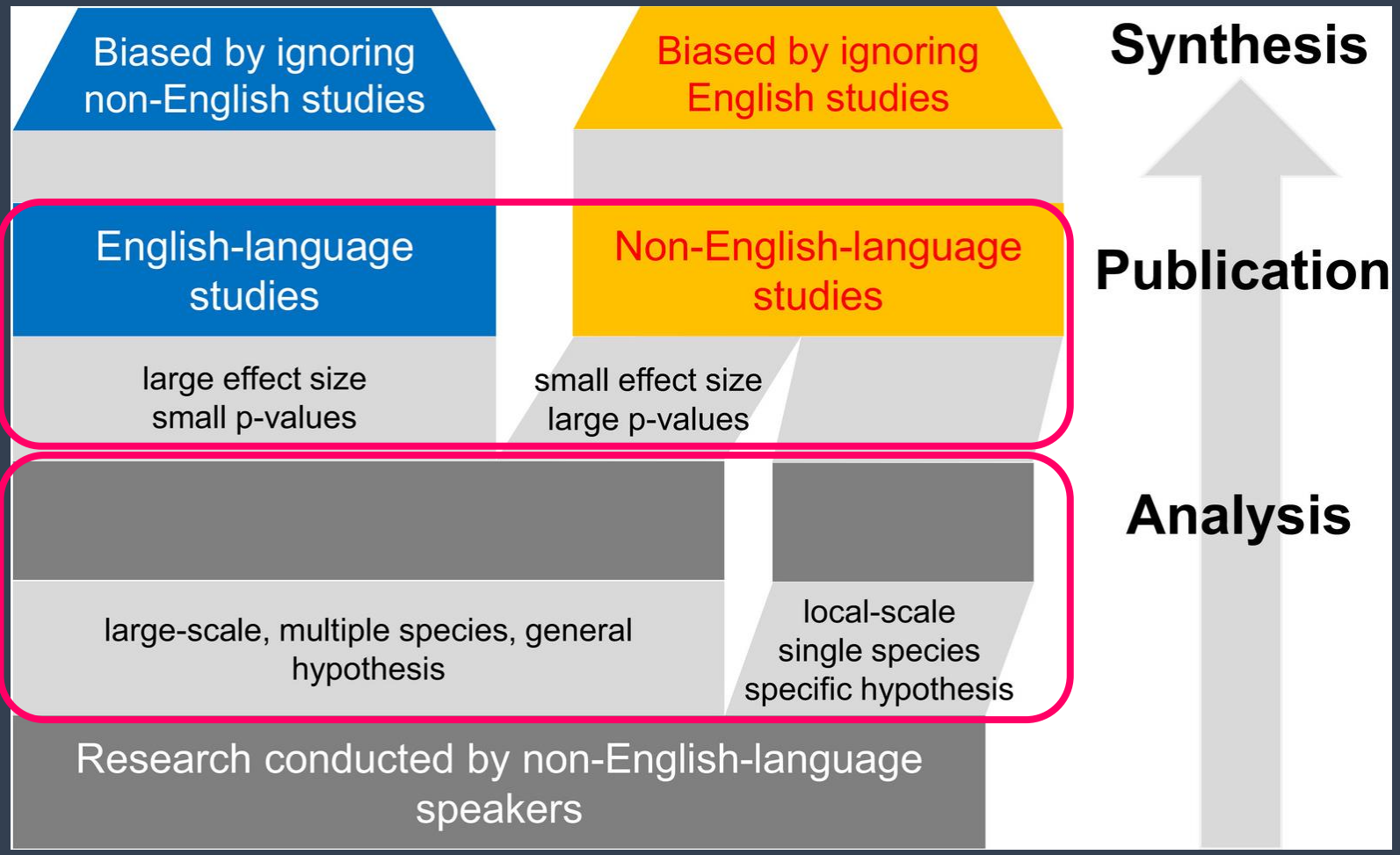
Egger et al (1997) The Lancet

3. Does English-language science represent a random subset of non-English-language science?

Language bias in evidence synthesis (in ecology and conservation)

Language bias in *statistical results*

Language bias in *study characteristics*



Konno et al (2020) Ecology and Evolution

3. Does English-language science represent a random subset of non-English-language science?

Testing the effects of ignoring Japanese-language studies in meta-analyses

We searched existing meta-analyses that included a sufficient number of studies published in **English** and in **Japanese**

