

REVIEW

## Climate Justice Dimensions: Approaching Loss and Damage and Adaptation towards a Just City

Pedro Henrique Campello Torres<sup>\*</sup>, Gabriel Pires de Araújo<sup></sup>, Marcos Tavares de Arruda Filho<sup></sup>, Isabela Carmo Cavaco<sup></sup>, Beatriz Dunder<sup></sup>

*Institute of Energy and Environment, University of São Paulo, São Paulo, 05508-900, Brazil*

### ABSTRACT

The escalating occurrence of severe climatic events over the past decade, with a projection for further intensification due to the climate emergency, underscores the critical role of urban and regional planning in climate action towards just cities. Municipalities and regions are both significant contributors to CO<sub>2</sub> emissions and are vulnerable to the adverse impacts of climate change. This paper contends that urban and regional planning must undergo a paradigm shift to address this challenge. Climate justice, encompassing dimensions of inequality and environmental equity, is a pivotal dialogue in these contexts. Through a comprehensive review, this study contributes to the evolving landscape of climate justice planning and policy, offering insights that could resonate across the Global South and beyond. As an illustrative case, the authors delve into Brazil's climate challenges, discussing adaptation planning and post-disaster response, and emphasizing the need for localized and community-driven initiatives. This article delves into the interplay between Loss and Damage, adaptation, and just cities, with a focus on the Global South. The authors scrutinize the emerging discourse on Loss and Damage, its associations with climate impacts, and the quest for a just and equitable approach. The work advances the understanding of the distinction between adaptation and Loss and Damage actions, highlighting the significance of a dedicated fund for addressing Loss and Damage in vulnerable countries.

**Keywords:** Climate justice; Loss and Damage; Global South; Just adaptation; Brazil

#### \*CORRESPONDING AUTHOR:

Pedro Henrique Campello Torres, Institute of Energy and Environment, University of São Paulo, São Paulo, 05508-900, Brazil; Email: [phcampellortorres@gmail.com](mailto:phcampellortorres@gmail.com)

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## 1. Introduction

The incidence of severe climatic events (droughts, floods, hurricanes, and rains) has increased in the past decade, and the tendency is to increase with the worsening of the climate emergency <sup>[1]</sup>. The statement that municipalities have been considered an essential territory for action for global climate problems is not new, either because they are essential vectors of CO<sub>2</sub> emissions or because they will suffer from its harmful effects, forcing them to adapt. It may also be due to the need for more legally binding and robust agreements and the role of national governments <sup>[2]</sup>.

Thinking or rethinking the role of urban and regional planning in the face of this challenge seems imperative <sup>[2-5]</sup>. Both in reports by the Intergovernmental Panel on Climate Change <sup>[6]</sup> and in the article “*Six research priorities for cities and climate change*” <sup>[7]</sup>, cities and their urban planning appear as fundamental to thinking about a future with just sustainability. Nevertheless, there are still many “gaps”, barriers, and challenges, especially in the most urbanized part of the planet, Latin America <sup>[8]</sup>, and in Africa and Asia regions that are projected to become the most urbanized in the coming decades <sup>[9,10]</sup>.

Climate change scenarios indicate that by 2050, three billion people are expected to live in slums and precarious settlements, exposed to the effects of climate change <sup>[7]</sup>. How will these cities be produced and planned? As early as 2010, urban planner Ray Quay presented proposals and tools for adapting to climate change, which he coined Anticipatory Governance <sup>[11]</sup>. Quay explained that the process for a response could be simplified into four distinct phases:

- 1) Anticipate a wide range of possible futures.
- 2) Develop multiple strategies.
- 3) Monitor changing conditions over time.
- 4) Act as anticipated and evaluate your progress.

However, these tools usually work—if they work—differently across all parts of the planet. In the context of the Global South, for example, dialogue regarding notions such as inequality, environmental justice, and climate justice is most imperative <sup>[12]</sup>. Otherwise, there is a risk of producing the type

of planning that engenders poverty and inequality in these regions <sup>[13]</sup>.

A growing collection of literature has illuminated this issue. However, few empirical studies focus on the territory of the Global South with researchers from the Global South, and even fewer, quantitatively, in Latin America. Barton <sup>[2]</sup> has worked on Chile’s theme, making a significant contribution based on the peculiarities of South America. The work led by Shi L. et al. <sup>[14]</sup> is another critical example of the need to approach the debate on inequality concerning planning for adaptation to climate change. Adaptation projects or green infrastructure should not reinforce inequalities <sup>[15]</sup>; however, it is necessary to attack adaptation and inequalities simultaneously <sup>[16]</sup>.

