Environmental Management (2024) 73:457–469
https://doi.org/10.1007/s00267-023-01901-1

Patterns and Pitfalls of Short-cuts Used in Environmental Management Rapid Reviews

Meagan Harper[1,2] · Trina Rytwinski[1,2] · Steven J. Cooke[1,2]

Received: 3 August 2023 / Accepted: 15 October 2023 / Published online: 3 November 2023

Abstract

Environmental managers and policy-makers need reliable evidence to make effective decisions. Systematic reviews are one way to provide this information but are time-consuming and may not meet the needs of decision-makers when faced with rapidly changing management requirements or transient policy-windows. Rapid reviews are one type of knowledge synthesis that follow simplified or truncated methods compared to systematic reviews. Rapid reviews on environmentally-relevant topics are growing in prevalence, but it is unclear if rapid reviews use similar short-cuts or follow available guidelines. In this methodological review, we assess 26 rapid reviews published between 2002 and 2023. Numerous rapid review short-cuts and approaches were identified, with few consistencies among studies. Short-cuts were present in all stages of the review process, with some of the most common short-cuts including not developing an a priori review protocol, not including stakeholder involvement, or not conducting critical appraisal of study validity. Poor quality in reporting of methods was observed. Fewer than half of assessed rapid reviews reported using available guidelines when developing their methods. Future rapid reviews should aim for improved reporting and adherence to published guidelines to help increase the useability and evidence-user confidence. This will also enable readers to understand where short-cuts were made and their potential consequences for the conclusions of the review.

Keywords Evidence synthesis · Accelerated review · Decision-making · Policy-making

Introduction

Environmental decision-making requires reliable evidence to improve the identification of effective management and policy interventions, and to avoid environmental and biodiversity consequences of either failing to react, or making inappropriate management decisions (Pullin et al. 2020). Systematic reviews are considered a gold standard in evidence synthesis, with reproducible and transparent methodologies that lead to low risk of bias and improved confidence in the results (Haddaway et al. 2015; Cook et al. 2017). Although environmental decision makers (including practitioners, managers and policy makers) may preferentially select systematic reviews to inform decision making (Thomas-Walters et al. 2021), they often need evidence on shorter time scales. These may include emergency decision making to avoid proliferation of invasive species, damage to sensitive habitats from emerging contaminants, or disease outbreak. Similarly, policy windows can emerge unexpectedly and often require rapid action (Rose et al. 2020).

When emergency situations or policy windows require decisions to be made in days, weeks or months, rather than years, systematic reviews (which can take over a year to complete; Haddaway and Westgate 2019) fall short of decision-makers' needs. Decision-makers may, therefore, turn to less robust forms of evidence, such as the results of a single study or the opinion of a single expert which may be prone to individual biases and incomplete knowledge (Sutherland et al. 2004). This may lead to more biased, less well-informed, snap judgements which should be avoided in the interests of improved outcomes (e.g., Retief et al. 2023). An emerging form of evidence synthesis that can provide robust evidence is rapid reviews. These reviews use components of the systematic review process, but with simplifications or steps left out (i.e., short-cuts) to decrease the time required to complete the review (Khangura et al.

✉ Meagan Harper
meaganharper@cmail.carleton.ca

[1] Department of Biology, Carleton University, Ottawa, ON, Canada

[2] Canadian Centre for Evidence-Based Conservation, Institute of Environmental and Interdisciplinary Science, Carleton University, Ottawa, ON, Canada

2012). Depending on the methods used, rapid reviews can produce robust, timely evidence for decision makers (Webb et al. 2017), but may be subject to potential increase in bias due to truncated review steps.

Rapid reviews are common in medicine and there is already an understanding of what short-cuts are frequently taken (Tricco et al. 2015). How these short-cuts can influence the outcomes of reviews, however, remains uncertain. In some instances, short-cuts have little influence on the overall effect relative to systematic reviews (Hamel et al. 2020a), while in other instances the inclusion of short-cuts in rapid reviews have been found to result in increased risk of bias and effects of different magnitudes and directions (Marshall et al. 2019). Even with this uncertainty, rapid reviews are increasingly being used in other sectors such as the built environment (Lagisz et al. 2022), as well as in social sciences (Downey et al. 2022). Rapid reviews are expected to increasingly be used to support environmental decision-making and policy development, especially in the face of the rapid global change apparent in the Anthropocene (Folke et al. 2021).

It is unclear what short-cuts and methods have been commonly used in rapid reviews on environmental topics to this point. Formalized guidelines for the conduct of systematic reviews have been available since the early 1990s for topics in medicine (Chalmers et al. 2002), and since 2006 for environmental and conservation topics (Pullin and Stewart 2006), but guidelines for rapid reviews are relatively new. For this methodological review (*sensu* Munn et al. 2018; Sutton et al. 2019), we use the definition of rapid review recommended by Hamel et al (2020b) and adopted by the Cochrane Collaboration (Garrity et al. 2021): "A rapid review is a form of knowledge synthesis that accelerates the process of conducting a traditional systematic review through streamlining or omitting various methods to produce evidence for stakeholders in a resource-efficient manner." This definition is also consistent with that used by the Collaboration for Environmental Evidence where rapid reviews are "[…] evidence syntheses that would ideally be conducted as a Systematic Reviews, but where methodology needs to be accelerated and potentially compromised to meet the demand for evidence on timescales that preclude Systematic Review conducted to full CEE or equivalent standards" (CEE 2022). The objective of this methodological review was to determine what methodological short-cuts, in relation to methods used in systematic reviews following published guidelines, are commonly used in rapid reviews on topics relevant to environmental management. Published rapid reviews were also compared to rapid review guidelines currently available in medicine (e.g., Garritty et al. 2021) and environmental management (e.g., CEE 2022) to showcase variation among currently available rapid reviews and potential areas for improvement. This methodological review will aid future work considering the consequences of rapid review short-cuts on the results and conclusions of rapid reviews.

Methods

Search Strategy

A systematic (but not exhaustive) search was conducted May 2023 in Web of Science Core Collection and Scopus using Carleton University institutional subscriptions, with a search update conducted September 2023. Additionally, to capture peer-reviewed or grey literature not found during database searching, we conducted a search in Google Scholar using five simplified search strings in September 2023. We selected search terms to describe environmental management from topics listed by *Environmental Evidence* (https://environmentalevidencejournal.biomedcentral.com/) and the CEE CEEDER database (https://environmentalevidence.org/ceeder/) (Appendix 1). Terms used to describe rapid reviews are various and without standardization, and were therefore selected based on scoping reviews previously done in medicine (Tricco et al. 2015), currently available guidelines (e.g., CEE 2022), and other terms identified from previous rapid reviews and pre-prints known to the authors (i.e., "ultrafast review"). Searches used Boolean operators "AND" and "OR" to combine methodological terms and topic terms while the operator "NOT" was used to decrease the number of non-relevant articles found by the search. Wildcard operators (*; any group of characters) and ($ or ?; single characters) were also used. Quotation marks were used for exact phrases (i.e., "Rapid review").

No restrictions were applied for date and document type. It was anticipated, however, that no articles prior to 1997 would be included as the first instance of rapid review assessments in health care settings was published that year (e.g., Best et al. 1997). Searching was conducted using English search terms although no language restrictions were applied during searching. Additional articles were identified by hand searching the reference lists of included articles. Comprehensiveness of the main search string was tested against a list of benchmark articles identified prior to searching (Appendix 1). All benchmarks were found by at least one database.

