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Resilience in rural studies: a bibliometric mapping of the scientific publications

Resiliência nos estudos rurais: um mapeamento bibliométrico das publicações científicas

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ABSTRACT: Resilience is a "reemerging concept" that has attracted the interest of scientists from different fields, authorities, and international organizations. This article aims to identify and analyze the scientific production on resilience in rural studies, through a bibliometric review. The analysis covers the following issues: number and chronology of publications, source of work, in addition to the most cited articles and authors. 148 publications in English were identified in the SCOPUS and Web of Science databases, until December 2020. The results demonstrate that publications on resilience in rural studies have experienced a significant increase in several international journals, since 2010. It was also observed that there is a domain academic background of researchers from the USA, Australia, and countries of the United Kingdom; however, China has also shown a significant growth trend in this area. The article ends by pointing out the importance of using such a theoretical lens in rural studies.

Keywords: bibliometric analysis; rural resilience; rural development; scientific production.

RESUMO: A Resiliência é um "conceito reemergente" que tem atraído o interesse de cientistas de diversas áreas, autoridades e organizações internacionais. O presente artigo tem como objetivo identificar e analisar a produção científica sobre resiliência nos estudos rurais, por meio de uma revisão bibliométrica. A análise cobre as seguintes questões: quantidade e cronologia das publicações, procedência dos trabalhos, além de artigos e autores mais citados. Foram identificadas 148 publicações em inglês nas bases de dados *SCOPUS* e *Web of Science*, até dezembro de 2020. Os resultados demonstram que as publicações envolvendo a resiliência nos estudos rurais tem experimentado um aumento significativo em diversos periódicos internacionais, desde 2010. Observou-se ainda que existe um domínio acadêmico de pesquisadores originários dos EUA, Austrália

e países do Reino Unido, todavia a China também tem apresentado uma significativa tendência de crescimento nesta área. O artigo termina apontando a importância de se incorporar tal lente teórica nos estudos rurais.

Palavras-chave: análise bibliométrica; resiliência rural; desenvolvimento rural; produção científica.

1. Introduction

Over the last few years, modern society has faced problems in different areas and on multiple levels. Global recession, political instability, market volatility, climate disturbances and those related to pandemics are some of the events that characterize the present and future of countries marked by uncertainty, complexities and turbulence (Bristow, 2010; Scoones, 2019). This is not new in rural areas, as farmers have always had to find solutions to face unexpected events, such as droughts, floods, or hailstorms, pests and diseases that infest crops or affect their animals. In addition, it is worth mentioning market uncertainties and changes in the availability of family work, aggravated by the intense migration of people to urban areas. Amid all this, farmers also have to face the challenge of meeting demands for food, fiber, fuel and other raw materials in sufficient quantity and quality suitable for human use.

In view of this context, the notion of resilience has emerged as a key concept both in scientific debates and in discussions about policies and development programs in different countries, especially in Europe and the United States (Janssen *et al*., 2006; Silva & Exterckoter, 2016). Traditionally, debates on resilience thinking seek to understand how something manages to persist, resist or overcome factors that threaten its stability. Resilience has been able to connect multiple concepts and allow applications in different areas (Folke, 2006; Manyena, *et al*., 2011; Darnhofer *et al*., 2016).

In the literature, there are two concepts widely recognized among researchers. One is engineering resilience, which focuses on the stability of a system near equilibrium, where resistance to disturbance and the speed of return toward pre-existing equilibrium are used to determine resilience (Pimm, 1984); the other conception is the perspective of ecology, in which resilience is indicated as a measure of the persistence of systems and their ability to absorb changes and disturbances, and also ensure the same relationships between populations or state variables (Holling, 1973). These two views underlie several definitions that divide the literature between authors with a conservative notion of return to equilibrium and those who emphasize adaptation and/or transformability.

Resilience has currently helped in investigations on the differential and uneven capacity of places to react, respond and deal with uncertainties, volatilities and rapid changes (Pike *et al*., 2010). In theory, resilient regions are considered to be capable of adapting better to changes, of learning from experiences, of self-organization in the face of turbulence and external shocks. They have a greater capacity to absorb disturbances and to persist, being able to even benefit from the context of crisis and create another path of grow. However, the authors Silva & Exterckoter (2016) demonstrated that the first and main studies on resilience concerned almost exclusively urban spaces, which demonstrates

a lack of work related to rural spaces, which exposes the lack of studies related to rural spaces.