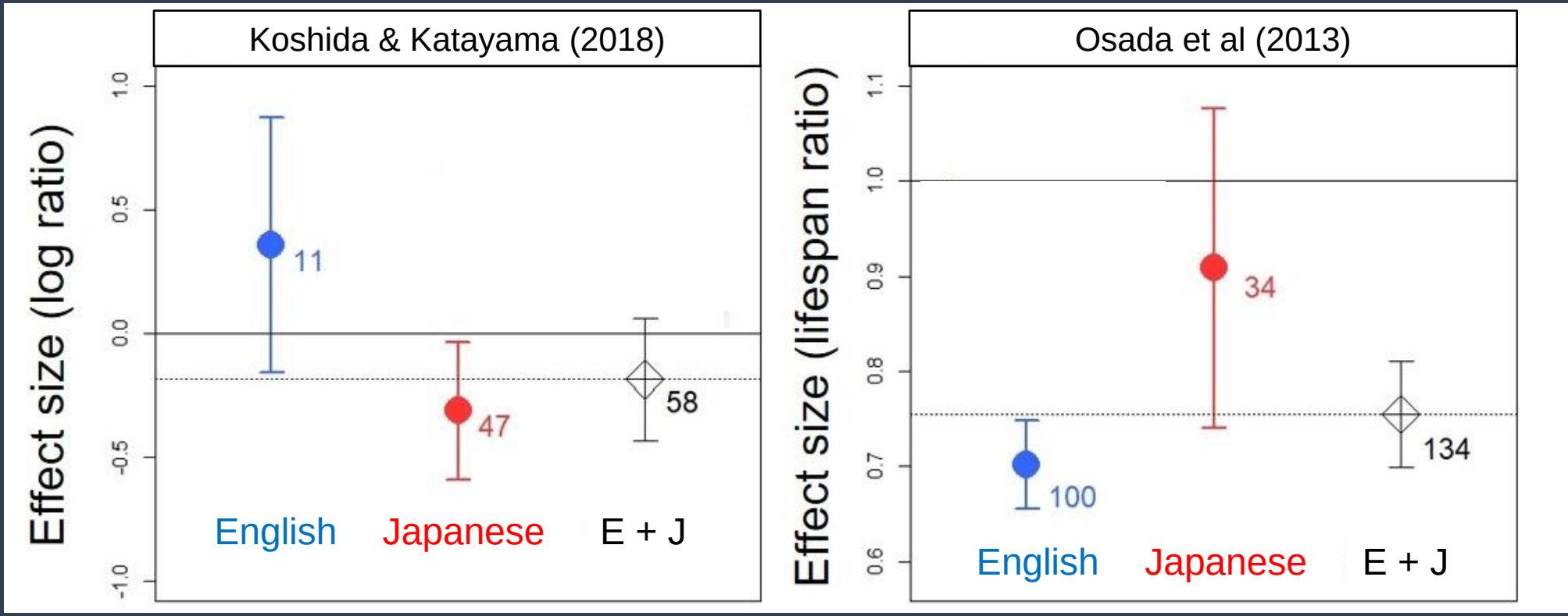
Most meta-analyses **did not search** Japanese-language studies

Four meta-analyses searched and used Japanese-language studies (comprising **25-81%** of the studies analysed)

Konno et al (2020) Ecology and Evolution

3. Does English-language science represent a random subset of non-English-language science?

Effect size differed between languages



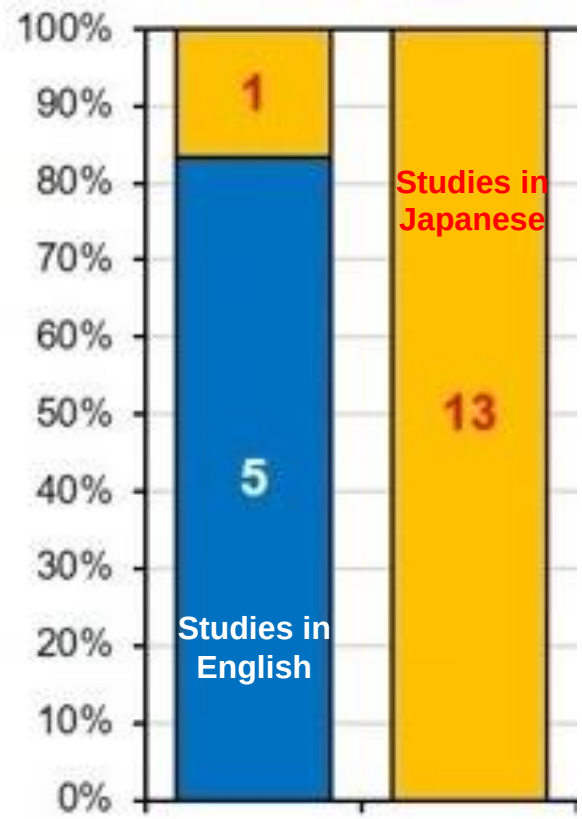
Ignoring Japanese-language studies ➡ more “significant” effect size in two (out of four) meta-analyses