Article Screening and Study Eligibility

Articles were screened at two stages: (1) title and abstract and (2) full-text, by a single reviewer. All articles found by database searching were screened, while the first 50 articles (sorted by relevance) from each search string in Google

Table 1 Inclusion/exclusion criteria applied at full-text

Eligibility Criteria	Included	Excluded
Topic	Any topic or population relevant to environmental management	All other topics (including human health, indoor environments etc.)
Intervention/ Exposure	An effect on a component of the environment (e.g., impact of microplastics on shorebirds) or environmental management intervention (e.g., e-flows on fish abundance). Studies may or may not have a PICO/PECO (e.g., Population, Intervention/ Exposure, Comparator, Outcome) or modified PICO/PECO statement.	Interventions/Exposures that: • Do not indicate how or in what manner the influence on the environment occurs (i.e., general statements of effect in the introduction) • Alter human behaviour without also measuring an environmental outcome (e.g., intervention changes opinion on single use plastics, but does not measure change in plastics in environment). • Methods comparison where no intervention/exposure is considered
Study Design	Relevant study designs include: • Conducted rapid reviews • Assessments of rapid reviews • Guidelines for conducting rapid reviews	All other study designs including but not limited to: • Traditional literature reviews • Other evidence syntheses (systematic review, systematic maps, stand-alone meta-analyses, scoping reviews etc.) • Manipulative or non-manipulative studies in the field or laboratory • Policy discussions • Theoretical studies (e.g., simulations)
Language	English	Any other language

Simplified inclusion criteria (topic and study design only) were considered at title and abstract

Scholar were screened. Articles that were relevant at title and abstract were also screened at full-text. Articles identified from other sources were screened at full-text only. Articles were obtained electronically when available without having to purchase or pay for access. Duplicates were removed manually prior to screening.

To be eligible for inclusion (see Table 1 for full inclusion/exclusion criteria), reviews had to consider a topic relevant to environmental management (broadly defined) and assess the impact of an exposure (e.g., impact of microplastics on shorebirds) or the effect of an intervention (e.g., environmental flows on fish abundance). Changes to human behaviour were not included unless they measured an environmental response of that change in behaviour (e.g., an intervention to change the opinion on the use of single use plastic that measures the rate of plastic use as an outcome would be excluded, unless the authors also measure the amount of plastic in the environment).

Additionally, articles had to conduct a rapid review. Authors either stated that they conducted a rapid review (or used some other accepted terminology; see Appendix 1), or it may have been apparent from the methodologies used (i.e., the study includes an identifiable section or passage describing aspects of the review methods such as search terms and sources, inclusion/exclusion criteria, or analyses conducted). Articles had to provide some description of the methods used. Primary research, policy documents and other review types such as systematic reviews, systematic maps, (quick) scoping reviews, horizon scans, stand-alone meta-analyses or traditional literature reviews, among others, were not considered. Articles that assessed rapid review methodologies or provided guidelines for the conduct of rapid reviews were also considered to capture additional recommended methodological short-cuts. Only English-language literature was included during the screening stage due to resource constraints.

Data Coding and Extraction Strategy

Meta-data from articles included at full text were extracted by the first author and recorded in an MS-Excel sheet based on pre-defined coding (Online Resource 1). Extracted data were used to determine the number and types of short-cuts used by each review. Extracted data included: (1) bibliographic information; (2) topic (i.e., objectives, exposure or intervention, outcomes, and general topic), (3) methodology used (i.e., authors follow a set of guidelines); and (4) short-cuts at different stages of the rapid review process including development, searches, screening and data extraction and/or analysis. Coding options were developed in a partly iterative process and updated as new information was encountered during data extraction. The timeframe for conducting rapid reviews was based on author description, or, if unavailable, a proxy was calculated as the time from the date of first search (or updated search if >2 years since the original search had elapsed) to review submission date to the journal. Eligible articles were summarized in a narrative synthesis. Throughout, 'papers' is used to refer to evidence incorporated in conducted rapid reviews, 'articles' to refer to evidence found

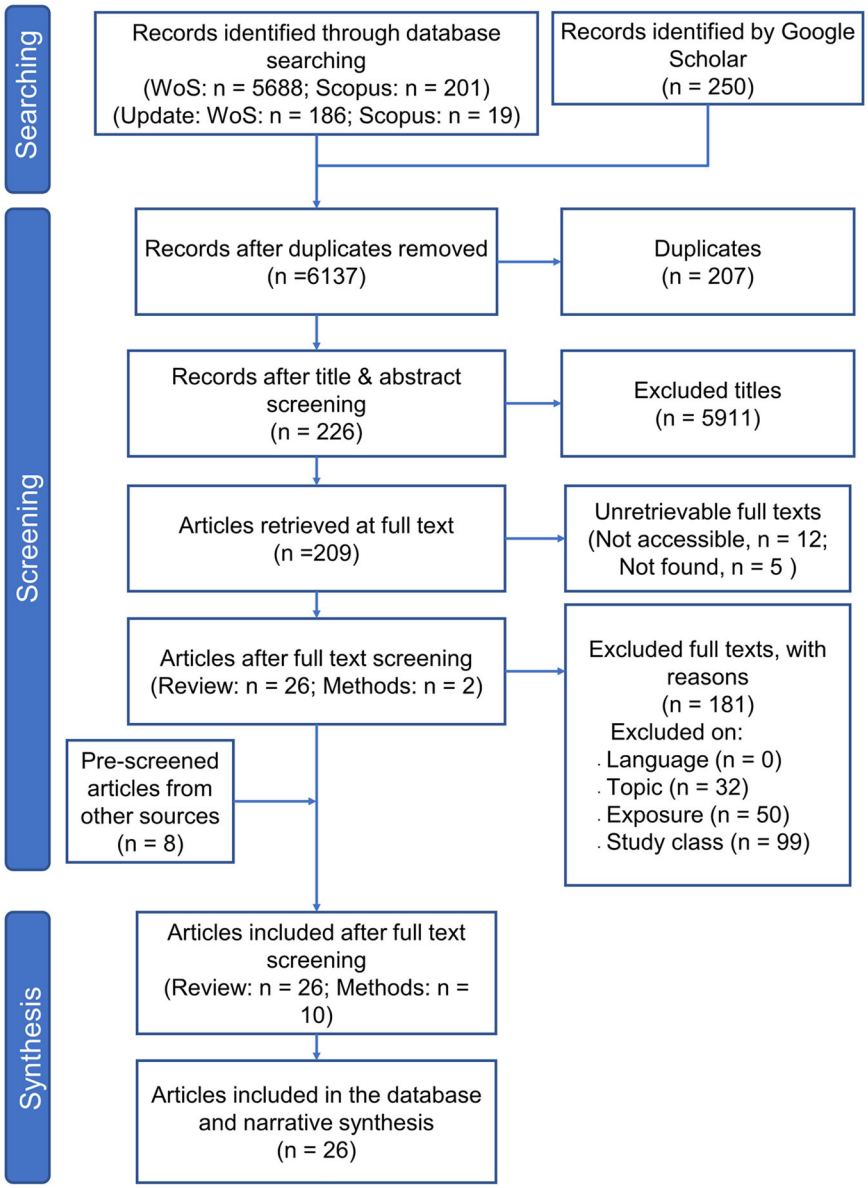

Fig. 1 ROSES flow diagram indicating numbers of articles retrieved from searches, screened, and included in the database (Haddaway et al. 2017)

during this methodological review, and 'RR' to refer to the rapid reviews identified by this methodological review.

Results

A total of 5889 articles were found through database searching and an additional 205 unique articles were identified during the search update. A total of 250 articles were identified from five Google Scholar searches. A total of 207 articles were removed as duplicates prior to screening (Fig. 1). Of the 6137 articles screened at title and abstract, 226 were eligible for full-text screening. A total of 28 articles (26 RRs, 2 methodological articles) were eligible for inclusion with most ineligible articles being excluded for study design (see Online Resource 1 for reasons for exclusion at full-text). It was not possible to obtain 17 articles (see Online Resource 1 for reasons). An additional eight methodological articles were identified from the reference lists of articles included at full-text.