Although the growing interest over the last 40 years reflects the possibilities of heuristic and methodological questions provided by resilience, it also motivates different criticisms regarding the polysemy, operability and analytical capacity of the concept (Manyena, *et al.*, 2011; Reghezza -Zitt *et al*., 2012; Mendéz, 2012). However, the arguments presented are not sufficient to dismiss the concept as a whole. The inclusion of this concept in studies on rural development can bring important contributions to the understanding and recognition of the broader character that this process provokes in the relationships between environmental, economic and social systems, as opposed to those that are limited to economic performance or simply to growth. Therefore, it seems appropriate to investigate the path of appropriation and use of resilience as a theoretical framework, situating its evolution and its applicability in different areas until its arrival in rural studies.

In this context, the present article aims to identify and analyze the scientific production on resilience in rural studies through a bibliometric review. We specifically sought to understand the evolution of the number of publications on the subject, the central countries, the most relevant articles, journals and authors in the area. To achieve this objective, a survey was carried out of all scientific publications published until December 2020, using the terms "rural resilience", "livelihoods resilience", "farm resilience" and "community resilience", in the Scopus and Web of Science (WoS) journal databases. The decision to carry out a literature mapping was due to the possible contributions of this effort to multidisciplinary discussions.

After this introduction, the study presents the debate on the etymological meaning of the concept and the different ways of thinking about resilience, based on the main disciplinary perspectives. In the third section, the methodological procedures adopted in this study are described. In the fourth section, the results of the research and analysis of the results found are presented. Ultimately, the final considerations are presented and the main conclusions are reported, as well as some recommendations for the development of future studies.

2. Etymological roots and evolution of the concept of resilience

The word resilience derives from the terms "resilire" and "resilio", both originating in Latin (Manyena *et al*., 2011). According to Alexander (2013), the etymology of these words is unknown, but their most common uses refer to meanings associated with "bounce", "boucingback", or else "to jump back", here freely translated as resuming a starting point (or going back to what was before), going back, recovering, retreating, jumping backwards (or back) (Longman, 2020).

The historical path of the uses of resilience, initially proposed by Alexander (2013), reveals that the first use of the word resilience in a scientific context was made in 1625, by Sir Francis Bacon, with the publication of a compendium of writings on natural history, the "Sylva Sylvarum". Here, the term was used for the first time during a reflection on echo strength. Years later, in 1656, the word was inscribed for the first time in a dictionary, the "Glossographia", by author Thomas Blount. The word was chosen from among 11,000 terms that

Blount considered distinct from ordinary language. The meaning of "recover" and "return" has been attributed to this word.

In the two subsequent centuries, in addition to the idea of recovery and return, the term resilience also came to be related to the concepts of elasticity, instability and volatility (Alexander, 2013). However, due to this association of resilience with unstable or volatile conditions by authors such as Samuel Johnson in 1751 and Henry Best in 1826, the term acquired a negative connotation. In 1839, the term "resilience" was first applied to the "mental strength" of someone who has the "capacity to recover from adversity", and later, "resiliency" appeared in a report in which American soldiers described the ability of the Japanese to endure the adversities of two seismic catastrophes that devastated the city of Shimoda in 1854 (Silva & Exterckoter, 2016). In these cases, the term was more related to human phenomena.

Despite differences in spelling, "resilience" and "resiliency" are synonymous. In English language dictionaries, the word resilience has two definitions: the first refers to the ability to become (Longman, 2020) and/or to be (Cambridge, 2020) strong, happy or successful again after something difficult or bad has happened; the second definition is the ability of a material to return to its original form after being bent, compressed, or stretched. Therefore, English definitions associate the term both with contexts related to people and also to materials.

In materials science[1], the use of resilience is a tradition. However, the authors disagree about the emergence of resilience in this area of knowledge. For example, Gonçalves (2014) states that its application begins in 1858, when the Scottish engineer William J. M. Rankine (1820-1872) used the term "resilience" to describe the ability of some metals/materials to resist forces, deforming without breaking (stiffness). Yunes & Szymanski (2001) claim that the use of the term had already been proposed by the English physicist Thomas Young, in 1807, in an attempt to understand the relationship between the pressure exerted on a material and the resulting deformation. However, if a material's shape is permanently deformed in response to stress, ductility deformation occurs, not resilience. After all, when the external force that changed the shape of a resilient material is removed, this material must be able to return to its initial position, that is, to its "equilibrium point". This characteristic can be translated into the elasticity presented by some bodies (such as rubbers and springs). In a way, this definition relates resilience to the principle of system stability, that is, recovery from a disturbance.