Talking about climate justice is also talking about its dimensions, scale, and social voices. This paper addresses this issue, approaching Loss and Damage and adaptation towards a just city. It aims to contribute to an ongoing critical discussion on climate justice planning and policy, avoiding the risk of it becoming one more panacea or reinforcing local and planetary privileges.

The article is divided as follows: The first part seeks to contextualize the need to more carefully approach the differences between action or reaction when we address climate change adaptation policies, programs, and plans. Understanding the context is fundamental for establishing a dialogue at the science-policy interface, which we propose to do in this work by observing these particularities towards just cities. In the second section, we describe the materials and methods of our analysis. In the third section, we present a review of Loss and Damage, aiming to understand the overview of the publications and the links with action and reaction to climate change events. In the final part of this article, we present the results and discuss the importance of these findings given the applied policy dialogue perspective. For the discussion, we use Brazil as an illustrative case study, an essential representative of the Global South and South America, and which has been suffering the uneven impacts of climate change in its continental territory.

## 2. Climate change adaptation policies, programs and plans: Action or reaction?

What does working with urban and regional planning related to climate change mean? Planning is already an anticipatory practice. The planning field and its practice deal with medium- or long-term schedules, which should contain uncertain ingredients for future development paths. The increasing importance of plans, in that sense, must contain indications for monitoring and periodic review, which is crucial to adapt to extreme eventuality.

So, recognizing this is critical. Recognizing this should alert us to how radical and far away from business-as-usual planning it needs to be. It is, therefore, about working within a scenario of uncertainty<sup>[11]</sup>. Climatic variability includes even more unpredictability in planning since it demands the need to work with the best available scientific data, often where a knowledge gap exists in several locations—even more in Global South countries<sup>[12]</sup>.

For example, the natural resources interdependence of water supply needs to be addressed on a macro and cross-scale. It involves stakeholders and an extrapolation of the traditional frontiers and business as usual, the usual guide practices of planning and management<sup>[12]</sup>. Water scarcity events can be demonstrated in diverse cities and regions worldwide and have shown evidence of the distance between the territory of production of the ecosystem service and consumption<sup>[17]</sup>.

Planning becomes essential in this context as it can also contribute as an intersection for an inter, multidisciplinary, and transdisciplinary articulation of responses and reflections to the challenges that arise. For this, a climate justice dialogue is crucial, a term originating in the Global North and solidifying in Latin America more recently<sup>[18]</sup>.

Porter, Rickards, Moloney, and Anguelovski, I.<sup>[19]</sup> organized a Planning Theory & Practice section entitled “Climate Justice in a Climate Changed World”. It is a must-read, mainly the contribution by Isabelle Anguelovski and David N. Pellow, “Towards an Emancipatory Urban Climate Justice Through

Adaptation?”. However, voices/authors are absent from the Global South, mainly from South American countries, which has been recurring and can be explained by several reasons, including, amongst others, the priority and necessity of the inequality agenda<sup>[20]</sup>.

Therefore, urban and regional planning needs to adjust its practice to local demands in the face of climate change. The best way to do this is not only from a formal participatory planning process; it is necessary to go beyond that including radical and insurgent approaches<sup>[21,22]</sup>. It ensures the necessary territory for community actors to propose actions, breaking the business-as-usual paradigms of current planning and management practices. Being direct: It is not a question of including the bottom-up discussion. Notwithstanding, it is from there that it must be done.

In this case, what may seem local will actually be evidence of the well-known and widespread term *glocal*<sup>[23]</sup>.

According to IPCC AR 6<sup>[6]</sup>:

*“Adaptation planning and implementation have progressed across all sectors and regions, with documented benefits and varying effectiveness. Despite progress, adaptation gaps exist, and will continue to grow at current rates of implementation. Hard and soft limits to adaptation have been reached in some ecosystems and regions. Maladaptation is happening in some sectors and regions. Current global financial flows for adaptation are insufficient for, and constrain implementation of, adaptation options, especially in developing countries” (IPCC, 2023, p.6).*

From what we can see, there was still an enormous gap initially. Moreover, there is an uneven distribution of those gaps: the global south countries. Second: maladaptation or what has been reported as fake solutions, or green makeup, that, instead of solving a problem, reinforce green privileges and enrich corporations. Third, financial flow for adaptation is insufficient, despite the increase of profits of fossil fuels, among other sectors—these have names from a climate justice perspective: climate debts and climate colonialism.

