



Article

Sustainable Tourism in Sensitive Areas: Bibliometric Characterisation and Content Analysis of Specialised Literature

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Abstract: Thirty years after the emergence of the term “sustainable tourism” and in view of the proliferation of literature on the subject, it seems appropriate to carry out a bibliographical review, based on empirical bibliometric data, in order to find out who the leading research pioneers are for this type of tourism, discover gaps in our understanding, and redefine the concept’s frontiers. This paper focuses specifically on sustainable tourism in *sensitive areas*, in a first attempt to provide understanding of the accumulated knowledge of the sub-theme by looking at research presented by impact publications. A total of 985 papers published on this topic on Web of Science were selected to this end, and after applying the H-Classics methodology, a content analysis of the forty papers with the greatest impact was carried out. This has led to the discovery of research trends, gaps in the analysis of polar and mountainous areas, and a lack of a core group of highly productive researchers in this area.

Keywords: sustainable tourism; sensitive areas; bibliometrics; content analysis; H-Classics

1. Introduction

In accordance with the definition in UNEP UNWTO (2005), sustainable tourism is “Tourism that takes full account of its current and future economic, social and environmental impacts, addressing the needs of visitors, the industry, the environment and host communities” [1] (pp. 11–12). Although the official definition was elaborated upon in 2005, the concept had appeared in scientific literature several decades earlier. Ruhanen et al. [2] establish 1987 as the starting point of the term, after the publication of “Our Common Future” by the World Commission on Environment and Development (WCED). Since then, the number of studies addressing the topic has not stopped growing. Buckley [3] estimated in his review that there were around 5000 publications, and at present, a simple search by topic in Web of Science yields more than 8500 results, reaching up to 1 million in Google Scholar.

In April 1995, the Sustainable Tourism Conference approved the first Sustainable Tourism Charter. In it, 18 principles were proclaimed that defined the concept. Number two stated that: “Tourism should contribute to sustainable development, integrating itself into the natural, cultural and human environment, respecting the fragile balances that characterise many tourist destinations, in particular small islands and environmentally sensitive areas...” In other words, special attention was paid to the so-called “sensitive areas”, without establishing (beyond small islands) what those areas are and what environments they comprise. In the absence of a generally accepted definition by the scientific community, this paper starts from the IUCN (2008) [4] definition of a *protected area*, which is “an area of land and/or sea specially dedicated to the protection and maintenance of biological diversity and of cultural and associated resources, managed through legal or other effective means”, and a *sensitive*

area is considered to be an area of land or sea (including islands, mountains, polar and coastal regions, and others such as deserts, etc.) that, owing to special environmental characteristics, requires particular attention in order to assimilate the impacts of tourism.

The unique characteristics of islands, which are a product of their vulnerability and remoteness, imply that there is a need for sustainability in island tourism when it comes to carrying capacity, community involvement, and local environmental policies. Coastal areas, on the other hand, are subject to both social and economic problems on account of their attractiveness to tourists, as well as environmental concerns about water scarcity and the deterioration of water quality [5]; all of this makes these regions particularly sensitive to the approach of sustainable tourism principles in their development. Coasts in particular have been at the forefront of the development of tourism infrastructure. Here, the presence of a large number of tourists has often had negative consequences for the sustainable use of available resources, which in turn has had an effect on the integrity of ecosystems [6]. Moreover, according to Tan et al. [7], although highly developed tourism has produced significant economic benefits, it has also caused pollution and unbalanced development, which have severely degraded the coastal environment and the marine ecosystem. Coastal areas have also been identified [8] as being most vulnerable to climate change, for example as a result of extreme events and sea level rise. It will be increasingly important for managers of coastal tourism destinations to understand their vulnerability to climate change and design appropriate strategies for adaptation.

Furthermore, the biogeographical characteristics, extreme conditions, and inhospitable environment, as well as the marine biodiversity of the polar regions, are also attracting an increasing number of tourists interested in their unpopulated nature and cultural and historical attractions. The development of tourism in the polar regions has the potential to negatively affect the natural character of these areas and the cultural integrity of their local communities. For this reason, Huijbens and Lamers [9] highlight the growing academic interest in this type of area, and went so far as to create an international research network—International Polar Tourism Research Network (ITPRN)—with biannual conferences on tourism in the polar regions. According to Stewart et al., “polar regions symbolize the world’s last great wildernesses, so it is not surprising that much research has focused on the effects of tourism activity, particularly the increasing numbers of tourists, on what is perceived as the fragile polar environment” [10] (p. 386).

Finally, Brătucu et al. [11] highlight how mountains and their landscapes represent key resources for the tourism industry in their study on sustainable tourism development practices in the Carpathian Mountains of Romania, although the over-development of mountain tourism can contribute to environmental degradation and affect biodiversity. This is justified by Malik and Bhat [12] in their study in the Himalayan region, where tourism creates environmental and socio-economic consequences, and mountain tourism is of particular concern because it is often adopted as a means for community development, but it also degrades the environment. Bonzanigo et al. [13] also consider a large amount of literature that suggests that the European Alpine Region is extremely sensitive to climate change. Winter tourism is closely related to climatic variations, especially in mountainous regions, where resorts depend heavily on snow. While individual measures for sustainability in these areas are not sufficient, the involvement of specialised authorities through legislative measures is essential for sustainable tourism in mountain areas.

Therefore, this article presents as its objective the analysis of literature specialized in sustainable tourism in sensitive areas, paying special attention to islands, coastal areas, polar regions, and mountains, owing to their particular exposure to tourism and the environmental dangers they suffer in the face of unplanned development, which turns these areas into prospects for sustainable tourism practices. The study will carry out a bibliometric characterization of the articles published on this subject on Web of Science, followed by a content analysis of those publications that make up the H-Core of this field of research.

This study is intended to fill a gap in the range of bibliometric studies on sustainable tourism produced to date, which have been concentrated in only a few publications, and have approached the

issue in a general manner. This article focuses on sustainable tourism applied to the areas described, and analyses all the publications from any time period covered by Web of Science, in order to produce results that are as representative as possible.

Following the Introduction, Section 2 illustrates the methodology used to obtain the sample selection and then defines the H-Classics methodology. Section 3 describes the bibliometric characteristics of the studies on sustainable tourism in sensitive areas. The main publications, authors, and journals will undergo a review. After that, in the fourth section, a content analysis of the forty articles that make up the H-Core will be carried out. Finally, Section 5 will outlay the main conclusions reached and the limitations of the study, and will also propose new lines of research.

2. Methodology: Bibliometric Analysis and the H-Index

After carrying out comparative analyses between the available scientific databases [14,15], the ISI Web of Science was selected as the source of the documentary samples for this study, as it is the most relevant database available and offers the greatest possible time coverage of the indexed information. The search sequence was defined by topic, combining the terms reflected in Table 1.

