

Discussing a challenging document focused on Land Use: The first bibliometric analysis of Laudato Si'

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Abstract

We live challenging times on several levels, and in this context the second encyclical, Laudato Si' (LS), of Pope Francis, published in 2015, has provided a special challenge for academics. As Pope Francis suggested in 2015, societies are challenged to modify the paradigms of life to achieve more sustainable development. LS has quickly become a widely quoted document, even by academics. This paper is the first bibliometric research about LS aiming to analyze this encyclical and explore several works published about LS between 2015 and 2020. To this end, we studied all documents published in the Web of Science Core Collection (238) and Scopus (222) about the topic "Laudato Si'" in depth and analyzed them using bibliometric methods. The results show that there are scientific fields focused on studying LS in particular, namely Religious Sciences and the fields of Sustainability and Environment Studies. We also observed a small amount of networking among the authors publishing about LS.

Keywords: Bibliometric research; Laudato Si; Development; Global issues

Introduction

Laudato Si (LS) is an encyclical signed by Pope Francis that was published in 2015. At the time, several sources identified it as a pontifical document with an ecological focus. Little by little, however, it has become clear that this encyclical called for sustainability not only of the planet but also of the relationships between people in order to generate a sense of justice, a

guarantee of transmission of the natural heritage and a belief in economic and social equity, within the communities and also among various countries.

As this is a document signed by a religious figure, one could suppose that scientific publications would not include quotes from the LS. However, as this document will show, this did not occur. LS, in the five years since its publication, has been cited in 238 documents identified by the Web of Science (WoS). Furthermore, these scientific publications are not restricted to journals focused on religious or theological studies, but gradually the fields of natural sciences, sustainability, ecology and forest sciences have also read, studied and discussed the LS.

On the one hand, it may be assumed that the citations of the LS in such diverse areas of scientific study reveal the success of the scope of this document. However, this work will show that the majority of the references still come from documents in religious and theological fields, which proves to be a serious challenge if we consider that the encyclical's stated intention has been to reach the majority of scientific fields involved in current social and political action. Finally, using P1 models (probability of citation between journals), we demonstrate that the articles that cite the LS are more likely to cite works from other journals in the same scientific field, which can delay the LS's ability to be analyzed in several other academic and bibliometric fields.

The next chapters have the following structure. Section 2 revisits the LS and its content. Section 3 details our bibliometric effort and the surrounding debate. Section 4 concludes the paper, raising some promising challenges for future avenues of study.

2. LS as an encyclical that (also) engages academic debate: From a description of the structure to a justification of the current analysis

Works such as those by Kerber (2018) or Bavaresco (2016) detail the contents of the LS. We do not intend to replicate the framework analysis of the LS that has been completed in areas as diverse as environmental policy, theological reflection, sustainability or international relations. For these debates, we suggest the works of Capaldi (2017), Neves et al. (2016), Muscolini (2016), Peppard (2016) and/or Thomasset (2019).

However, we consider it relevant to briefly present the LS's content in order to better understand the scope of the literature as well as the potential that it has presented for many of the works that we will analyze in our bibliometric effort.

Chapter 1 serves as an introduction to the main dimensions of the LS. It starts with the responsibility of the human species to end its violent transformation of the natural environment and moves towards the need for action to repair and recover the earth based on the 3Rs: Reduce, Reuse, and Recycle.

Chapter 1 also identifies how human's current impact on the environment and the planet's resources has led to growing weaknesses, especially affecting the communities that mostly dependent on natural resources (especially rural and fishing communities) while also harming communities with more consumption capacity through the practice of superfluous consumption or an additions to the so-called 'waste disposal'. The combination of these factors means that we are faced with the threat of a reduced legacy for future generations.

Chapter 1 is further developed based on a call to action/conversion, manifested in a change in behaviors, lifestyle, forms and methods of production, and consumption practices. In addition to touching on dimensions such as water management, Pope Francis mentions the need for a different view of the economy, calling for more solidarity and less focused on immediate profits or outcomes. It also recognizes that current economic models have been generating an enormous amount of suffering (albeit silent), a suffering affecting millions of human beings mired in poverty, pollution, loss of biodiversity, and social degradation.

Chapter 2 develops the theological foundation of the LS. Reinforcing the idea that the present requires action, it denounces the prevalence in current international relations of the 'law of the strongest'. It is in this chapter that we can see, more clearly, that this document aims to reach everyone, following a precedent used by, for example, John XXIII, which tended to sign documents addressed to 'all men of goodwill'.

