

Supplementary Material

Quantitative content analysis of shifting frames in conservation science

In addition to a qualitative thematic analysis of key themes emerging from the conservation science literature, I conduct a quantitative, directed content analysis of the selected review articles (Dixon-Woods et al., 2005; Hsieh & Shannon, 2005). The frequency of terms identified by Mace (2014, within the ‘Changing views of nature and conservation’ table) as being associated with four major framings of conservation were quantified in each of the ten review articles (Table S1) using the ‘Autocode with Dictionary’ tool of MAXQDA 2020 (VERBI Software, 2019). A fifth frame, ‘Peoples and natures’, considers terms (co-production, values, transdisciplinary, transformative) that have become more mainstream with the growth of the conservation social sciences and wider recognition of diverse conservation knowledges, values and pathways.

Note that for some terms (e.g ‘threatened species’) the ‘whole word’ function was checked within the MAXDictio Dictionary, whereas for others (e.g ‘adaptability’) several permutations of the term (denoted by adapt* in Table S1) were identified). Autocodes within each review article were manually checked to remove codes placed in the incorrect context (e.g ‘values’ were only coded within the ‘Peoples and natures’ frame if in reference to human, subjective values, rather than quantitative values) or placed in the article title, reference list or author affiliation.

Analysis of journals selected by existing reviews of conservation science

Table S2 summarises the journals selected by existing reviews of the conservation science literature (Table 1), and Table S3 lists the justifications made by review authors for their journal selection. Note that neither Donaldson et al. (2016) or Bennett et al. (2017) selected literature to review according to journal title, so are not shown in Table 3 or Table S2. Donaldson et al. (2016) ‘...searched the Web of Science (WoS) citation indexing database and tallied the number of papers on each species...’ and ‘we refined our search by the WoS “biodiversity conservation” subject field, in order to capture papers relevant to the fields of biodiversity and conservation’. Bennett et al. (2017) conducted their review to provide a ‘...succinct and accessible reference guide to and overview of the conservation social sciences...through a review of the classic, applied and interdisciplinary conservation social sciences’. Some journals (such as *Conservation Letters*, which was established in 2008) did not exist at the time of publication of earlier reviews such as Lawler et al., (2006).

Table S1

Frame	Key terms	Clark & May, 2002	Fazey, Fischer, & Lindenmayer, 2005	Lawler et al., 2006	Velasco et al., 2015	Donaldson et al., 2016	Di Marco et al., 2017	Bennett et al., 2017	Godet & Devictor, 2018	Mazor et al., 2018	Williams et al., 2020	Total
1 Nature for itself	species	20	39	41	17	38	52	3	24	8	4	226
	habitat*	0	38	6	1	13	0	1	11	9	2	81
	protected area*	0	0	0	3	1	3	1	10	0	1	19
	wildlife*	0	2	1	0	0	2	6	2	0	0	13
	wilderness	0	0	0	0	0	0	1	2	0	0	3
2 Nature despite people	threat*	0	15	48	3	14	6	0	29	3	32	150
	threatened species	0	4	0	1	7	17	0	0	0	1	30
	extinct*	0	1	5	0	2	1	0	1	0	2	12
	population*	0	11	1	4	3	0	4	0	0	11	34
	pollution	0	3	2	2	1	0	2	0	12	0	22
	overexploitation	0	0	1	3	0	0	0	2	9	0	15
	habitat loss	0	0	5	0	0	0	0	0	0	1	6
natural resource management	0	0	0	0	0	0	5	0	0	0	5	
3 Nature for people	ecosystem*	0	10	10	20	1	15	8	1	3	1	69
	ecosystem service*	0	0	1	6	1	1	2	0	0	0	11
	ecosystem function	0	0	0	1	0	0	0	0	0	0	1
	economic*	0	3	2	2	0	1	42	4	0	4	58
4 People and nature	social*	0	2	0	16	1	0	214	4	0	1	238
	interdiscipl*	0	0	0	2	0	0	13	0	0	6	21
	adapt*	0	1	0	0	0	0	2	0	0	0	3
	environmental change	0	0	0	0	0	0	3	0	2	0	5
	resilien*	0	0	0	1	0	0	0	1	0	0	2
	Socioecological/ socio-ecological* system	0	0	0	0	0	0	0	0	0	0	0
5 Peoples and natures	coprod*/ co-produ*	0	0	0	0	0	0	2	0	0	0	2
	values	0	4	0	1	0	0	21	1	0	0	27
	transdisciplin*	0	0	0	0	0	0	0	0	0	0	0
	plural*	0	0	0	0	0	0	0	0	0	0	0
	participatory	0	0	0	2	0	0	4	0	0	0	6
	transform*	0	0	0	1	0	0	0	0	0	1	2
	Total	20	133	123	86	82	98	334	92	46	67	

