

Appendix 1. Visualization: detailed methodologies.

What is the goal of the visualization and analysis?

- The visualization and accompanying metrics allow an overview of the major areas of research of those articles classified with the term 'social-ecological systems.' The input dataset was sourced from Web of Science. For the author-network, the metric 'betweenness centrality' gives an indication of the importance of key nodes. For the cited reference network, 'modularity Q' and 'mean silhouette' metrics provide an indication of the overall structural properties of the network.

How was the visualization conducted?

- The analysis and visualization were conducted using the software Citespace, version 3.8R1 (Dated 6 January 2014).

Which assumptions and methods have been used in generating the visualization?

- Clustering- identification of prominent groupings- is performed using a smart local moving algorithm (Waltman & Van Eck 2013).
- The clusters allow the identification of core themes within the literature. Time slicing was set at one year intervals.
- Labels for the clusters were based on 'noun-phrases' taken from the titles of co-cited papers.

How were the metrics selected and can they be justified?

- Table A1.3 below shows the outputs of three approaches to automatically generating labels for the clusters, drawing on terms found the titles of all the co-cited papers in each cluster. Term Frequency Inverse Document Frequency (TFIDF), Log Likelihood Ratio (LLR) and Mutual Interactions (MI).
- In our judgement the labels do not show strong dissimilarities, and Log Likelihood Ratio provides the best combination of unique aspects related to each cluster, whilst also providing a breadth of indication of topics within the theme. Hence our choice to include LLR in Figure 3.

Table A1.1 Analytical strategies for scientometric analysis

Issue	Strategy
Hyphenated words:	Both databases treat searches for hyphenated words similarly: social-ecological will find both social-ecological and social ecological
Boolean searching	Terms were combined with the OR operator to ensure all forms of the word were accounted for e.g. socialecological OR social-ecological
Variant endings	Truncation was used to find variant endings e.g. ecolog
Publication types:	Search was refined in both databases to only include the document type (journal) 'articles'
Phrase Searching	Used for "Social-ecological systems"
Fields Searched	Topic search in Web of Science which equates to the Title, Abstract and Keyword search available in Scopus
Time period	From the earliest record in the index to end of 2013
Analysis options	By publication year, by source (journal title) by subject category (discipline of journal)

Table A1.2 Broad categories of the use of the terms socioecological and socialecological

Fields	Meaning
Public health and psychology	Health of individuals within wider contexts
Ecology	Interactions of species within their environment
Human Ecology/ Resilience Theory/ Complex Adaptive Systems	With '-system' to conceptualise an entity made up of interacting biogeographical and social components

Table A1.3 Comparison of output metrics for Labelling Clusters: Term Frequency Inverse Document Frequency (TFIDF), Log Likelihood Ratio (LLR) and Mutual Interactions (MI)

ClusterID	Size	Silhouette	mean(Year)	Label (TFIDF)	Label (LLR)	Label (MI)
0	65	0.458	2004	(12.68) multi-level connection; (10.72) collaborative design; (10.72) management system; (10.72) rhine basin; (10.72) informal participatory platform	adaptive capacity (68.49, 1.0E-4); multi-level connection (29.47, 1.0E-4); research framework (25.92, 1.0E-4);	complex adaptive network
1	49	0.458	2000	(9.48) catastrophic threshold; (8.11) synthesis; (8.04) forest; (8.02) multi-use boreal forest; (8.02) interlocking panarchies	catastrophic threshold (35.2, 1.0E-4); concept (38.73, 1.0E-4); multi-use boreal forest (21.1, 1.0E-4);	british columbia
2	43	0.803	1997	(12.68) pre-contact pacific; (9.5) history; (9.5) urban cultural landscape; (9.5) biodiversity-rich; (8.68) rural people	pre-contact pacific (59.41, 1.0E-4); social ecological system (59.41, 1.0E-4); history (24.68, 1.0E-4);	building resilient social-ecological system
3	41	0.942	1996	(12.68) atoll countries; (7.21) pacific island countries; (7.21) uncertainty; (6.52) countries; (3.69) problem	pacific island countries (186.26, 1.0E-4); uncertainty (186.26, 1.0E-4); problem (177.19, 1.0E-4);	urban delta
4	34	0.841	1993	(10.72) resilience management; (10.72) working hypothesis; (10.72) participatory approach; (7.64) understanding complex eco-social interaction; (7.64) diagrammatic approach	resilience management (39.41, 1.0E-4); working hypothesis (39.41, 1.0E-4); participatory approach (39.41, 1.0E-4);	building resilient social-ecological system
5	28	0.762	2003	(8.68) global collaboration; (8.68) open source; (8.68) social-ecological research; (8.68) open content; (7.03) interplay	social-ecological analysis (33.21, 1.0E-4); biodiversity (26.09, 1.0E-4); multilevel water (26.09, 1.0E-4);	collaborative focus
6	17	0.967	1994	(10.45) canadian western arctic community; (4.12) social-ecological resilience; (2.87) migration;	canadian western arctic community (135.77, 1.0E-4); social-ecological resilience (72.77, 1.0E-4); migration (14.96, 0.001);	resilience

7	15	0.92	1992	(4.2) local ecological knowledge; (4.2) dynamic; (4.2) sweden; (4.2) racken watershed; (4.2) ecosystem	local ecological knowledge (65.86, 1.0E-4); racken watershed (70.19, 1.0E-4); lake (65.86, 1.0E-4);	racken watershed
8	9	1	2001	(11.63) violence; (11.63) youth; (11.63) building community connection; (1.9) building;	violence (95.69, 1.0E-4); youth (95.69, 1.0E-4); building community connection (95.69, 1.0E-4);	...
9	5	0.938	2001	(4.04) marine governance; (3.41) planning; (3.35) fisher; (2.38) communities; (2.38) fisheries	adaptive marine governance (9.35, 0.005); patron-client relation (9.35, 0.005); southern kenya (9.35, 0.005);	resilience
10	4	0.979	1997	(8.68) sustainable development; (4.04) transformation; (3.35) development; (3.35) world; (2.7) adaptive capacity	sustainable development (42.67, 1.0E-4); world (42.67, 1.0E-4); transformation (21.22, 1.0E-4);	resilience
11	3	1	1999	(7.64) support; (7.64) theoretical framework; (7.64) school; (4.22) action research; (2.95) framework	action research (36.43, 1.0E-4); support (36.43, 1.0E-4); theoretical framework (36.43, 1.0E-4);	...
12	3	0.996	1998	(7.64) strategic adaptation; (7.64) social conflict; (7.64) swedish water management; (2.95) conflict; (2.38) social-ecological resilience	swedish water management (34.92, 1.0E-4); strategic adaptation (34.92, 1.0E-4); social conflict (34.92, 1.0E-4);	social-ecological resilience
13	2	1	1999	(2.38) social-ecological system; (1.01) system;	marine social-ecological system (13.1, 0.001); introduction (13.1, 0.001); lagoon (10.33, 0.005);	social-ecological system