

Table 1. The research process stages (adapted from Chalmers & Glasziou, 2009), examples of potential research waste and how ecology and conservation can limit these.

Research stage	Examples of potential for research waste	Where ecology and conservation can reduce waste
Questions relevant to stakeholders	Irrelevant questions asked	Co-development of research questions with stakeholders and using appropriate methodology such as Delphi exercises to avoid issues such as group think or not including the right group of experts or stakeholders
	Previous knowledge not properly taken into account	Make use of evidence synthesis methods (e.g. cumulative meta-analysis, systematic mapping, systematic reviews, meta-analysis) to identify questions that are not satisfactorily answered
Appropriate design and methods	Study poorly designed, under-powered (or over-powered. etc.)	Use simulations or power-analysis prior to undertaking data collection. Predefine effect size of interest with stakeholders (i.e. do not rely on rules of thumb for “statistical significance”)
	Using inappropriate statistical tools (including overfitting etc.)	Better training of early-career researchers in methods. Open code and data to ensure reproducibility of methods
	Questionable research practices lead to poor quality research	Open science (open methods and data, reproducible methods, sharing code, etc.)
		Better training of early-career researchers in methods of open science and evidence synthesis
Unbiased reporting	Lack of open data	Open science (open methods and data, reproducible methods, sharing code, etc.)
	Hypothesising after the results are known	Pre-registration of hypotheses
	p-hacking	Open science (open methods and data, reproducible methods, sharing code, etc.)
	File-drawer syndrome (only some studies are published)	Pre-registration of hypotheses and methods. Open publishing (including preprints)
	Incomplete reporting, making evidence synthesis difficult or impossible	Increasing knowledge of researchers and peer reviewers on what is essential to report, and changing journal guidelines where necessary to ensure all relevant information is reported
Accessible full publication	Publications not available to practitioners and decision makers	Open access publishing, including making resources available to researchers to be able to publish open access
Evidence synthesis	Research not designed or presented in the context of the existing knowledge	Using systematic reviews, systematic maps, meta-analysis, etc. to shape research priorities. Where good quality evidence is available these should be synthesised providing evidence to relevant stakeholders. Research gaps should be the focus of primary studies.