There was no consistent term used to describe RRs, although more articles used 'rapid evidence assessment' (7 RRs), 'rapid review' (6 RRs) and 'rapid evidence synthesis' or 'brief review' (3 RRs each) than other terms. There is no apparent trend in terminology becoming more consistent since the first published RR identified in 2002, except for agricultural studies, where 'rapid evidence assessment' was the most used term. Other than one RR published in each of 2002, 2013 and 2014, RRs were published since 2017 (Fig. 2).

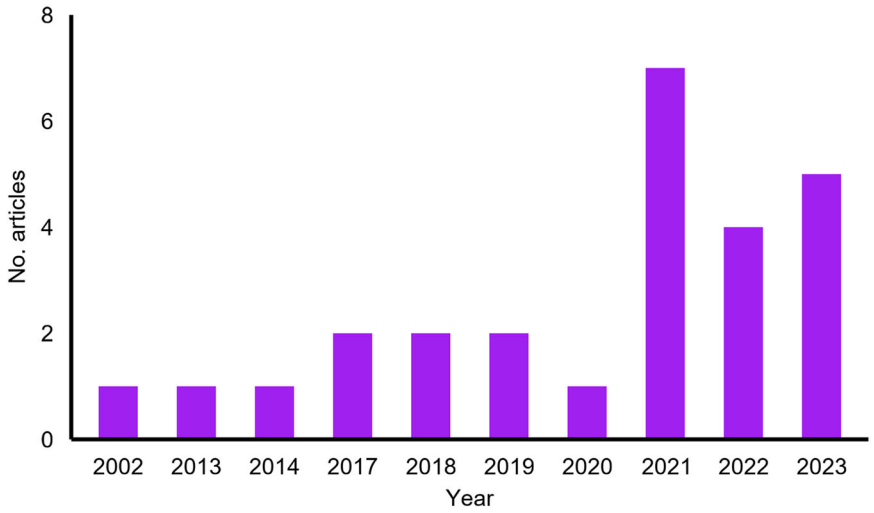

Fig. 2 Number of rapid reviews related to environmental management published per year. Note that 2023 is an incomplete year

Rapid reviews varied in topic, with most focusing on agriculture (7 RRs), the mitigation or effect of pollutants (5 RRs: microplastics [1 RR]) or conservation initiatives (5 RRs). Other topics considered the effects of food provision/consumption, invasion biology and land use/land cover change (2 RRs each), as well as effects of climate change (1 RR). A single study considered the off-target effects of parasiticides.

Methodological reporting was often poor, with approximately half of RRs not providing a detailed methods section or no specific methods section. There appeared to be some improvement in recent years, with nine of the sixteen RRs published since 2021 including clear methodological sections.

Short-cuts in Published Rapid Reviews

Short-cuts were identified for the main components of the review process including Review Development, Searches, Screening, Data Extraction and Data Analysis (see summary in Table 2). Due to lack of reporting in some RRs, it was difficult to determine which short-cuts were taken but not reported, versus which short-cuts were not taken. As such, the total number of RRs using each short-cut should be interpreted cautiously, as some RRs simply may not have reported on short-cuts that were, in fact, taken.

Review Development

All RRs had limits to their scope. The most consistently used scope limitation was geographic or locational (i.e., specific countries, regions, or habitat types), although many RRs also limited the scope of the review by considering only one or two key questions. Eleven studies used formal (i.e., published review guidelines) or informal guidance (i.e., previously conducted rapid reviews) to develop their methods. Only six RRs reported incorporating some sort of stakeholder involvement or consultation in the development of the review scope.

Searches

For RRs that reported their search terms (24/26 articles), 13 used simplified search strings that included only part of the PICO or PECO components considered by the study. For example, some searches only considered the population, while others considered intervention and outcome terms, without also incorporating population. All other studies used searches that incorporated population, intervention/effect, and outcome terms. Only three studies indicated whether topic experts, methodologists or information specialists were involved in the design of the literature searches. Two RRs reported that the results of the search were tested for comprehensiveness (e.g., compared search results to a benchmark list).

Database searches were used by 25 RRs, 14 of which used more than one database. The most databases used by a single RR was six, and the most frequently used databases were ISI Web of Science (20 RRs), Scopus (10 RRs), and Science Direct (5 RRs). No other databases were used by more than two RRs. Date ranges were used to limit the number of search returns in nine RRs, all to less than 40 years of article publication dates. Other sources used to find relevant articles included search engines (Google Scholar: 8 RRs; Google: 3), and grey literature (10 RRs). Additionally, three RRs searched organizational websites, eight used backward citation chasing and three sourced articles through author networks or personal knowledge. Eight RRs used multiple sources for identifying relevant articles (i.e., database, search engines and other sources). All other RRs used two or fewer source types, with ten RRs using a single source type (i.e., databases) to identify relevant articles. A

Table 2 Rapid review methods and short-cuts ($n = 26$ Rapid Reviews)

Rapid review methods and short-cuts		Count (%)
Scope and General Methodology		
Guidelines used	Yes	11 (42%)
	No (used other sources)	2 (8%)
	Not reported	13 (50%)
Based on an a priori protocol	Yes	4 (15%)
	No	22 (85%)
Review question	Clearly defined	17 (65%)
	Unclear/inferred	9 (35%)
Methodology described	Yes – detailed	14 (54%)
	Yes – not detailed	11 (42%)
	No	1 (4%)
Duration of review	>6 months	6 (23%)
	≤6 months	5 (19%)
	Not reported	15 (58%)
Limited scope/number of questions	Yes – Clearly reported	21 (81%)
	Yes – Some indication of limits	5 (19%)
Stakeholder involvement	Yes	6 (23%)
	No	20 (77%)
Searching		
Simplified search strings	Yes – simplified	13 (50%)
	No – includes PICO components	12 (46%)
	Not reported	1 (4%)
Benchmark list	Yes	2 (8%)
	No/Not reported	24 (92%)
Database searching	Searched >1 database	14 (54%)
	Searched 1 database only	11 (42%)
	Not reported/Not used	1 (4%)
Grey literature incorporated	Yes	10 (38%)
	No	12 (46%)
Web-based search engines	Yes	10 (38%)
	No	15 (58%)
	Not reported	1 (4%)
Other sources searched	Yes	11 (42%)
	Not reported	15 (58%)
Date limits applied	Yes	9 (35%)
	No	13 (50%)
	Not reported	4 (15%)
Screening		
Screening stage*	Title and/or abstract	16 (62%)
	Title and abstract and Full-text	14 (54%)
	NR	10 (38%)
Title and abstract	Duplicate screening	4 (15%)
	Independent screening	4 (15%)
	Single Screening	4 (15%)
	Not reported	14 (54%)
Full-text	Duplicate screening	4 (15%)
	Independent screening	6 (23%)
	Single Screening	2 (8%)
	Not reported	14 (54%)
Consistency check	Reported for Title and Abstract	3 (17%)
	Reported for Full-text	3 (17%)
	Not reported for either	17 (66%)
Literature type included	Primary	10 (38%)
	Secondary	2 (8%)
	Mixed	12 (46%)
	NR	2 (8%)
Language limits applied	English only	14 (54%)
	Multiple languages	1 (4%)
	Not reported	11 (42%)
Data extraction/Analysis		
Method used*	Manual extraction	19 (73%)
	Automated	2 (7%)
	Not detailed	6 (23%)
Data extraction	Two or more reviewers extracted data separately for each review	2 (8%)
	One reviewer extracted data from each review, with consistency check	2 (8%)
	Single reviewer only	4 (15%)
	Not reported/Unclear	18 (69%)
Data validation	Conducted	3 (12%)
	Not reported	23 (88%)
Critical appraisal or internal validity	Conducted	8 (38%)
	Not conducted	4 (15%)
	Not reported	14 (54%)
Analysis		
Synthesis method*	Quantitative data synthesis	6 (23%)
	Narrative data synthesis	26 (100%)
	Other summary techniques	8 (31%)

*Total exceeds 26 RRs due to some studies using more than one technique

single RR reported no information about sources of evidence searched.