Table S2

Journal	Clark & May 2002	Fazey et al. 2005	Lawler et al. 2006	Velasco et al. 2015	Di Marco et al. 2017	Godet & Devictor 2018	Mazor et al. 2018	Williams et al. 2020	No. reviews journal is selected for analysis
Total journals analysed per review	2	3	14	3	4	9	21	20	N/A
Agriculture, Ecosystems and the Environment			1						1
American Naturalist							1		1
Animal Conservation			1			1		1	3
Austral Ecology			1						1
Biodiversity & Conservation		1	1	1	1	1		1	6
Biological Conservation	1	1	1	1	1	1	1	1	8
Biological Invasions								1	1
Bird Conservation Journal								1	1
Conservation Biology	1	1	1	1	1	1	1	1	8
Conservation Genetics								1	1
Conservation Letters					1	1		1	3
Diversity & Distributions						1	1		2
Ecography							1		1
Ecological Applications			1				1	1	3
Ecological Economics			1						1
Ecological Monographs							1		1
Ecology							1		1
Ecology Letters			1				1		2
Ecosystems			1				1		2
Ecotoxicology			1						1
Environmental Conservation						1		1	2
Evolution							1		1
Fish and Fisheries								1	1
Forest Ecology and Management								1	1
Functional Ecology							1		1
Global Change Biology			1				1	1	3
Global Ecology and Biogeography							1		1
Journal for Nature Conservation						1			1
Journal of Animal Ecology							1	1	2
Journal of Applied Ecology			1				1		2
Journal of Biogeography							1		1
Journal of Ecology							1		1
Journal of Insect Conservation								1	1
Journal of Wildlife Management								1	1
Molecular Ecology							1		1
Nature								1	1
Oikos							1		1

Evans MC (2021) Reconceptualising the role(s) of science in biodiversity conservation. *Environmental Conservation*

Oryx	1	1	1	3
Proceedings of the National Academy of the United States of America			1	1
Proceedings of the Royal Society B - Biological Sciences		1		1
Science			1	1

Table S3

Review citation	Journal selection justification
Clark and May 2002	n > 2,700 papers, two journals, 1987 to 2001 'two leading conservation research journals: <i>Conservation Biology</i> (United States) and <i>Biological Conservation</i> (United Kingdom).'
Fazey et al. 2005	n = 547 papers in 2001, three journals 'The journals were selected on the basis that they were the highest impact biological journals with ' <i>conservation</i> ' in the title. They have all been heavily involved in the promotion of conservation biology and together provide a good representation of the global scientific literature in conservation biology.'
Lawler et al. 2006	n = 628 papers in 1984, 1994, and 2004; 14 journals total 'We sampled a wide range of conservation literature by first identifying the top 60% of ecology journals, as ranked by the Journal Citation Reports...the 60% cut-off corresponded to an ISI impact factor of "1" for the 2003 rankings. From this initial set of candidate journals, we selected those for which at least 50% of the published papers addressed conservation topics.'
Velasco et al. 2015	n = 966 papers in 2000 and 2011, three journals 'We examined three international journals in biodiversity conservation: <i>Biodiversity & Conservation</i> , <i>Biological Conservation</i> and <i>Conservation Biology</i> . We selected these three journals, following Fazey et al. (2005), as they are a good representation of the worldwide scientific literature in biodiversity conservation in the first decade of 21st century.'
Di Marco et al. 2017	18,369 paper classifications from 13 existing reviews, and n = 2,553 papers published between 2011 to 2015, three journals 'We selected <i>Biological Conservation</i> and <i>Conservation Biology</i> because of their primary focus on conservation and their usage in past reviews of conservation research... We selected <i>Conservation Letters</i> , a much younger journal never previously used in similar analyses, as it has a specific focus on articles with a clear significance for conservation policy and practice.'
Godet & Devictor 2018	n = 12,971 papers published between 2000 to 2015, 9 journals 'We analysed...nine leading international conservation science journals. We restricted this analysis to journals corresponding to the field 'conservation' according to the Web of Science: <i>Animal Conservation</i> , <i>Biodiversity and Conservation</i> , <i>Biological Conservation</i> , <i>Conservation Biology</i> , <i>Conservation Letters</i> , <i>Diversity and Distributions</i> , <i>Environmental Conservation</i> , <i>Journal for Nature Conservation</i> , and <i>Oryx</i> '
Mazor et al. 2018	n > 44,000 papers published between 2006 and 2016, 21 journals '...21 prominent ecological and conservation journals.' "...all journals from the ISI Web of Science in the field of "Ecology" and "Biodiversity Conservation" with a 2016 Impact Factor ≥ 4.000 = 34 journals. Journals required 10 years of continuous data from 2006-16 = 30 remaining. Journals categorised as generic or specialised. Generic = primary research journals for all areas of ecology. Only Generic journals used = 21 remaining and used for the analysis.
Williams et al. 2020	n=959 papers from years 1997, 2002, 2007, 2012 and 2017, 20 journals 'To investigate patterns in the wider conservation-science literature, we picked a representative sample of 20 conservation, applied ecology, and general-interest journals. We ensured that our sample journals ranged from the highest impact journals in which conservation scientists are likely to publish, through to relatively low-impact factor, taxon-specific, journals. We also included some journals linked to related disciplines, which publish conservation-relevant studies, for example, Fish and Fisheries.'

Literature cited

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