This perspective became known in the literature as "engineering resilience", and it is present both in political speeches and in media coverage when referring to economic, environmental issues, or social challenges. In the Human Development Report (UNDP, 2014, p. 16), for example, the definition of resilience refers to the "ability of a system and its component parts to anticipate, absorb, accommodate or recover from the effects of external factors in a timely and efficient way".

Therefore, this definition presented in the report addresses resilience based on the physical

[1] Field that applies the fundamental sciences of chemistry and physics to understand the behavior and properties of specific materials, such as metal rods.

concept of elasticity. This is how most people understand the term, as it is easier to understand how the concept is applicable. As a rule, any case anchored in this perspective will have only one path to global stability. By accepting this perspective, resistance to disturbances and the speed of return to pre-existing "normality" can be used to determine resilience.

This equilibrium-centered view is also used in psychology and psychiatric sciences when referring to individual resilience. In these areas, resilience was introduced in the 1950s and became popular in the late 1980s, specifically in analyzing the development of children in traumatic environments. Despite some variations, resilience can be defined as the ability to recover from the shocks suffered or to be shaken and bounce back, returning to one's previous state before the trauma (Mendéz, 2012).

From an engineering perspective, the return to "normality" is always invoked as something beneficial, and that should be sought to maintain the status quo. However, what to do when unwanted states are identified, to which one does not intend to return? After all, in these cases would it be desirable to preserve what one has? Children who live in poverty who manage to overcome adversity do not remain the same, but they can still be seen as resilient. Cities subject to disastrous events, but which later become remarkably different, can still be seen as resilient. Therefore, an obvious limitation of this approach is the idea of "resetting conditions" or "returning to normal". Thus, as discussions about resilience advanced, it became necessary to broaden the perspective, in order to understand more complex behaviors.

Later, between the 1960s and 1970s, resilience emerged in the field of ecology (Folke, 2006). The use of the term was a reaction to studies on the stability of ecosystems, which analyzed the behavior of simple dynamic systems (for example, the interaction between predators and prey), through discussions inherited from the exact sciences. However, it was with the seminal work "Resilience and Stability of Ecological Systems", by Crawford Stanley Holling (1973), that resilience became widespread in ecological studies (Carpenter *et al*., 2001; Folke, 2006).

In his study, Holling (1973) highlighted the fact that ecosystems usually have several stable regimes, for example, a lake can be clear or cloudy (if it is dominated by algae) (Scheffer & Carpenter, 2003). In this context, the focus is on the ability of systems to remain within the critical limits of a given regime while maintaining their essential functions (e.g. self-organization, learning and adaptation) and their structures in the face of disturbances capable of pushing them to beyond their "tensile strength", that is, to another regime (Holling & Gunderson, 2002).

Therefore, any instability that cannot be sustained can transform the current state into another one, which will have an alternative behavior regime. The "ecology perspective" moves away from the understanding that systems have a propensity to return to a single equilibrium, as advocated by dominant theories on stability. Thus, resilience now considers that unpredictability is present in the functioning of systems and, even if new components are introduced, their integrity is not impacted. That is, despite being unstable, some of the systems may nevertheless be resilient. Since then, resilience has become widely recognized as "the ability of a system to absorb disturbances and reorganize itself while undergoing changes in a way that still

retains the same functions, structure, identity and feedbacks" (Darnhofer, 2014, p. 463).

The differences established between these two conceptions – resilience in engineering and resilience in ecology – have different consequences on the way of understanding and evaluating the concept. While the first conception focuses on efficiency, constancy and predictability, the second turns to antagonistic attributes, such as persistence, mutability and unpredictability (Holling, 1996). Therefore, an inadequate design in the definition can compromise the analysis of the process in question.

It should be noted that, from the perspective of ecology, it is admitted that the development of the system does not have a linear and unidirectional progression. Thus, not all post-shock configuration possibilities to be acquired by the ecosystem are positive or desirable. In this case, not infrequently, the literature demonstrates that systems can be taken to levels of greater precariousness and remain there for long periods due to their high resilience (Gunderson, 2000). In this regard, Carpenter *et al*., (2001) highlight the importance of knowing which system will be investigated, including its limits and rules. Based on such information, one can understand the interaction between these components and how they influence the behavior and determination of the systems characteristics.