Chapter 2 signals the importance of the dialogue of the faith with other dimensions of human life, such as poetry and other forms of art but also with regards to scientific knowledge. Even so, in Chapter 2, it becomes apparent that the renewed vision of creation proposed in the LS is an important vision for everyone. Evoking the message of the human being 'created in the image and likeness of God', Chapter 2 also reminds readers of the idea that the planet is a part of the common good, where private property exists only to contribute to a balanced management of our 'common home '. Chapter 2 cites several figures and personalities from the Christian tradition as those who have shared in the vision of the LS from the figure of St. Francis of Assisi to St. Bonaventure or even the biblical Daniel.

Finally, Chapter 2 also points out that the deep wound found in human relationships with nature must not be compensated for by an exaggerated appreciation of the environmental realities to the detriment of human relationships, especially detrimental to the most vulnerable human beings, such as the communities directly dependent on nature for their survival or the elderly and children of the more industrialized countries.

Chapter 3 refocuses the discussion on the responsibility of the human being in the face of the profound changes that have occurred in the natural environment. However, it co-blames the human beings' output, their means, their tools, and technologies that have contributed to this transformation. Thus, the absolutization of technology is seen as a cause for the loss felt in the environment, for global warming and for the threat of impoverishing future generations.

Chapter 3 is also a chapter in which the need for a balanced ecology is emphasized, recognizing the value of human beings in all their characteristics and ages, especially those who are

sometimes valued less than certain environmental movements. Thus, stressing the need for humanity's values not to be tied to technological success, Chapter 3 calls for a critical reading of technological evolutions and how the pace of technological progress is itself consuming the planet's capacity for regeneration.

The (central) concept of 'integral ecology' is developed in Chapter 4 where authors like DiLeo (2018) explain the presence of the influence of Leonardo Boff and other (heterodox) authors (Sadowski, 2016). It is a chapter that reinforces the interconnectedness of creation; that is, all living beings and non-living beings are interconnected. Thus, it is no longer possible for someone or some community to feel isolated from what happens to another being or another community. In keeping with the encyclical 'Evangelii Gaudium' and DiLeo's reading (2018), there is an "invitation to dialogue with all persons and concern for the vulnerability of creation to sociopolitical and economic systems that value only profit and power". As DiLeo (2018) points out, "an integral ecology calls for openness to categories that transcend the language of mathematics and biology and take us to the heart of what it is to be human." Thus, Chapter 4 calls for a greater look at communities (including the scientific community) and calls for a transcendent viewpoint. Regarding the concept of 'integral ecology', there is also an appreciation of human labor, especially the work of farmers and owners of small agricultural spaces, emphasizing the importance of small-family farming for the value of the products created for consumption and for an approximation between the role of producers and the role of consumers (Sommerville et al., 2019).

Chapter 5 looks for solutions to some of the environmental problems mentioned. While it assumes that the analyses are not sufficient, it reinforces the need for dialogue and action. The need for dialogue is extended to all options (religious, political, economic, etc.) This chapter emphasizes that the Catholic Church does not replace the evidence of scientific debate, but that it cannot deny the possibility of promoting concerned debated and, above all, action.

Chapter 5 is a critical chapter for the results achieved, particularly at international summits on the environment. Thus, recognizing that market mechanisms are not sufficient to guarantee the answers to the problems of our "Common Home," Chapter 5 again identifies some of the current problems (in keeping with what was seen in Chapter 1), such as the exaggerated consumption, the corruption, or the short-term thinking. It claims for the need for transparency in decision-making processes, and remembering that everyone saves what is most important to them (criticizing the priority given to banks' financial rescues). It is a chapter that ends by showing how there is less and less space for the weakest and the least productive, emphasizing that each and every human being is indispensable to changing the world.

The last chapter (Chapter 6) reinforces the human beings' role as guests in a "common home." It is made explicit in this chapter that there must be an individual and community ecological

conversion (Crabbé, 2016) and that all people must be guardians of creation. Thus, nobody can be excused from that responsibility. Returning to a language of the influence of authors like Boff (Coatanea, 2016), Chapter 6 points out transformative steps, including the reduction of plastics as a key material for current production processes, the planting of trees, the care of others, and even increased recognition of the transcendence of creation through prayer and poetry motivated by Nature (in line with the expression of Saint Francis of Assisi). Using a biblical foundation, similar to Chapter 2, it appeals to an ethics of sobriety and gratitude (Crabbé, 2016).

