

Visualisation des métadonnées

Formation FRB/CESAB sur les cartes et revues systématiques Mardi 4 octobre, Montpellier

Romain Sordello



L'étape de la visualisation

Lorsque la base de données (carte systématique) est finalisée, énormément de possibilités de représentations existent

Il va falloir:

- ⇒ Faire des choix sur les données les plus pertinentes (vue d'ensemble du corpus, données particulières à mettre en avant)
- ⇒ Faire des choix sur les formes de visualisation les plus adaptées pour représenter les données sélectionnées

CEE Guidelines

https://environmentalevidence.org/information-for-authors/9-data-synthesis-page/

9.2.2 Mapping and data visualization

The process of mapping and presentation of data can take **many forms** and (see James et al 2016 for a detailed discussion of methodologies for the production of Systematic Mathis guidance does not wish to be overly prescriptive in what is a fast moving field ps).

Presentation of maps can range from a simple spreadsheet format to innovative forms of data visualisation that make the evidence base easier to interrogate and extract information of interest to the user. Good examples of data visualisation are McKinnon et al. (2016) and Haddaway et al. (2014).

Recording of **key characteristics of each study** included in a narrative synthesis is vital if the Systematic Map is to be useful in summarising the evidence base. **Key characteristics stated in the Protocol** must be fully presented in at least tabular form.

Below is a minimum list of characteristics that will normally be enhanced through data coding of other variables of interest.

- Subject population
- •Intervention/exposure variable
- Setting/context
- Outcome measures
- •Methodological design

EEJ Guidelines

https://environmentalevidencejournal.biomedcentral.com/submission-guidelines/preparing-your-manuscript/systematic-map

Mapping the quantity of studies relevant to the question

Present here **a figure or a database**, showing how the relevant literature is organised (categories, coding...) according to transparent, replicable criteria. This map should be **readily updatable**.

Mapping the quality of studies relevant to the question

The map should provide some preliminary **estimate of the quality** of the available evidence. This may involve providing a **description of the design** of each study (or of a representative sample of studies).

This section should include an explanation of how the map can be used to find appropriate studies and observations on the **distribution of articles and relative quantity and quality of available evidence** with respect to the broad question and how the question might be broken down to enable full systematic review(s) to be conducted in future.

Describe **knowledge gaps** (unrepresented or underrepresented subtopics that warrant further primary research) and **knowledge clusters** (well-represented subtopics that are amenable to full synthesis via systematic review)

Quelles données représenter?

- Des données incontournables :
 - Données bibliométriques de base : chronologie des publications, localisation des études, types de documents, types de contenus
 - Population
 - Exposition
 - Outcomes
- Des données liés aux design des études (observationnelles/expérimentales, types de protocoles expérimentaux, *in situlex situ*, etc.)
- Des données spécifiques qui mettent en avant des résultats forts

Quelle représentation choisir?

• Une grande liberté laissée par la CEE, à vous d'innover.....

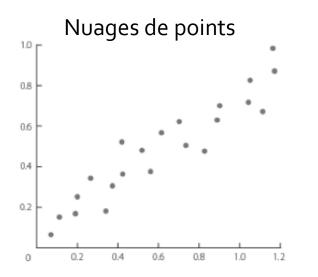
Des graphiques lisibles, propres, « sexy »

Adaptée aux données à représenter

• Une diversité de graphiques sur l'ensemble du manuscrit

Camemberts Zeus Aghrecke Agollen Arès Athèna Hacèles Autres

Mappemondes

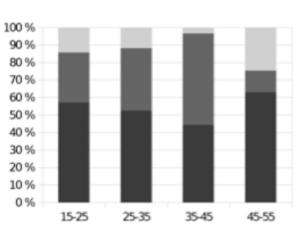


cohort	first_period	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
Apr 28, 2014	79	22%	19%	13%	19%	16%	23%	19%	20%	11%	14%	16%	10%	10%	10%	9%	6%	6%
May 5, 2014	168	23%	21%	21%	24%	24%	29%	24%	18%	22%	14%	14%	12%	13%	10%	10%	7%	
May 12, 2014	188	19%	19%	13%	21%	19%	20%	24%	21%	16%	14%	13%	10%	9%	9%	7%		
May 19, 2014	191	23%	21%	22%	22%	26%	27%	29%	26%	21%	21%	17%	15%	10%	6%			
May 26, 2014	191	21%	16%	20%	24%	27%	23%	20%	19%	15%	15%	12%	12%	6%				
Jun 2, 2014	184	24%	24%	24%	24%	21%	21%	18%	20%	16%	15%	18%	7%					
Jun 9, 2014	182	19%	16%	25%	19%	23%	28%	22%	18%	13%	10%	5%						
Jun 16, 2014	209	24%	20%	24%	22%	23%	17%	18%	15%	13%	7%							
Jun 23, 2014	217	22%	19%	19%	20%	20%	17%	19%	18%	12%								
Jun 30, 2014	221	18%	18%	24%	24%	23%	19%	20%	8%									
Jul 7, 2014	203	24%	23%	18%	16%	24%	22%	16%										

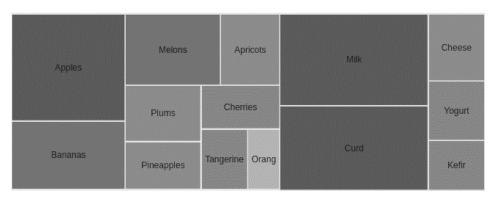
HeatMaps

Jul 14, 2014

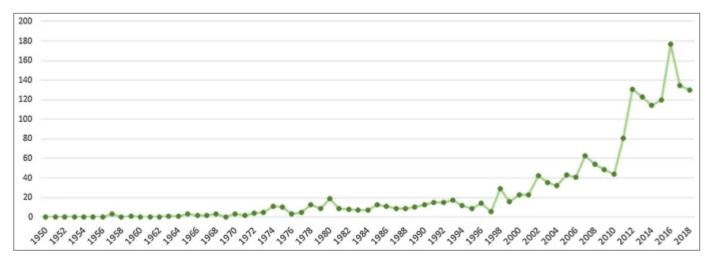
Histogrammes



TreeMaps

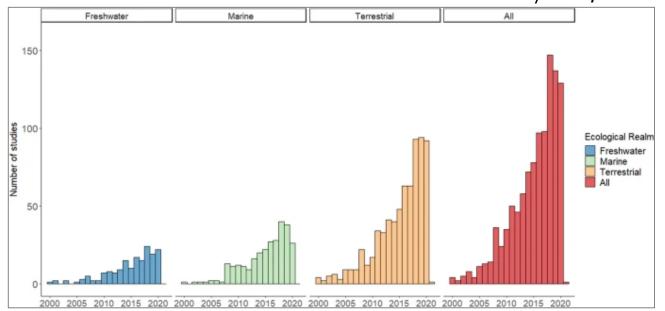


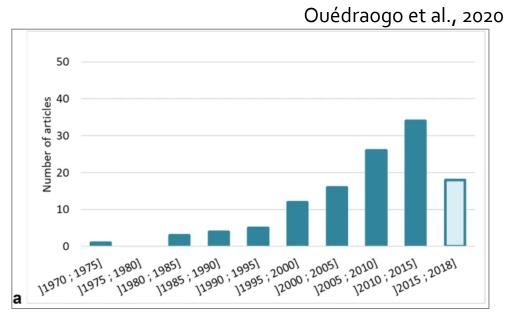
Données bibliométriques de base : distribution chronologique