Table 1. Search file.

WOS	
Date	4 March 2018
Database	Web of Science Core Collection
Type	Simple
Syntax	✓ Sustainable tourism + island (556 documents)
	✓ Sustainable tourism + mountains (256 documents)
	✓ Sustainable tourism + polar regions (4 documents)
	✓ Sustainable tourism + sensitive environments (50 documents)
	✓ Sustainable tourism + coastal regions (171 documents)

This search may leave some interesting articles out of the sample if the keywords or the topic do not include any of the search terms. Thus, Rodríguez and Espino [16] discuss the key sustainability factors in an empirical analysis on the island of Gran Canaria, but do not introduce the term “island” as a key word in their study. The search term has focused on sustainable tourism, without considering other related terms, such as ecotourism, a concept reviewed by Fennel [17] in a content analysis; or community-based-tourism (CBT), a type of tourism that takes into considerations social, environmental, and cultural sustainability, and which is operated and owned by the resident in order to increase the consciousness of the visitors, showing them the local and community way of life [18]. Although such terms show an undoubted relationship with sustainable tourism, they have not been included in the search, since they are considered independent concepts and their study should be carried out in future papers.

After eliminating duplicate records (e.g., coastal regions and islands produce some overlapping results), the final sample set is made up of a total of 985 documents. After the first search, it can already be observed how the analysis of sustainable tourism in sensitive areas focuses primarily on islands and mountain areas. Little attention is paid, for example, to polar regions, where the number of documents indexed on Web of Science is limited to four, or to other sensitive areas.

Finally, and as a preliminary step before finalising the results, the sample set had to be standardised (i.e., refining the information, locating and correcting spelling errors, variants of the same word or name, etc.), as the final result of the analysis depends to a large extent on exhaustive standardisation.

The SciMAT bibliometric software and the analysis tools made available by WoS were the instruments used to obtain the results [19]: Analyze Results and Creation Citation Report. A single citation pattern, the Social Sciences Citation Index (SSCI) of the Web of Science, was used in all analyses.

The second part of the paper carries out a meta-analysis of the 40 articles included in the H-Core. For this purpose, the methodology proposed by Martínez et al. [20] to identify the classics of literature of a scientific area through the H-Classics concept and the H-Index indicator was used to select the works considered “classics” in this discipline, and to determine the most influential studies of sustainable tourism in sensitive areas within the 985 documents that make up the initial sample.

The H-Classics methodology starts from the definition of the concept of literature or citation classic [20]—that is, those documents that have marked a certain discipline and whose visibility is above the rest (number of citations received). In accordance with definitions made by Martínez et al. [21], the H-Index indicator was applied according to the following procedure:

- Select the publications and their citations from the selected database.
- Configure the sample population that represents the area of research to be analysed.
- Determine H-Index (Hirsch index for the area under study: It is calculated by ranking publications by the number of citations received in descending order, and listing them to determine the point at which the order number matches the number of citations received [22]) of the area under study.
- Extract the H-Core for the area under study (those documents placed above the H-Index of the area).

In this case, the H-Index has been set at forty, so the first forty documents in descending order of citation will configure the H-Core of this area, which will then be subjected to a meta-analysis.

3. Bibliometric Characterisation of the Literature Specialising in Sustainable Tourism in Sensitive Areas

Thirty years after the emergence of the term “sustainable tourism”, and in view of the proliferation of literature centred on the subject, it seems appropriate to carry out a bibliographical review based on empirical bibliometric data, in order to find out who the leading research pioneers are for this type of tourism, discover gaps in our understanding, and redefine its frontiers.

The publication of results is a fundamental part of the research process, and the means by which progress in a given area is validated and publicised. Therefore, if publications are the means of transmitting and validating scientific knowledge, the analysis of publications is an appropriate tool for evaluating research activity and helping legitimize emerging advances [23]. Bibliometric analyses are based on bibliometrics, or the “science of science”, according to [24]. They are focused on calculating and analysing the values of what is quantifiable in the production (publications) and consumption of scientific information [25–27]. To this end, they employ mathematical and statistical methods to the indexed documents in order to study said activities.

On the one hand, a number of rigorous bibliometric analyses already exist on the topic of sustainable tourism. For example, Butler [28] studied the evolution of the concept a little more than a decade after its emergence. Lu and Nepal [29] used the articles published in a single specialized journal (*Journal of Sustainable Tourism*) over a period of 15 years for their analysis; more recently, Ruhanen et al. [2] presented a longitudinal analysis of 492 papers published in the four journals of greatest impact in the field of tourism.

On the other hand, there is no record of specific bibliometric studies for sustainable tourism in sensitive areas. The importance of research in this sub-field, however, is undeniable. The World Trade Organisation (WTO) itself focuses on SIDs (small island developing states) as well as wetlands and coastal areas as concrete fields of work in the study of the sustainable development of tourism. According to Lim and Cooper [30], challenges in the growth and development of tourism in sensitive areas are of paramount importance for future sustainability practices. The growing interest of international travellers in visiting these types of destinations, the sensitivity of these areas to climate change, and the changing lifestyles of their residents imply that there is a greater incentive for academic and scientific research in this field.

This paper focuses specifically on sustainable tourism in sensitive areas, in a first attempt to provide understanding of the accumulated knowledge of the sub-theme by assessing research published by impact publications. By focusing on this very specific and interesting topic, the study strengthens its underlying intellectual structure and knowledge base, and complements the bibliometric studies mentioned above. This is achieved by covering a greater time period, a larger number of journals and articles, and a different set of analyses that will allow the creation of future research agendas.

3.1. Document Samples

The samples obtained include articles dated between 1992 and 2018. The first article listed deals with sustainable strategies for tourism on Caribbean islands and was written by De Albuquerque and McElroy in 1992 [31]. The selection is made up of a total of 6392 citations, 19.09% of which are concentrated in the first ten documents. Particularly noteworthy are the first four papers on the list. Gössling et al. [32], Krüger [33], Aburto-Oropeza et al. [34], and Aguilo et al. [35] accumulate more than 2% of the aforementioned total number of citations (Table 2).

Table 2. Ten main papers by number of citations.