The motivations for this work: The importance of LS within encyclicals focused on the environment and ecology

In the first paragraphs of the encyclical LS we realized how this document seeks to follow a series of documents developed by the previous Popes over the last fifty years focused on the environment and ecology. In particular, between numbers three and six, we see the identification of the following documents that have somehow influenced the LS: *Pacem in Terris* (John XXIII), *Octogesima adveniens* (Paul VI), *Redemptor hominis* (John Paul II), *Centesimus annus* (John Paul II), *Sollicitudo rei socialis* (John Paul II), and *Caritas in veritate* (Benedictus XVI).

However, performing a descriptive analysis clearly demonstrates how the LS has imposed itself on the academic discussion published and located by the Web of Science databases (SCI-EXPANDED, SSCI, A & HCI, CPCI-S, CPCI-SSH, ESCI, CCR- EXPANDED, and IC). The number of documents referring to each of those encyclicals identified by the Web of Science (as of July 23, 2020) is as follows:

Pacem in Terris (1963): 23

Octogesima adveniens (1971): 4

Redemptor hominis (1979): 4

Sollicitudo rei socialis (1987): 11

Centesimus annus (1991): 37

Caritas in veritate (2009): 47

Laudato Si (2015): 222

Although other encyclicals have stimulated scientific insights, the LS has sparked relevant academic debate, as seen above. A bibliometric analysis on the LS is therefore essential for the following five reasons which, as seen in Ferreira et al. (2020), Kadam (2020) or Pinto et al. (2019), are the requisite reasons for conducting a bibliometric analysis.

First, bibliometric analysis allows researchers to 'mark' the evolution of scientific reflection on a given topic; this markup will be very useful for comparative purposes of analyzing the subsequent evolution of the topic, in accordance with the discussion by Garcia et al (2019). Second, the current year, 2020, was considered by the Dicastery for Promoting Integral Human Development as a Special Year for the LS, which may indicate the need to reinforce the message with the target audiences already identified in 2015 (Zagonari, 2019) . Taking advantage of reference years like 2020 is a useful tool to guide the evolution of the scientific literature on a particular topic (Mourao and Martinho, 2020). Third, we intend to analyze what the scientific community—one of the 'partners' invoked in the LS document—has been doing since the LS. Thus, we intend to analyze what the academy has published as a result of individual reflections and of the academic community on the issue. Fourth and linked to the previous justification, we have to recognize that the LS is not an encyclical that particularly focuses on academic and scientific behavior 'per se', as for example the 'Fides et Ratio' by John Paul II does. In spite of this, such evidence arouses even more interest in analyzing the LS and the extent to which the LS is an encyclical that also concerns many academic communities. As Zagonari (2019) recognizes, however, the LS is based on “an inter-disciplinary perspective that combines science and ethics, and theoretically and empirically assesses its scientific and ethical statements in terms of their ability to achieve global environmental sustainability.” Finally, we intend to examine, in the wake of Linneluecke et al. (2020), what trends have been defined, both in terms of focused scientific fields (Are, for example, the fields of natural sciences citing the LS more than the theological or economic sciences?) and which universities/institutions have positioned themselves with greater interest in this debate as so far.

The sections that follow will provide answers to these questions.

3. The bibliometric analysis of Laudato Si' 2015-2020

This research was performed considering documents obtained from the WoS Core Collection (Web of Science, 2020) and Scopus (Scopus, 2020) databases for the period of 2015 to July 2020 using the search term “Laudato Si.” A total of 238 documents were considered from the

WoS database, and 222 documents were considered from Scopus (searching within titles, abstracts and keywords).

In this way, the sample has a total of 460 documents. The year 2018 had the most documents in the two analyzed databases (figure 1). Additionally, the English language was used for the majority of the published documents (figure 2). In general, the number of works published in most other languages was similar for the two databases; however, we also identified a higher number of studies listed by Scopus written in French, Portuguese and Spanish.

In the following subsections, we will discuss the distribution of these papers. We will particularly focus on the following filters: keywords, authors, organizations (i.e. affiliations), countries, and sources (i.e. journals). For the analysis performed in these subsections, we also considered the results from the VOSviewer software (VOSviewer, 2020; van Eck and Waltman, 2020).

