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Scientific Production on Climate Change in Peru, A Bibliometric Study 2001-2025

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Abstract

Climate change is one of the major contemporary global challenges, with impacts on territories and societies, particularly in highly vulnerable countries like Peru. In this context, this article aims to analyze the scientific output on climate change in Peru during the period 2001–2025, through a bibliometric study designed to characterize its evolution, impact, collaboration patterns, and main predominant thematic approaches. A quantitative, descriptive, and analytical approach was adopted, based on bibliometric techniques applied to the Scopus database. The final corpus consisted of 867 scientific articles analyzed using the Bibliometrix and Biblishiny software. The results show sustained growth in scientific productivity with a marked intensification since the last decade, as well as a high level of participation in international collaboration networks. In terms of impact, a concentration of citations and h-index is observed among a small number of authors, institutions, and journals with global reach. The thematic analysis reveals a predominance of the socio-environmental approach, focusing on the Andean territory, biodiversity, deforestation, and the interactions between human and non-human dimensions. In conclusion, the findings demonstrate the consolidation of climate change as a priority research field in Peru and underscore the need to strengthen interdisciplinary studies that integrate the analysis of the built environment, territorial planning, and architecture in the face of current climate challenges.

Keywords: *Climate Change, Peru, Bibliometrics, Scientific Production, Territory*.

Introduction

Climate change represents a complex global phenomenon that not only involves environmental, social, and economic processes, but also directly impacts the built environment and architectural practices within the framework of sustainable development in contemporary societies. Its effects manifest themselves in the transformation of territories, the vulnerability of cities, resource management, and the habitability of spaces, influencing both the physical and symbolic configuration of urban and rural landscapes. In this context, various international organizations have warned about the magnitude and urgency of a phenomenon that jeopardizes the continuity of living conditions and spatial production, noting that global warming is progressing at a faster rate than anticipated and is becoming one of the most critical challenges for humanity's immediate future [1].

Scientific evidence has demonstrated that rising temperatures and heat waves are risks intensified by climate change [2]. This phenomenon is defined as persistent alterations in the state of the climate, identifiable through variations in average temperature and the variability of its properties, which persist for extended periods, generally decades or more [3]. Likewise, alterations in precipitation patterns, the intensification of extreme weather winds, and the depletion of the ozone layer ozono [4] directly affect the configuration of the territory and the performance of the built environment, influencing architectural

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design, urban planning, and the resilience of inhabited spaces in the face of increasingly adverse climate scenarios.

Greenhouse gas emissions driving climate change, primarily carbon dioxide, nitrous oxide, and methane, are closely linked to anthropogenic activities such as deforestation, fossil fuel burning, land-use change, intensive livestock farming, the use of chemical fertilizers, and various industrial processes [5], These activities have caused profound alterations in natural resources, including soil, air, and water [6], demonstrating the decisive role of humankind in climate system variation, which impacts diverse socio-territorial contexts unevenly.

Peru, characterized by its high climatic and geographical diversity and significant social inequalities, presents a unique setting for understanding the scientific output on climate change within this national context. This analytical exercise aims to identify how academia addresses this phenomenon. Climate data from this part of the world has revealed key trends of variability and intensification of extreme events, as follows:

The coastal region has an average annual temperature that fluctuates approximately between 21.1 and 22.6 °C, while in the highlands, values range from 12.6 to 14.4 °C, and in the rainforest, they range from 22.7 to 25.7 °C. Regarding average annual rainfall, the coast registers ranges from 22.3 to 174.1 mm, the highlands from 573.2 to 834.3 mm, and the rainforest from 1156 to 2093 mm. Likewise, the Cordillera Blanca has experienced a loss of approximately 40.5% of its total glacial cover, and between 1996 and 2019 the number of tropical glaciers decreased by approximately 28.17%. [6]

These data demonstrate the marked climatic heterogeneity of the Peruvian territory and the high sensitivity of its ecosystems to climatic variations, expressed in temperature and rainfall differences between the coast, highlands, and rainforest, along with the significant loss of glaciers. In this context, droughts, floods, the sustained increase in temperature, and landslides intensify the impacts of climate change [5]. These events are part of far-reaching, multisectoral effects, since climate change directly influences tropical ecosystems, exacerbates public health problems, alters the dynamics of production systems and trade, affects demographic processes, and compromises food security on a global scale, among other impacts [7]; this is compounded by impacts on the land and the built environment, as the vulnerability of infrastructure and settlements increases, posing challenges for urban planning and architecture.

In line with the 2030 Agenda for Sustainable Development, Sustainable Development Goal 13 (Climate Action) promotes the adoption of urgent measures to address climate change and its effects in a coordinated manner. It is important to highlight that during the Conference of the Parties held in Paris in 2015 (COP21), 195 countries adopted the Paris Agreement, considered the first legally binding global climate agreement, whose objective is to guide the transition to low-carbon economies and limit the increase in global average temperature to below 2°C, a critical threshold for the stability of the planetary climate system [1].

Furthermore, recent studies emphasize that the increase in climate risks requires integrated approaches that combine environmental data, territorial analyses, and adaptive design strategies to strengthen the resilience of the built environment [8]. Within this framework, the present research aims to analyze the scientific output on climate change in Peru during the period 2001–2025, through a bibliometric study that identifies publication and citation indicators [9]. This is especially relevant considering that, according to the Reuters Institute and Oxford University's Digital News Report 2023, 36% of people avoid consuming news, with climate change being one of the most avoided topics globally [10]. In this sense, the systematization of scientific output contributes to strengthening the visibility, understanding, and communication of scientific knowledge on climate change, in the face of misinformation, information overload, and social disinterest.

Methodology

This study adopts a quantitative, descriptive, and analytical approach, based on bibliometric techniques, to systematically examine the scientific output on climate change in Peru during the period 2001–2025. In this sense, bibliometrics transcends a merely descriptive record, relying on indicators of production, citation, and collaboration [11], which allows for measuring the results of scientific activity [12] [13], thus constituting an ideal tool for this study.

a) Information Sources and Time Frame

Information was compiled from the Scopus database, selected for its broad interdisciplinary coverage, standardized metadata, and international recognition in bibliometric studies. The analysis period was initially established between the years 2000 and 2025; However, due to the lack of publication records on climate change in Peru during the year 2000, the time frame was adjusted to 2001–2025. This time frame allows us to observe the evolution of scientific production over more than two decades, in a context marked by the strengthening of the global climate agenda, the adoption of the Paris Agreement (2015), and the implementation of the Sustainable Development Goals, particularly SDG 13 (Climate Action).

b) Inclusion and Exclusion Criteria

To ensure the relevance and consistency of the documentary corpus, the following criteria were established:

Inclusion Criteria:

- Scientific articles published in peer-reviewed academic journals.