Furthermore, resilience can be very context--dependent, particularly in spatio-temporal scales and perspectives (Carpenter *et al*., 2001). Thus, possible changes in internal conditions or in the larger system in which it is embedded can make a system that is considered resilient today no longer be so in 50 years, or even in the next month. Furthermore, this change can happen suddenly and unexpectedly, as explained by Holling (1973), below:

> A management approach based on resilience (…) would emphasize the need to keep options open (…) and the need to emphasize heterogeneity. Flowing from this would be not the presumption of sufficient knowledge, but the recognition of our ignorance; not the assumption that future events are expected, but that they will be unexpected (Holling, 1973, p. 21).

After all, the future cannot be fully predicted and, therefore, it is necessary to learn to deal with uncertainties, since they can interfere with the oscillations and amplitudes of a system. In this case, when a change to an undesirable state is noticed, the necessary conditions must be created to lead the system to a state weighted as desirable.

Another point that is worthy of mention is that although strategies that seek spatial homogeneity (global stability) of a given system are capable of generating favorable results in the short term (such as increased productivity), in the long term they can make the system vulnerable to certain disturbances that would previously be absorbed by more diversified systems (Gunderson, 2000). This finding is based on the fact that in more diversified systems there is the possibility of variation in the relative importance of species and their replacement in different functions and interactions (functional redundancy). Therefore, diversification points to different elements that can contribute in a similar way to the functioning of the ecosystem, avoiding the monopolization of resources by one or a few species. Hence, diversity (previously rejected) is now considered as a favorable aspect to the persistence of systems.

Resilience was incorporated into the social sciences between the 1980s and 1990s. If in the ecological area there was no consensus on resilience, as a concept and how to achieve it, in the

social sciences it could not be different. After all, as it is a polysemic concept, its use incurs risks, especially if it is viewed with an inflexible eye After all, as it is a polysemic concept, its use incurs risks, especially if it is only seen from one perspective, with an inflexible mind. For this reason, in some attempts to incorporate the concept in social studies, the definitions were finally based on the notions of stabilization and/or return to the previous position (Timmerman, 1981).

The concept of resilience was refined and introduced in the areas of sociology and human geography. Here, the design is centered on human--environment interactions. Thus, the definitions of social resilience and institutional resilience, proposed by Adger (2000), arise. While social resilience can be understood as the ability of groups or communities to withstand external disturbances (e.g. social, political and environmental changes) to their social infrastructure, the resilience of institutions[2] seeks to capture the historical evolution and effectiveness of institutions, the existence of integrating characteristics of social organizations (such as norms and networks of trust), the cultural context in which institutional adaptation takes place, and human-environment relations as a whole.

Within the scope of economics and economic geography, resilience has aroused interest in discussions related to development and the worsening of global problems (global recession, food security, financial and economic crisis, climate change, resource depletion, etc.) that have potentially disastrous consequences in several areas (Bristow, 2010). The insertion of the concept in broader and more integrated contexts has favored systemic understanding in the social sciences.

In this context, the approach of socioecological systems (SES)[3] appears. It is assumed that they are complex systems and, therefore, present characteristics such as non-linearity, heterogeneity, multiequilibrium, self-organization and learning. Resilience is understood here as the ability of a system to absorb disturbances and reorganize itself, while making changes to preserve the same functions, structure, identity and feedbacks (Folke, 2006). This definition is very close to that proposed by Holling (1973).

However, in studies on SES, resilience incorporates an evolutionary notion, that is, that the system is in a process of continuous adjustment in the face of changes. The idea of returning to "normality" is thus completely set aside. On the other hand, resilience becomes a dynamic concept, which involves continuous learning, and not an automatic response that emanates from the properties of the system.

In this regard, heterogeneity is seen as an important factor, as it allows a wide diversity of arrangements and rearrangements of the components of a system when conditions change. Thus, a SES will be more resilient the greater its ability to develop adaptation mechanisms in the face of changing

[2] In this article, Adger (2000, p. 2) defines institutions as: "the behaviors, rules and norms that govern society, as well as the more usual notion of formal institutions (governance and law). For the author, using this broad definition is important because institutional structures, such as property rights, govern the use of natural resources, creating incentives for sustainable or unsustainable use. Therefore, they are a core component linking social and ecological resilience."