3.1. Keywords

Let us start our bibliometric analysis by paying special attention to the keywords of the identified works. The keywords are very important elements in a bibliometric analysis because, according to Pesta et al. (2018), they are terms that the authors consider central to link the work in question to search engines and to bibliographic search algorithms. Thus, keywords reveal a commitment on the part of the authors between the core themes of the work in question with the main topics that the scientific literature is currently considering. Finally, these words are an identification of the work with the target audience of a specific reading public.

Figure 3 and Table 1 present the results obtained through the VOSviewer software for the link co-occurrence with the item keyword (considering one to be the minimum number of occurrences of a keyword). The results show that beyond the expected keywords 'Laudato Si' and 'Pope Francis,' the keywords that occurred more frequently are 'ecology,' 'climate

change,' 'environment,' 'sustainability,' 'ethics,' 'justice,' and 'leadership'. In turn, keywords as 'integral ecology,' 'ethics,' 'Catholicism,' and 'justice' are among the earlier occurrences (with an average publication year of 2016). It is highly relevant (and challenging) that these keywords are clearly more related to ecological issues than with theological topics; however, as we will demonstrate later, there have been more articles published in theological journals than in ecological publications.

[Insert here Figures 1, 2, and 3]

[Insert here Table 1]

Table 1 shows two aspects that are also relevant. The first aspect concerns the observation that the oldest keywords were more focused on religious subjects. This explains why the 'Average Publication Year' of 'Catholicism,' 'Religion' or 'Incarnation' is 2016. In contrast, keywords like 'Ecology,' 'Climate Change,' or 'Environment' are associated with later years. This aspect shows that there is an evolutionary reading of the LS by the identified authors; we can thus observe that the LS started to be approached within religious studies first and that in more recent publications it has been increasingly cited as an important document for the consideration of other fields of the academy, namely the field of climate change and global problems.

3.2. Authors, affiliations, countries and journals publishing about the LS

Reflecting the output of the VOSviewer, Figure 4 shows that our sample has a total of 323 authors affiliated with 230 organizations, from 36 countries and publishing in 114 journals/sources from the WoS platform. From the Scopus database, results were obtained from 292 authors, 240 organizations, 35 countries and 112 sources.

[Insert here Figure 4]

282

283 [Insert here Table 2]

284

285 Taking into account this information, Table 2 reveals that the majority of the authors have
286 published one document about the LS. Some authors—like Denis Edwards (with four articles)
287 —have published two or more documents, for a maximum of four documents among the
288 authors and eight for organizations (with Australian Catholic University publishing the most).

289 The USA (with about seventy documents in both databases) and Italy (with thirty-two
290 documents in WoS and thirty-six in Scopus) are the leading countries according to Table 2.
291 Some journals that are more focused on religious issues are among the leading sources (this is
292 the case of titles like *Theological Studies*, *The Journal of Religious Ethics* or *Heythrop*). It is also
293 worth mentioning that a book called *Integrated evaluation for the management of*
294 *contemporary cities* appears among the top sources in this list.

295

296 **3.3. Authors, organizations, countries and sources according to the number of citations**

297 The number of citations of the previously identified documents are detailed in Table 3. The
298 results presented in this table show that, in general, there are higher frequencies identified in
299 the Scopus database than in WoS.

300

301 [Insert here Table 3]

302

303 On the other hand, authors Heather Akin, Ariel Hasell, Kathleen Hall Jamieson, Asheley R.
304 Landrum and Robert B. Lull have more than ten citation in both databases. Regarding the
305 number of citations for several organizations, there are relevant differences between the two
306 databases. For example, for WoS, the organizations whose works reported a higher number of
307 citations (more than ten citations) are Australian Catholic University, the University of Notre
308 Dame, Fordham University, California State University–Fresno, Texas Tech University, and the
309 University of Pennsylvania. For Scopus, the institutions with the highest number of citations of
310 works about the LS are the University of Pennsylvania, Texas Tech University, and California
311 State University.

312 The USA and Italy are, again, the countries with the most citations. The journals *Theological*
313 *Studies*, *Cognition* and *Quarterly Review of Biology* are among the most cited sources identified
314 by both databases.

3.4. Testing the hypothesis of homophily among citations

At this point, we consider it particularly relevant to investigate whether journals publishing articles about the LS tend to cite works on the LS published in other journals of the same scientific field—supporting the hypothesis of homophily—or of a different field. Namely, we intend to investigate whether journals focused on biology are also able to publish articles about the LS that quote works from journals focused on theology, for example. As one of the objectives of the LS was to spread its influence over the highest number of scientific areas possible, testing the homophily hypothesis will demonstrate whether it is a latent barrier to the objective of enlarged influence.