- Publications in English and Spanish.

- Studies explicitly focused on climate change and global warming in the Peruvian context.

- Access: All Open Access

- Documents indexed within the period 2001–2025.

Exclusion criteria:

- Theses, books, book chapters, conference proceedings, technical reports, and non-peer-reviewed documents.

- Duplicate records.

- Studies that mention Peru only marginally without addressing climate change as the central analytical focus.

c) Search Strategy and Terms

The search strategy was designed to maximize the retrieval of relevant documents, using keywords in English and Spanish related to climate change and its geographical delimitation in Peru. Boolean operators AND & OR were used to articulate the main concepts. The search equation applied was the following:

TITLE-ABS-KEY(

("global warming" OR "calentamiento global" OR "climate change" OR "cambio climat")

AND

(Peru OR Perú)

)

This equation allowed the identification of research that addresses the phenomenon of climate change from various disciplinary perspectives, provided that Peru constitutes the area of analysis.

d) Bibliometric indicators and analysis procedures

The bibliometric analysis was structured around four dimensions: scientific productivity, impact, collaboration and themes, operationalized through specific indicators.

Table 1. Bibliometric Indicators Used

Dimension	Indicators
Scientific Productivity:	Years of publication, number of documents per year, most productive authors (addressed through impact metrics), institutions and countries with the highest output.
Impact:	Citations per document, average citations, h-index.

Collaboration:	Co-authorship, institutional collaboration networks, international collaboration networks.
Thematic Areas:	Most frequent keywords, co-occurrence analysis, identification of thematic clusters.

The retrieved data were processed and analyzed using the Bibliometrix package from the R statistical environment, utilizing its Biblioshiny graphical interface. This allowed for descriptive analyses, the generation of bibliometric indicators, the construction of co-authorship and institutional collaboration networks, and the visualization of co-occurrence maps of keywords and thematic structures. These tools facilitated a comprehensive interpretation of the dynamics, evolution, and thematic orientation of scientific production on climate change in Peru.

Results

The results of the bibliometric analysis are presented, which characterize the temporal evolution, the main actors, the institutions with the highest scientific output, and the thematic lines on climate change in Peru during the period 2001–2005.

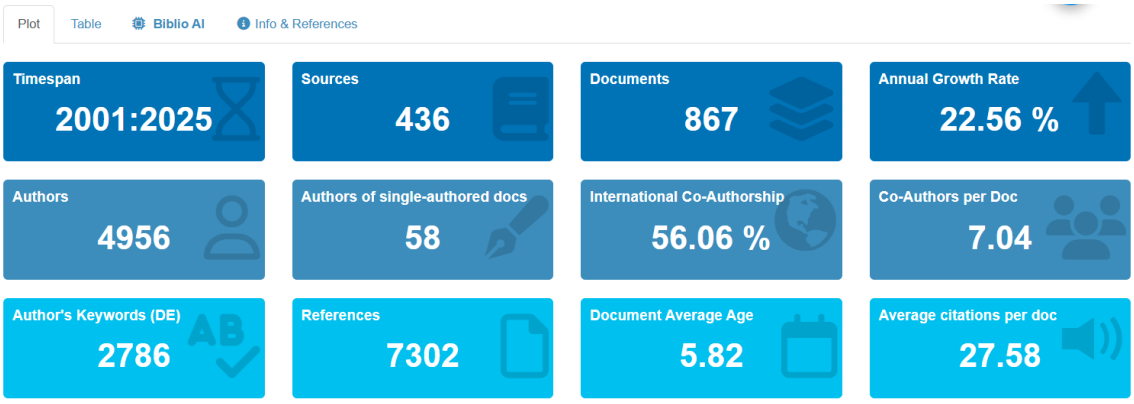

Figure 1: General Information on the Bibliographic Corpus on Climate Change In Peru (2001-2025)

Figure 1 shows the bibliometric analysis, which encompassed a total of 867 scientific articles published between 2001 and 2025, indexed in 436 sources (journals and other serial publications). This demonstrates a wide editorial dispersion and a growing interdisciplinary interest in the study of climate change in the Peruvian context. The annual growth rate of scientific output reached 22.56%, indicating a sustained expansion of the field throughout the analyzed period, especially in recent years.

The average age of the documents was 5.82 years, suggesting a relatively growing and constantly updated body of literature. Furthermore, the average of 27.58 citations per document, along with a total of 7,302 references, reflects a significant level of academic impact and engagement with established international scientific debates.

In terms of content, 4,879 keywords were identified, along with 2,786 keywords provided by the authors, reflecting a high degree of thematic and conceptual diversity in the research approaches. The analyzed corpus included 4,956 authors, with a low proportion of individually authored documents (67 articles) compared to an average of 7.04 co-authors per document, demonstrating a marked trend toward collaborative research. This dynamic is further reinforced by the 56.06% international co-authorship, an indicator that reveals the strong integration of the Peruvian case into global scientific networks on climate change.

Finally, the entire corpus consists of scientific articles, which reinforces the methodological consistency of the study and the relevance of the results for analyzing formal academic production on climate change in Peru.