Rank	Title	Authors	Year	Total Citations	% Citations
1	Ecological footprint analysis as a tool to assess tourism sustainability	Hansson, CB, Horstmeier, O, Saggel, S, Gössling, S	2002	186	2.91%
2	The role of ecotourism in conservation: panacea or Pandora's box?	Krüger, O	2005	167	2.61%
3	Mangroves in the Gulf of California increase fishery yields	Aburto-Oropeza, O, Danemann, G, Valdez, V, Murray, J, Sala, E, Ezcurra, EM	2008	145	2.27%
4	The persistence of the sun and sand tourism model	Aguilo, E, Alegre, J, Sard, M	2005	135	2.11%
5	Policy learning and policy failure in sustainable tourism governance: from first- and second-order to third-order change?	Hall, CM	2011	119	1.86%
6	A multicriteria approach to evaluate wind energy plants on an Italian island	Cavallaro, F, Ciraolo, L	2005	111	1.74%
7	Philippine coral reefs under threat: The economic losses caused by reef destruction	White, AT, Vogt, HP, Arin, T	2000	92	1.44%
8	The growth of coastal tourism in the red-sea: present and future effects on coral reefs	Hawkins, JP, Roberts, CM	1994	92	1.44%
9	Public preferences for landscape features: The case of agricultural landscape in mountainous Mediterranean areas	Sayadi, S, Gonzalez-Roa, MC, Calatrava-Requena, J	2009	88	1.38%
10	The consequences of tourism for sustainable water use on a tropical island: Zanzibar, Tanzania	Gössling, S	2001	85	1.33%
				1220	19.09%

As for the concentration of these papers by year and number of citations received, as shown in Figure 1, the time period between 2008 and 2013 shows the highest number of citations, with momentary peaks in 2002 and 2005. It is clear that as time passes through the two and a half decades covered by the selection of papers, the number of publications per year steadily increases. In recent years, the number of citations has dropped, as an obvious consequence of the reduced period of exposure.

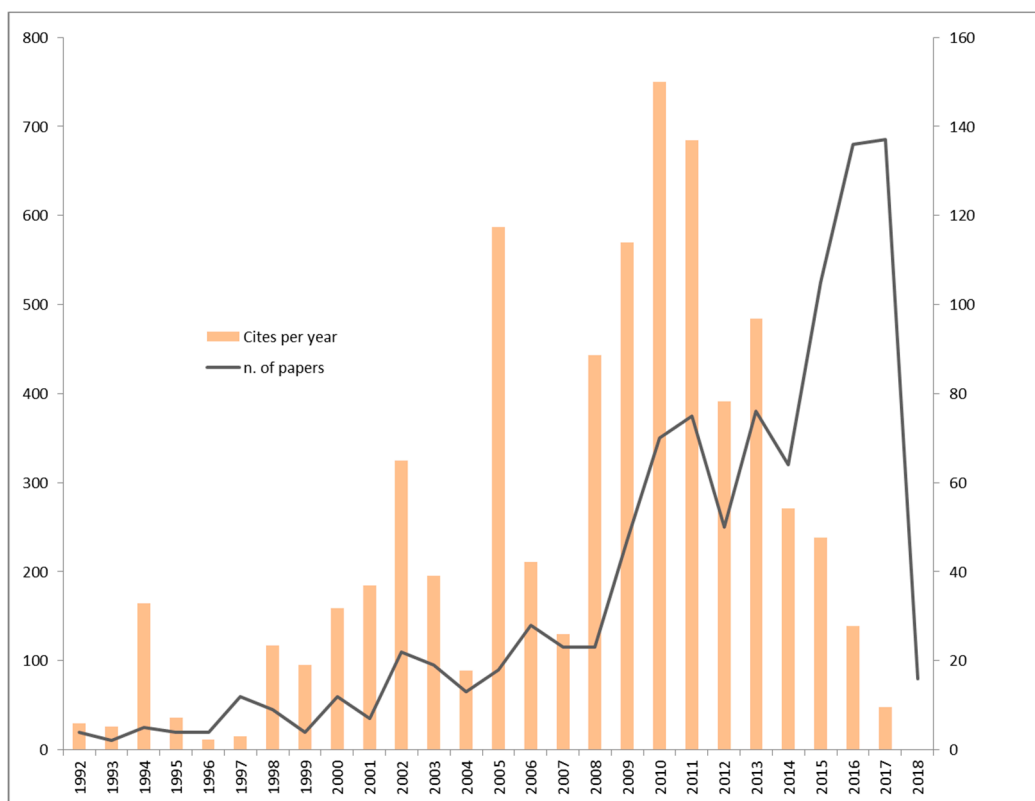


Figure 1. Number of papers and citations per year.

The most common document type among these papers is the article, although congress and conference proceedings papers also represent a significant percentage. Table 3 shows the distribution of the 985 documents. It is necessary to clarify that the sum of these counts exceeds the total figure of 985 and the 100% mark, as there are papers registered in more than one document category.

Table 3. Number of papers per type of document.

Document Types	Record Count	%
Article	682	69.24%
Proceedings paper	306	31.07%
Book Chapter	47	4.77%
Review	15	1.52%
Book review	14	1.42%
Editorial Material	12	1.22%
Book	2	0.20%

As for the research areas the sample documents represent (Figure 2), the following stand out: ecological and environmental sciences, with 409 documents (41.5% of the total); social sciences (263 documents, 26.7%); science and technology (126 documents, 13.1%); and business and economics (111 documents, 11.27%). It should be noted that each document may appear in one or more subject categories, and that only those categories which include ten or more documents from the sample set are shown on the graph. As can be seen, the sustainability of tourism in sensitive areas has been analysed in relation to a wide range of themes and knowledge areas, although environmental and social sciences, technology, and business clearly predominate.