Screening

Reporting on screening was often incomplete, making it difficult to determine what steps were taken during the screening process. Two RRs conducted only title and abstract screening, while all others that reported, used two-stage screening (title and/or abstract, and full-text). Of rapid reviews that reported title and/or abstract screening (16/26), the number of screeners was reported in twelve RRs. Four RRs had a single screener with no consistency checking, four had consistency checking on a subset of articles (e.g., 10%), and four RRs had complete duplicate screening. Of the 12 RRs reporting full-text screening, six had independent screening by two or more reviewers with consistency checks done in all cases (the proportion of studies checked was only reported in 2 RRs). Four RRs had complete duplication of screening at full-text with inconsistencies resolved through consensus or by an additional screener. Two RRs had a single screener at full-text. Stop criteria

(e.g., stopping screening after 70% completed) was not used in any RRs at any screening stage. Five RRs reported utilizing screening software or code to facilitate the screening process in some way (i.e., for deduplication or collaboration among screeners). Tools included Rayyan (Ouzzani et al. 2016), EcoEvidence (Norris et al. 2012), Covidence (www.covidence.org) and the r-package *revtools* (Westgate 2019). All other RRs conducted screening manually.

Most RRs screened to include primary research (10 RRs) or a mix of primary and secondary research (12 RRs). Two RRs included only secondary research to inform their review. Papers from a single language (English) were used in 14 of the 15 RRs that reported language, while the remaining RR considered papers in both English and French.

Data Extraction/Analysis

Data were almost always extracted manually by the reviewer (19/20 RRs reporting data), with only two articles using automation to assist in data extraction. Few RRs (8 of 26) reported the number of individuals who conducted data extraction, with only two that reported conducting consistency checks and three conducting data validation. Critical appraisal was rarely reported and only eight RRs conducted critical appraisal. Critical appraisal was based on pre-developed tools including AMSTAR (Shea et al. 2007), CASP (Critical Appraisal Skills Program 2022), and standard Eco Evidence weightings (see Norris et al. 2012), or was developed specifically for the review (4 RRs). All studies included some form of narrative synthesis. A single rapid review conducted formal meta-analysis of effect sizes, and another eight studies used vote counting. An additional seven used a scoring method or other techniques (e.g., automated content analysis) to summarize results.

Timeframe of Rapid Reviews

No study quantified the amount of time taken to conduct a review. Sufficient information was available to determine the time taken from first search to date of submission for 11 of 26 articles. Of these, five took six months or less, while the remaining studies ranged from 8 – 12 months.

Comparison to Rapid Review Guidelines

Methods articles found during the screening process included scoping assessments of rapid reviews in medicine (two articles), comparisons of different evidence techniques (two articles), or guidelines for rapid reviews (five articles and one beta version) (see Online Resource 1). Only articles providing guidance for rapid reviews are considered here, and additional guidance documents known to the authors or used by included rapid reviews are incorporated in this comparison.

Several articles used formal (i.e., Cochrane Rapid Review Guidelines) or informal guidance (i.e., other published rapid reviews) to inform their methods. Studies with detailed methods most frequently used rapid review guidelines or established methods when producing their reviews. These included those recommended by the Cochrane Rapid Reviews Methods Group (1 RR), EcoEvidence (Norris et al. 2012; 2 RRs), the Rapid Review Guidebook (Dobbins 2017; 1 RR), a 'how to guide' for quick scoping reviews and rapid evidence assessments (Collins et al. 2015; 1 RR) and it's beta version (Miller et al. 2018; 1 RR). Other reviews used modified existing guidance for the conduct or reporting of systematic reviews (6 RRs), or informal guidance basing methods on other rapid reviews previously conducted in sectors such as health care or social sciences (2 RRs). Other guidance documents known to the authors, but not considered by any RR include the STARR decision tool (Pandor et al. 2019) and the CEE Rapid Review Guidelines (CEE 2022).

Few studies used all recommended short-cuts for any guidelines, and several did not include recommended components. For example, the CEE Rapid Review Guidelines (CEE 2022), Cochrane Review Guidelines (Garritty et al. 2021), the Rapid Review Guidebook (Dobbins 2017), the STARR decision tool (Pandor et al. 2019), Collins et al. (2015), and Khangura et al. (2012) all recommend the inclusion of stakeholders (sometimes called the steering group), but only 6/26 RRs noted stakeholder involvement. Whether this is due to lack of reporting in other RRs, or a true lack of stakeholder involvement is unclear. Similarly, CEE and Cochrane Guidelines, Collins et al. (2015) and Khangura et al. (2012) all recommend that RRs be based on an a priori protocol, but only four RRs noted that methods were based on a registered protocol. The conduct and inclusion of critical appraisal of internal validity and risk of bias in review analysis and synthesis was explicitly recommended by CEE, the Cochrane Collaboration, the Rapid Review Guidebook, the STARR decision tool, Collins et al. (2015) and Norris et al. (2012) but was only included in eight RRs.

Other recommended short-cuts were commonly applied by included reviews (Fig. 3) such as narrow or focused questions, date and language limits, and not including grey literature or other sources during searching. An area where there is high variation in recommended guidance and in application is during screening. In some cases, dual screening of excludes (never identified in captured RRs) is recommended (i.e., Khangura et al. 2012; Garritty et al. 2021), while complete double screening (Dobbins 2017) or single screening with consistency checking (Collins et al. 2015; CEE 2022) is recommended. Few studies adequately