The patterns of identified citations tend to present statistical regularities, which can be disclosed by a probabilistic model (p_1).

Following Uddin and Hossain (2013) and Mourao (2020), we can classify all dyads of identified sources/journals (i, j) as mutual ($x_{ij} = x_{ji} = 1$), asymmetric (x_{ij} not equal to x_{ji}), or null ($x_{ij} = x_{ji} = 0$). The probabilities of each type of dyad are modelled as a function of three sets of parameters: the expansiveness of the journal (i.e., the capacity of mainly citing other journals), the popularity of each journal (i.e., the capacity of being quoted by a majority of sources), and reciprocity (the capacity of simultaneously citing and being cited). The probabilities of mutual, asymmetric and null dyads, denoted as m_{ij} , a_{ij} , and n_{ij} , respectively, are modelled as follows:

$$m_{ij} = \lambda_{ij} \exp(\rho + 2\theta + \alpha_i + \alpha_j + \beta_i + \beta_j) \quad (\text{Equation 2})$$

$$a_{ij} = \lambda_{ij} \exp(\theta + \alpha_i + \beta_j) \quad (\text{Equation 3})$$

$$n_{ij} = \lambda_{ij} \quad (\text{Equation 4})$$

In Equations 2–4, and according to Mourao (2020), the α parameters are interpreted as "expansiveness" measures for each node (in our case, for each journal). The β parameters are interpreted as "popularity" measures. The ρ parameter is related to a general measure of the tendency towards "reciprocity" within the network. The θ parameter is a function of the density of the network, reflecting the total number of observed arcs (an arc is defined as a citation in our network). Finally, the λ parameters are normalizing constants used to guarantee that the modelled probabilities add up to one for any given dyad.

Following Holland and Leinhardt (1981), positive values for each parameter provide statistical evidence of how the studied effects reflect the established relationships between journals. A positive θ indicates that if the density of the net increases (i.e., as the amount of connections between journals grows), it will be expected that any particular journal may establish a greater number of connections with other sectors. In contrast, when θ is negative, the interpretation of Holland and Leinhardt (1981) suggests that the number of connections in the net does not help explain the density of citations among the journals. In practical terms, this implies that, independent of the density, existing ties tend to be explained by certain latent trends of selectivity assumed by the journals. Additionally, a positive ρ implies that any journal is likely to establish reciprocal connections with other journals.

The estimates for the observed network from WoS are as follows (given its similarities with the Scopus' observed network, we will omit Scopus' estimates, but they are available upon request):

- A negative value was found for the θ parameter (-0.9538), which was interpreted as suggested— the trend of this network is not to have random citations. This means that the existing arcs are defined by exogenous dimensions.
- Also, a negative value has been found for the reciprocity parameter ρ (-0.4769), suggesting that when there is a citation of one journal in another, it should not be expected that there will be citations of the quoting journal in the originally citing journal.

In order to avoid exhibiting extensive matrices containing the estimated probabilities of citations of one journal in another, we opted for a common figure—the dendrogram of probabilities, which clarifies the different groups of journals considering the estimates of the P1 parameters. Figure 5 reveals the estimated linkages.

Some more immediate observations made upon the generation of Figure 5 relate to the following two statements:

- Despite the LS's focuses on ecology and sustainability, there is a strong resistance of journals outside the range of the religious/theological field to cite or publish works on the Laudate Si;
- the probability of citations is higher among journals in the same scientific area (e.g. *Filozofska Istrazivanja* citing *Horizons* and vice-versa, *The Journal of Religious Ethics* citing *Religions* and vice-versa, or *Biological Conservation* most-likely citing *The Quarterly Review of Biology* and vice-versa) , which must be realized as an obstacle for the LS reaching a wider academic audience.

[Insert here Figure 5]

394 Discussion

395 The encyclical LS contains demanding reflections about human life and environmental
396 challenges through the lens of sustainable development, where justice, ethics, religion and
397 leadership all play an important role.

398 The journal articles collected by in WoS and Scopus since 2015, about this encyclical highlight
399 these dimensions. First, we have to emphasize the attention paid by the scientific community
400 to this encyclical, comparatively higher than that given to previous encyclicals. The studies
401 published earlier, namely, around 2016, focused more on religious debate about the LS. In any
402 case, despite the focus given by the studies published in more recent years for the ecologic,
403 climatic and environmental aspects, we have to recognize that most of the documents and
404 citations regarding the LS appeared in articles related to religious domains.