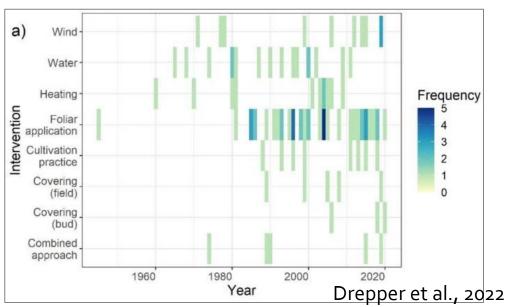


Sordello et al., 2020

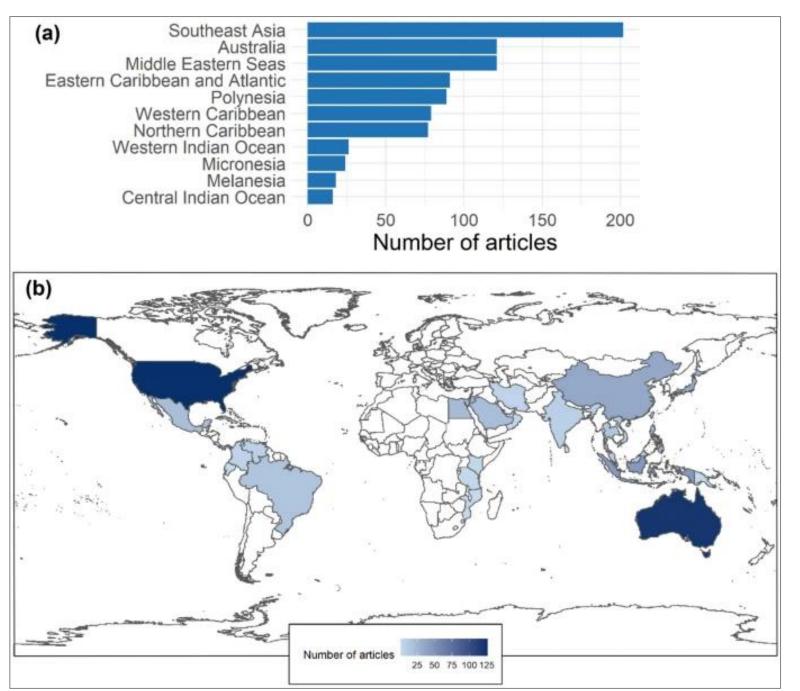




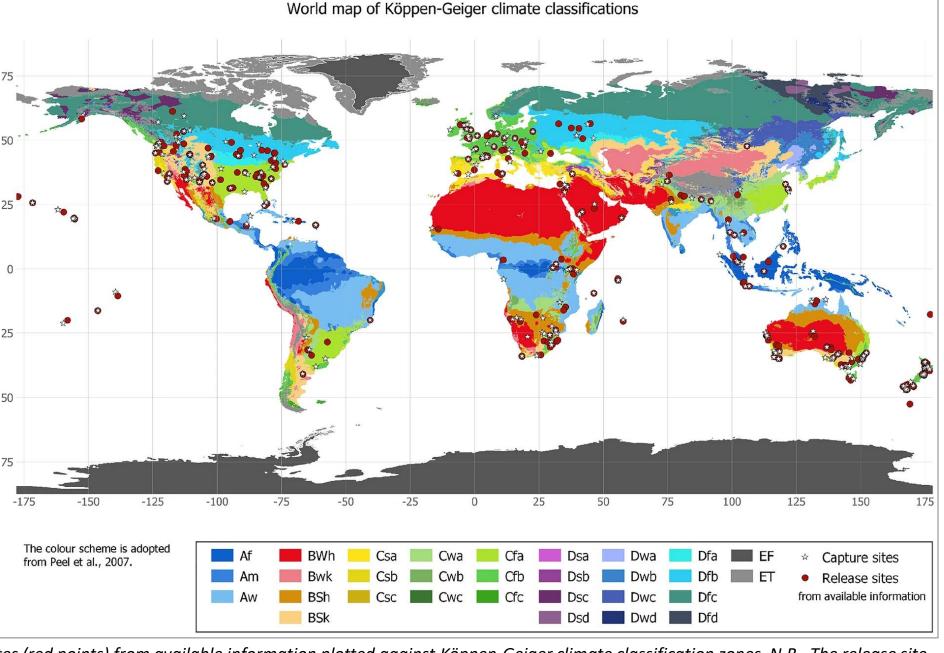




Données bibliométriques de base : distribution spatiale des études



Données bibliométriques de base : distribution spatiale des études



Langridge et al., 2021

Capture sites (white stars) and release sites (red points) from available information plotted against Köppen-Geiger climate classification zones. N.B., The release site coordinates are not a comprehensive illustration because not all publications gave geographic coordinates and/or sufficiently described release locations. Köppen-Geiger climate zones are detailed here in [67, 68]: https://doi.org/10.1127/0941-2948/2006/0130 or https://doi.org/10.1038/sdata.2018.214

Données bibliométriques de base : distribution spatiale des études

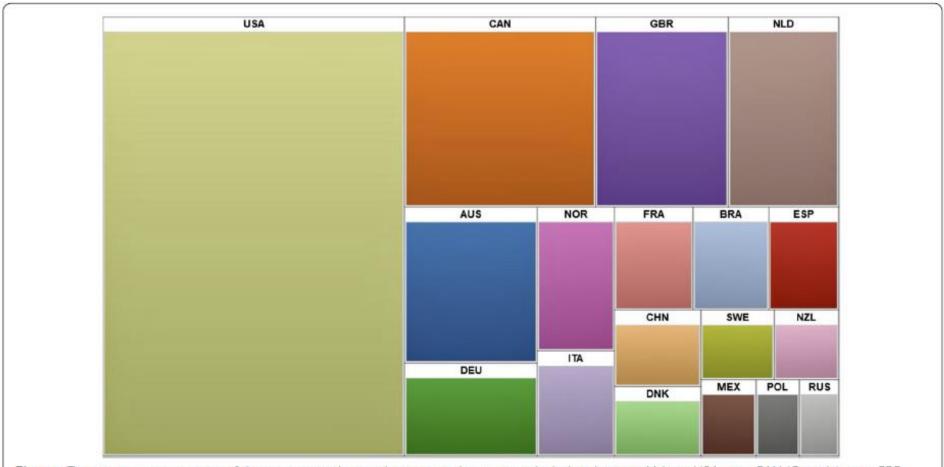
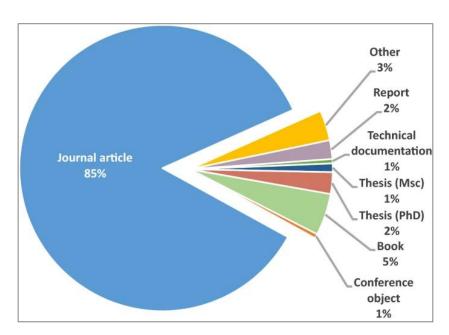
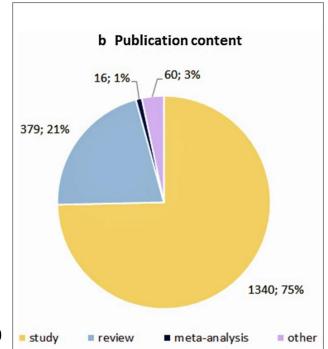


Fig. 12 Tree-map representation of the countries where at least 10 studies were included in the map. Values: USA: 441; CAN (Canada): 121; GBR (Great Britain): 84; NLD (Netherlands): 70; AUS (Australia): 69; DEU (Germany): 41; NOR (Norway): 37; FRA (France): 27; ITA (Italia): 27; BRA (Brazil): 26; ESP (Spain): 24; CHN (China): 22; DNK (Denmark): 20; SWE (Sweden): 17; NZL (New-Zealand): 15; MEX (Mexico): 14; POL (Poland): 11; RUS (Russia): 10

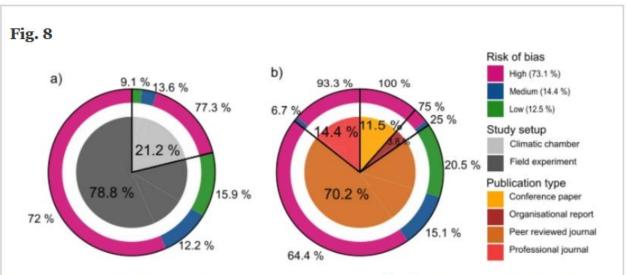
Données bibliométriques de base : types de documents et contenus