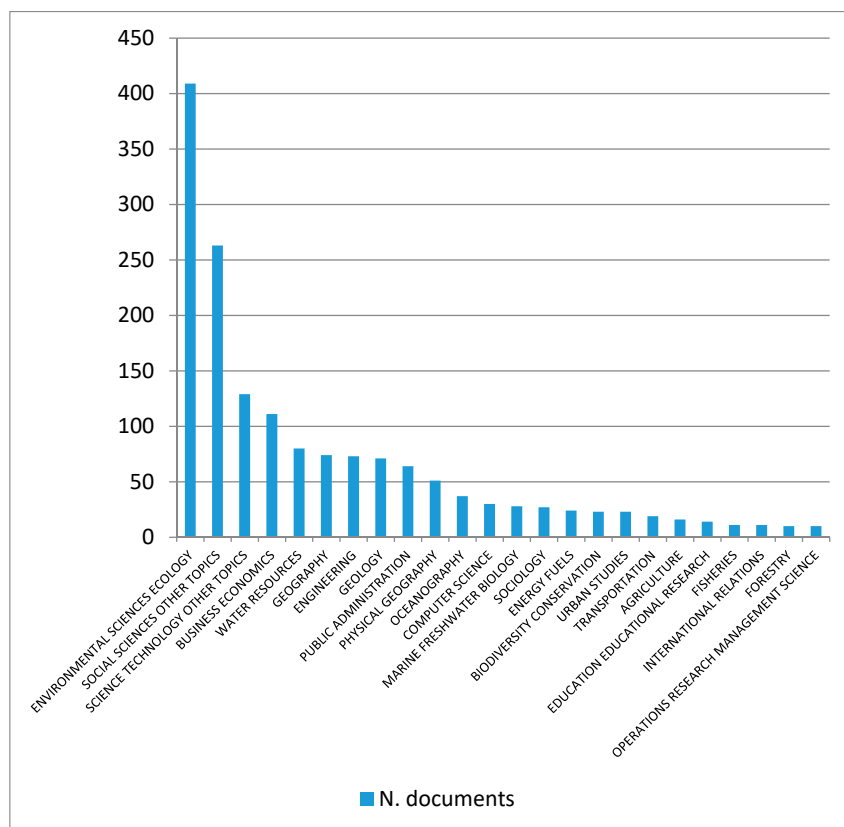


Figure 2. Number of documents by research area.

On the other hand, when focusing on the subject categories defined by Web of Science (Table 4), it can again be observed how the greatest number of documents is concentrated in environmental sciences and environmental studies, as well as tourism-related articles pertaining to the specific categories of hospitality, leisure, and sport tourism. The table only shows the subject categories with thirty or more documents—again, it should be noted that the same work can be included in more than one different category, so that the sum of documents and percentages exceeds 100%.

Table 4. Main subject categories.

Subject Categories (Web of Science)	n. Documents	%
ENVIRONMENTAL SCIENCES	271	27.61%
HOSPITALITY LEISURE SPORT TOURISM	223	22.64%
ENVIRONMENTAL STUDIES	181	18.38%
GREEN SUSTAINABLE SCIENCE TECHNOLOGY	121	12.28%
WATER RESOURCES	80	8.12%
ECOLOGY	77	7.82%
GEOGRAPHY	74	7.51%
GEOSCIENCES MULTIDISCIPLINARY	64	6.50%
PLANNING DEVELOPMENT	63	6.40%
MANAGEMENT	54	5.48%
GEOGRAPHY PHYSICAL	51	5.18%
ECONOMICS	47	4.77%
SOCIAL SCIENCES INTERDISCIPLINARY	40	4.06%
OCEANOGRAPHY	37	3.76%
ENGINEERING ENVIRONMENTAL	33	3.35%
BUSINESS	30	3.05%

3.2. Authors

The 985 sample documents bring together research work by 2576 authors (including co-authors). Table 5 shows a ranking of the top ten most productive authors on Web of Science (greatest number of articles listed on Web of Science), including the sum of the total citations received and the percentage they represent of the total number of citations in the 985 documents (6.393%). The most prolific authors do not exceed four papers published by journals indexed on Web of Science, which shows the lack of a corpus of researchers who provide leadership in this area. It will be necessary to study the evolution of literature on this subject, in order to detect citation patterns that will highlight those authors who are most productive and of the greatest impact, and who could be referred to as “classic” authors of the discipline. (Separating the authors represented in the sample selection into author 1, 2, and 3 doubles the number of citations. The initial value of the total citations received by the 205 H-Classics has been taken for the percentage calculation).

Table 5. Top 10 authors by number of papers in the sample.

Rank	Author	N. of Papers	N. of Cites	% Cites
1	Gössling, S	4	335	5.24%
2	Scherrer, P	4	42	0.66%
3	Marzuki, A	4	21	0.33%
4	Carlsen, J	4	17	0.27%
5	Esbah, H	4	11	0.17%
6	Calado, H	4	22	0.34%
7	Arizpe, O	4	1	0.02%
8	Duvat, V	4	0	0.00%
9	Scheyvens, R	3	164	2.57%
10	Pickering, CM	3	107	1.67%
			720	11.26%

On the other hand, the ranking according to published papers varies considerably if we take into account the order of authors by impact of their publications (i.e., number of citations received), as can be seen in Table 6. While Gössling stands out as both the most productive author, with four papers, and the author with the greatest impact, with 335 citations, the rest of the table shows how authors with only one paper have had a wider impact than others with a greater number of papers. It is worth mentioning that Duvat has not received any citations to date, despite being one of the most productive authors, with three articles on the subject listed on Web of Science. However, Aburto-Oropeza ranks fourth for impact with a single document indexed on the database.

Table 6. Top 10 authors per impact.

Rank	Author	N. of Papers	N. of Cites	% Cites
1	Gössling, S	4	335	5.24%
2	Scheyvens, R	3	164	2.57%
3	Sala, E	2	146	2.28%
4	Aburto-Oropeza, O	1	145	2.22%
5	Aguilo, E.	1	135	2.11%
6	Hall, CM	1	119	1.86%
7	Cavallaro, F	1	111	1.74%
8	Pickering, CM	3	107	1.67%
9	Hawkins, JP	1	92	1.44%
10	White, AT	1	92	1.44%
			1446	22.57%

Figure 3 shows the first 10 countries of origin of the authors and co-authors of the 985 documents in the sample. As can be expected, most authors are North American, while the People’s Republic of China comes second and Australia third. Several European countries occupy the following ranks.

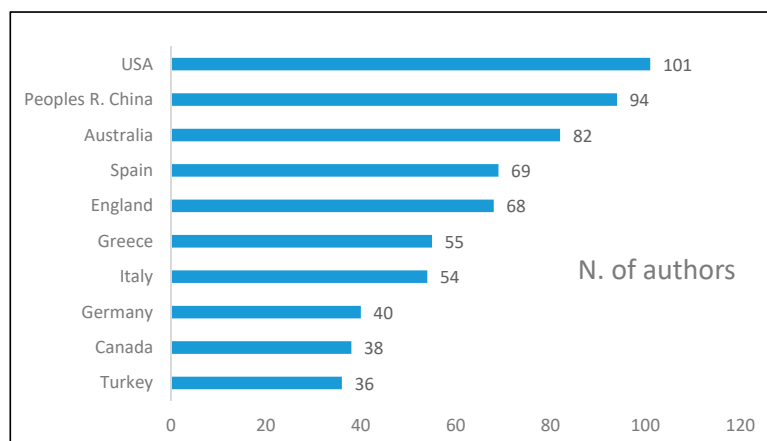


Figure 3. Authors' countries.

As for the language of publication, English comes first, making up more than 95% of the documents, and Spanish second, representing 2.24%.

3.3. Journals

To conclude this section on the bibliometric characteristics of the documents focused on sustainable tourism in sensitive areas, the main journals are analysed (Table 7).