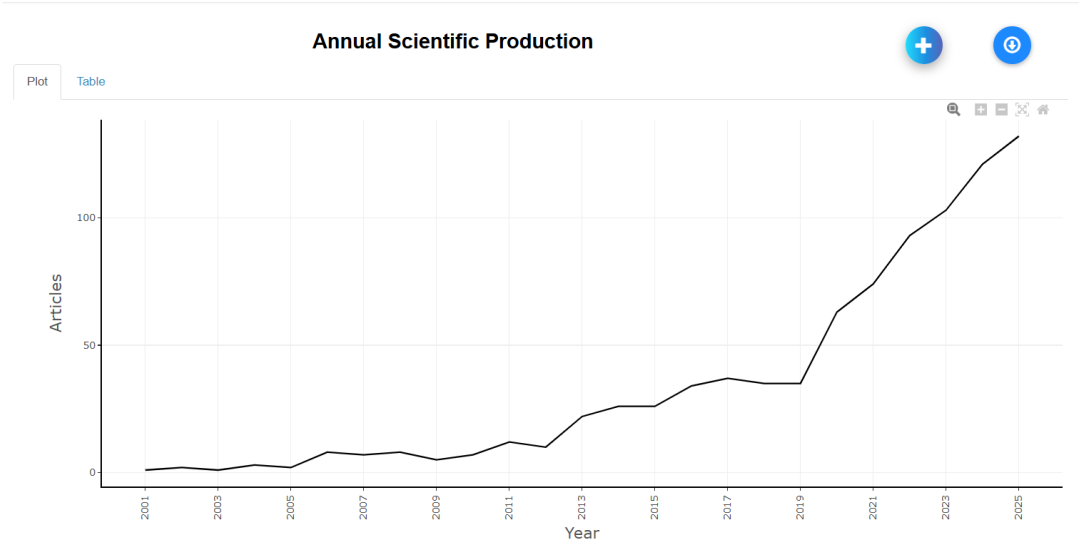

Figure 2: Annual Evolution of Scientific Production on Climate Change in Peru (2001-2025)

Figure 2 shows the annual evolution of scientific production on climate change in Peru during the study period, demonstrating progressive and sustained growth over time. In the initial phase (2001-2010), production remained at low and irregular levels, suggesting a still incipient field of research with limited academic visibility.

From 2011 onward, a gradual increase in the number of publications is observed, consolidating between 2013 and 2018, a period in which growth is more stable and continuous. However, it is from 2019 onward that an accelerated and pronounced increase in scientific production is recorded, reaching its peak around 2024-2025. This trend coincides with the strengthening of the international climate agenda, the implementation of the Paris Agreement, and greater integration of science and environmental policies within the national context.

Overall, the trend reflected in the figure confirms the consolidation of climate change as a priority research focus in Peru, as well as its growing approach from interdisciplinary perspectives, including those linked to territory, the built environment and spatial planning.

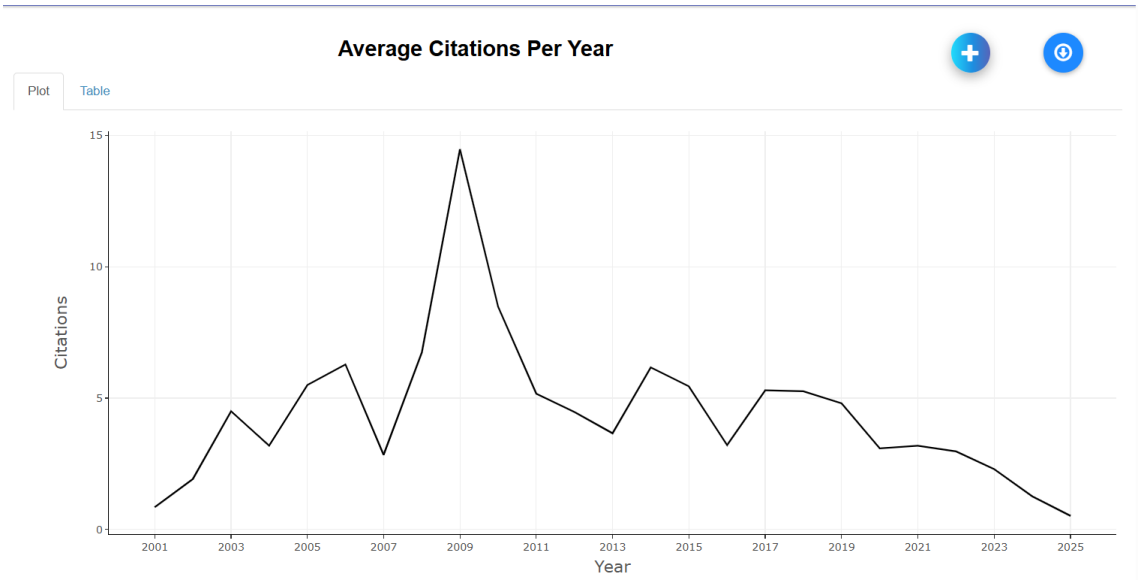

Figure 3: Average Number of Citations Per Year of Scientific Production on Climate Change in Peru (2001-2025)

The results in Figure 3 show a fluctuating pattern with a notable peak around 2009, the year with the highest average citation count. This suggests the publication of works with high scientific impact or foundational importance for the subsequent development of the field. Between 2010 and 2018, the

average citation count shows moderate variations, remaining at intermediate levels that reflect a progressive consolidation of scientific output. From 2019 onward, a downward trend is observed, mainly associated with the shorter exposure time of more recent articles to accumulate citations, a common phenomenon in bibliometric studies.

This figure highlights that the impact of scientific output is not distributed homogeneously over time, but rather responds both to the maturity of the field and to temporal factors inherent in citation cycles. This reinforces the need to interpret these indicators in relation to the historical context and the evolution of the research area.

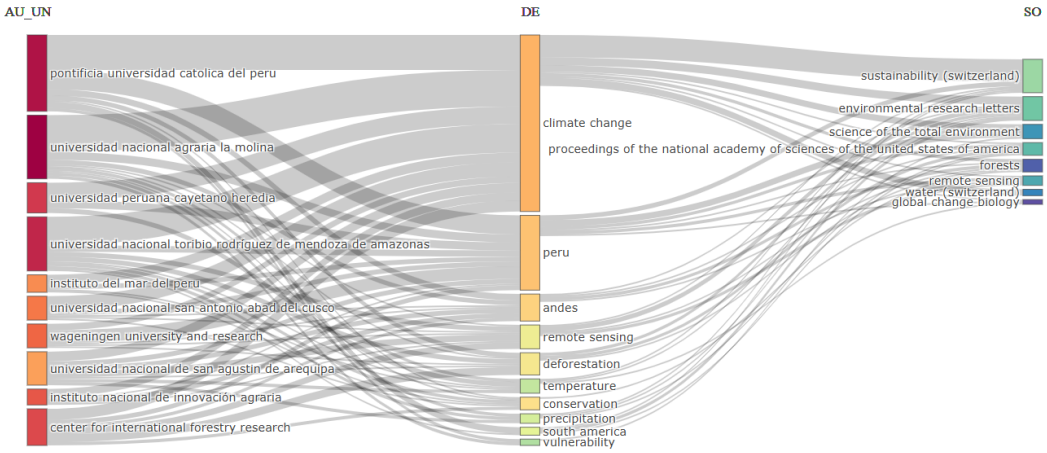

Figure 4: Relationship Between Institutions, Keywords and Publication Sources in Climate Change Research in Peru (2001-2025)