Langridge et al., 2021

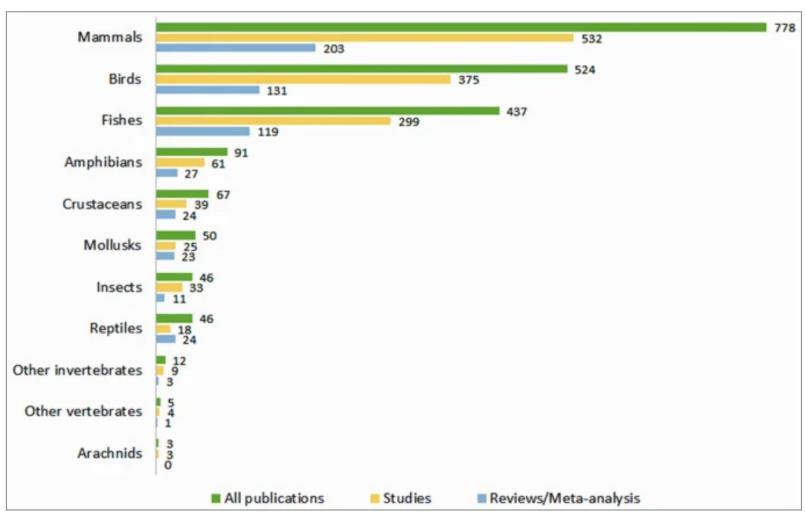


Sordello et al., 2020

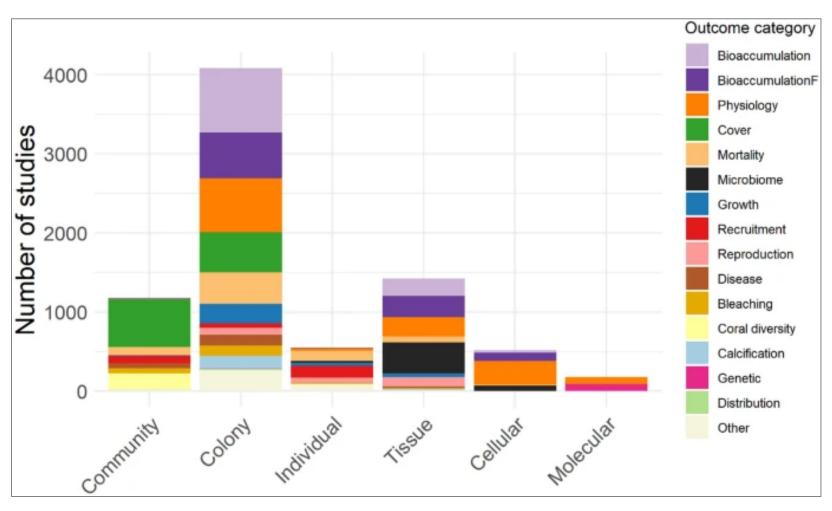


Share of articles judged as having a low, medium or high risk of bias by (a) type of study (controlled or field environments) and (b) type of publication

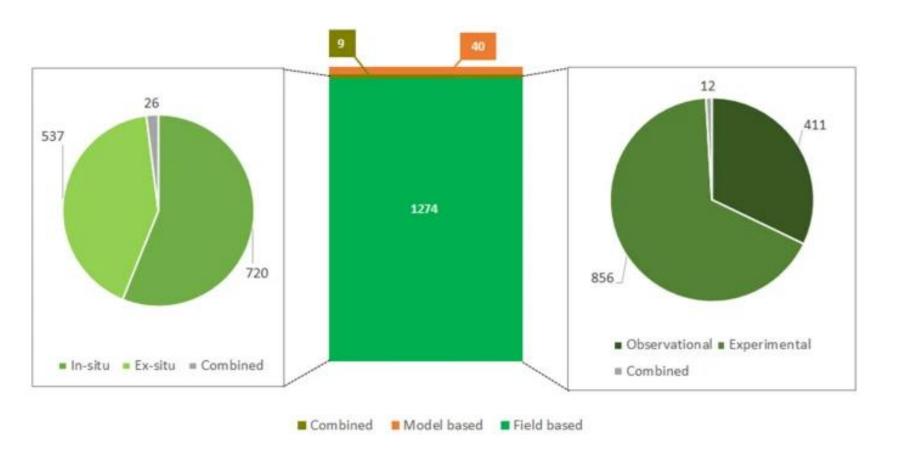
Visualisation de la population



Visualisation des outcomes



Données plus ciblées sur les études de la carte



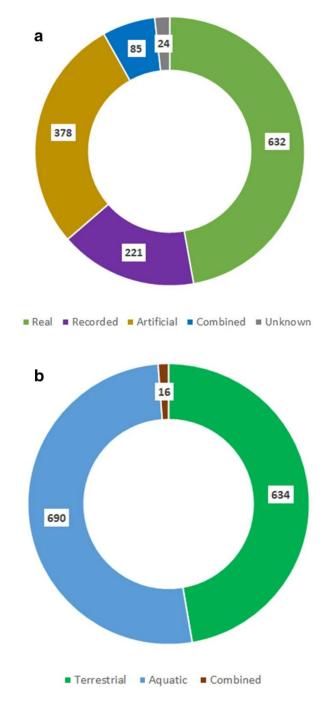
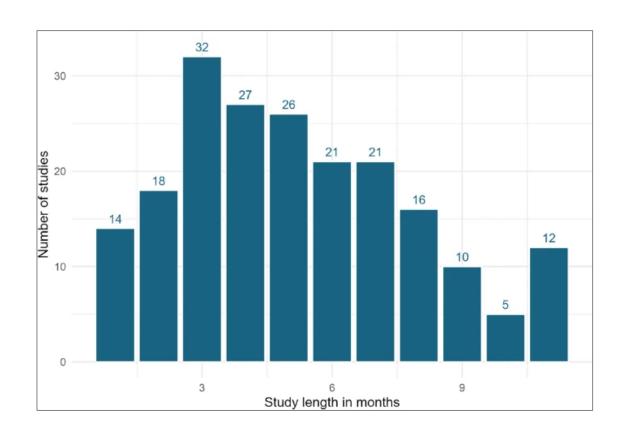
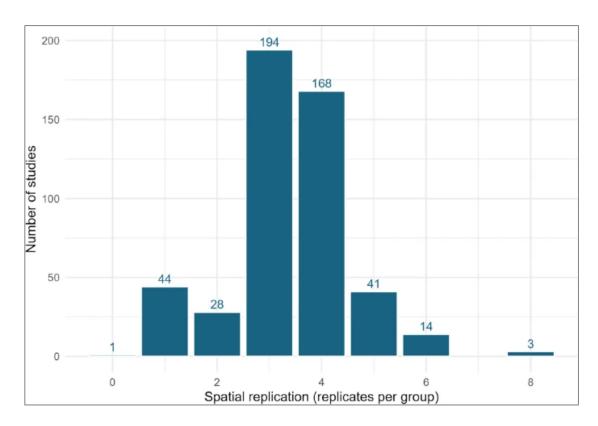


Table 4 Total number of studies, experimental studies, and observational studies for the 20 most studied taxa and the group "reef-building corals" (Coral)

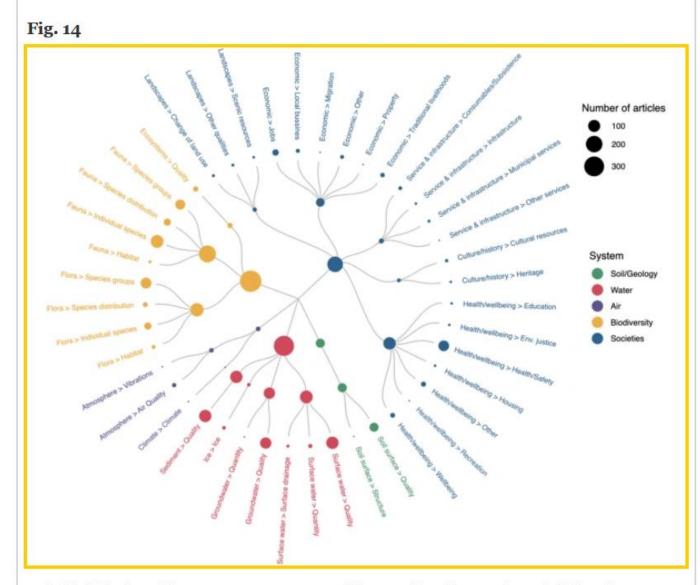
From: Evidence on the impacts of chemicals arising from human activity on tropical reef-building corals; a systematic map