[3] Socioecological systems (SES) are systems that integrate the complexity of interactions and interdependencies between human beings and the biosphere. The SES are structured by ecological, social, economic, institutional, cultural and technological components (Resilience Alliance, 2007).

external factors and internal processes, persisting in its trajectory or transitioning to another, in case the change proves to be inevitable (Darnhofer *et al*., 2016). However, the idea of transformation still needs further discussion, as in some contexts, this process would be the denial of resilience itself (Reghezza-Zitt *et al*., 2012).

According to Berkes *et al*. (2003), based on studies on SES, arguments can be proposed about the adaptive capacity of different systems, including societies and their institutions. In this sense, the different analytical perspectives on resilience provide relevant support for discussions within the scope of sustainable development and environmental issues. Notions such as "point of equilibrium", "non-linearity" and "evolution", arising from multidisciplinary perspectives, contribute to the analysis of adaptations imposed by man-nature interaction, such as those resulting from agricultural practices. There are many examples of these interactions: deforestation and consequent erosion processes, soil compaction, salinization, etc. All these phenomena seriously affect urban and rural communities, harm agriculture, industry and commerce, threatening local development.

3. Methodological procedures

This study consists of a bibliometric review that proposes to map studies on resilience in rural areas. This type of investigation is exploratory in nature, as it allows the researcher to make a rigorous and reliable assessment of a set of studies on a specific fact or phenomenon (Gil, 2008). In view of the existence of a large number and diversity of sources of information in the scientific literature, in general, a singular effort is necessary for a better understanding of the state of the art, and thus to identify the real gaps in the theory that need to be investigated.

Initially, a mapping (tests) of several articles that discussed the concept of resilience was carried out, in order to understand the historical path of the concept and find the most representative terms for the study of resilience in rural areas. After an initial assortment of articles was obtained, the studies cited by these articles were examined, as a way to determine seminal works and key researchers in this area. These readings made it possible to identify four expressions that are frequently used in papers that address resilience in rural areas, namely: "rural resilience", "livelihoods resilience", "farm resilience" and "community resilience". In addition, the term "development" was used, in order to limit the search only to articles in the field of development, thus reducing the number of unwanted works related to resilience in other areas of science. Subsequently, these terms were used in a systematic search in the databases of Scopus and Web of Science (WoS) journals, as they have a relevant collection in the field of Social Sciences.

In the selection of the sample, search terms were used simultaneously with the term development (i.e. "rural resilience" OR "farm resilience" OR "community resilience" OR "livelihoods resilience" AND "development") in the title fields, in the abstract and in the keywords from documents in article format, excluding any other type of publication, such as annals of events, dissertations, theses and book chapters. The search terms were used in English, as Janssen *et al*. (2006) and Exterckoter *et al*. (2016) have already shown that most publications on resilience were written in this language. In

addition, as the survey was carried out in January 2021, a time frame was chosen that covered the entire period prior to December 31, 2020.

Moreover, the EndNot® program was used to identify and eliminate publications not related to the rural environment and repeated articles, since the search was carried out in two databases. Figure 1 details the stages of the review process adopted in this study.

Finally, the search resulted in 762 scientific papers, 339 of which were obtained from the Scopus database and 423 from the Web of Science database. Of these, 612 articles were discarded during filtering, both because they were not related to the rural environment and because they were duplicates. Therefore, a total of 148 studies potentially capable of contributing to studies of rural resilience were identified.

4. Bibliometric analysis and discussion on resilience in rural studies

After the exposure of the theoretical-methodological basis for carrying out this study, this chapter presents the results obtained. Figure 2 shows the temporal dynamics of the searched scientific productions. Approximately 94% of the 148 documents consulted were published after 2010, and only around 6% were published before 2010. These results show the quantitative growth of research on resilience in rural areas. Studies such as those by Janssen *et al*. (2006) and Exterckoter *et al*. (2016) had already described a significant and continuous increase in the number of articles on resilience. The subject was increasingly used in analyzes of smaller systems, such as cities and/or communities, including in rural areas. Such an increase in public interest coincides with increased international attention to environmental and climate change, possible sudden shocks and extreme disasters (Douxchamps *et al*., 2017).