405 The analysis performed about the most productive and impacted authors, affiliations,
406 countries and sources confirms this trend. However, this analysis also reveals that there are
407 opportunities to create more networking among the international scientific communities for
408 enlarging the discussion concerning the LS. Additionally, the published documents seem to
409 center around authors from the USA, Italy, the UK and Brazil, which confirms the attention
410 provided by some of these countries' university departments to expand the study of the LS.

411 5. Conclusion

412 This work was the first bibliometric exercise carried out on the encyclical Laudato Si, occurring
413 five years after its publication. If the objectives of the LS at the time of its publication were to
414 reach a greater height of reading and influence, this bibliometric work revealed some
415 challenges for accomplishing this goal.

416

417 Most of the keywords in these works identified by WoS and Scopus are words that point to
418 terms like 'ecology', 'climate change', 'environment', 'sustainability', 'ethics', which, to some
419 extent, reveals how the LS motivated academic works related to its own concerns.

420

421 We also found that there is a predominance of academic work from the fields of religious
422 sciences and theology on the topic of the LS. The number of works of the scientific areas of
423 biology and sustainable development follows. Although there are not yet significant numbers

of works regarding authorship/co-authorship, most teams of authors are from universities in the USA and Italy, with some emerging in countries like Brazil.

The five years between this study and the publication of the LS in 2015 thus contain emerging challenges. As of now, we account for three emerging challenges. The first is related to the need to continue to observe the evolution of the reach of the LS and to diversify the focus of academic attention beyond religious sciences, who, in an expected way, were the first scientific field to analyze the LS. The second challenge is related to the perception of the popularity of the LS compared to previous encyclicals—are we facing a new trend (of scientific attention) on papal documents or is the popularity of LS mainly due to the popularity of Pope? The third challenge is related to a deeper epistemological question. Our estimations of the citation probability model highlighted a clear trend of homophily—authors and journals tend to cite authors and journals from the same scientific field. Although this behavior is expected due to current methodological approaches, from the restricted space for publication and to the need for scientific focus, the same behavior can pose a serious challenge for interdisciplinary studies and the discussion of cross-cutting documents as the LS intends to be. Thus, the aforementioned concentration of the focus of debate around the LS can also be explained by the epistemological practices underway in nowadays' academic institutions.

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524 **Table 1.** Keywords with five or more occurrences

Keyword	Occurrences	Avg. pub. Year
laudato si'	59	2017.614
pope francis	55	2017.782
ecology	32	2017.156
laudato si	25	2017.28
climate change	22	2017
environment	22	2017.667
integral ecology	18	2016.941
creation	16	2017.133
sustainability	16	2017.6
ethics	11	2016.889
catholicism	10	2016.8
ecological conversion	10	2017.2
justice	10	2016.8
anthropocene	8	2017.286
environmental ethics	8	2018
leadership	8	2017.125
anthropocentrism	7	2017.429
catholic social teaching	7	2017.429
poverty	7	2017.286
religion	7	2016.5
sustainable development	7	2016.286
theology	7	2018
care	6	2016.833
consumerism	6	2017.833
encyclical	6	2017
spirituality	6	2018.167
attitudes	5	2017.4
christianity	5	2017.4
common home	5	2017
ecological crisis	5	2017
environmental crisis	5	2018.8
incarnation	5	2016.4
laudato si'	5	2017.6
responsibility	5	2016.6
science	5	2017.75

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529 **Table 2.** Number of identified documents about LS (2015–2020), according to WoS and Scopus databases