Table 7. Top 10 journals per number of papers in the sample.

Orden	Journal	n. Articles	n. Cites	% Cites
1	JOURNAL OF SUSTAINABLE TOURISM	44	751	11.75%
2	OCEAN & COASTAL MANAGEMENT	28	238	3.72%
3	SUSTAINABILITY	28	52	0.81%
4	JOURNAL OF COASTAL RESEARCH	21	63	0.99%
5	TOURISM MANAGEMENT	19	546	8.54%
6	MOUNTAIN RESEARCH AND DEVELOPMENT	14	160	2.50%
7	JOURNAL OF ENVIRONMENTAL PROTECTION AND ECOLOGY	13	42	0.66%
8	ISLAND STUDIES JOURNAL	12	27	0.42%
9	JOURNAL OF MOUNTAIN SCIENCE	11	18	0.28%
10	INTERNATIONAL JOURNAL OF SUSTAINABLE DEVELOPMENT AND WORLD ECOLOGY	9	38	0.59%
	TOTAL	199	1935	30.26%

Although the 985 works are distributed across a total of 519 publications, almost a quarter of them are concentrated in the first ten journals listed in the ranking, totalling a little less than a third of the citations, making them largely responsible for the impact of these papers.

There is a publication with a higher number of articles (10). ISLAND TOURISM: SUSTAINABLE PERSPECTIVES. However, this is a book included in Ecotourism Book Series. For this reason, it is not included in Table 7). The journals fall into different categories: environment, tourism, and specific areas including sensitive areas (islands, mountains, coastal areas).

4. Analysis of the H-Classics of the Study of Sustainable Tourism in Sensitive Areas

As described in Section 2, the application of the H-Index in the main sample offered a resulting total of 40 articles, which configure to the H-Core in this topic. The list of the forty titles together with their authors is shown in Appendix A.

For each one of these works, a file has been created detailing objectives (focus of the study), the origin of the data or sample applied, location, methodology, and main results obtained. Table 8 shows the first ten documents of the H-Core together with their respective characteristics. In order to keep this article at a manageable length, we have only included the ten articles with the greatest impact, although the complete table is available from the authors upon request.

Table 8. Content-analysis of the top 10 papers in H-Core.

Author	Focus of the Study	Data/Sample	Location	Method	Results
Gössling et al. (2002)	To provide a methodological framework for the calculation of ecological footprints related to leisure tourism	Ecological footprint of 117,690 international leisure tourists, who visited the Seychelles in the year 2000	Seychelles	Each tourist's total ecological footprint consists of the aggregated categories built-up land, fossil energy land, arable land, pasture, forest, and sea space.	Aggregated footprint per tourist 1.8564 Ha per cap per year High-value tourists might generate the largest foreign exchange earnings per capita, but they also seem to be characterised by the highest resource use per Capita.
Krüger (2005)	To analyze if ecotourism contributes towards conservation of threatened species and habitats or if it is just a marketing ploy of the tourism industry	251 case studies on ecotourism from the literature	Cases from all continents	Meta analysis Contingency tables, test for differences, and multivariate logistic regression analysis (sustainability as dependent variable)	Local involvement and control measures were perceived to increase the success of ecotourism in conservation. Too-high tourist numbers and lack of control or management were identified as the main reasons for unsustainability
Aburto Oropeza et al. (2008)	To test the hypothesis that the amount of mangrove forests has a direct bearing on the production of many commercially important fisheries	13 coastal regions from a wetland database for northern Mexico. Fisheries data included 9146 landing records (2001–2005) in 25 local offices of the Mexican National Fisheries and Aquaculture Commission	Baja California and the Gulf of California	Scaling models Regression models	A square-root relationship between mangrove area and fisheries The extreme undervaluation of the benefits generated by mangroves for fisheries versus the projected benefits of coastal development and aquaculture reveals a management crisis for coastal areas in the Gulf of California
Aguiló et al. (2005)	To analyse the Balearic tourism market To check if there is a “new sun and sand tourist” whose demands are not so different from the “old tourist”; if classic sun and sand destinations are still competitive and the need for further reorganisation of the sun and sand tourism model, from the perspective of local sustainable development policies	Tourist Spending Survey (EGT) 1989–2000	Balearic Islands (Spain)	Frequencies, covariance analysis, Price model	The existence of a neo-Fordist sun- and-sand-type tourist: a consumer of a less standardised, better quality product. It is not enough to design a product based on good quality hotels and clean beaches. Instead, attention must be paid to the entire tourist destination
Hall (2011)	To analyse sustainable tourism and the governance systems for sustainable tourism, via the concepts of policy learning and failure	No use of data. Theoretical article	Not applicable	Literature review	Although exogenous factors such as a crisis event may lead to policy paradigmatic change, there is insufficient evidence that such a shift in sustainable tourism policy will necessarily occur given the entrenched dominance of the existing paradigm.
Cavallaro and Ciraolo (2005)	To make a preliminary assessment regarding the feasibility of installing some wind energy turbines in a site on the island of Salina	Anemologic data	Salina—Aeolian Archipelago (Italy)	PROMETHEE Multicriteria method NALADE method Sensitivity analysis	Multicriteria analysis can provide a valid tool to aid decision-making for achieving targets relating to more sustainable green energy
White et al. (2000)	To analyse economic plans to get sustainable levels of healthy reefs	Three popular diving destinations in Philippines	Mabini (Batangas)-Philippines	Cost-benefit analysis	To providing income for the tourism industry, reef visitors are often willing to contribute to the costs for reef management Reef management involving local fishing communities, local governments and other concerned organizations is a cost-effective way to alleviate the pressure on the numerous threatened coral reefs. Economic valuation and cost-benefit analysis can provide essential information to support more investment in reef conservation

Table 8. Cont.