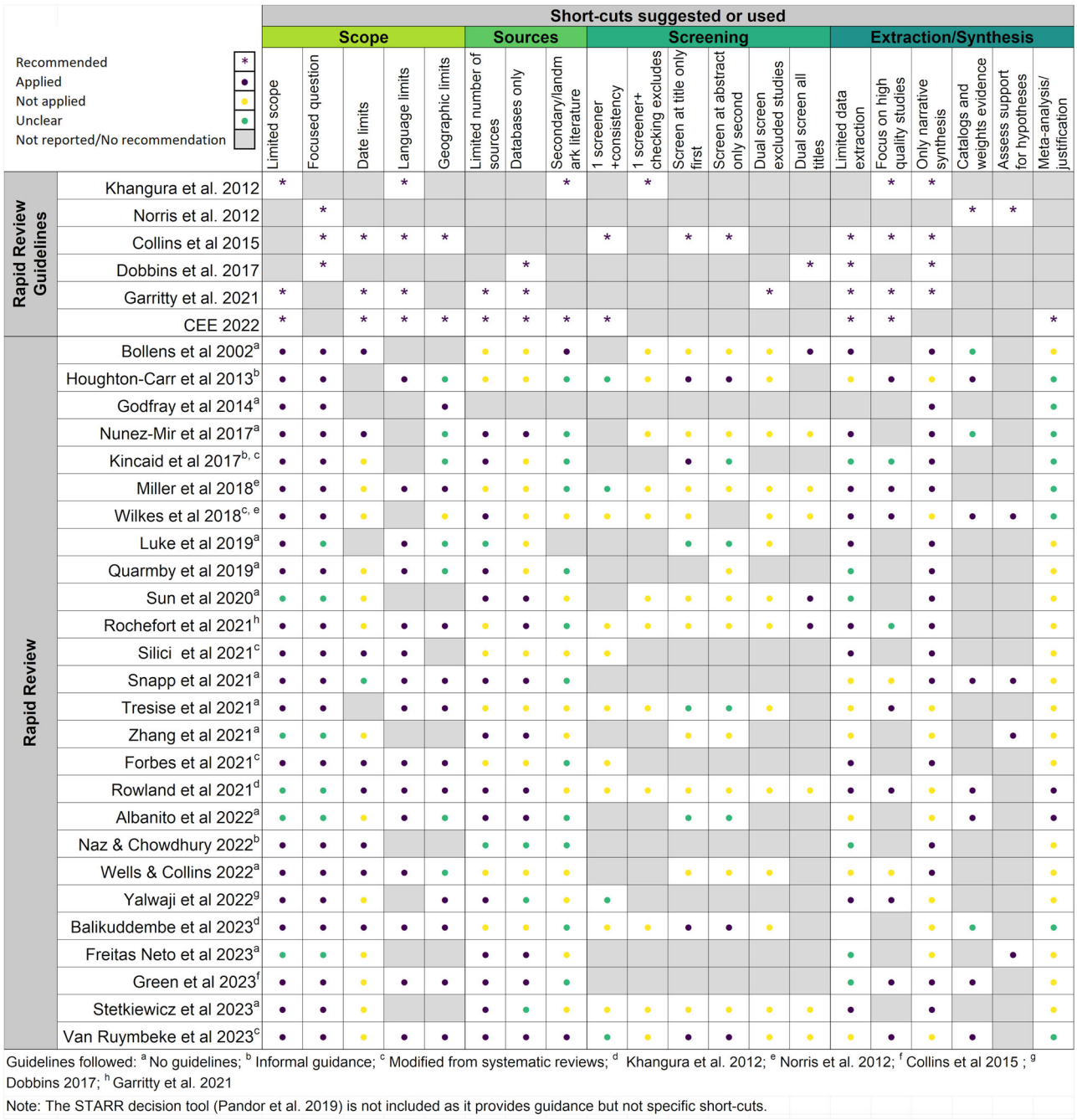

Fig. 3 Short-cuts recommended by rapid review guidelines. Only items that deviate from systematic review guidelines are included. Letters indicate the guideline used by each rapid review

reported screening at different stages (12/26) making it difficult to determine whether these short-cuts are being adopted by authors. However, screening can have a large impact on the results of a review, so improved standardization and reporting of screening in future reviews will be essential to aid in decision-makers' understanding review biases. Most guidelines also recommended narrative synthesis only (as was done in several of the included RRs; 12/26). However, when meta-analysis is possible, as was the case for one RR, it may be desirable to incorporate quantitative analysis, especially when the level of impact or effect of an intervention is the question under consideration (CEE 2022).

An additional recommendation in many guidelines is the involvement of information specialists in the review process (Khangura et al. 2012; Dobbins 2017; Pandor et al. 2019; Garritty et al. 2021; CEE 2022). Although also recommended in systematic review guidelines, it is important to

note that both topic and methodological expertise can streamline and speed up the review process (Lagisz et al. 2022). Few articles noted whether the review team had expertise in evidence syntheses prior to their reviews or whether information specialists were involved in the production of the review (but see Rowland et al. (2021) and Rochefort et al. (2021) for exceptions).

Discussion

The results of this methodological review indicate that the methods used for conducting rapid reviews vary considerably. Numerous strategies were employed, frequently with different combinations of short-cuts, when compared to systematic reviews, and few studies used established guidelines. Short-cuts included not using a protocol, limiting searches to peer-reviewed sources, only having one person screen literature, and not conducting critical appraisal of study validity. Few studies used exactly the same short-cuts, which may be due to the relative newness of specific guidance for rapid reviews in environmental management (i.e., CEE guidelines for rapid reviews were first published in 2022).

Across the RRs considered, many methodological steps were not reported. Application of reporting guidelines such as those produced by Cochrane and CEE will assist in improving methods, but must be paired with an acceptance of common terminology. Several studies that can be considered rapid reviews based on their methodologies were identified as simply "reviews" or "brief reviews" while many studies, also using these terminologies were not, in fact, rapid reviews (see Online Resource 1). It is unclear how many studies using rapid review synonyms were excluded from consideration due to lack of reporting of rapid review methods. Although none of the rapid reviews identified here stated plans for updating or expanding to full systematic reviews in the future, lack of reporting can also decrease the potential usefulness of rapid reviews as starting points for future full systematic reviews. This decreases past rapid review utility as the evidence-base on a particular topic expands or more complete evidence syntheses are required for decision making. As rapid reviews are increasingly used to influence environmental decision-making and policy, improved methodological reporting will be essential to enable accurate understanding of potential biases introduced during the conduct of the review.

A single rapid review conducted formal meta-analysis of effect sizes, although eight studies did use vote counting and an additional seven used a scoring method to summarize results. In several cases, not conducting formal meta-analysis may have been due to heterogeneity in the available literature (e.g., Rowland et al. 2021); however, in most cases the rationale for not conducting quantitative synthesis was unclear. In future RRs, attempting to incorporate quantitative synthesis where possible would increase the potential value of rapid reviews for decision makers. Similarly, assessing study validity through critical appraisal and assessing the influence of biases during analysis would help increase the utility of rapid reviews during decision making, as they would be explicitly considered. Only 30% of studies considered here incorporated any form of critical appraisal of internal validity. This is potentially problematic, as not incorporating assessments of internal validity means that each piece of evidence in a review is equally weighted, regardless of whether there is high risk of bias or not. However, critical appraisal can be time consuming. It will be important in future reviews for authors to explicitly note when critical appraisal was, or was not, conducted (and why) so that review users can make informed decisions based on review results. Encouragingly, most studies considered some form of external validity (i.e., generalizability) during study selection.

A common distinction used to separate systematic reviews and rapid reviews is that RRs take less than 6 months while systematic reviews take between six months to more than two years to complete (Khangura et al. 2012) contingent upon resourcing. Estimates for environmental evidence syntheses indicate that, on average, a full systematic review will take 164 days (full-time equivalents) or about one year (Haddaway and Westgate 2019; Note - it has been our experience that they take significantly longer). Only five of the rapid reviews considered here were conducted in six months or less. A third of studies that reported sufficient information took between 11 and 12 months. Additionally, the proxy used to estimate RR timeframe, time elapsed between first search and date of submission to the journal, is likely an underestimate of the true time it took to conduct these RRs, as methods development, stakeholder engagement and search scoping would have occurred prior to the first search. It may also not accurately represent the amount of time spent on the project, as it assumes that time was devoted to a single project. It is unclear if any of the RRs met policy windows or decision timelines. If RRs on environmental management are taking similar time frames to complete as more comprehensive systematic reviews, the potential benefits of these more rapid methods may not outweigh the potential consequences of removing steps, such as critical appraisal. However, it is unclear how long a systematic review on similar topics would have taken.

It may be possible to further expedite the review process (whether systematic or rapid) by incorporating artificial intelligence tools such as large language models or machine learning. Early adopters of machine learning have provided tools, such as EPPI-Reviewer or Abstrackr, that help decrease

the effort and time required to conduct screening (Tsou et al. 2020). Only five of the rapid reviews included here indicated that a screening tool was used but this is an area likely to provide benefits in the future. For example, one of the fastest rapid reviews (Van Ruymbeke et al. 2023) used an AI-based screening tool and was completed in as little as 3 months (although it should be noted that this review also had one of the largest review teams conducting screening). Similarly, automation of data extraction (as was used in 2 RRs), through text mining, may decrease researcher effort and the time required for reviews (Gates et al. 2021). Caution should be taken when using these tools however, as many of these technologies are still being developed and require expert verification to ensure accuracy (e.g., ChatGPT; Qureshi et al. 2023). Furthermore, using AI tools will still require rigorous methodology, reporting, and appropriate transparency to create accountable systems that decision-makers can trust (de Fine Licht and de Fine Licht 2020).