Figure 4 presents a three-field diagram relating institutional affiliations, keywords, and publication sources of scientific production on climate change in Peru. The Pontifical Catholic University of Peru and the National Agrarian University La Molina stand out as the main institutional nodes, along with other universities and research centers, as well as the presence of international institutions, demonstrating a dynamic of transnational collaboration.

Thematically, terms such as climate change, Peru, and Andes predominate, associated with concepts related to territory and environmental monitoring, such as deforestation, remote sensing, temperature, and vulnerability. Regarding publication sources, the research is concentrated in high-impact international journals, such as Sustainability, Environmental Research Letters, Science of the Total Environment, and Proceedings of the National Academy of Sciences of the United States of America, reflecting the integration of Peruvian research into global scientific circuits and its relevance to the analysis of territory and the built environment in the face of climate change.

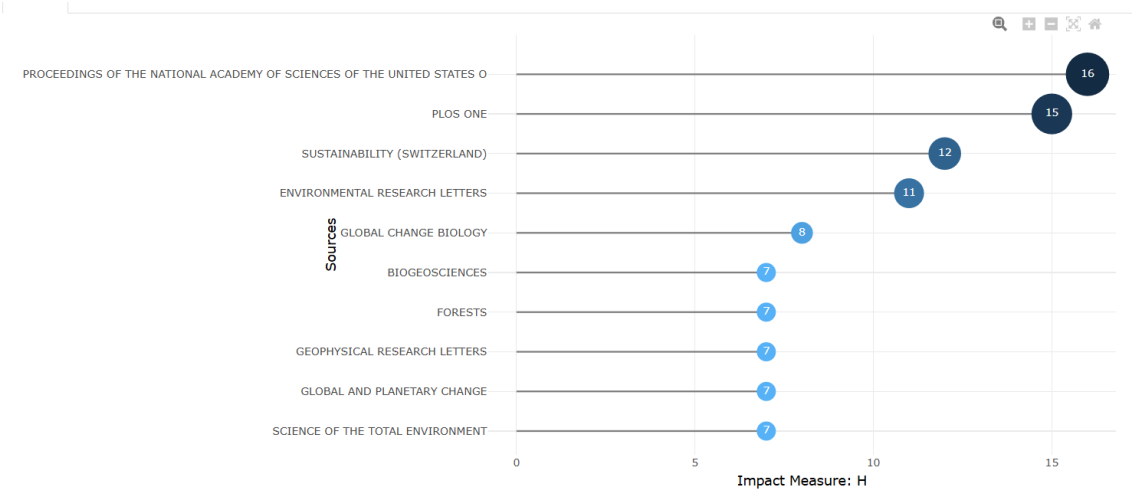

Figure 5: Local Impact of the Main Sources of Publication on Climate Change in Peru According To H-Index (2001-2025)

This figure shows the local impact of the main scientific journals that concentrate climate change research in Peru, measured by the h-index, an indicator that combines productivity and citations. The results show that Proceedings of the National Academy of Sciences of the United States of America leads the ranking with an h-index of 16, followed by PLOS ONE (15) and Sustainability (Switzerland) (12), demonstrating the predominant role of high-impact journals with international reach in disseminating scientific knowledge on this topic.

Likewise, journals specializing in environmental and Earth system sciences, such as Environmental Research Letters, Global Change Biology, Biogeosciences, Forests, and Science of the Total Environment, have significant h-index values, reflecting the consolidation of these publications as central channels for climate research related to territory, ecosystems, and environmental processes.

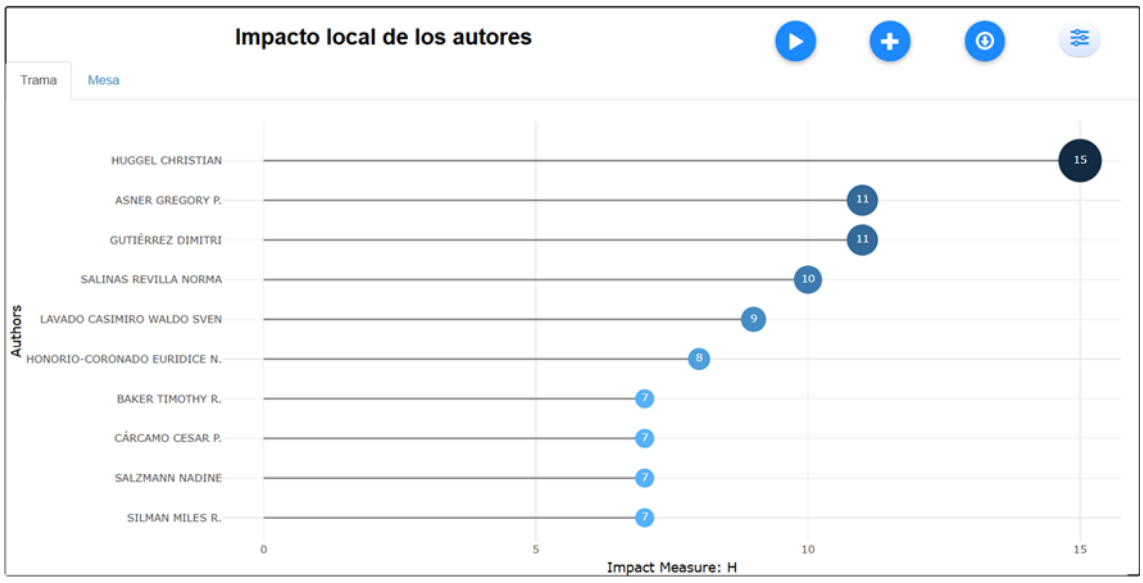

Figure 6. Local Impact of The Main Authors on Climate Change in Peru According To H-Index (2001-2025)

The results highlight a small group of authors with significant scientific influence on climate change research, identified through bibliometric indicators of impact, productivity, and temporal trajectory. Christian Huggel stands out, with the highest h-index (15), indicating sustained productivity and significant impact over a relatively short period since 2013. This performance suggests established leadership in the field, with 862 total citations across 18 publications. He is followed by Gregory P. Asner and Dimitri Gutierrez, both with an h-index of 11, demonstrating a sustained and highly cited contribution.