Taxa	Total		Experimental		Observational	
Pocillopora damicornis	719	(9.1%)	546	(14.2%)	173	(4.2%)
Stylophora pistillata	603	(7.6%)	537	(14%)	66	(1.6%)
Coral	555	(7%)	33	(0.9%)	522	(12.8%)
Porites	255	(3.2%)	18	(0.5%)	237	(5.8%)
Scleractinia	218	(2.7%)	20	(0.5%)	198	(4.8%)
Acropora tenuis	207	(2.6%)	148	(3.8%)	59	(1.4%)
Acropora muricata	199	(2.5%)	154	(4%)	45	(1.1%)
Porites astreoides	197	(2.5%)	109	(2.8%)	88	(2.2%)
Porites lutea	190	(2.4%)	32	(0.8%)	158	(3.9%)
Acropora	184	(2.3%)	58	(1.5%)	126	(3.1%)
Orbicella annularis	169	(2.1%)	101	(2.6%)	68	(1.7%)
Acropora cervicornis	152	(1.9%)	146	(3.8%)	6	(0.1%)
Acropora millepora	149	(1.9%)	140	(3.6%)	9	(0.2%)
Siderastrea siderea	125	(1.6%)	64	(1.7%)	61	(1.5%)
Pocillopora verrucosa	122	(1.5%)	59	(1.5%)	63	(1.5%)
Porites porites	110	(1.4%)	89	(2.3%)	21	(0.5%)
Porites lobata	105	(1.3%)	34	(0.9%)	71	(1.7%)
Turbinaria reniformis	101	(1.3%)	100	(2.6%)	1	(0%)
Acropora valida	100	(1.3%)	34	(0.9%)	66	(1.6%)
Orbicella faveolata	99	(1.2%)	49	(1.3%)	50	(1.2%)





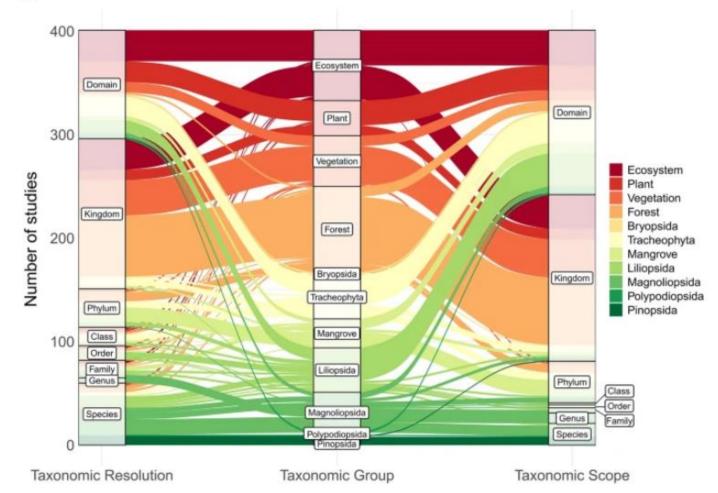
Représentations plus complexes



Radial bubble plot of the systems, components and factors affected across the included studies. Systems are depicted by the bubble colour. Bubble size indicates the number of articles. An interactive version is available at the project website; https://3mkproject.github.io/research.html

Représentations plus complexes

Fig. 8



The difference in taxonomic resolution and taxonomic scope of retrieved threat mapping literature among plant taxonomic groups. Taxonomic resolution is the lowest taxonomic level that was mapped as an independent population unit, thus indicative of how taxonomically detailed the threat mapping application was. Whereas, taxonomic scope is the lowest taxonomic level that includes all species for which threats were mapped within the article. The width of the flows represents the number of articles

Représenter les synthèses existantes

Table 8 Comparing other evidence syntheses to our current map. N.B

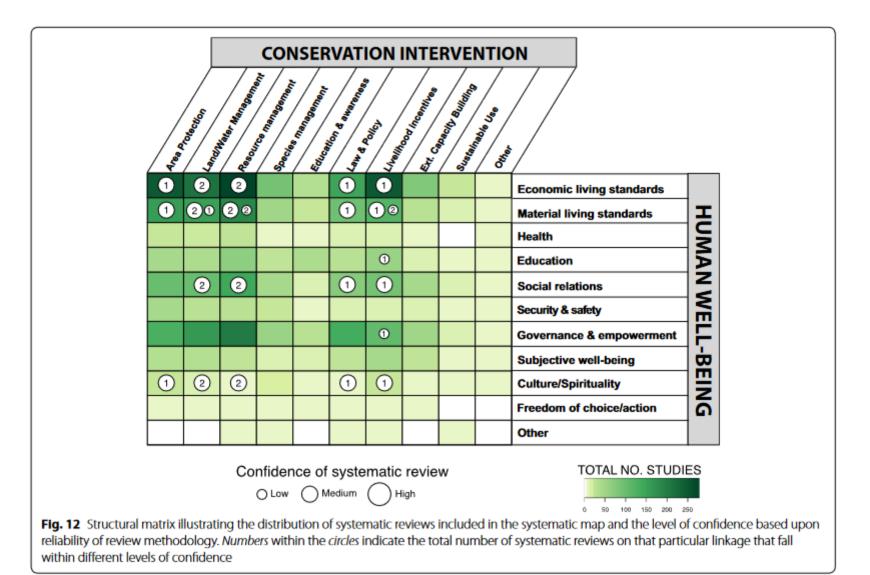
From: Existing evidence on the outcomes of wildlife translocations in protected areas: a systematic map

Citation	Scope of review	Nature of synthesis	Search databases	No. of other literature sources	Publication data range of included articles	No. of included publications
Our map (translocation synthesis)	P: all biodiversity worldwide I: reintroductions, introductions, Supplementations C: protected areas	Systematic map	2 databases: WOS, SCOPUS	12 (+2 grey literature calls)	1969 to 2020	498
Fischer J, Lindenmayer DB. An assessment of the published results of animal relocations. <i>Biological Conservation</i> . 2000; 96: 1–11	P: animals worldwide I: reintroductions, supplementations, introductions	Map-like	0 databases	A search for articles across 12 major journals only	1979 to 1998	124
Hale SL, Koprowski JL. Ecosystem-level effects of keystone species reintroduction: a literature review. <i>Restoration Ecology</i> . 2018; 26: 439–45	P: key-stone species I: reintroductions only	Map-like	1 database: WOS	0	1995 to 2016	69
Tetzlaff SJ, Sperry JH, DeGregorio BA. Effects of antipredator training, environmental enrichment, and soft release on wildlife translocations: a review and meta-analysis. <i>Biol Cons.</i> 2019; 236: 324–31	P: all biodiversity ^a I: translocations ^a C: antipredator training, soft release, or environmental Enrichment	Meta- analysis	0 databases (Search in google scholar only)	0	1981 to 2018	41
Resende, P., Viana-Junior, A., Young, R., Azevedo, C., 2020. A global review of animal translocation programs. <i>Anim. Biodivers</i> . Conserv. 221–232. https://doi.org/10.32800/abc.2020.43.0221	P: animals I: introduction, reintroduction, translocations ^a	Map-like	2 databases: WOS, SCOPUS	1	1986 to 2017	145

P population, I interventions, C context

^aMethods unclear and exclusion criteria difficult to ascertain. The first line in italics corresponds to this map

Représenter les synthèses existantes



Identifier les knowledge gaps et les knowledge clusters

La carte a pour objectif d'identifier :

• les **manques** de connaissances en vue de prioriser de futures études primaires (appels à projet par exemple)

• les **amas** de connaissances en vue de prochaines revues systématiques

Identification des knowledge gaps et les knowledge clusters

- Plusieurs façons de faire :
- se baser sur les volumes P, E, O
- utiliser un découpage fonctionnel (types de design, etc.)