Proceeding with the analysis, the most productive institutions and countries are listed in Table 1. In this case, articles are allocated to institutions and countries based on the first author's affiliations. The most productive entity in this study was Scotland's Rural College, responsible for 9 publications. This shows the unprecedented nature of resilience thinking in rural studies, but what draws attention is the predominance of researchers working in Western institutions, especially in the United States, England, Scotland and Italy (Table 1). However, our

FIGURE 1 – Stages of the selection process of eligible studies.
SOURCE: elaborated by the authors.

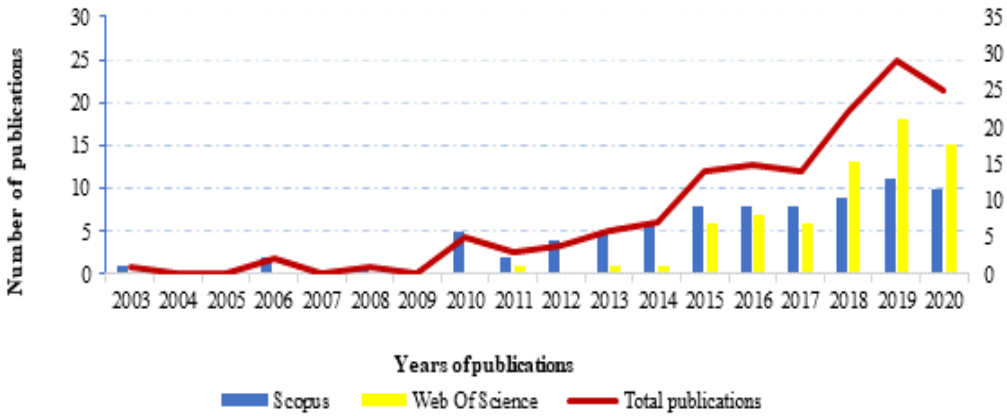

FIGURE 2 – Temporal dynamics of articles published from 2003 to 2020.
SOURCE: elaborated by the authors.

database also included many articles by Australian and Chinese researchers. These results corroborate other studies that also detected a greater number of more general publications on resilience in these countries, including the growing involvement of Australian and Chinese researchers in the subject (Janssen *et al*., 2006; Exterckoter *et al*., 2016; Xue *et al*., 2018). Regarding Brazilian publications, the search found the article "Resilience: contributions and challenges to the study of the development of regions", by the authors Silva and Exterckoter, published in 2016.

The results presented in Figure 3 show the distribution of journals where scientific studies were published. The 148 articles identified in this research were distributed in 79 journals, but only 22 of them had more than one publication, as seen in Figure 3. In general, this distribution of publications in different journals demonstrates the interest of researchers in the subject. However, it is worth highlighting the renowned English journal of rural studies, entitled Journal of Rural Studies, with 22 articles in total. With far fewer articles published, Sustainability (9 articles) and Community Development Journal (7 articles) follow.

Then, the authors with the highest number of citations in the data set can be seen. Table 2 shows the top 10 articles from Scopus and Web of Science journals with their authors, titles of articles and journals, year of publication, number of citations and titles of journals in our database. Regarding the authors in the references of rural studies, Wilson (2010), Darnhofer *et al*. (2010), McManus *et al*. (2012) and Shiferaw *et al*. (2014), are the most cited, respectively. Another interesting point is the large number of citations obtained by articles by Austrian author Ika Darnhofer. Currently, Darnhofer is a professor at the University of Natural Resources and Life Sciences (or simply, BOKU), located in Vienna, and is one of the exponents of research on resilience thinking in rural areas. In this case, the research is oriented towards the management of family properties, with the principles of resilience applied to socio-ecological systems.

TABLE 1 – Top 20 most productive institutions (left) and countries (right).

Rank	Institutions	No. of articles	Country	No. of articles
1	Scotland's Rural College	9	United States	22
2	University of Basilicata	5	Australia	19
3	University of the Sunshine Coast	3	England	15
4	The University of Queensland	3	Scotland	12
5	New Mexico State University	3	China	11
6	University of Plymouth	3	Italy	8
7	University of Reading	3	Canada	7
8	University of Pretoria	2	Spain	5
9	Commonwealth Scientific and Industrial Research Organisation	2	Netherlands	6
10	University of Southern Queensland	2	South Africa	3
11	University of Natural Resources and Life Sciences	2	Austria	3
12	Chinese Academy of Sciences	2	Denmark	3
13	Roskilde University	2	New Zealand	3
14	Conselho Superior de Investigações Científicas	2	Germany	2
15	University of Mississippi	2	Greece	2
16	University of Oregon	2	Ireland	2
17	University of Vermont	2	Japan	2
18	University of Groningen	2	Nigeria	2
19	University of the West of England	2	Norway	2
20	Bindura University of Science Education	2	Zimbabwe	2

SOURCE: elaborated by the authors.