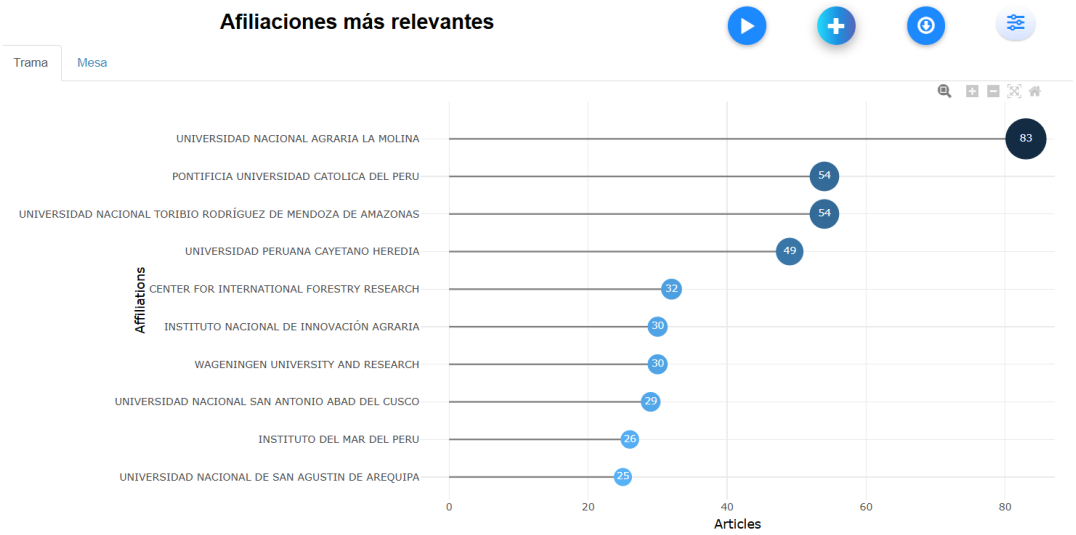

Figure 7: Institutional Affiliations with the Highest Scientific Output on Climate Change In Peru (2001-2025)

The figure reveals a clear concentration of scientific output in a small group of leading institutions. This is the case with the National Agrarian University La Molina, which tops the ranking with 83 articles, consolidating its position as the main academic hub for climate change research. This is consistent with its specialization in agricultural, environmental, and territorial sciences. It is followed by the Pontifical Catholic University of Peru and the National University Toribio Rodríguez de Mendoza of Amazonas (54 articles each), reflecting the relevance of both universities in the capital and institutions located in strategic regions for the study of Andean-Amazonian ecosystems.

Also noteworthy is the presence of international research centers, such as the Center for International Forestry Research and Wageningen University and Research, demonstrating a pattern of multilevel scientific collaboration in which national and international institutions with shared agendas on climate change converge. This collaborative network reveals a strong connection primarily through entities with a solid environmental and territorial orientation, reinforcing the interdisciplinary and collaborative nature of the field. In the regional context of southern Peru, scientific production is more concentrated in institutions such as the University of San Agustín in Arequipa and the University of San Antonio Abad in Cusco, which have a more visible presence in the analyzed productivity indicators. In contrast, the National University of the Altiplano in Puno does not appear among the institutions with the highest volume of publications during the study period, despite being located in a territory highly sensitive to the impacts of climate change, such as the Lake Titicaca basin and the Andean highlands. This gap highlights the need to strengthen territorially based scientific research in Puno.

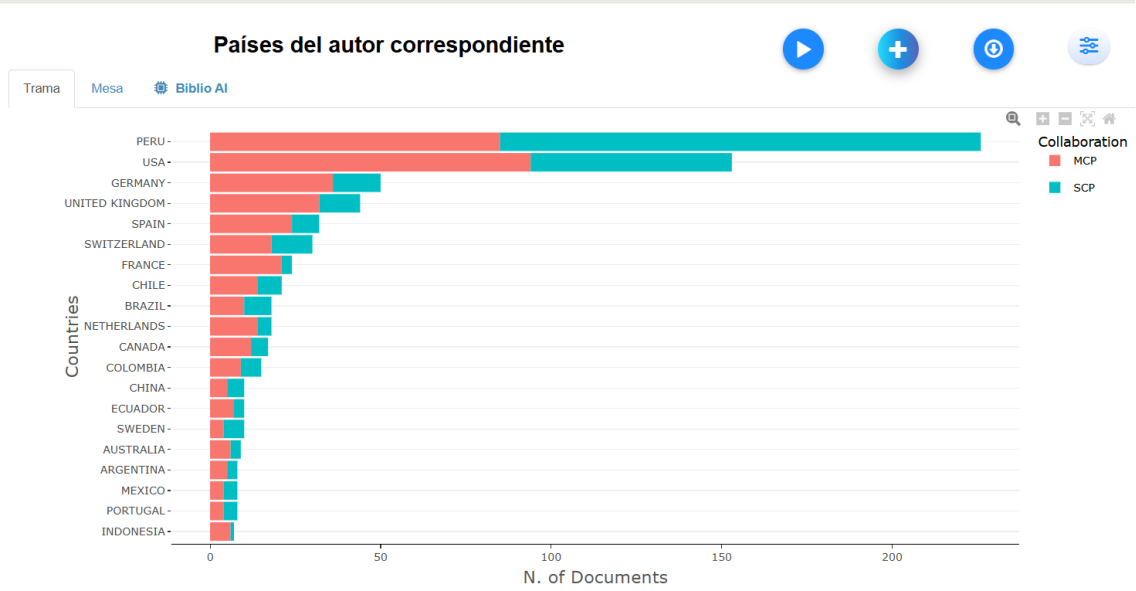

Figure 8: Corresponding Author Countries and Patterns of Scientific Collaboration in Climate Change Studies In Peru (2001-2025)

Figure 8 shows the distribution of the corresponding author's country of affiliation, differentiating between international collaborative publications (MCP) and single-country publications (SCP). Peru clearly leads in production, with a high volume in both SCP and MCP publications, indicating a consolidated national scientific base that, at the same time, maintains strong ties with international networks. The United States ranks second, standing out especially for its high participation in internationally collaborative publications, reflecting its strategic role as a scientific partner in Peruvian climate research.