There are several limitations to the conduct of this methodological review. First, we primarily consider published, peer-reviewed literature, and searched only one source (i.e., Google Scholar) of grey literature. Rapid reviews are often conducted by government and non-governmental organizations, which may mean important, unpublished rapid reviews were missed. We suspect that many of those reviews would not just be "grey" but in fact be limited to internal distribution. With greater movement towards open science and decision making, access to those documents may become easier in the future. We used topic-specific terms for describing environmental management during searching. The search string was not exhaustive, and some relevant rapid reviews may not have been captured (see Appendix 1). However, we selected terms based on topics considered relevant by the journal *Environmental Evidence*, the flagship journal of the CEE, and additional terms from CEEDER, a specifically designed database of evidence syntheses covering diverse environmental management topics suggesting we did indeed have broad topical coverage.

Conclusion

Numerous approaches to conducting environmental rapid reviews were found during this methodological review, with some short-cuts being more common than others. Reporting was often poor, limiting the ability of this review to determine if any short-cuts are used consistently in combination. Short-cuts used in past reviews were often recommended in formal and informal guidance, but many published rapid reviews did not incorporate recommendations for critical appraisal, stakeholder involvement or the use of pre-defined protocols. Further effort to improve reporting of rapid review methods, and adherence to published guidance is recommended to decrease the risk of potential biases in rapid reviews. This will also improve the useability and level of confidence decision-makers and policy makers have in rapid reviews in the future.

Data availability

All data supporting the findings of this study are available within the paper and its Supplementary Information. Data extracted from rapid reviews, articles excluded at full text, and a list of relevant methodological articles are included in Online Resource 1. Search terms and benchmark lists are included in Appendix 1.

Supplementary information The online version contains supplementary material available at https://doi.org/10.1007/s00267-023-01901-1.

Acknowledgements Funding for this work was provided by Carleton University via the Multidisciplinary Research Catalyst Fund. MH is supported in part by a Natural Science and Engineering Research Council of Canada Postgraduate Scholarship – Doctoral (PGS D).

Author contributions All authors contributed to the study concept and design. Literature searches, data abstraction and analysis were performed by MH. The first draft was written by MH, and TR and SJC commented and revised previous versions of the manuscript. All authors read and approved the final manuscript.

Funding The authors declare they have no financial interests.

Compliance with ethical standards

Conflict of interest Non-financial interests: SJC is a board trustee and MH is a volunteer for the Collaboration for Environmental Evidence. Neither receives compensation as members of the organization. TR has no competing interests to declare relevant to the content of this article.

Ethics approval None required.

Appendix 1

Searches:

- Web of Science Core Collection (WoS) - May 10, 2023; no date or language restrictions. Searched using advanced search for terms in the title, abstract, and keywords (Topic search).

  Update search ran September 27, 2023 to capture new articles since the original search.
- Scopus – May 24, 2023; no date or language restrictions. Searched using advanced search for terms in title, abstract and keywords (TITLE-ABS-KEY)

  Updated search run on September 27, 2023 to capture new articles published since the original search.

- Google Scholar Search 1–2 – September 27, 2023; no date or language restrictions. Did not include citations or patents. Searched for words occurring "anywhere in the article". Sorted by relevance and selected first 50 articles only.
- Google Scholar Search 3–5 – September 30, 2023; no date or language restrictions. Did not include citations or patents. Searched for words occurring "anywhere in the article". Sorted by relevance and selected first 50 articles only.

Final search string (WoS):

TS = (("Rapid review$" OR "Accelerated review$" OR "Abbreviated review$" OR "Rapid evidence synthesis" OR "Accelerated systematic review$" OR "Brief review$" OR "Evidence summary" OR "Evidence summaries" OR "Expedited systematic review$" OR "Quick review$" OR "Rapid evidence assessment$" OR "Rapid evidence review $" OR "Rapid evidence-based literature review$" OR "Rapid interim review$" OR "Rapid literature review$" OR "Rapid narrative review$" OR "Rapid nonsystematic review$" OR "Rapid structure review$" OR "Rapid structure literature review$" OR "Rapid systematic review$" OR "Systematic rapid evidence review$" OR "Ultrafast review $") AND ("Environmental management" OR "Ecosystem management" OR Conserv* OR Ecolog* OR Environment* OR Biolog* OR "Climate change" OR Agricultur* OR Forestry OR Fisher* OR "Natural resource*" OR Biodivers* OR "Ecosystem service$" OR "Sustainable energy" OR Soil* OR Aquatic OR "Water quality" OR "Wastewater") NOT ("COVID-19"))

Final search string (Scopus):

TITLE-ABS-KEY ("Rapid review?" OR "Accelerated review?" OR "Abbreviated review?" OR "Rapid evidence synthesis" OR "Accelerated systematic review?" OR "Brief review?" OR "Evidence summary" OR "Evidence summaries" OR "Expedited systematic review?" OR "Quick review?" OR "Rapid evidence assessment?" OR "Rapid evidence review?" OR "Rapid evidence-based literature review?" OR "Rapid interim review?" OR "Rapid literature review?" OR "Rapid narrative review?" OR "Rapid nonsystematic review?" OR "Rapid structure review?" OR "Rapid structure literature review?" OR "Rapid systematic review?" OR "Systematic rapid evidence review?" OR "Ultrafast review?") AND TITLE-ABS-KEY ("Environmental management" OR "Ecosystem management" OR Conserv* OR Ecolog* OR Environment* OR Biolog* OR "Climate change" OR Agricultur* OR Forestry OR Fisher* OR "Natural resource*" OR Biodivers* OR "Ecosystem service?" OR "Sustainable energy" OR Soil* OR Aquatic OR "Water quality" OR "Wastewater") AND NOT TITLE-ABS-KEY ("COVID-19")

Final search string (Google Scholar 1):

"rapid review" "Environmental management" OR "Ecosystem management" OR Conservation OR Ecology OR Environment OR Biology OR "Climate Change" OR Agriculture OR Forestry OR Fisheries OR "Natural resource" OR Biodiversity OR "Ecosystem Service" OR "Sustainable energy" OR Soil OR Aquatic OR "Water quality" OR "wastewater" -"Covid 19"

Final search string (Google Scholar 2):

"Rapid evidence" "Environmental management" OR "Ecosystem management" OR Conservation OR Ecology OR Environment OR Biology OR "Climate Change" OR Agriculture OR Forestry OR Fisheries OR "Natural resource" OR Biodiversity OR "Ecosystem Service" OR "Sustainable energy" OR Soil OR Aquatic OR "Water quality" OR "wastewater" -"COVID 19"

Final search string (Google Scholar 3):

"Rapid * review" "Environmental management" OR "Ecosystem management" OR Conservation OR Ecology OR Environment OR Biology OR "Climate Change" OR Agriculture OR Forestry OR Fisheries OR "Natural resource" OR Biodiversity OR "Ecosystem Service" OR "Sustainable energy" OR Soil OR Aquatic OR "Water quality" OR "wastewater" -"COVID 19"

Final search string (Google Scholar 4):

"Brief review" "Environmental management" OR "Ecosystem management" OR Conservation OR Ecology OR Environment OR Biology OR "Climate Change" OR Agriculture OR Forestry OR Fisheries OR "Natural resource" OR Biodiversity OR "Ecosystem Service" OR "Sustainable energy" OR Soil OR Aquatic OR "Water quality" OR wastewater -"COVID 19"

Final search string (Google Scholar 5):