Author	Focus of the Study	Data/Sample	Location	Method	Results
Hawkins and Roberts (1994)	To examine the impacts that expanding coastal tourism has had on coral reefs	Not applicable	Egypt, Israel, and Jordan	Case study	Although current levels of recreational use appear to be sustainable, the massive expansion planned throughout the region will place the long term future of the region in doubt. Unless the pace of tourist development in the northern Red Sea is reduced soon, the carrying capacity of coral reefs seems sure to be exceeded, with widespread reef degradation the likely result
Sayadi et al. (2009)	To examine whether agricultural landscape provision really responds to a social demand. To evaluate rural landscape preferences of citizens from a range of choices. To estimate their willingness to pay (WTP) to enjoy each of the landscape characteristics existing in the area	Answers given by visitors in previous work (Sayadi, 1998; Sayadi and Calatrava, 2001)	Alpujarras-(Granada)-Spain	Conjoint Analysis (CA) and Contingent Valuation (CV)	Agricultural landscape component plays an important role in public preferences on the landscape and WTP. Maintaining local agricultural activities, preventing future migration from agricultural lands, recovering abandoned fields, and including elements of rural landscape observation and appreciation of existing recreational programmes for rural tourism in the area were among the strategies to take full advantage of this aesthetic landscape potential, and to foster sustainable development of the region.
Gössling (2001)	To analyse the influence of tourism industry in the use of freshwater resources on the east coast of Zanzibar, Tanzania	Two earlier surveys carried out by FAO/UNDP and by Halcrow (1994). The Tourism Zoning Plan by the MWCELE (1993) A questionnaire administered to sample of hotels and guesthouses	Unguja Island and Pemba (Zanzibar) Tanzania	Frequencies, proportions and correlations	The tourism in the area becomes unsustainable, which could have an adverse effect on the national economy and also on the local population and environment. Therefore, a precautionary water management approach is suggested

With the aim of examining the articles included in the H-Core in greater depth, they have been grouped according to the sensitive area they deal with, the type of study they describe, the main focus of the research work, and the geographical area or continent where the study was carried out.

4.1. Sensitive Area

More than half of the H-Core articles, 25 to be precise, describe studies on islands. Different coastal areas are the subject of analysis in nine publications. Lastly, there are five articles that focus on protected areas in the mountains, and only one document examines the polar region: Eijgelaar et al. [36] investigate the perception of tourists on cruise ships visiting the Antarctic polar region, and the influence of the behaviour of these travellers on sustainable tourism in the region. This document ranks 13th in the H-Core for number of citations.

Taking into account that the complete sample set of the initial 985 papers contains only four articles dealing with polar regions, the existence of a gap in the studies on sustainable tourism in this type of area becomes evident, something that researchers could exploit in the future by developing this line of investigation further. It can be thought that perhaps the amount of research in each area is representative of the amount of tourism. However, there is no doubt about the potential of the polar regions as tourist attractions, given the increase in travellers that has been occurring in the last two decades [10]. The Association of Arctic Expedition Cruise Operators estimates this raise to be 18.3% in the last five years, in the Antarctic region alone. The United Nations Environmental Program also reveals that tourism is a growing activity in the Polar Regions. In the Arctic, tourism is already an important component of the economies of the north. In the Antarctic, the number of tourists landing on continental Antarctica continues to rise sharply. There are serious concerns that tourism is promoting environmental degradation in the Polar Regions (especially in the Arctic) by putting extra pressures on land, wildlife, water, and other basic necessities, and on transportation facilities. Therefore, a greater research effort on the sustainability of tourism in these areas may be a trend in specialized scientific literature.

Islands and coastal areas stand out from the outset as areas frequently selected for this type of study, so focusing empirical studies or analyses on these areas in the future would not be considered original or groundbreaking.

On the other hand, mountain areas, especially in protected parks, nature parks or ski resorts, also seem to provide an opportunity for researchers to exploit the lack of work in the analysis of sustainable tourism in these areas. According to the Association for Sustainable Development of Mountain Regions in Macedonia, about 15–20% of the tourist industry, or US\$70–90 billion per year, is accounted for by mountain tourism. However, while European mountain regions are usually strictly regulated for tourism, mountainous regions in many other parts of the world have been characterized by unregulated, uncontrolled, and haphazard development. Therefore, there is an interest gap in the analysis of sustainable tourism in these areas that have not been adequately managed so far.

4.1.1. Type of Study

The forty documents making up the H-Core have been grouped into four categories, in accordance with the type of study produced:

- Theoretical Study: Elaboration of a theoretical, conceptual or methodological framework for an element related to the subject matter.
- Empirical Study/Impact study: Empirical application by means of qualitative or quantitative techniques; the impacts of tourism or impacts on social, environmental, or economic tourism.
- Literature Review: Revision or critical review of theories and concepts in order to analyse aspects of sustainable tourism in sensitive areas.
- Case Study: Individual descriptive or exploratory analysis of a place or aspect.

It is worth noting that some of the forty publications could be referenced under more than one category, which is why the final tally is greater than forty. Figure 4 shows the results obtained.

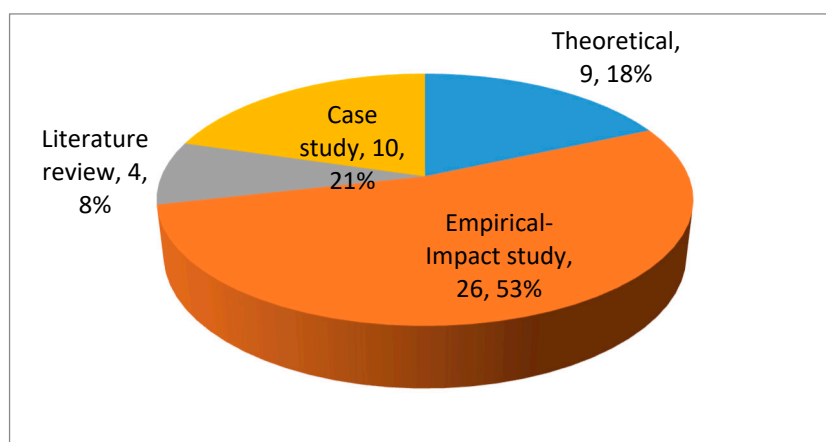


Figure 4. Type of study of papers in H-Core.

As expected, most of the articles centred on this topic carry out some kind of empirical or impact study, especially on environmental and economic issues. Non-empirical case studies also have significant weight, with the work of Krüger [35] standing out among the top ten as the second-most influential article of the total sample, or Hawkins and Roberts [37] with their comparison of cases in Israel, Egypt, and Jordan.

Theoretical articles and literature revisions have a minor presence. It is not easy to publish such studies, as it is necessary to demonstrate originality or address a theoretical gap in the area in order to obtain positive feedback in journals of impact and quality. Only Hall's [38] work, which aims to analyse sustainable tourism and systems of governance through policy learning and policy failure, falls into this category in the top ten articles of the ranking.

4.1.2. Focus of the Study

It has been rather complicated to define categories on account of the diversity of approaches and objectives of the articles corresponding to the H-Core of the topic.