However, some adaptation actions seem more

like immediate response actions than medium and long-term planning, and that is based on climate change forecasts. Wouldn't these measures be what is conventionally called *Loss and Damage*? Loss and Damage mean different things to different groups, and there is no agreed-upon definition of Loss and Damage within the UN Framework Convention on Climate Change (UNFCCC). However, Loss and Damage can generally be understood as the negative impacts of climate change that occur despite, or in the absence of, mitigation and adaptation.

Loss and Damage are increasingly discussed in the global agenda for tackling climate change. Although the genesis of an agreement to finance a fund for Loss and Damage took place in 2013, with the Warsaw International Mechanism and later in 2015, with the Paris Agreement Article 7, it was at COP26, in Glasgow, Scotland, that pressure from civil society led to a boost on the topic <sup>[24]</sup>. At COP27, which took place at the end of 2022 in Sharm el-Sheikh, Egypt, the decision to establish a Loss and Damage fund was ratified to compensate low- and middle-income countries that are already suffering from the negative impacts of climate change <sup>[25]</sup>.

Despite the progress made in the decision taken at COP27 <sup>[24,25]</sup>, there is a risk that the discussion on Loss and Damage becomes a merely symbolic issue about the urgencies and dangers of global society. Having a political understanding of the losses and damages related to climate change that the fund's compensations would cover and the governance mechanisms that would be applied to address justice in its different dimensions can reduce this risk <sup>[24]</sup>.

Differentiating between adaptation and Loss and Damage actions seems imperative. Both to clarify their differences and the dispute over resources, the type of projects, programs, policies, and plans. This paper seeks to advance and contribute in this direction. To do so, it presents this discussion and, in addition, observes, through reviews, what has been published about Loss and Damage. The topic will undoubtedly grow in the coming years <sup>[24-26]</sup> and research will incorporate Loss and Damage more strongly. That justifies the importance of this study

even more as we mark the frame we are making and, on the other hand, follow an emerging agenda designed for the coming years.

Brazil, our illustrative case here, has experienced several severe climate impacts. Only in the last few years, tragic events, such as those that occurred in Pernambuco and the south of Bahia, in the northeast region, the floods in Acre and Amazonas in the north, the fires and floods in the center-west, severe droughts in the south and southeast, as well as floods. Despite having a national adaptation plan, from 2016, actions and differentiations on post-tragedy response and adaptation planning need to be clarified.

### 3. Material and methods

For this work, research was mobilized on the relationship between the area of climate change and planning, as well as on Loss and Damage and adaptation. The objective is not to present a systematic review of the literature, which would require specific techniques and protocols, but an initial mapping of the works—what has been produced and understood by the academy—on the themes in order to fertilize the discussion in the light of the lens of climate justice. In this sense, as an illustrative element for discussion, a country from the Global South, in South America, Brazil, is used not as a case study but as an element that enables reflection and replicability in other countries in the region.

The steps taken on the bibliographic searches carried out are shown below. For the literature review process, mixed research methods were used in multiple databases since databases with a predominance of publications in the English language tend to suppress and make invisible the extensive academic production of countries in the global south, mainly in South America, in which many of the publications are produced in Latin American papers, or books and journals that are not indexed in databases such as Scopus or Web of Science. To this end, a search was added to the Scopus and Web of Science databases of Scielo and Redalyc—open-access databases with publications from the region.

Scielo (Scientific Electronic Library Online) is

a Brazilian open-access database, operating since 1997. It is the result of a partnership between FAPESP (Fundação de Amparo à Pesquisa do Estado de São Paulo) and BIREME (Centro Latino-Americano e do Caribe de Informação em Ciências da Saúde) with the aim of increase the visibility of Brazilian scientific production and develop a methodology for electronic publication in Brazil, Latin America, and Caribe. Redalyc is an open-access indexing system supported by the Autonomous University of the State of Mexico. Founded in 2003, its main goal is to give visibility and increase the quality of Latin American Social Sciences and Humanities journals.