Konno et al (2020) Ecology and Evolution

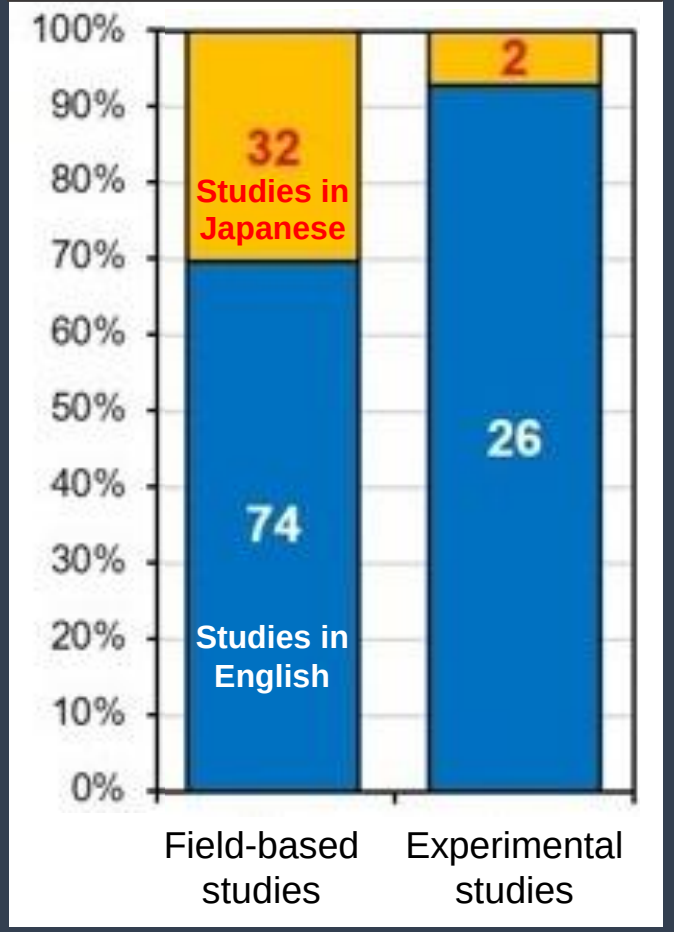
3. Does English-language science represent a random subset of non-English-language science?

Language bias present in study characteristics

Koshida & Katayama (2018)