In order to include the complete range of possibilities, topics have been defined broadly and divided into the following three categories (again, the presence of some articles in more than one is noted):

- Environment: this is the subject matter of more than half of the documents, twenty-six to be precise. Their objectives are to analyze the various aspects of the environmental impact of tourism, such as associated CO₂ emissions [39,40], its ecological footprint [32], and its impact on water use [6,41–43] and certain animal species, such as dingoes [44], threatened species [33], birds [45], and apes [46], as well as the impact on fauna and flora (coral reefs [37,47]) and on land in the form of erosion and land degradation [42,48].
- Tourism/tourists: 13 articles were taken into account, focused mainly on perceptions, motivations, and types of tourist markets. The examples are the studies by Aguiló et al. [35] on the existence of a new sun and beach tourist, Sayadi et al. [49] and their study of the willingness to pay of visitors to rural landscapes. Similarly, Thur [50] presented a model on the willingness to pay of tourists visiting protected area on the Antilles (Netherlands), Eijgelaar et al. [36] study the behaviour of cruise ship tourists in the Antarctic, and Seckelmann [51] compares domestic tourism in lesser-known areas of Turkey to mass tourism in the richer parts of the country.
- Policies: eleven documents can be categorised under this heading, which focuses on policies, forms of governance, and actions to protect, promote, and manage sustainable tourism.

For example, there is Hall [38] and his review of the literature on systems of governance for sustainable tourism, Scheyvens and Momsen [52] and their construction of a conceptual framework for the analysis of pro-poor tourism, Yasarata et al. [53] on the influence of political obstacles in the implementation of sustainable tourism development, or Magliocca et al. [54] and their proposal for the development of ecotourism policies for the sustainable management of protected parks in the Congo.

4.1.3. Continent/Geographical Area

Previously, reference was made to the considerable number of European authors in the global sample of articles, so it is not particularly noteworthy that seventeen of the forty research projects referenced in the H-Core were carried out in different places in Europe, predominantly in Spain (Balearic Islands, Catalan coast, Aragonese mountains, the Alpujarra mountains in Granada, and the Pyrenees), Italy (Sardinia), France (Brittany, French islands), or Holland (Antilles).

The rest of the continents are represented in a similar way (Africa: seven; Asia and Australia: five; America: three). The limited presence of high impact studies developed in territories of the American continent, whether North, Central, or South, seems remarkable despite the predominance of American authors in the global sample set.

Antarctica appears only once, in the aforementioned article by Eijgelaar et al. [36].

5. Conclusions

The aim of this analysis has been to present patterns and trends followed by a specific field of sustainable tourism, thirty years after the first appearance of this concept in the 1987 Brundtland Report.

The characterisation of the papers published on Web of Science has highlighted the areas of greatest interest to researchers, namely islands and coastal areas, while papers dealing with mountain and polar areas are less visible on this database, which is considered to be the most relevant according to many scientific forums.

It is not possible to speak of a strong core of researchers in the discipline of sustainable tourism in sensitive areas, since the most productive authors have only produced four papers since the first appearance of a document on this subject in 1992. It has also been observed that there is no correlation between productivity and impact, as the ranking of authors varies considerably in each case, with the exception of Gössling, who ranks first among the authors in both publications and citations received.

The thematic areas are highly skewed towards the environment, and the question of how the environment and tourism influence and affect each other: nature attracts tourism, and that tourism generates positive as well as negative impacts in these areas. In contrast, knowledge areas, such as management or business, are less represented and could be the subject of a future research trend focused on this topic.

When examining the list of the forty classics obtained through the application of the H-Classics methodology, certain issues need to be taken into consideration:

- a. The dynamic character of the H-Classic methodology: It has been demonstrated that the way in which the classics of literature on sustainable tourism in sensitive areas have been selected provides a true picture of the discipline at the time of conducting the study, which means that the methodology responds to the changes in citation patterns over time. Though they may swap positions, the top ranks (in terms of citations received) in the list will remain constant, and will continue to form a part of the classics in future searches. However, the lowest-ranking documents in the set will be subject to modifications. Some articles will be replaced by new ones, yet others will climb up the ranks, etc.
- b. Subject matter of the sample documents: When the pre-processing and standardization tasks were carried out, the abstracts of each one of the articles were read to verify if they fit or were specifically related to the subject, observing that although there is an important group of them

that deal unequivocally with the subject, there are others that do not do so in a specific way, though there is a clear relationship.

- c. Caution when assessing citations: The number of citations received by a document is used in scientific research as the main bibliometric indicator. Nevertheless, it is worth highlighting that this is fundamentally a quantitative indicator. According to Gómez and Bordons [55], this indicator has become essential in the evaluation of scientific activities, despite the controversy that it arouses owing to the diverse motivations that lead an author to cite, and in spite of the complexity of discerning between the proportion of citations that correspond to the quality of the research work, and those that correspond to other factors, such as the prestige of the authors cited, the institution they represent, etc. This study has taken the number of citations as a measure of visibility and impact, assuming that although there is no exact correspondence between the number of citations and the usefulness of the document, the greater the number, the greater the interest for the scientific community.
- d. Temporary character of citation: Any study of this kind is subject to a certain time lag. Between the publication of a document and the time it receives its first citations, a certain period of time passes, which means that those documents that were published earlier have a higher likelihood of having accumulated citations, since they have been available for longer than those from later authors. This has the effect that more recent works have a smaller chance of demonstrating their transcendence as a measure of the number of citations received. This is why it is necessary to update the ranking regularly. Taking into account the Law of Exponential Growth, ten years could be defined as an adequate interval.

Some of the conclusions that can be drawn from the forty documents that make up the H-Core are the following:

- Despite the prominence of authors from the People's Republic of China, in the 985 documents obtained from Web of Science, there is no representation of this country in the forty articles of the H-Core, as is the case with North American and Australian authors.
- The contemplated areas of study are, as mentioned earlier, centred on questions relating to the environment and climate impact or natural resources. As Ruhanen et al. [2] say, it is questionable whether climate change will become a paradigm of sustainable tourism as long as attention to it is a prerequisite for sustainable development.
- Other areas, such as ethics in tourism development or business management policies associated with this type of tourism have not yet been developed, and could be emerging issues to be exploited by researchers in the future.

In short, this work has been designed to contribute to the set of works based on the bibliometric analysis of sustainable tourism, focusing on a field of special interest, and demonstrating that the combination of the H-Classics methodology with the analysis of content produces scientific knowledge of greater depth than the mere traditional reviews of literature that are not supported by any qualitative or quantitative arguments. When it comes to the practical applications of this research, apart from providing novel ideas on literature review in the fields of sustainable tourism in sensitive areas, the research helps discover gaps in the understanding of this type of tourism and redefines its frontiers. It is thought that the results could be interesting for academic and scientific research in this field.