For each database, a methodological path was carried out. The search was conducted in a specific time frame (31/10/2022 to 07/11/2022), considering the 27th Conference of the Parties—COP27 as a turning point in the discussion about Loss and Damage, by consolidating the need for a fund. Therefore, the focus was on articles published before COP27, understanding the prior concept construction. The timeframe with the end of COP 27 is due to the assumption—as a hypothesis—that from COP 27, the number of research and publications on Loss and Damage increased in volume, changing the current profile of what has been published<sup>[27]</sup>.

### 3.1 Scielo

The first search on the Scielo database was the

descriptor “Loss and Damage” until November 2022—the eve of COP27. The second search with the terms (Loss and Damage) AND (Climate) in order to try to refine the search for articles dealing with Loss and Damage in the context of climate change, excluding articles in the area of AgroSciences and health. **Figure 1** indicates the search carried out on the Scielo data.

### 3.2 Redalyc

The first search in the Redalyc database with the descriptor ‘Loss and Damage’. The second search with the terms ‘Loss and Damage’ AND ‘Climate’ is to refine the search for articles dealing with ‘Loss and Damage’ in the context of climate change, excluding articles in AgroSciences and health. The third search was with the terms ‘Loss and Damage’ AND ‘Climate’ AND ‘Brazil’. The fourth search included ‘Loss and Damage’ AND ‘Climate’ AND ‘Global South’. The fifth search was with the term “Loss and Damage AND Climate AND Global South AND Paris Agreement”. The sixth and final search with the terms ‘Loss and Damage’ AND ‘Climate’ AND ‘Global South’ AND ‘Paris Agreement’ AND ‘Brazil’. **Figure 2** indicates the search carried out on the Redalyc database.

### 3.3 Web Of Science (WoS)

The descriptors were all written in the English

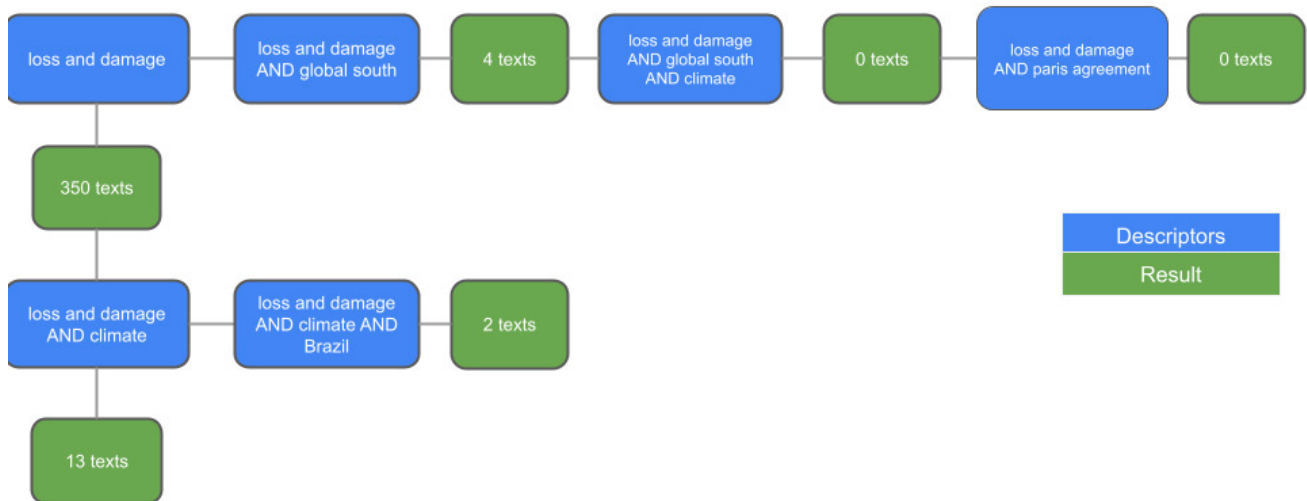


Figure 1. Scielo.