WoS		Scopus		WoS		Scopus	
Authors	Documents	Authors	Documents	Organizations	Documents	Organizations	Documents
edwards, denis	4	mckim r.	3	australian catholic univ	8	university of florence	3
dileo, daniel r.	3	zsolnai l.	3	boston coll	5	university of illinois at urbana-champaign	3
albareda tiana, silvia	2	abastante f.	2	univ notre dame	5	boston college	2
briola, lucas	2	carroll j.e.	2	catholic univ amer	4	corvinus university of budapest	2
diniz alves, jose eustaquio	2	deane-drummond c.	2	fordham univ	4	university of palermo	2
franc, jaroslav	2	dileo d.r.	2	marquette univ	4	university of catania	2
gabriel, ingeborg	2	edwards d.	2	politecn milan	4	university of salerno	2
hrynkow, christopher	2	jenkins w.	2	univ durham	4	mediterranea university of reggio calabria	2
hutter, reinhard	2	löwy m.	2	univ florence	4	university of virginia	2
jenkins, willis	2	malerba a.	2	politecn torino	3	university of ljubljana	2
kelly, anthony j.	2	massimo d.e.	2	santa clara univ	3	university of notre dame	2
malerba, alessandro	2	musolino m.	2	st vincent coll	3		
massimo, domenico enrico	2	nesticò a.	2	univ catania	3		
musolino, mariangela	2	peppard c.z.	2	univ virginia	3		
nestico, antonio	2	platovnjak i.	2	fac jesuita filosofia & teol	2		
peppard, christiana z.	2	scherz p.	2	fu jen catholic univ	2		
platovnjak, ivan	2			imed	2		
scherz, paul	2			katholieke univ leuven	2		
zambam, neuro jose	2			mediterranea univ reggio calabria	2		
				pontificia univ catolica parana pucpr	2		
				pontificia univ javeriana	2		
				st louis univ	2		
				sun aversa	2		
				univ fed minas gerais	2		
				univ int catalunya	2		
				univ ljubljana	2		
				univ navarra	2		
				univ palermo	2		
				univ pontificia bolivariana	2		
				univ portland	2		
				univ ramon llull	2		
				univ salerno	2		
				univ wien	2		
				villanova univ	2		
Total	41		34		97		24

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533 **Table 2.** Number of identified documents about LS (2015–2020), according to WoS and Scopus databases (continuation)

WoS Countries	Documents	Scopus Countries	Documents	WoS Sources	Documents	Scopus Sources	Documents
usa	73	united states	69	integrated evaluation for the management of contemporary cities	25	green energy and technology	25
italy	32	italy	36	theological studies	22	theological studies	18
		united					
brazil	19	kingdom	16	heythrop journal	8	laudato si' and the environment: pope francis' green encyclical	14
england	18	australia	8	journal of religious ethics	7	heythrop journal - quarterly review of philosophy and theology	8
australia	13	canada	8	philippiniana sacra	7	journal of religious ethics	7
spain	8	germany	8	environment	5	environment	5
argentina	6	spain	8	new blackfriars	5	religions	5
canada	6	belgium	5	religions	5	bulletin de litterature ecclesiastique	4
germany	6	poland	5	nova et vetera-english edition	4	contributions to conflict management, peace economics and development	3
colombia	5	brazil	4	perspectiva teologica	4	independent review	3
philippines	4	colombia	3	australasian catholic record	3	pensamiento	3
austria	3	france	3	horizons	3	quarterly review of biology	3
czech republic	3	hungary	3	horizonte-revista de estudos de teologia e ciencias da religiao	3	sustainability and the humanities	3
india	3	argentina	2	internationale katholische zeitschrift communio	3	tijdschrift voor theologie	3
portugal	3	chile	2	pensamiento	3	valori e valutazioni	3
belgium	2	china	2	quarterly review of biology	3	bogoslovni vestnik	2
croatia	2	czech republic	2	revista de cultura teologica	3	cauriensia	2
france	2	india	2	revista perseitas	3	church, communication and culture	2
ireland	2	ireland	2	scripta theologica	3	communio	2
japan	2	netherlands	2	studia theologica-czech republic	3	environmental ethics	2
mexico	2	portugal	2	teologia	3	health progress (saint louis, mo.)	2
peoples r china	2	slovenia	2	trumpeter-journal of ecosophy	3	horizons	2
slovenia	2	south africa	2	veredas do direito	3	ideals and ideologies: a reader	2
switzerland	2			worldviews-global religions culture and ecology	3	international bulletin of mission research	2
taiwan	2			bogoslovni vestnik-theological quarterly-ephemerides theologicae	2	journal of agricultural and environmental ethics	2
				cauriensia-revista anual de ciencias eclesíasticas	2	journal of jesuit studies	2
				environmental ethics	2	perseitas	2
				environmental humanities	2	scripta theologica	2
				international bulletin of mission research	2	sophia	2
				irish theological quarterly	2	studia theologica	2
				journal of agricultural & environmental ethics	2	verbum vitae	2
				journal of jesuit studies	2	worldviews: environment, culture, religion	2
				pacifica	2	zygon	2
				reveleto-revista electronica espacio teologico	2		
				revista pistis & praxis-teologia e pastoral	2		
				sophia	2		
				world heritage and degradation: smart design, planning and technologies	2		
				zygon	2		
Total	222		196		162		143