Likewise, the significant presence of European countries such as Germany, the United Kingdom, Switzerland, Spain, and France is observed, as well as Latin American countries such as Chile, Brazil, Colombia, and Argentina, confirming the global and multinational nature of climate change research in Peru. These results confirm that climate change research in Peru is based on a combination of national leadership and international collaboration, a key condition for addressing complex climate problems with territorial reach.

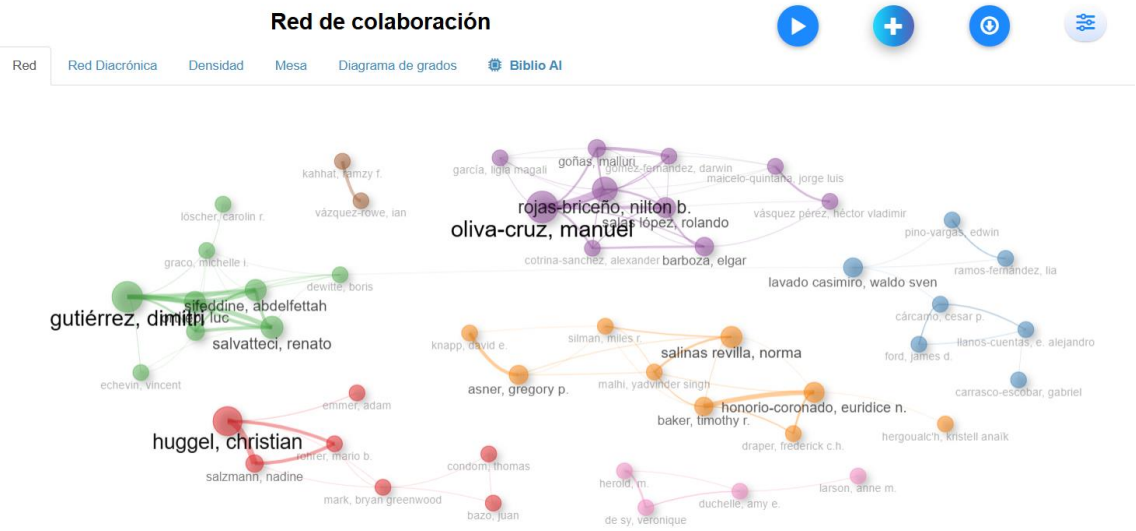

Figure 9: Scientific Collaboration Network in Climate Change Studies Related to Peru (2001-2025)

The figure illustrates the collaborative network among authors, where each node corresponds to a researcher and the links indicate co-authorship in the analyzed publications. The size of the nodes reflects the degree of collaboration (number of links), while the colors distinguish communities or co-authorship clusters—that is, groups of researchers who publish frequently with each other.

Highly centralized nodes are identified, such as those headed by Huggel, Christian, Gutiérrez, Dimitri, and Rojas-Briseño, Nilton B. / Oliva-Cruz, Manuel, which act as collaborative hubs and articulate relatively cohesive subnetworks. These central nodes concentrate a significant portion of the research output and function as connection points between national and international researchers, demonstrating transnational cooperation dynamics.

Likewise, the network exhibits a fragmented but complementary structure, with several medium and small clusters that reflect specific lines of research (for example, glacial impacts, climate risks, adaptation, or environmental management). The limited interconnection between some clusters suggests that, although active collaboration exists, it is primarily organized within specialized groups, with few bridges between thematic communities.

The network shows that climate change research linked to Peru relies on defined academic leadership and recurring collaborations, mainly with foreign researchers, which reinforces the internationalization of the field. However, it also points to opportunities to strengthen inter-institutional and national collaborative networks, especially those originating from regional universities.

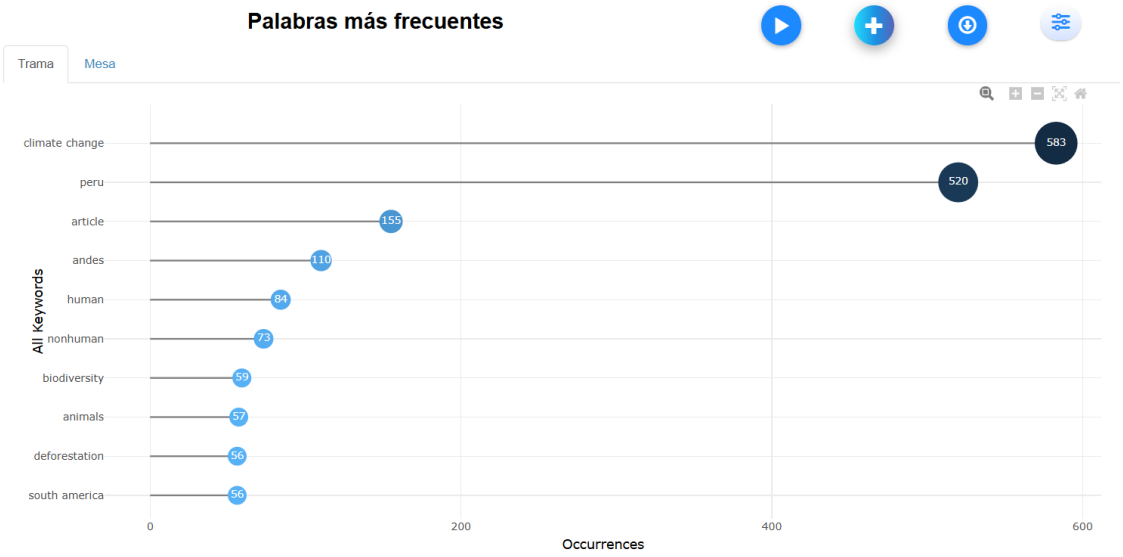

Figure 10: Most Frequent Words in Scientific Production on Climate Change in Peru (2001-2025)

