Method 20
Systematic review

Summary of method

A structured, step-wise methodology following an *a priori* protocol to comprehensively collate, critically appraise and synthesise existing research evidence (traditional academic and grey literature). This method is applicable to specific questions such as: What is the effectiveness of an intervention? What is the effect of X on Y? What is the prevalence of a phenomenon? How reliable is a specific method?

Systematic review relies on the existence of scientific knowledge and is not usually appropriate for emerging topics or knowledge gaps (although 'empty reviews' may be valuable).

Systematic reviews should be conducted according to the rigorous standards demanded by review coordinating bodies such as the Cochrane Collaboration[1], the Collaboration for Environmental Evidence[2] and the Campbell Collaboration[3], as well as the ROSES reporting standards; tools such as PredicTER enable the calculation of the time needed to conduct systematic reviews (see references below). While this method is relatively time-consuming, efforts are under way to reduce the time needed.

Reporting requirements include: protocol of methods, fates of all articles screened at full text, transparent documenting of all methods used. The method includes tertiary reviews, or systematic reviews of reviews.

Key references

Collaboration for Environmental Evidence (2018) Guidelines for Systematic Review and Evidence Synthesis in Environmental Management. Version 5.0. Environmental Evidence, http://www.environmentalevidence.org/guidelines/table-of-contents

[1] www.cochrane.org
[2] www.environmentalevidence.org
[3] www.campbellcollaboration.org

Higgins JPT, Green S (editors). Cochrane Handbook for Systematic Reviews of Interventions Version 5.1.0 [updated March 2011]. The Cochrane Collaboration, 2011. Available from www.handbook.cochrane.org.

Haddaway NR and Westgate MJ (2018) Predicting the time needed for environmental systematic reviews and systematic maps. *Conservation Biology*. The PredicTER tool is available at https://estech.shinyapps.io/predicter/

Haddaway NR et al (2018) ROSES RepOrting standards for Systematic Evidence Syntheses: pro forma, flow-diagram and descriptive summary of the plan and conduct of environmental systematic reviews and systematic maps. *Environmental Evidence*, *7*(1), 7.

Examples of application

The Global Environment Facility commissioned and funded a systematic review on the impacts of terrestrial protected areas on human wellbeing (Pullin *et al.* 2013). This review was a mixed methods systematic review involving quantitative and qualitative syntheses. In general, the evidence base was found to be particularly poor and many impacts reported by qualitative research were not studied quantitatively.

Pullin AS et al (2013) Human well-being impacts of terrestrial protected areas. *Environmental Evidence*, *2*(1), 1.

See Environmental Evidence Journal http://environmentalevidencejournal.biomedcentral.com/ for multiple other examples of systematic reviews. Many examples of these reviews were requested by stakeholders and an advisory board was involved in scoping and designing the review protocol.

Systematic review	
Cost	Staff (6-24 months FTE), subscriptions (database access, article access), software (reference/specialist review management), travel and subsistence, expert (informatician, quantitative/qualitative specialist) Affected by: size of the evidence, existence of previous reviews, need for specialist expertise, complexity of the question, required level of rigour
Time required	6 months - 4 years Affected by: quantity of literature, availability of staff, response

	time, existence of previous systematic reviews or maps (allowing a systematic review of systematic reviews, or a rapid systematic review following production of a systematic map)
Repeatability	High (if conducted, recorded, and archived properly)
Transparency	High (if conducted well, i.e. endorsed by a systematic review co-ordinating body)
Risk of bias	Low (if conducted well), acknowledges risk of bias transparently in evidence base and review method
Scale (or level of detail)	Independent of scale (any)
Capacity for participation	Potential consultation throughout
Data demand	High
Types of knowledge	Scientific/technical, explicit
Types of output	Written report plus other communication materials (e.g. policy brief), list/description/database of existing evidence, answer to question, identification of knowledge gap
Specific expertise required	Systematic reviewer/informatician, topic expert, quantitative/qualitative specialist

Strengths	Weaknesses
Full documentation allows verification and repeatability	High time/resource (staff and expertise/training/access to research papers) requirement
Updating is relatively quick if methods reported well	Report typically written only in English
Protocol externally peer-reviewed and published, increasing transparency and registering intent to conduct the review	Difficult to interpret main report without additional forms of communication (e.g. factsheets), although these are usually done
Comprehensive	Not suitable for broad topic areas
Low risk of bias	
Open access	
Highly resistant to criticism	
Always peer-reviewed	
Coordinating bodies exist that can act as additional endorsement	
Includes stakeholder engagement	
Can be relatively fast if multiple systematic reviews already exist on the topic (systematic review of systematic reviews can be performed)	