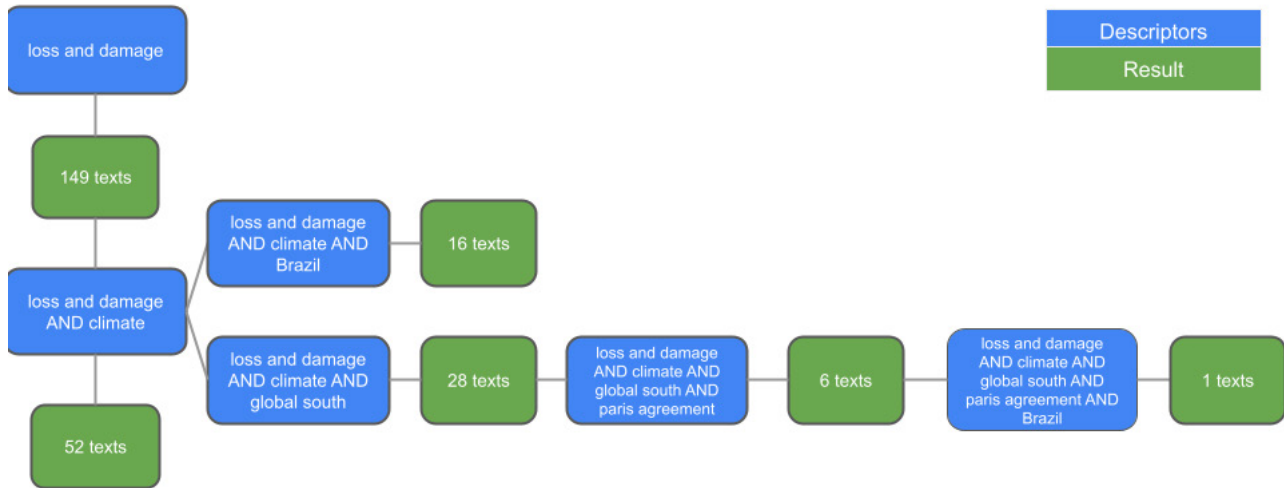


Figure 2. Redalyc.

language, and the first Web of Science (WoS) search was ‘Loss and Damage’. At the WoS database, articles, book chapters, notes, editorial material, and news items, among others, are included. The second search was with the descriptor ‘Loss and Damage’ AND ‘Climate’. Exclusion filters were applied, excluding the study areas: Sport Sciences, Reproductive Biology, Radiology Nuclear Medicine Medical Imaging, Optics, Computer Science Theory Methods, Pharmacology Pharmacy, Engineering Aerospace, Biochemistry Molecular Biology, Astronomy Astrophysics, Computer Science Information Systems, Physiology.

The third search with ‘Loss and Damage’ AND ‘Climate’ AND ‘Global South’. The final and fourth search with ‘Loss and Damage’ AND ‘Climate’ AND ‘Global South’ AND ‘Paris Agreement’. **Figure 3** indicates the search carried out on the Web Of Science (WOS) database. **Figure 4** indicates the search carried out on the Web Of Science (WOS) database with the exact search.

### 3.4 Scopus

The first search used “exact term” in Scopus data, identified by the square brackets {loss and damage}, noting that the descriptors were all written in the English language. Exclusion filters were used to exclude areas unrelated to the issue: Medicine, Biochemistry, Genetics and Molecular Biology, Physics

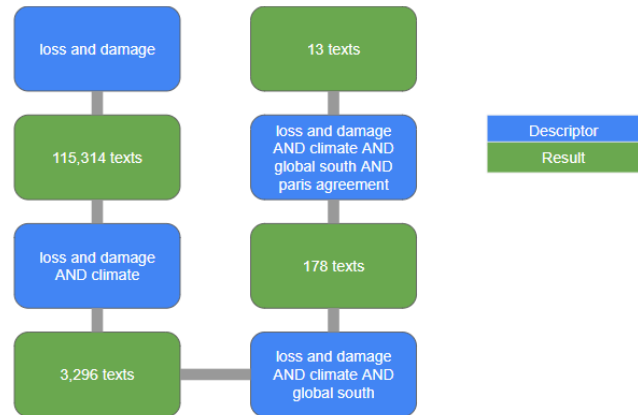


Figure 3. WoS 1.