The analysis of keywords reveals a thematic structure in the scientific production on climate change, with a high frequency of "climate change" (583) as the most recurrent term, confirming its centrality in the analyzed corpus. Secondly, "Peru" (520) highlights the strong territorial grounding of the research, demonstrating an explicit national focus. The terms "Andes" (110) and "South America" (56) reinforce the Andean and South American regional scale, situating the studies within a specific geographical framework. Likewise, the presence of "biodiversity" (59), "animals" (57), and "deforestation" (56) indicates a socio-environmental and ecological orientation, with an emphasis on conservation and land use. Furthermore, the existence of "human" (84) and "nonhuman" (73) suggests an integrative approach that articulates human and non-human dimensions of climate change, aligning with contemporary perspectives in environmental and socio-ecological studies.

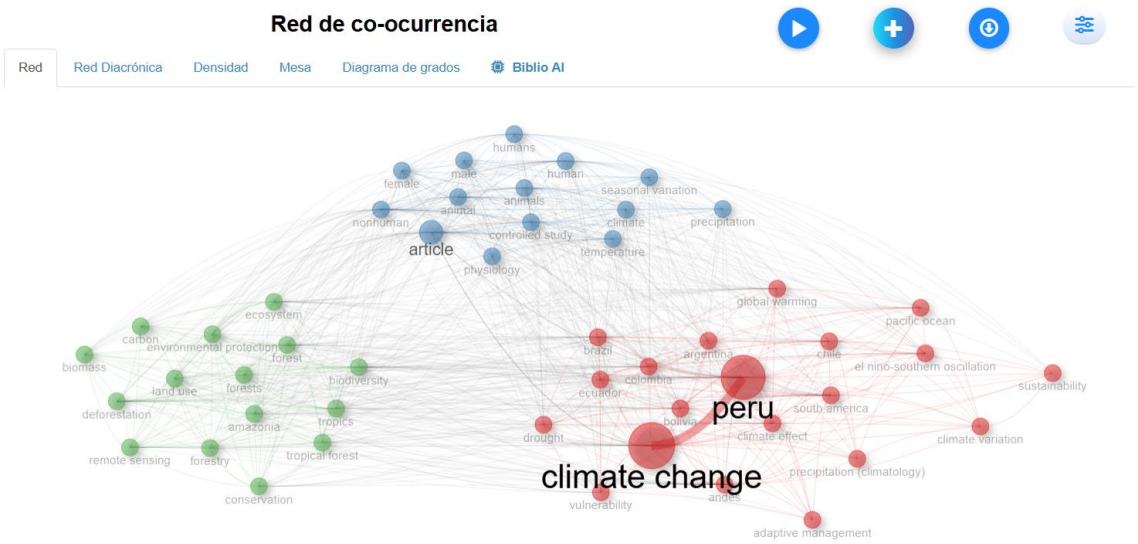

Figure 11: Network Of Co-Occurrence of Keywords in Climate Change Research in Peru (2001-2025)

This figure shows the keyword co-occurrence network, where node size represents term frequency and links indicate their co-occurrence in the analyzed documents. A highly connected central core, comprised of "climate change" and "Peru," confirms its structuring role within the research field. Around this core, various thematic clusters, differentiated by color, are articulated, highlighting the diversity of approaches taken.

A first cluster, associated with climatic and regional variables, includes terms such as Andes, precipitation, climate variability, and El Niño-Southern Oscillation, reflecting an emphasis on climate dynamics and their territorial effects. A second cluster is linked to socio-environmental dimensions, highlighting terms like "vulnerability," "adaptive management," and "sustainability," indicating a line of research focused on the impacts of climate change on populations and land management systems. A third cluster groups terms related to ecosystems and land use, such as "deforestation," "biodiversity," "forests," and "Amazon," demonstrating the centrality of studies on conservation and changes in vegetation cover.

The network reveals an interdisciplinary thematic structure, in which physical, ecological and socio-territorial approaches are closely interrelated, reinforcing the idea that scientific production on climate change in Peru is built from an integral perspective that articulates climate, territory and society.

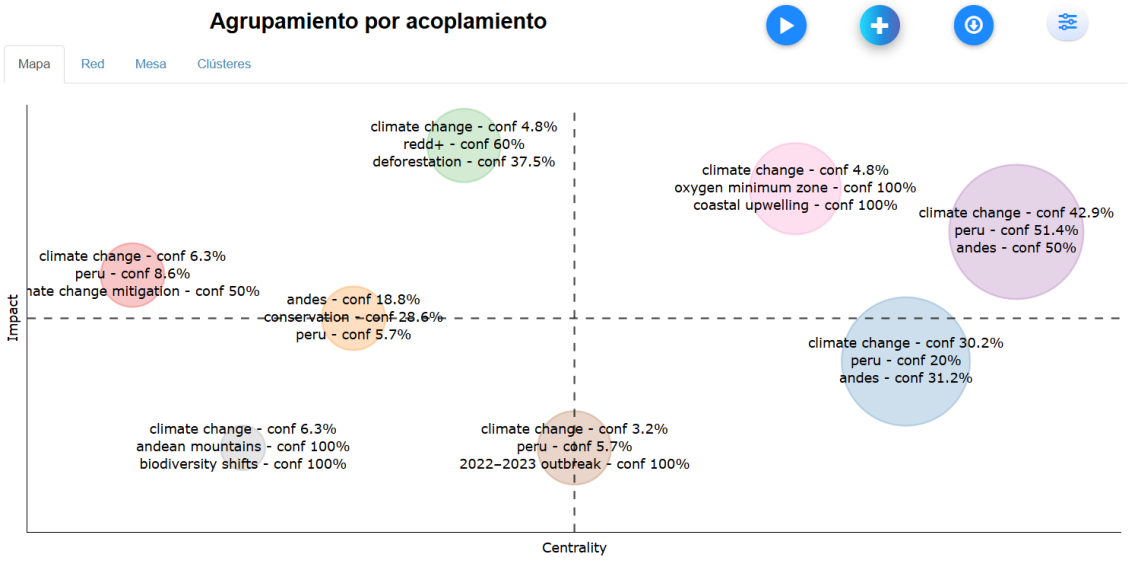

Figure 12: Thematic Grouping by Bibliographic Coupling in Climate Change Research in Peru (2001-2025)

The figure presents the bibliographic coupling map, organized according to the axes of centrality (structural relevance within the field) and impact (visibility or relative weight of the clusters). Several well-defined thematic areas are identified. In the quadrant of greatest centrality and impact, clusters focused on climate change, Peru, and the Andes stand out, confirming their role as key elements of the field. These clusters integrate territorial and regional approaches, highlighting the importance of Andean ecosystems on the national scientific agenda.