- ...

• Cela peut aller (c'est même recommandé) jusqu'à identifier clairement des questions traitables en revues

Croisements 2 à 2 Population-Exposition-Outcome

Sordello et al., 2020

	Abstract	Industrial	Transportation	Military	Urban	Recreation	Other
Mammals	181	145	145	73	12	27	11
Fishes	86	104	97	14	2	11	5
Birds	74	60	142	25	109	20	3
Amphibians	23	4	31	0	5	2	0
Insects	19	2	10	0	2	2	1
Crustaceans	9	18	8	1	0	0	2
Mollusks	9	9	6	1	0	0	0
Other invertebrates	2	3	5	0	0	0	0
Reptiles	1	7	7	3	0	1	0
Other vertebrates	1	1	2	0	0	2	0
Arachnids	1	1	1	0	1	0	0

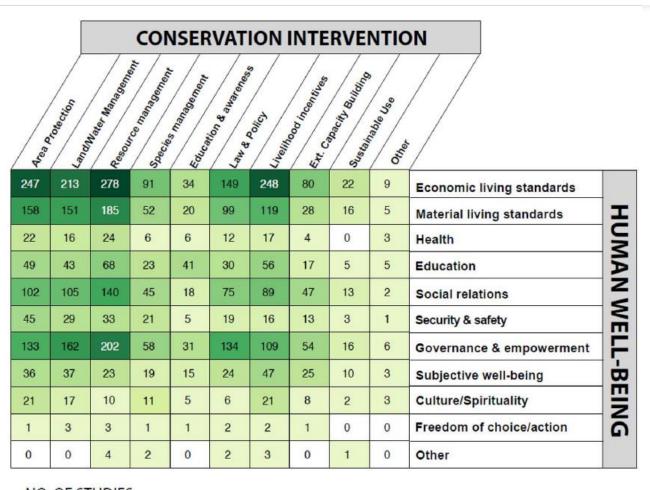
Langridge et al., 2021

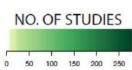
Taxonomic kingdom X Programme motivation	Intervention ty	rpe					
	Intro+suppl	Introduction	Reintro+suppl	Reintroduction	Supplementation	Unknown	Total
Animalia	6	6	176	158	158	182	686
Conservation (improving status of focal species)	6	4	158	123	110	88	489
Experimental or trial translocations		1	4	12	13	16	46
Human-wildlife conflict				5	11	17	33
Rewilding (restoring natural functions)			3	3		2	8
Unknown		1	9	11	9	33	63
Wildlife rescue operation			2	4	15	26	47
Fungi				4	3		7
Wildlife rescue operation				4	3		7
Plantae		4	10	11	41	82	148
Conservation (improving status of focal species)		3	10	9	39	72	133
Experimental or trial translocations		1		2	2	5	10
Unknown						1	1
Wildlife rescue operation						4	4
Total	6	10	186	173	202	264	841

Croisements 2 à 2 Population-Exposition-Outcome

Cook et al., 2017

Stanton, et al., 2022





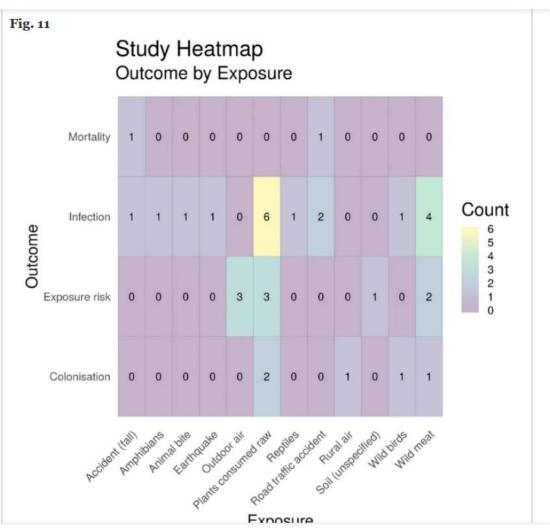
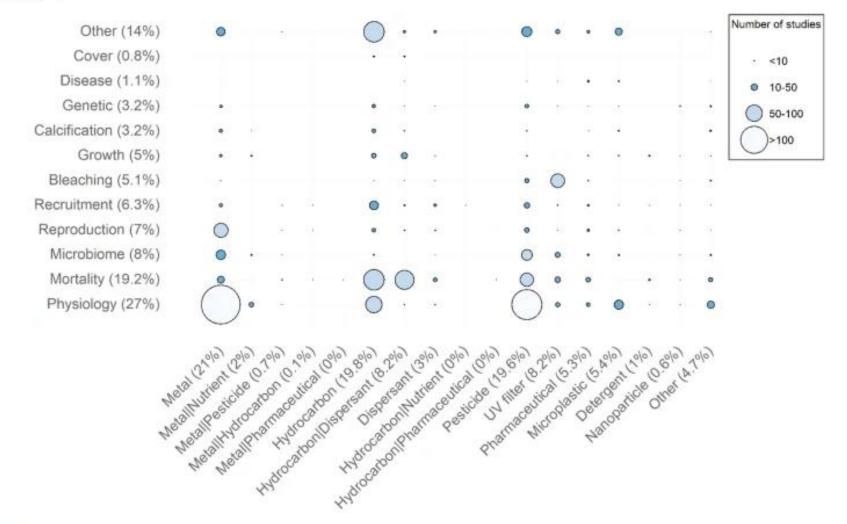
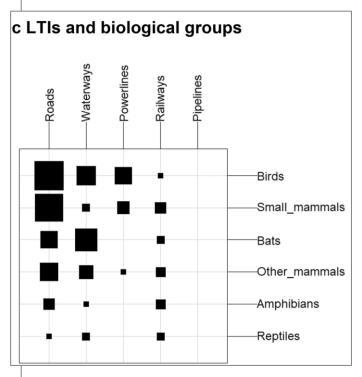


Fig. 8



Heatmap showing the distribution and frequency of experimental studies into exposure and outcomes categories. The size of the circles is function of the number of studies, and the proportion of studies in each exposure and outcome categories is indicated in parenthesis



Ouédraogo et al., 2020

Identification des knowledge clusters

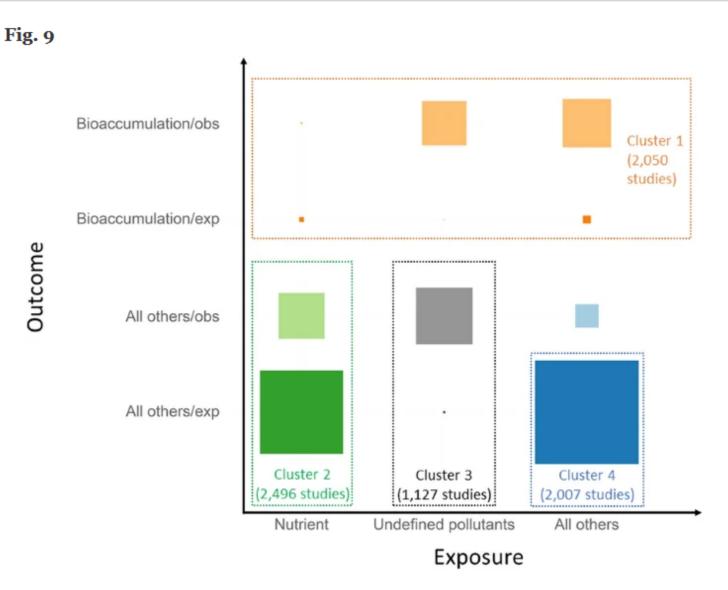
Exemple : sélection des 4 clusters les plus élevés de chacun de 3 croisements P-E-O

 \Rightarrow 12 clusters en tout

From: Evidence of the impact of noise pollution on biodiversity: a systematic map