Evidently, this information concerns a specific period of time, and, as such, may change in the future. After all, it is possible that there is a more recent valuable article, but that has not yet been disseminated or is not available for access by other researchers. For example, in the time frame of this study, Professor Arthur Steiner, working at Scotland's Rural College, was the researcher who most published articles on resilience in rural areas as first author (five articles).

Finally, as with Janssen *et al*. (2006), it was also seen that researchers who were members of the Resilience Alliance (RA)[4] were cited many times, especially C. S. Holling (Canada), C. Folke (Sweden), Lance Gunderson (USA), Carpenter (USA) and Walker (Australia). In fact, these researchers have generated important contributions to the resi-

[4] The Resilience Alliance (RA) is an international multidisciplinary research organization that was established in 1999. The RA consists of a ...

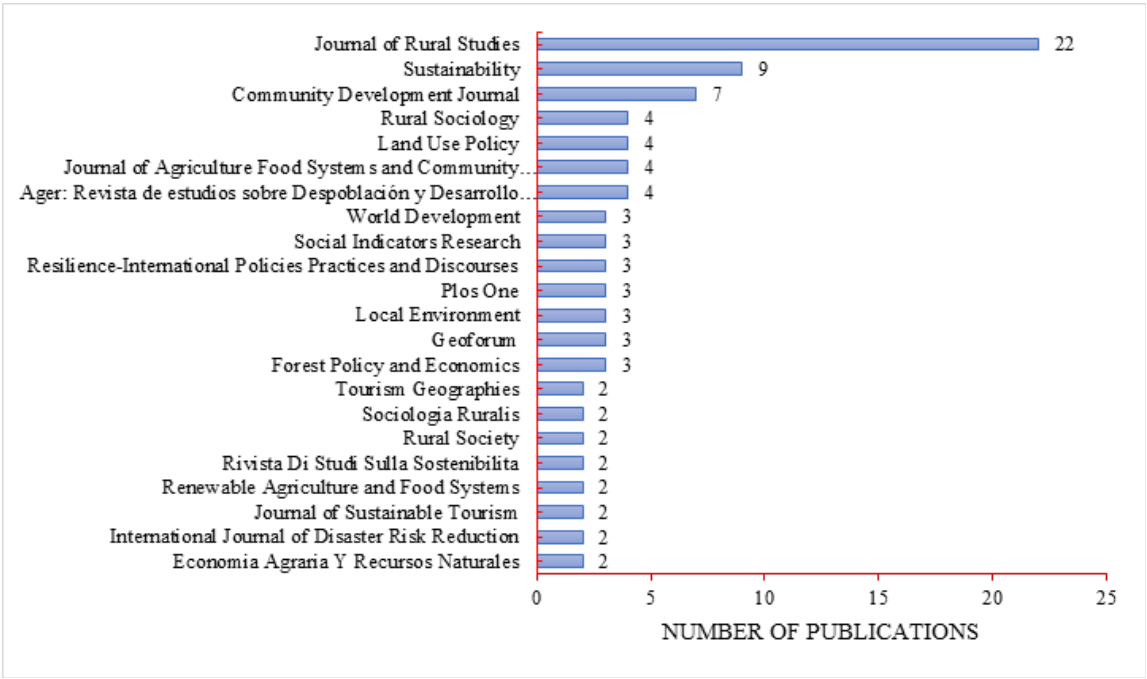

FIGURE 3 – Periodicals where the articles found in this study were published.
SOURCE: elaborated by the authors.

lience of socioecological systems. Their studies are useful for different types of contexts and approaches involving this concept, including rural studies. After all, farmers have always had to find solutions to face unexpected environmental events (hail, frost, and drought), politics, as well as economic events, such as market uncertainties. Increased competition, globalization and environmental changes have demanded increasingly complex adaptive responses from farmers. Therefore, a better understanding of the resilience of productive systems can lead to a path to rural development.

5. Final considerations

The present study aimed to identify and analyze, through a bibliometric review, the scientific production on resilience in rural studies. Thus, an attempt was made to survey the publications on resilience in rural areas until December 2020.