As for the limitations of this study, the lack of a definition in literature of what is to be considered a "sensitive area" should be mentioned first and foremost. This article has defined it as islands, coastal areas, mountains, and polar regions. However, other papers also mention other zones, such as deserts or savannahs, as places where sustainable tourism requires special attention. An attempt has been made to alleviate this problem by adding the generic term "sensitive areas" to the thematic search, to try to include possible works not picked up by the searches of the four selected areas. On the other hand, the usual problems associated with the database and the use of bibliometrics must be pointed out. The articles obtained from Web of Science originate in very different disciplines, where citation

patterns vary significantly (the H-index of environmental sciences may be radically different from that of economics as a discipline, for example). Another considerable limitation is the fact that it is impossible to determine how many of the citations received by a paper are a reflection of its quality or usefulness.

Finally, among the future lines of research that may complete the knowledge accumulated on the subject, it would be important to validate the results obtained by conducting new studies using other databases (Google Scholar, Scopus) and exploring the possibility of combining them. Furthermore, a co-word analysis dividing the time period under study into different phases could identify emerging concepts, new trends, and patterns of correspondence between the themes of each sub-period. As a final point, new analysis related to ecotourism, community-based tourism, and other terms related to sustainable tourism can be developed in the future to complete the current one.

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Conflicts of Interest: The authors declare no conflict of interest.

Appendix

Table A1. The 40 papers in the H-Core.

Rank	Title	Authors
1	Ecological footprint analysis as a tool to assess tourism sustainability	Gössling, S, Hansson, CB, Horstmeier, O, Saggel, S
2	The role of ecotourism in conservation: panacea or Pandora's box?	Krüger, O
3	Mangroves in the Gulf of California increase fishery yields	Aburto-Oropeza, O, Ezcurra, E, Danemann, G, Valdez, V, Murray, J, Sala, E
4	The persistence of the sun and sand tourism model	Aguilo, E, Alegre, J, Sard, M
5	Policy learning and policy failure in sustainable tourism governance: from first- and second-order to third-order change?	Hall, CM
6	A multicriteria approach to evaluate wind energy plants on an Italian island	Cavallaro, F, Ciraolo, L
7	Philippine coral reefs under threat: The economic losses caused by reef destruction	White, AT, Vogt, HP, Arin, T
8	The growth of coastal tourism in the red sea: present and future effects on coral reefs	Hawkins, JP, Roberts, CM
9	Public preferences for landscape features: The case of agricultural landscape in mountainous Mediterranean areas	Sayadi, S, Gonzalez-Roa, MC, Calatrava-Requena, J
10	The consequences of tourism for sustainable water use on a tropical island: Zanzibar, Tanzania	Gössling, S
11	A climate change vulnerability assessment methodology for coastal tourism	Moreno, A, Becken, S
12	Tourism and poverty reduction: Issues for small Island states	Scheyvens, R, Momsen, JH
13	Antarctic cruise tourism: the paradoxes of ambassadorship, last chance tourism and greenhouse gas emissions	Eijgelaar, E, Thaper, C, Peeters, P
14	A review of the impacts of nature based recreation on birds	Steven, R, Pickering, C, Castley, JG
15	Tourism in Small Island States: From Vulnerability to Strengths	Scheyvens, R, Momsen, J
16	Energy use, CO ₂ emissions and waste throughout the life cycle of a sample of hotels in the Balearic Islands	Rossello-Batle, B, Moia, A, Cladera, A, Martinez, V
17	Tourism and sustainable water supply in Mallorca: a geographical analysis	Kent, M, Newnham, R, Essex, S
18	Politics and sustainable tourism development—Can they co-exist? Voices from North Cyprus	Yasarata, M, Altinay, L, Burns, P, Okumus, F
19	A methodological approach to be used in integrated coastal zone management processes: the case of the Catalan Coast (Catalonia, Spain)	Sarda, R, Avila, C, Mora, J
20	Bicycle tourism in the South Island of New Zealand: planning and management issues	Ritchie, BW
21	Impacts of tourism development on water demand and beach degradation on the island of Mallorca (Spain)	Garcia, C, Servera, J

Table A1. Cont.

Rank	Title	Authors
22	User fees as sustainable financing mechanisms for marine protected areas: An application to the Bonaire National Marine Park	Thur, SM
23	Hematological differences between stingrays at tourist and non-visited sites suggest physiological costs of wildlife tourism	Semeniuk, CAD, Bourgeon, S, Smith, SL, Rothley, KD
24	Domestic tourism - a chance for regional development in Turkey?	Seckelmann, A
25	Coastal tourism development in Southeast Asia: relevance and lessons for coastal zone management	Wong, PP
26	Urban and tourist land use patterns and water consumption: Evidence from Mallorca, Balearic Islands	Hof, A, Schmitt, T
27	When wildlife tourism goes wrong: a case study of stakeholder and management issues regarding Dingoes on Fraser Island, Australia	Burns, GL, Howard, P
28	The Impact of Land Use/Land Cover Changes on Land Degradation Dynamics: A Mediterranean Case Study	Bajocco, S, De Angelis, A, Perini, L, Ferrara, A, Salvati, L
29	Do tourism-based ski resorts contribute to the homogeneous development of the Mediterranean mountains? A case study in the Central Spanish Pyrenees	Lasanta, T, Laguna, M, Vicente-Serrano, SM
30	Conceptualizing yield - Sustainable tourism management	Northcote, J, Macbeth, J
31	Does the tourist care? A comparison of tourists in Koh Phi Phi, Thailand and Gili Trawangan, Indonesia	Dodds, R, Graci, SR, Holmes, M
32	Comparative life cycle assessment and social life cycle assessment of used polyethylene terephthalate (PET) bottles in Mauritius	Foolmaun, RK, Ramjeeawon, T
33	Tourism in protected areas can threaten wild populations: from individual response to population viability of the chough <i>Pyrrhocorax pyrrhocorax</i>	Kerbiriou, C, Le Viol, I, Robert, A, Porcher, E, Gourmelon, F, Julliard, R
34	Small island states and territories: Sustainable development issues and strategies—Challenges for changing islands in a changing world	Douglas, CH
35	Implementing carbon neutral destination policies: issues from the Seychelles	Gössling, S, Schumacher, KP
36	Beyond Sustainability: Optimising Island Tourism Development	Lim, CC, Cooper, C
37	Managing Dive Tourism for the Sustainable Use of Coral Reefs: Validating Diver Perceptions of Attractive Site Features	Uyarra, M, Watkinson, A, Cote, IM
38	Population structure and group composition of western lowland gorillas in north-western Republic of Congo	Magliocca, F, Querouil, S, Gautier-Hion, A
39	Consequences of Non-Intervention for Infectious Disease in African Great Apes	Ryan, SJ, Walsh, PD
40	Pyrenean Pastoralists' Ecological Knowledge: Documentation and Application to Natural Resource Management and Adaptation	Fernandez-Gimenez, ME, Estaque, FF

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