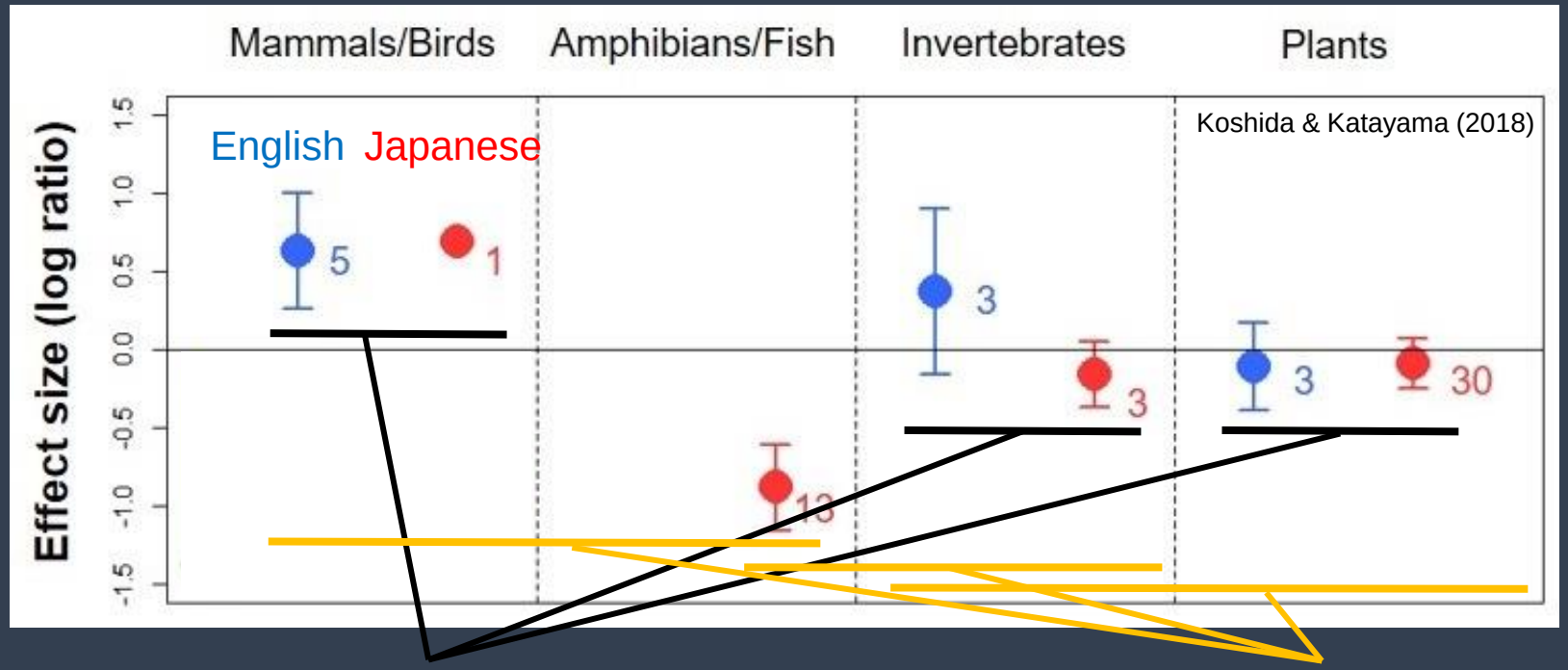
Osada et al (2013)



Konno et al (2020) Ecology and Evolution

3. Does English-language science represent a random subset of non-English-language science?

Language bias in study characteristics explained effect size difference



Effect size did not differ within each taxon

Effect size differed between taxa

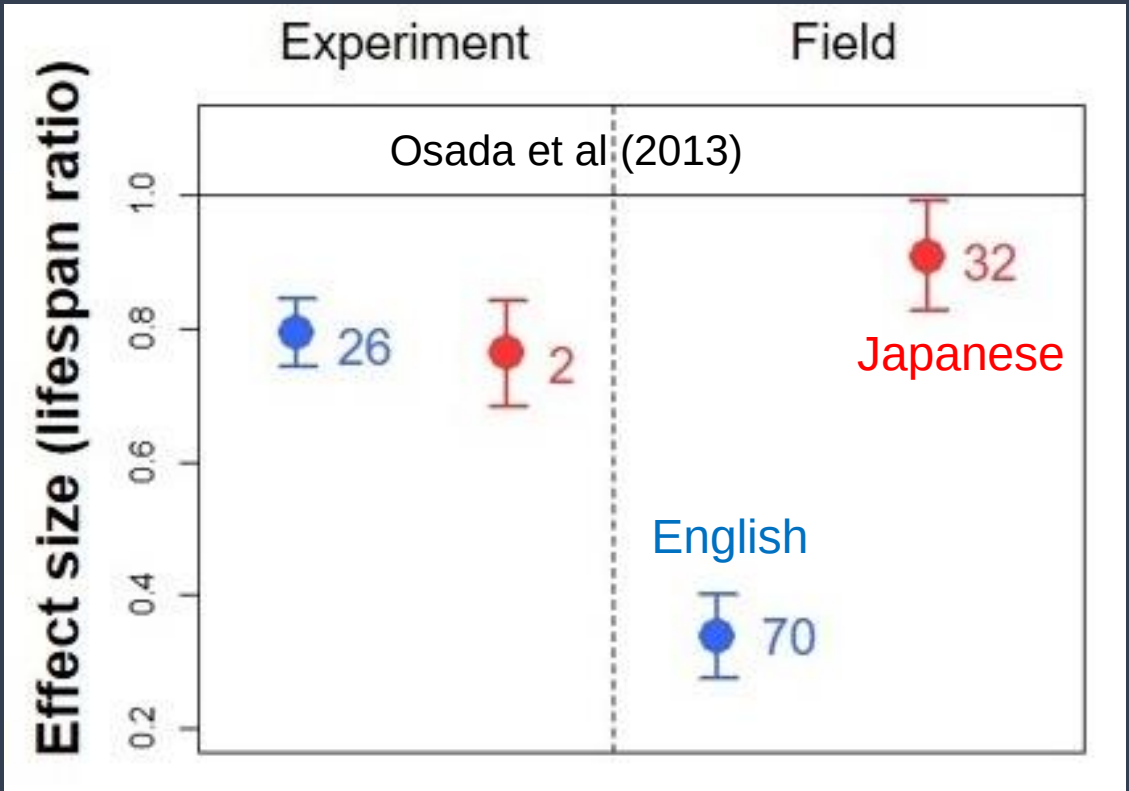
Language bias in study characteristics (eg taxa)
+
Varying responses between taxa