This mapping of the literature showed an increase in research on resilience in rural areas since 2010, and great interest from countries that were developing studies on general resilience, such as the United States, Australia, and the countries of the

[4] ... network of scientists and practitioners who seek to advance the theoretical understanding and practical application of resilience, adaptive capacity and transformation of societies and ecosystems in order to cope with changes and support human well-being (Resilience Alliance, 2007).

TABLE 2 – Top 10 articles on rural resilience available in the Scopus and Web of Science databases, ordered by the number of times they are cited in other studies.

Rank	Author(s)	Title	Journal	Year	No. of citations
1	McManus, P.; Walmsley, J.; Argent, N.; Baum, S.; Bourke, L.; Martin, J.; Pritchard, B.; Sorensen, T.	*Rural community and rural resilience: What is important to farmers in keeping their country towns alive?*	*Journal of Rural Studies*	2012	197
2	Shiferaw, B.; Tesfaye, K.; Kassie, M.; Abate, T.; Prasanna, B. M.; Menkir, A.	*Managing vulnerability to drought and enhancing livelihood resilience in sub-Saharan Africa: Technological, institutional and policy options*	*Weather and Climate Extremes*	2014	179
3	Wilson, G.	*Multifunctional 'quality' and rural community resilience*	*Transactions of the Institute of British Geographers*	2010	164
4	Darnhofer, I.; Fairweather, J.; Moller, H.	*Assessing a farm's sustainability: insights from resilience thinking*	*International Journal of Agricultural Sustainability*	2010	156
5	Skerratt, S.	*Hot spots and not spots: Addressing infrastructure and service provision through combined approaches in rural Scotland*	*Journal of Rural Studies*	2010	105
6	Milestad, R.; Darnhofer, I.	*Building farm resilience: The prospects and challenges of organic farming*	*Journal of sustainable agriculture*	2003	97
7	Darnhofer, I.	*Resilience and why it matters for farm management*	*European Review of Agricultural Economics*	2014	89
8	Arouri, M.; Nguyen, C.; Ben Youssef, A.	*Natural Disasters, Household Welfare, and Resilience: Evidence from Rural Vietnam*	*World Development*	2015	87
9	Scott, M.	*Resilience: A conceptual lens for rural studies?*	*Geography compass*	2013	83
10	King, C. A.	*Community resilience and contemporary agri-ecological systems: Reconnecting people and food, and people with people*	*Systems Research and Behavioral Science*	2008	79

SOURCE: elaborated by the authors.

United Kingdom. The international institution with the highest number of publications was Scotland's Rural College, with 9 articles. As for the authors of studies in the referred area, it was not possible to determine the most prominent ones regarding the subject. However the following authors deserve

mention for their recent contributions: Darnhofer, McManus, Shiferaw, Steiner and Wilson. Among the main journals in the area, the Journal of Rural Studies stands out.

Therefore, the conceptual and methodological contributions produced by the set of authors cited in this study are highlighted. These results provide a broader view of resilience within the scope of rural studies and can also serve as a basis for studies in different areas. Moreover, by properly establishing the concept of resilience, with notions arising from different perspectives, this study contributes to avoiding bias in the construction of knowledge about the concept, but evidently the theory cannot advance without the indispensable contribution of empirical studies.

A limitation of this study is that the bibliometric review carried out only included studies containing the search terms chosen in their title, keywords or abstract, excluding publications based on possible synonyms, such as stability, adaptability, resistance and robustness, or antonyms such as vulnerability, capacity and susceptibility. Therefore, the publications selected in this article do not comprise all publications on resilience in rural studies. Undoubtedly, the total number of articles on resilience is greater than the number of articles found and accessed through the adopted protocols. Consequently, there are probably other academic studies with contributions in this area, but which were not identified due to the descriptors used in this study.

These impasses can be interesting for comparisons between the results obtained here with those of any other study. After all, the concept is still under construction and new studies shall contribute a lot to overcome possible conceptual weaknesses and operational challenges. Consequently, the political implications of this study will be more frequent and recognized as more applied approaches emerge, especially in contexts involving major evolutionary trends and their impacts on human-nature interaction, in which they are marked by turbulence, uncertainty and instabilities.

Finally, we suggest that a similar study is undertaken, but in a larger sample and/or with other combinations of descriptors that are also relevant to rural studies.

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