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536 **Table 3.** Items with five or more citations, for WoS and Scopus databases

WoS		Scopus		WoS		Scopus	
Authors	Citations	Authors	Citations	Organizations	Citations	Organizations	Citations
akin, heather	12	akin h.	17	australian catholic univ	17	university of pennsylvania	17
hasell, ariel	12	hasell a.	17	univ notre dame	15	texas tech university	17
jamieson, kathleen							
hall	12	jamieson k.h.	17	fordham univ	12	california state university	17
				calif state univ			
landrum, asheley r.	12	landrum a.r.	17	fresno	12	community of sant-egidio	9
lull, robert b.	12	lull r.b.	17	texas tech univ	12	leuphana university lüneburg	9
caniglia, guido	10	peppard c.z.	9	univ penn	12	arizona state university	9
herberg, jeremias	10	caniglia g.	9	arizona state univ	10	cornell university	7
				leuphana univ			
hoerl, erich	10	herberg j.	9	luneburg	10	columbia university	7
lang, daniel	10	hörl e.	9	univ durham	9	environmental defense fund	7
laubichler,							
manfred	10	lang d.	9	st jeromes univ	9	pomona college	7
meyer, esther	10	laubichler m.	9	politecn milan	6	university of notre dame	7
schmieg, gregor	10	meyer e.	9	columbia univ	6	macquarie university	6
schricket, isabell	10	penza g.	9	cornell univ	6	politecnico di milano	6
						enea (italian national agency for new technologies)	6
vilsmaier, ulli	10	schmieg g.	9	environm def fund	6		6
peppard, christiana z.	9	schricket i.	9	pomona coll	6	university of wollongong	6
deane-drummond, celia	9	vilsmaier u.	9	santa clara univ	5	university of genoa	5
		deane-drummond c.	7	univ virginia	5	missouri botanical garden	5
ormerod, neil	9			loyola univ			
vanin, cristina	9	larson-konar d.	7	maryland	5	fordham university	5
				missouri bot garden	5	loyola university	5
edwards, denis	7	pearson a.r.	7				
larson-konar, dylan	6	romero-canyas r.	7			australian catholic university	5
						wuppertal institute for climate, environment and energy	5
pearson, adam r.	6	schuldt j.p.	7				
romero-canyas, rainer	6	borrelli g.	6				
schuldt, jonathon p.	6	buffoli m.	6				
castillo, daniel p.	5	capolongo s.	6				
globokar, roman	5	citterio m.	6				
green, brian							
patrick	5	favotto a.	6				
raven, peter h.	5	gola m.	6				
rowlands, anna	5	perkiss s.	6				
		procopio g.p.	6				
		rebecchi a.	6				
		tweedie d.	6				
		edwards d.	5				
		castillo d.p.	5				
		globokar r.	5				
		magoni s.	5				
		raven p.h.	5				
		rosasco p.	5				
		sachs w.	5				
		sdino l.	5				
Total	242		319		168		167

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538 **Table 3.** Items with five or more citations, for WoS and Scopus databases (Continued)

WoS		Scopus		WoS		Scopus	
Countries	Citations	Countries	Citations	Sources	Citations	Sources	Citations
usa	113	united states	104	theological studies	42	theological studies	35
italy	23	italy	55	integrated evaluation for the management of contemporary cities	20	green energy and technology	34
australia	20	germany	20	cognition	12	cognition	17
england	19	australia	19	sustainability science	10	valori e valutazioni	15
germany	17	united kingdom	10	quarterly review of biology	9	quarterly review of biology	10

canada	9	canada	5	journal of religious ethics	6	sustainability science	9
brazil	6			environment	6	climatic change	7
				climatic change	6	journal of religious ethics	6
				religions	5	environment	6
				bogoslovni vestnik-theological quarterly-		social and environmental	
				ephemerides theologicae	5	accountability journal	6
				political theology	5	bogoslovni vestnik	5
Total	207		213		126		155

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549 **Figure 1.** Distribution of the documents by years in the WoS and Scopus databases

550 **Figure 2.** Distribution of the documents by main languages in the WoS and Scopus databases

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567 Figure 5 – Dendrogram of journals publishing works about the LS according to their probability of citing articles from other sources