→ Effect size difference between languages

Konno et al (2020) Ecology and Evolution

3. Does English-language science represent a random subset of non-English-language science?

Language bias in statistical results explained effect size difference (?)



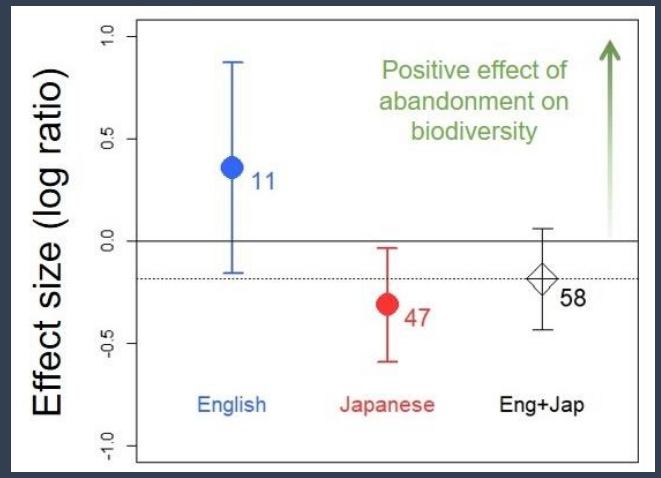
Effect size differed between languages even in field-based studies

Language bias in statistical results (?) → Effect size difference between languages

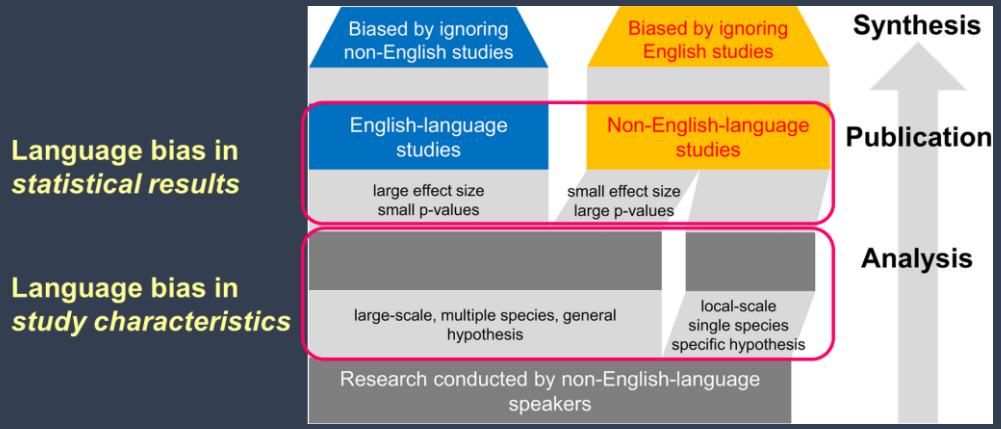
Konno et al (2020) Ecology and Evolution

~~3. Does English-language science represent a random subset of non-English-language science?~~

Ignoring non-English-language literature can change conclusions in meta-analyses drastically



Language bias seems to exist both in study characteristics and in statistical results, which explains the revealed difference in effect size between languages



Konno et al (2020) Ecology and Evolution

3. Does English-language science represent a random subset of non-English-language science?

Discipline-wide searches for studies that test the effectiveness of conservation interventions

(Sutherland et al 2019 Biol Cons)

