

## Appendix 1. Research method for the analysis of empirical applications of frameworks

Our search for articles that empirically applied each framework was conducted as follows:

1. Each foundational article was searched for in Web of Science Core Collection. For frameworks with more than one foundational article, we focused on the first article listed for the citation analysis. These included Holling (2001) for Resilience, de Groot et al. (2002) for IAES, Liu et al. (2007*b*) for CHNS, and Ostrom (2007) for SESF.
2. Once the title of the foundational article was entered, a list of all articles citing the manuscript was returned. The total number of articles was recorded.
3. To limit this search to only “socio-ecological” or “socio-environmental” papers, results were refined by entering keywords such as “socio-environmental”, “socio-ecological”, “coupled human natural system”, etc.
4. The refined list of articles was regarded as the sample of SE research referencing the framework in any way.
5. All abstracts of manuscripts from this refined list were reviewed and the entire article received a cursory review to assess whether or not the framework was applied. If it was applied, the following information was recorded:
  - a. The SE system domain of the research (e.g., watershed management, smallholder farming system, fishery, etc.).
  - b. The location of the system under investigation.

**Table A1.1.** Citation metadata

Framework	Foundational article	Total citations	Refined citations	Citations with empirical application
HEF	Machlis et al. (1997)	100	37	9
Resilience	Holling (2001)	873	298	99
IAES	de Groot et al. (2002)	1053	111	42
TVUL	Turner et al. (2003)	997	263	10
CHNS	Liu et al. (2007 <i>b</i> )	856	71	24
SESF	Ostrom (2007)	650	77	31