"Quick review" "Environmental management" OR "Ecosystem management" OR Conservation OR Ecology OR Environment OR Biology OR "Climate Change" OR Agriculture OR Forestry OR Fisheries OR "Natural resource" OR Biodiversity OR "Ecosystem Service" OR "Sustainable energy" OR Soil OR Aquatic OR "Water quality" OR "Wastewater" -"COVID 19"

Benchmark articles (all found in WoS; Scopus = Rowland et al. 2021, Pullin 2023 and Miller et al. 2018):

- Rowland et al. 2021
- Forbes et al (2021)
- Naz and Chowdhury (2022)
- Pullin (2023)
- Miller et al (2018)

References

Albanito F, Jordon M, Abdalla M, et al. (2022) Agroecology–a Rapid Evidence Review. Report to the UK Climate Change Committee. P. 87

Balikuddembe JK, Di B, Reinhardt JD et al. (2023) A Haddon matrix-based analysis of the anthropogenic drivers of floods in 10

Eastern African partner countries of the Belt and Road Initiative 1990–2021. Int J Disaster Risk Reduct 92:103683. https://doi.org/10.1016/j.ijdrr.2023.103683
Best L, Stevens A, Colin-Jones D (1997) Rapid and responsive health technology assessment: the development and evaluation process in the South and West region of England. J Clin Eff 2:51–56. https://doi.org/10.1108/eb020865
Bollens SM, Cordell JR, Avent S, Hooff R (2002) Zooplankton invasions: a brief review, plus two case studies from the northeast Pacific Ocean. Hydrobiologia 480:87–110. https://doi.org/10.1023/A:1021233018533
Chalmers I, Hedges LV, Cooper H (2002) A brief history of research synthesis. Eval Health Prof 25(1):12–37. https://doi.org/10.1177/0163278702025001003
[CEE] Collaboration for Environmental Evidence (2022) Guidelines and Standards for Evidence Synthesis in Environmental Management. Version 5.1
Collins A, Coughlin D, Miller J, Kirk S (2015) The production of quick scoping reviews and rapid evidence assessments: A how to guide. Department for Environment, Food and Rural Affairs: UK Government
Cook CN, Nichols SJ, Webb JA et al. (2017) Simplifying the selection of evidence synthesis methods to inform environmental decisions: A guide for decision makers and scientists. Biol Conserv 213:135–145. https://doi.org/10.1016/j.biocon.2017.07.004
Critical Appraisal Skills Program (2022) CASP qualitative checklist
de Fine Licht K, de Fine Licht J (2020) Artificial intelligence, transparency, and public decision-making. AI Soc 35:917–926. https://doi.org/10.1007/s00146-020-00960-w
Dobbins M (2017) Rapid Review Guidebook: Steps for conducting a rapid review. National Collaborating Center for Methods and Tools (NCCMT), Canada
Downey H, Spelten E, Holmes K, Van Vuuren J (2022) A rapid review of recreational, cultural, and environmental meanings of water for Australian river communities. Soc Nat Resour 35:556–574. https://doi.org/10.1080/08941920.2022.2032894
Folke C, Polasky S, Rockström J et al. (2021) Our future in the Anthropocene biosphere. Ambio 50:834–869. https://doi.org/10.1007/s13280-021-01544-8
Forbes S, Bicknell E, Guilovica L et al. (2021) A rapid review of the environmental impacts associated with food consumption in Australia and New Zealand. Curr Nutr Rep. 10:334–351. https://doi.org/10.1007/s13668-021-00374-0
Freitas Neto LL, Espósito BP (2023) Toxicity of zinc oxide to scleractinian corals and zooxanthellae: a brief review. Quím Nova 46:266–272. https://doi.org/10.21577/0100-4042.20230003
Garritty C, Gartlehner G, Nussbaumer-Streit B et al. (2021) Cochrane Rapid Reviews Methods Group offers evidence-informed guidance to conduct rapid reviews. J Clin Epidemiol 130:13–22. https://doi.org/10.1016/j.jclinepi.2020.10.007
Gates A, Gates M, Sim S et al. (2021) Creating efficiencies in the extraction of data from randomized trials: a prospective evaluation of a machine learning and text mining tool. BMC Med Res Methodol 21:169. https://doi.org/10.1186/s12874-021-01354-2
Godfray HCJ, Blacquière T, Field LM et al. (2014) A restatement of the natural science evidence base concerning neonicotinoid insecticides and insect pollinators. Proc R Soc B: Biol Sci 281:20140558. https://doi.org/10.1098/rspb.2014.0558
Green L, Webb E, Johnson E et al. (2023) Cost-effective approach to explore key impacts on the environment from agricultural tools to inform sustainability improvements: inversion tillage as a case study. Environ Sci Eur 35:1–5. https://doi.org/10.1186/s12302-023-00784-7
Haddaway NR, Macura B, Whaley P, Pullin AS (2017) ROSES for systematic review reports. Version 1.0. https://doi.org/10.6084/m9.figshare.5897272
Haddaway NR, Westgate MJ (2019) Predicting the time needed for environmental systematic reviews and systematic maps. Conserv Biol 33:434–443. https://doi.org/10.1111/cobi.13231
Haddaway NR, Woodcock P, Macura B, Collins A (2015) Making literature reviews more reliable through application of lessons from systematic reviews. Conserv Biol 29:1596–1605. https://doi.org/10.1111/cobi.12541
Hamel C, Michaud A, Thuku M et al. (2020a) Few evaluative studies exist examining rapid review methodology across stages of conduct: a systematic scoping review. J Clin Epidemiol 126:131–140. https://doi.org/10.1016/j.jclinepi.2020.06.027
Hamel C, Michaud A, Thaku M et al. (2020b) Defining rapid reviews: a systematic scoping review and thematic analysis of definitions and defining characteristics of rapid reviews. J Clin Epidemiol 129:74–85. https://doi.org/10.1016/j.jclinepi.2020.09.041
Houghton-Carr HA, Boorman DB, Heuser K (2013) Land use, climate change and water availability: Phase 2a. Rapid Evidence Assessment: Results and synthesis. NERC/Centre for Ecology & Hydrology, Wallingford, UK, p 45
Khangura S, Konnyu K, Cushman R et al. (2012) Evidence summaries: the evolution of a rapid review approach. Syst Rev 1:10. https://doi.org/10.1186/2046-4053-1-10
Kincaid K, Rose G, Devillers R (2017) How fisher-influenced marine closed areas contribute to ecosystem-based management: A review and performance indicator scorecard. Fish Fish 18:860–876. https://doi.org/10.1111/faf.12211
Lagisz M, Vasilakopoulou K, Bridge C et al. (2022) Rapid systematic reviews for synthesizing research on built environment. Environ Dev 43:100730. https://doi.org/10.1016/j.envdev.2022.100730
Luke SH, Slade EM, Gray CL, Annammala KV et al. (2019) Riparian buffers in tropical agriculture: Scientific support, effectiveness and directions for policy. J Appl Ecol 56:85–92. https://doi.org/10.1111/1365-2664.13280
Marshall IJ, Marshall R, Wallace BC et al. (2019) Rapid reviews may produce different results to systematic reviews: a meta-epidemiological study. J Clin Epidemiol 109:30–41. https://doi.org/10.1016/j.jclinepi.2018.12.015
Miller, Casas-Mulet KA, Little R, de SC et al. (2018) Deficiencies in our understanding of the hydro-ecology of several native Australian fish: a rapid evidence synthesis. Mar Freshw Res 69:1208–1221. https://doi.org/10.1071/MF17241
Munn Z, Stern C, Aromataris E et al. (2018) What kind of systematic review should I conduct? A proposed typology and guidance for systematic reviewers in the medical and health sciences. BMC Med Res Methodol 18:5. https://doi.org/10.1186/s12874-017-0468-4
Naz A, Chowdhury A (2022) Pollutant extraction from water and soil using Montmorillonite clay-polymer composite: A rapid review. Mater Today: Proc 60:1–7. https://doi.org/10.1016/j.matpr.2021.10.366
Nunez-Mir GC, Liebhold AM, Guo Q et al. (2017) Biotic resistance to exotic invasions: its role in forest ecosystems, confounding artifacts, and future directions. Biol Invasions 19:3287–3299. https://doi.org/10.1007/s10530-017-1413-5
Norris RH, Webb JA, Nichols SJ et al. (2012) Analyzing cause and effect in environmental assessments: using weighted evidence from the literature. Freshw Sci 31:5–21. https://doi.org/10.1899/11-027.1
Ouzzani M, Hammady H, Fedorowicz Z et al. (2016) Rayyan—a web and mobile app for systematic reviews. Syst Rev 5:210. https://doi.org/10.1186/s13643-016-0384-4
Pandor A, Kaltenthaler E, Martyn-St James M et al. (2019) Delphi consensus reached to produce a decision tool for SelecTing Approaches for Rapid Reviews (STARR). J Clin Epidemiol 114:22–29. https://doi.org/10.1016/j.jclinepi.2019.06.005
Pullin AS, Stewart GB (2006) Guidelines for systematic review in conservation and environmental management. Conserv Biol 20(6):1647–1656. https://doi.org/10.1111/j.1523-1739.2006.00485.x