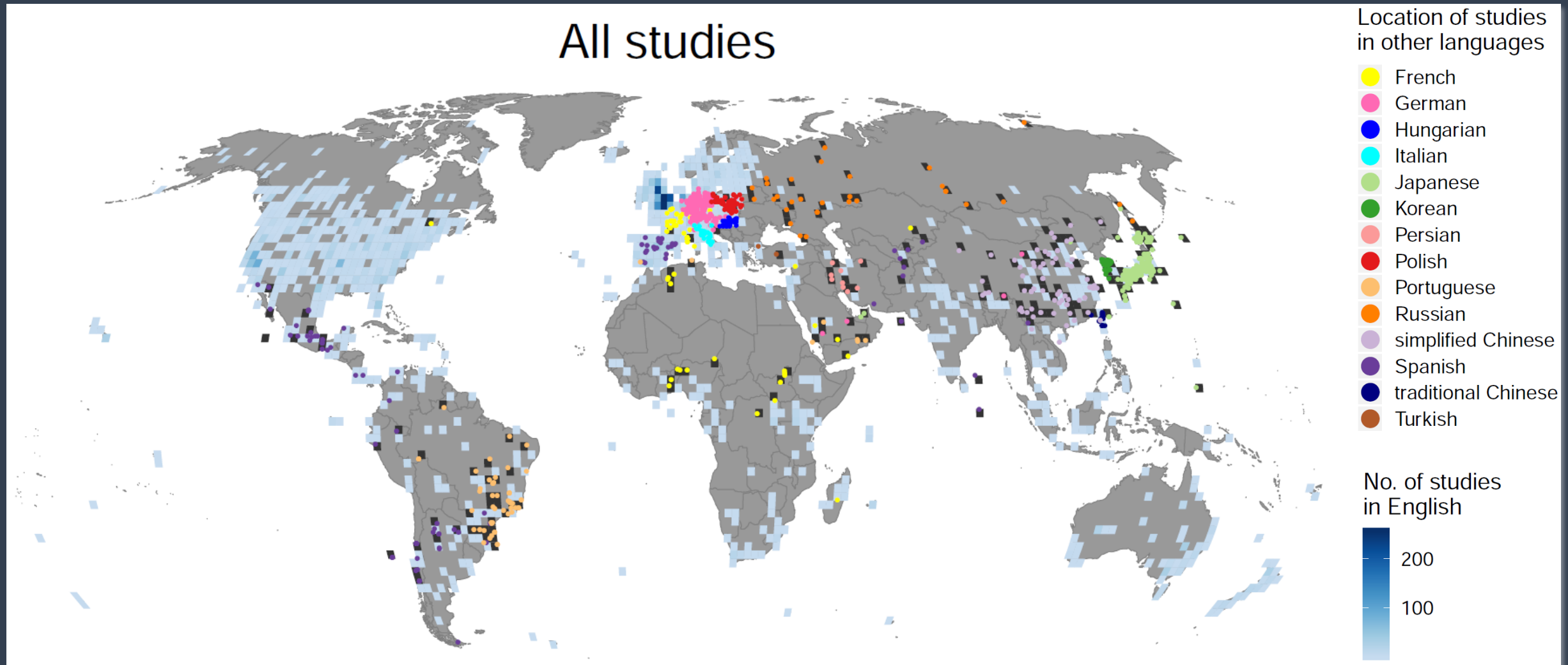
Conservation Evidence
Providing Evidence to Improve Practice

translate
Transcending language barriers to environmental sciences

To date we have:

- Identified a total of 466 peer-reviewed journals in ecology and conservation in 19 languages (available at: https://translatesciences.com/resources/#journals)
- Screened 417,668 papers in 327 journals in 16 languages
- Identified 1,171 non-English-language papers that meet our selection criteria, compared to 6,628 English-language papers

~~3. Does English-language science represent a random subset of non-English-language science?~~



English-language studies cover 2,731 grid cells, while non-English-language studies cover further 196 grid cells (i.e., 7% increase in coverage)

Is non-English-language literature important in science?

translate
Transcending language barriers to environmental sciences

https://translatesciences.com/

Three common assumptions

1. ~~Most scientific knowledge is available in English~~

   Up to 36 % of biodiversity literature is still published in non-English languages

2. ~~Non-English-language literature is diminishing~~

   The amount of biodiversity literature is increasing in most languages,
   at a similar rate to English

3. ~~English-language science represents a random subset of non-English-language science~~

   There is a bias in both study characteristics and statistical results
   between English-language and non-English-language studies