Cluster	Number of studies	Combinations		
		Р	E	0
Behavioural impacts of noise on mammals	355	x		х
Impacts of transportation noise on behaviour	216		x	х
Impacts of abstract noises on biophysiology	208		x	х
Impacts of abstract noise on behaviour	202		х	х
Impacts of industrial noises on behaviour	187		x	х
Impacts of abstract noise on mammals	181	х	х	
Biophysiological impacts of noise on mammals	181	х		х
Behavioural impacts of noise on fishes	159	x		х
Biophysiological impacts of noise on fishes	149	х		х
Impacts of industrial noise on mammals	145	x	x	
Impacts of transportation noise on mammals	145	x	x	
Impacts of transportation noise on birds	142	х	x	

Identification des knowledge clusters



Summary of the four well-represented subtopics that may be amenable to relevant full syntheses via systematic reviews (square size is function of the number of studies, "exp" and "obs" stand for experimental and observational studies, respectively). Studies reporting exposure to nutrient in combination with other chemical categories were both counted in clusters 2 and 4

Quelques outils/logiciels

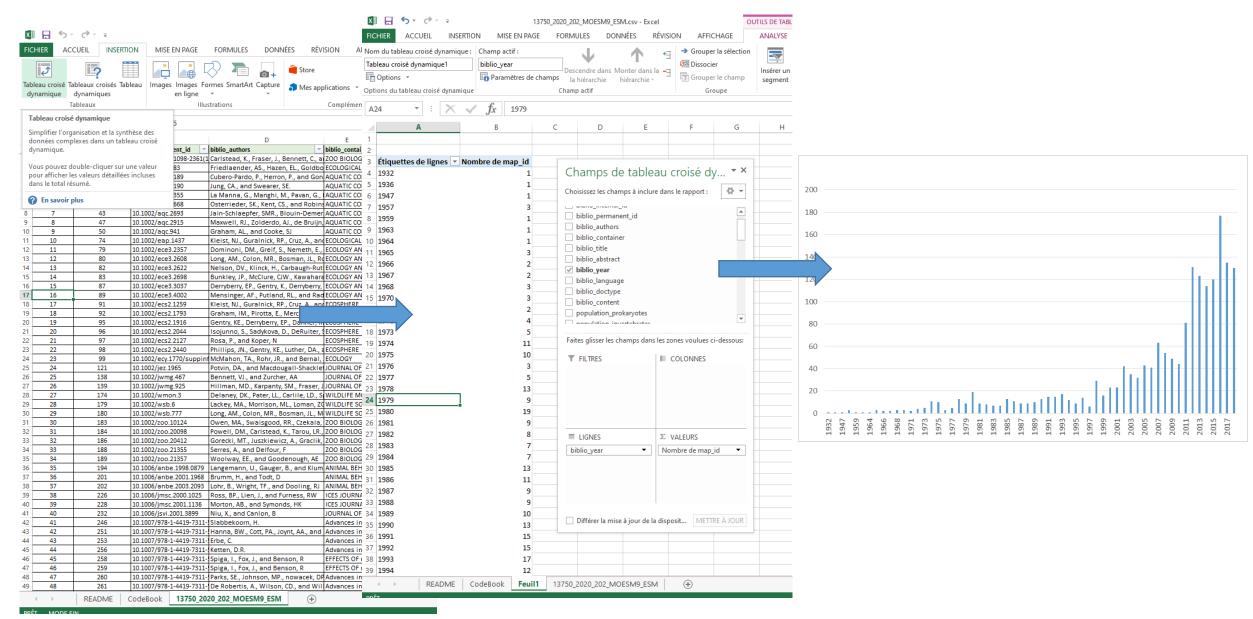
• Excel : graphiques simples (camemberts, bâtons, points) et heat maps (mise en forme conditionnelle)

• EviAtlas : mappemonde, graphiques simples, heat maps

r : possibilités très larges (ex: package tree maps)

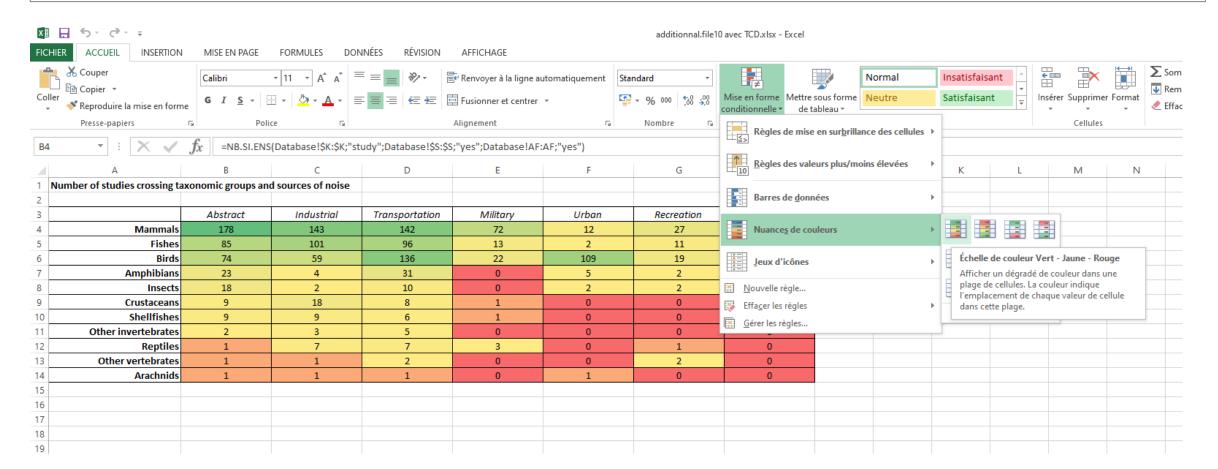
Nombreux outils en ligne gratuits ou payants (tree maps notamment)

Excel: Tableaux croisés dynamiques



Excel: Heatmaps

- 1/ Utiliser la Fonction NB.SI.ENS
- ⇒ Permet de compter le nombre de cellules répondant à plusieurs conditions (ex: telle Population et telle Exposition) Exemple : =NB.SI.ENS(Database!\$K:\$K;"study";Database!\$S:\$S;"yes";Database!AF:AF;"yes")
- 2/ Utiliser la mise en forme conditionnelle « nuances de couleurs » pour colorier automatiquement la heatmap



Haddaway et al. Environ Evid (2019) 8:23 https://doi.org/10.1186/s13750-019-0167-1

Environmental Evidence

METHODOLOGY

Open Access

EviAtlas: a tool for visualising evidence synthesis databases



Neal R. Haddaway^{1,2*}, Andrew Feierman¹, Matthew J. Grainger^{3,4}, Charles T. Gray⁵, Ezgi Tanriver-Ayder⁶, Sanita Dhaubanjar⁷ and Martin J. Westgate⁸