Pullin AS, Cheng SH, Cooke SJ et al. (2020) Informing conservation decisions through evidence synthesis and communication. In: Vickery JA, Ockendon N, Pettorelli N, et al., (eds) Conservation Research, Policy and Practice. Cambridge University Press, Cambridge, p 114–128

Pullin A (2023) Introducing PROCEED: a new service for fast registration and publication of protocols for environmental evidence syntheses, including Rapid Reviews. Environ Evid 12:2. https://doi.org/10.1186/s13750-022-00295-7

Quarmby S, Santos G, Mathias M (2019) Air quality strategies and technologies: a rapid review of the international evidence. Sustainability 11:2757. https://doi.org/10.3390/su11102757

Qureshi R, Shaughnessy D, Gill KAR et al. (2023) Are ChatGPT and large language models "the answer" to bringing us closer to systematic review automation? Syst Rev 12:72. https://doi.org/10.1186/s13643-023-02243-z

Retief FP, Bond A, Morrison-Saunders A et al. (2023) Gaining a deeper understanding of the psychology underpinning significance judgements in environmental impact assessment (EIA). Impact Assess Proj Appraisal 41:250–262. https://doi.org/10.1080/14615517.2023.2181248

Rochefort G, Lapointe A, Mercier A-P et al. (2021) A rapid review of territorialized food systems and their impacts on human health, food security, and the environment. Nutrients 13:3345. https://doi.org/10.3390/nu13103345

Rose DC, Mukherjee N, Simmons BI et al. (2020) Policy windows for the environment: Tips for improving the uptake of scientific knowledge. Environ Sci Policy 113:47–54. https://doi.org/10.1016/j.envsci.2017.07.013

Rowland JA, Bracey C, Moore JL et al. (2021) Effectiveness of conservation interventions globally for degraded peatlands in cool-climate regions. Biol Conserv 263:109327. https://doi.org/10.1016/j.biocon.2021.109327

Shea BJ, Grimshaw JM, Wells GA et al. (2007) Development of AMSTAR: a measurement tool to assess the methodological quality of systematic reviews. BMC Med Res Methodol 7:10. https://doi.org/10.1186/1471-2288-7-10

Silici L, Rowe A, Suppiramaniam N, Knox JW (2021) Building adaptive capacity of smallholder agriculture to climate change: evidence synthesis on learning outcomes. Environ Res Commun 3:122001. https://doi.org/10.1088/2515-7620/ac44df

Snapp SS, Kebede Y, Wollenberg EK et al. (2021) Agroecology and climate change rapid evidence review: Performance of agroecological approaches in low-and middle-income countries. CGIAR Research Program on Climate Change, Agriculture and Food Security (CCAFS), Wageningen, the Netherlands, https://hdl.handle.net/10568/113487

Stetkiewicz S, Menary J, Nair A et al. (2023) Food system actor perspectives on future-proofing European food systems through plant breeding. Sci Rep. 13:5444. https://doi.org/10.1038/s41598-023-32207-1

Sun Y, Ding J, Siemann E, Keller SR (2020) Biocontrol of invasive weeds under climate change: progress, challenges and management implications. Curr Opin Insect Sci 38:72–78. https://doi.org/10.1016/j.cois.2020.02.003

Sutherland WJ, Pullin AS, Dolman PM, Knight TM (2004) The need for evidence-based conservation. Trends Ecol Evol 19:305–308. https://doi.org/10.1016/j.tree.2004.03.018

Sutton A, Clowes M, Preston L, Booth A (2019) Meeting the review family: exploring review types and associated information retrieval requirements. Health Inf Libr J 36:202–222. https://doi.org/10.1111/hir.12276

Thomas-Walters L, Nyboer EA, Taylor JJ et al. (2021) An optimistic outlook on the use of evidence syntheses to inform environmental decision-making. Conservat Sci and Prac 3. https://doi.org/10.1111/csp2.426

Tresise ME, Reed MS, Chapman PJ (2021) Effects of hedgerow enhancement as a net zero strategy on farmland biodiversity: a rapid review. Emerald Open Res 3:23. https://doi.org/10.35241/emeraldopenres.14307.1

Tricco AC, Antony J, Zarin W et al. (2015) A scoping review of rapid review methods. BMC Med 13:224. https://doi.org/10.1186/s12916-015-0465-6

Tsou AY, Treadwell JR, Erinoff E et al. (2020) Machine learning for screening prioritization in systematic reviews: comparative performance of Abstrackr and EPPI-Reviewer. Syst Rev 9:73. https://doi.org/10.1186/s13643-020-01324-7

Van Ruymbeke K, Ferreira JG, Gkisakis VD et al. (2023) Assessing the impact of farm-management practices on ecosystem services in European Agricultural Systems: A rapid evidence assessment. Sustainability 15:12819. https://doi.org/10.3390/su151712819

Webb JA, Schofield K, Peat M et al. (2017) Weaving common threads in environmental causal assessment methods: toward an ideal method for rapid evidence synthesis. Freshw Sci 36:250–256. https://doi.org/10.1086/690449

Wells C, Collins CT (2022) A rapid evidence assessment of the potential risk to the environment presented by active ingredients in the UK's most commonly sold companion animal parasiticides. Environ Sci Pollut Res 29(30):45070–88. https://doi.org/10.1007/s11356-022-20204-2

Westgate MJ (2019) revtools: An R package to support article screening for evidence synthesis. Res Synth Methods 10:606–614. https://doi.org/10.1002/jrsm.1374

Wilkes MA, Mckenzie M, Webb JA (2018) Fish passage design for sustainable hydropower in the temperate Southern Hemisphere: an evidence review. Rev Fish Biol Fish 28:117–135. https://doi.org/10.1007/s11160-017-9496-8

Yalwaji B, John-Nwagwu HO, Sogbanmu TO (2022) Plastic pollution in the environment in Nigeria: A rapid systematic review of the sources, distribution, research gaps and policy needs. Sci Afr 16:e01220. https://doi.org/10.1016/j.sciaf.2022.e01220

Zhang S, Wang J, Yan P et al. (2021) Non-biodegradable microplastics in soils: A brief review and challenge. J Hazard Mater 409:124525. https://doi.org/10.1016/j.jhazmat.2020.124525