Other relevant groupings link deforestation, REDD+, and mitigation, reflecting a consolidated line of research on land-use change and climate policies. Specialized clusters associated with coastal dynamics (coastal upwelling, oxygen minimum zone), biodiversity, and Andean mountains also emerge. Although these clusters have lower centrality, they show high thematic impact, indicating specialized subfields with strong internal consistency.

Finally, the clusters with less centrality and impact correspond to more recent or situational issues, such as specific outbreaks in the 2022-2023 period, suggesting emerging lines of inquiry still in the process of consolidation. Thus, this map reveals a diverse thematic structure with a dominant Andean-territorial core and ramifications toward ecological, coastal, and environmental management approaches.

Discussion

Scientific production constitutes a social and institutional process characteristic of contemporary societies, driven by scientific communities that, through interdisciplinary interaction, generate, debate, and validate knowledge, data, and interpretations regarding problems and phenomena of common interest [14], the results of which are reflected, among other things, in the scientific article [15]. In this sense, the study's results confirm that scientific production on climate change in Peru is a collective and relational process, articulated by academic communities, primarily universities and research centers with a track record in environmental, agricultural, and territorial sciences, such as the National Agrarian University La Molina, the Pontifical Catholic University of Peru, and the National University Toribio Rodríguez de Mendoza, which act as hubs for sustained knowledge generation. While scientific production reflects the knowledge that emerges from the collective work of academic communities, it also highlights the individual contributions of authors [16], through collaborations, thematic specialization, and intellectual exchange. At the author level, a small group of highly productive researchers was identified who maintain consistent publications over time, forming stable epistemic communities that lead specific lines of research. Likewise, the recurring presence of international institutions and authors demonstrates broader, transnational academic communities that contribute to the themes and methodologies of national production, meaning that scientific productivity is not homogeneous.

The progressive increase in publications, especially since the last decade, coincides with the consolidation of climate change as a global scientific and political problem, as well as with Peru's inclusion in international environmental research agendas, consistent with trends observed in countries of the Global South [3]. The results confirm that climate change research in Peru is characterized by a high dependence on international networks, authorial centralization, and a strong thematic focus on the Andes and biodiversity. This reinforces the need for science policies that promote greater decentralization, regional institutional strengthening, and the integration of local knowledge into climate science production.

A relevant finding is the regional inequality in scientific production. While the main public universities in regions like Cusco and Arequipa show a sustained presence in the academic network, the National University of the Altiplano in Puno does not register significant participation in indexed publications on climate change, despite its strategic location in a highly vulnerable territory such as the Lake Titicaca region. Nevertheless, there is published regional research, not necessarily indexed in databases like Scopus, that addresses this topic. For example, from a communication and social perception perspective, the study “Clean Titicaca Now Campaign: An Experience from Social Communication” describes the communication intervention in Puno, highlighting the role of local media and civil society in environmental management regarding the pollution of the inner bay of Lake Titicaca [17]; another study related to this topic is “Social Representation of Climate Change in the Urban Population of the Puno Region,” which reinforces that media strategies not only inform but also legitimize collective initiatives and generate social agency, which is crucial in contexts where

perceptions of climate change are influenced by cultural factors and beliefs [18]; that is, the Andean worldview, where nature is a living entity [19].

In line with this, recent conceptual phenomena such as “solastalgia” have emerged, describing the emotional and psychological pain caused by the environmental degradation of one's usual surroundings [20]. This is particularly relevant for contexts in southern Peru, such as Puno and the Andean highlands, where the relationship between communities and their territory is based on a relational worldview, in which nature is not an external object but a living subject. In this sense, the impacts of climate change, such as alterations to Lake Titicaca, droughts, or frosts, not only generate economic and ecological effects but also profound symbolic, cultural, and emotional impacts, consistent with solastalgia. Therefore, the low visibility of these dimensions in Peruvian scientific production, identified in the bibliometric analysis, reveals a significant thematic gap and reinforces the need to integrate approaches that connect climate change, mental health, Andean territoriality, and local knowledge, aligning with recent international trends that broaden the study of climate change to include its psychosocial and cultural consequences.

Conclusions

The bibliometric study of scientific production on climate change in Peru, from 2001 to 2025, shows a sustained and accelerated growth in the number of publications on climate change, particularly since the last decade. This trend reflects the progressive consolidation of the topic on the national scientific agenda and its alignment with international climate commitments such as the Paris Agreement and SDG 13.

In terms of scientific impact, citation indicators and the h-index reveal a concentration of impact among a small group of authors, articles, and internationally recognized journals. This demonstrates the high global visibility of Peruvian research, although it also suggests the need to diversify leadership and strengthen production in regional and local journals.

The analysis of co-authorship and institutional and international collaboration networks shows that scientific production is strongly linked to international networks, with the presence of collaboration hubs that concentrate the greatest connectivity and centrality. These dynamics foster the circulation of knowledge, but also reveal asymmetries in institutional participation, with some universities and regions exhibiting low or no integration into these networks.

Thematic analysis, including keywords, co-occurrences, and clusters, shows that scientific production is structured around dominant axes such as climate change, the Andean region, biodiversity, deforestation, and human-nature interactions, confirming a predominantly socio-environmental and territorial approach. Within this framework, the relevance of incorporating the concept of “solastalgia" emerges, allowing for an understanding of the emotional and cultural dimensions associated with environmental degradation, particularly in Andean contexts. Furthermore, opportunities are identified to deepen research that more explicitly integrates dimensions applied to the built environment, spatial planning, and architecture in the face of the challenges of climate change in Peru.

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