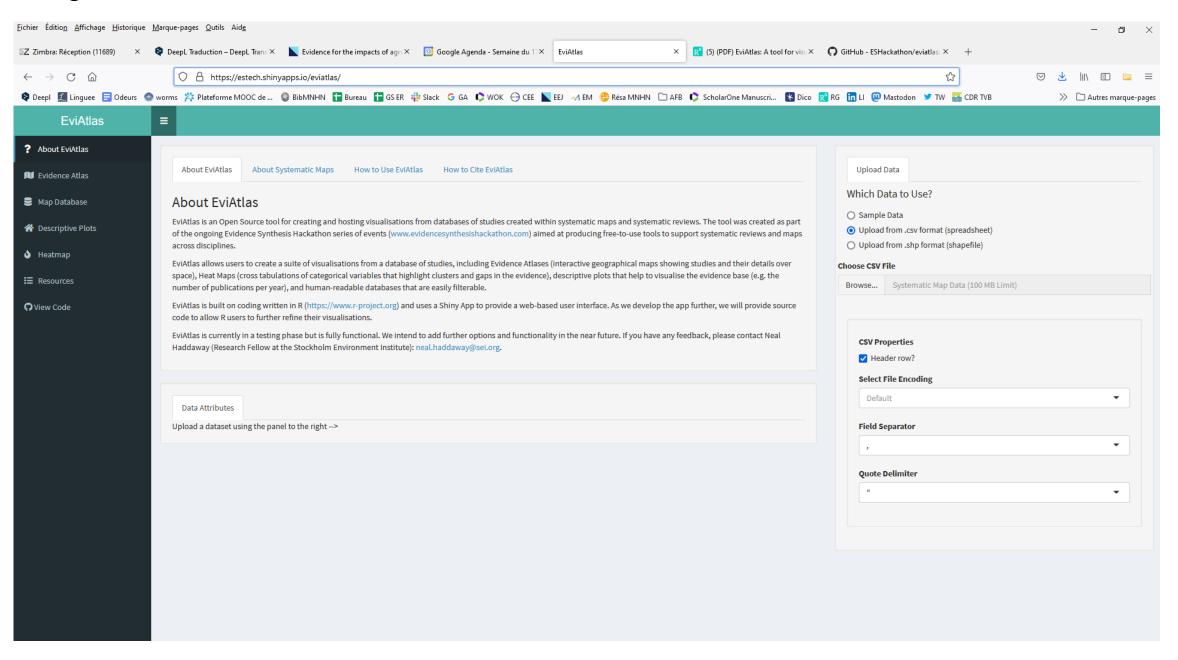
Abstract

Systematic mapping assesses the nature of an evidence base, answering how much evidence exists on a particular topic. Perhaps the most useful outputs of a systematic map are an interactive database of studies and their meta-data, along with visualisations of this database. Despite the rapid increase in systematic mapping as an evidence synthesis method, there is currently a lack of Open Source software for producing interactive visualisations of systematic map databases. In April 2018, as attendees at and coordinators of the first ever Evidence Synthesis Hackathon in Stockholm, we decided to address this issue by developing an R-based tool called *EviAtlas*, an Open Access (i.e. free to use) and Open Source (i.e. software code is freely accessible and reproducible) tool for producing interactive, attractive tables and figures that summarise the evidence base. Here, we present our tool which includes the ability to generate vital visualisations for systematic maps and reviews as follows: a complete data table; a spatially explicit geographical information system (Evidence Atlas); Heat Maps that cross-tabulate two or more variables and display the number of studies belonging to multiple categories; and standard descriptive plots showing the nature of the evidence base, for example the number of studies published per year or number of studies per country. We believe that *EviAtlas* will provide a stimulus for the development of other exciting tools to facilitate evidence synthesis.

Keywords: Evidence synthesis technology, Software, Tools, Systematic mapping, Data viz



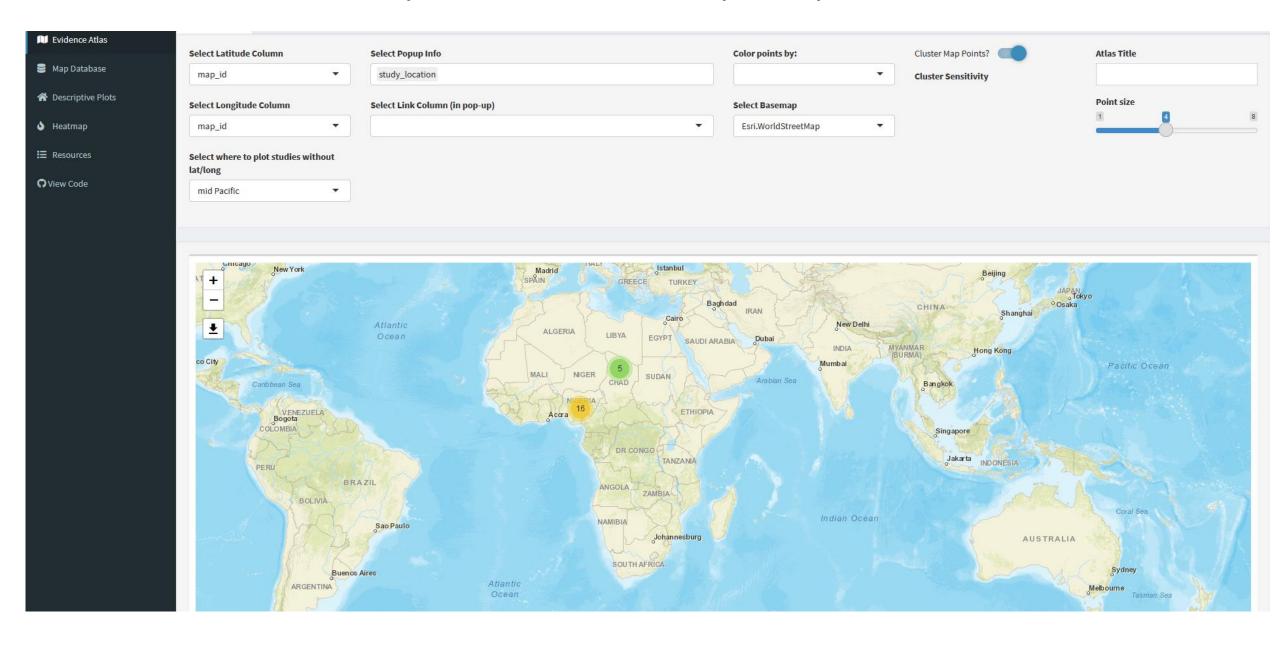
Charger la base de données



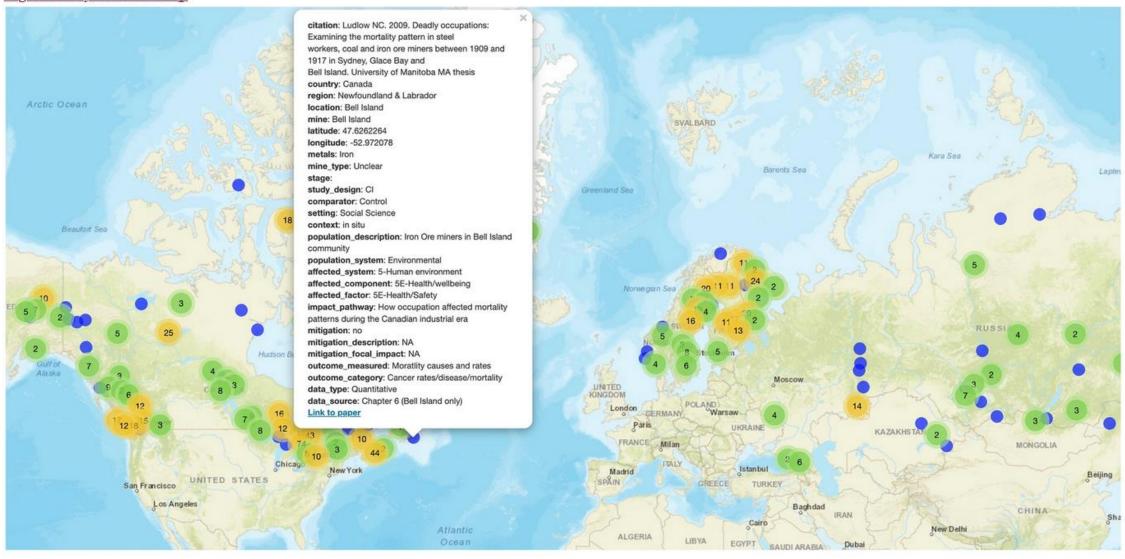
Visualiser la base de données en ligne

EviAtlas	=													
? About EviAtlas	Show 10 v entries											Search:		
№ Evidence Atlas	m	ap_id��	biblio_internal_id	biblio_permanent_id	biblio_authors 🖟	biblio_container.	biblio_title_	biblio_abstract []	biblio_yea	ar 📫 biblio_language	† biblio_doctype []	biblio_content.	population_prokaryotes.	population_inverte
😂 Map Database		A	All	All	All	All	All	All	All	All	All	All	All	All
♠ Descriptive Plots ♦ Heatmap	1	1		6 10.1002/(SICI)1098-2361(1999)1	Carlstead, K., Fraser, J., Ben	ZOO BIOLOGY	Black rhinoceros (Diceros bico	The captive population of blac	i	1999 en	journal article	study	no	no
: ≣ Resources	2	2		9 10.1002/15-0783	Friedlaender, AS., Hazen, EL.,	ECOLOGICAL APPLICATIONS	Prey- mediated behavioral respo	Behavioral response studies pr	2	2016 en	journal article	study	no	no
	3	3		34 10.1002/aqc.1189	Cubero-Pardo, P., Herron, P.,	AQUATIC CONSERVATION- MARINE AN	Shark reactions to scuba diver	1. Worldwide, there are concer	:	2011 en	journal article	study	no	no
	4	4		35 10.1002/aqc.1190	Jung, CA., and Swearer, SE.	AQUATIC CONSERVATION- MARINE AN	Reactions of temperate reef fi	1. Anthropogenic sound as a st	2	2011 en	journal article	study	no	no
	5	5		37 10.1002/aqc.2355	La Manna, G., Manghi, M., Pava	AQUATIC CONSERVATION- MARINE AN	Behavioural strategy of common	Owing to the increase of boat	2	2013 en	journal article	study	no	no
	6	6		42 10.1002/aqc.2668	Osterrieder, SK., Kent, CS., and Robinson, RW	AQUATIC CONSERVATION- MARINE AN	Responses of Australian sea li	1. Tourist- based activities,	2	2017 en	journal article	study	no	no
	7	7		43 10.1002/aqc.2693	Jain-Schlaepfer, SMR., Blouin	AQUATIC CONSERVATION- MARINE AN	Do boating and basking mix? Th	1. Basking is the primary mech	:	2017 en	journal article	study	no	no
	8	8		47 10.1002/aqc.2915	Maxwell, RJ., Zolderdo, AJ., d	AQUATIC CONSERVATION- MARINE AN	Does motor noise from recreati	1. Recreational boating activi	1	2018 en	journal article	study	no	no
	9	9		50 10.1002/aqc.941	Graham, AL., and Cooke, SJ	AQUATIC CONSERVATION- MARINE AN	The effects of noise disturban	1. Recreational boating contin	2	2008 en	journal article	study	no	no
	10	10		74 10.1002/eap.1437	Kleist, NJ.,	ECOLOGICAL ARRIVICATIONS	Sound	Birds breeding in	2	2017 en	journal article	study	no	no

Atlas des études => Nécessité de disposer des coordonnées lat/lont pour chaque étude

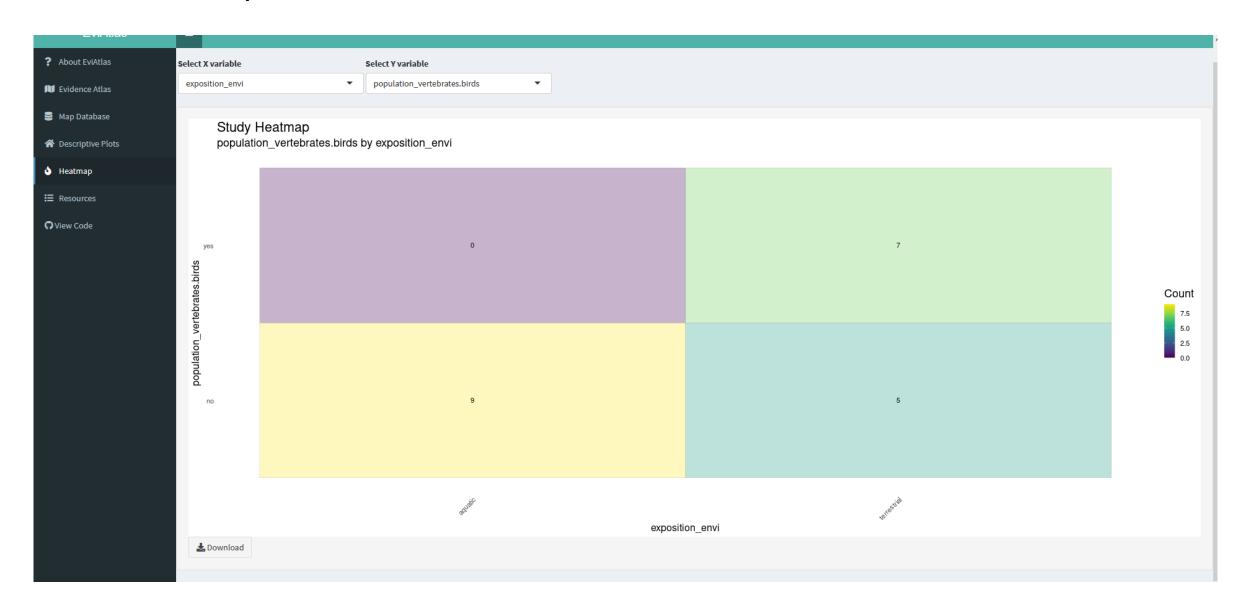


From: Evidence of the impacts of metal mining and the effectiveness of mining mitigation measures on social—ecological systems in Arctic and boreal regions: a systematic map



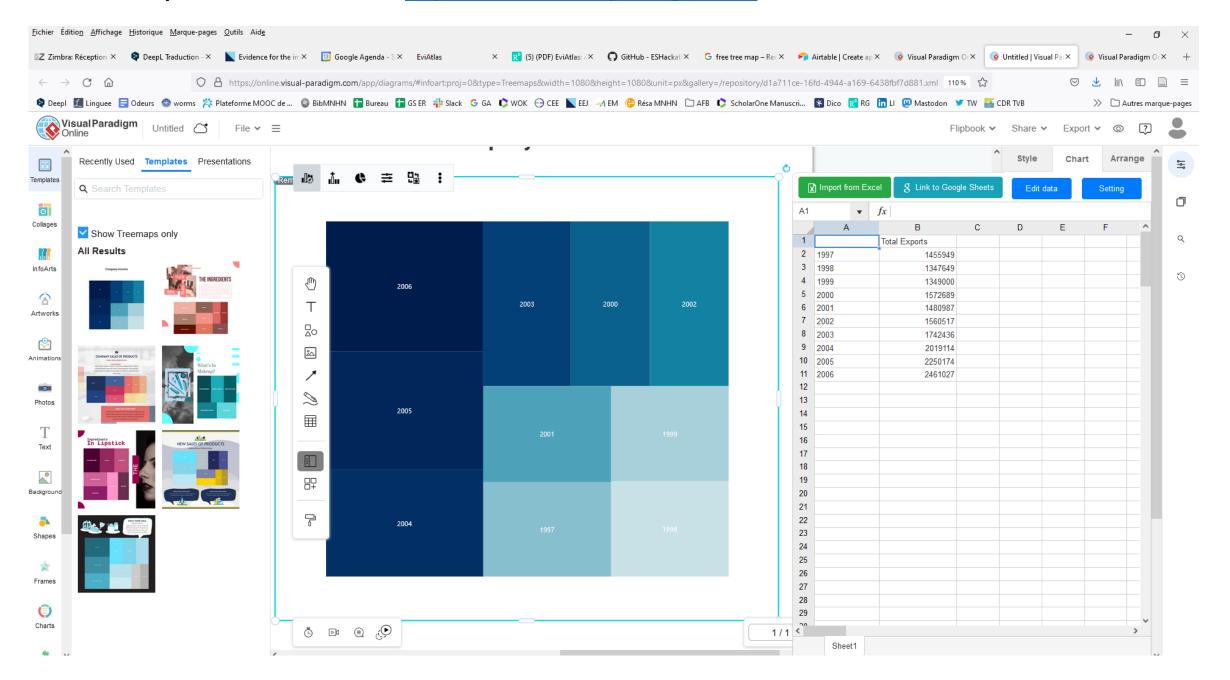
Screenshot of the interactive evidence atlas showing the location of all study systems in the 585 included studies across 902 total outcome measures. The popup contains descriptive meta-data and a link to the paper on Google Scholar. The interactive evidence atlas is available here: https://gmkproject.github.io /research.html

Edition de heatmaps



Free tree maps online

https://online.visual-paradigm.com/



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