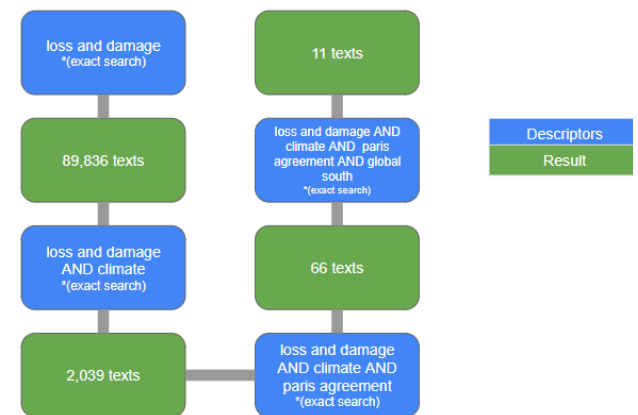


Figure 4. WoS 2.

and Astronomy, Neuroscience, Pharmacology, Toxicology and Pharmaceutics, Immunology and Microbiology, Veterinary, and Dentistry.

The second search was {loss and damage} AND {climate} while the third search was {loss and damage} AND {climate} AND {global south}. Finally,

the fourth search was {loss and damage} AND {climate} AND {global south} AND {Paris agreement}.

Figure 5 indicates the search carried out on the Scopus database.

### 4. Results

The topic below presents the results of searches in the various databases. Table 1 below confirms the discrepancy between the bases. What would be even greater if we had included the Portuguese or Spanish searches. Although the theme already has a considerable number of published works—as indicated by the data in the WoS base—when the filter for the Global South, the most vulnerable region on the planet, the drop is considerable. It is even more significant if we include the descriptor Brazil, a country used here to illustrate a territory of the Global South concretely.

### 4.1 Scielo

From the first Search on Scielo with the descriptor “Loss and Damage” until November 2022—the eve of COP27—a total of 350 articles were returned, most from the medical (46%), biological (13%), rural production (29%), and related areas. In the second search with the terms (Loss and Damage) AND (Climate) 13 articles returned, highlighting:

- Arévalo, G, Jorge, G. (2020). Challenges of Compensation and Reparation for Loss and Damage Related to the Adverse Effects of Climate Change.

For (Loss and Damage) AND (Climate) AND (Brazil). Only two articles returned, which do not deal directly with the topic; they only permeate the discussion of Loss and Damage when dealing with the effects of climate change, but the subject is not part of the primary purpose of the article:

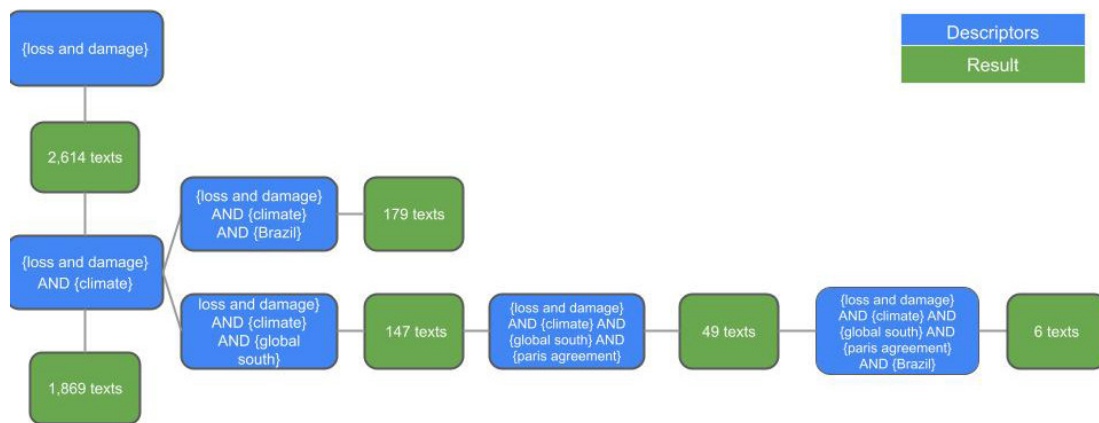


Figure 5. Scopus.

Table 1. Learnings from the database search: WoS, Scopus, Scielo and Redalyc.

Descriptors	WoS*	Scopus*	Scielo	Redalyc	Total
Loss and Damage	89.836	2.614	350	149	92.949
Loss and Damage AND Climate	2.039	1.869	13	52	3.973
Loss and Damage AND Climate AND Global South	118	147	0	28	293
Loss and Damage AND Climate AND Paris Agreement AND Global South	11	49	0	6	66
Loss and Damage AND Climate AND Brazil	67	179	2	16	264
Loss and Damage” AND “Climate” AND “Paris Agreement” AND “Global South” AND Brazil	0	6	0	1	7

\*using the “exact search” features.

- Alvalá, R.C.S., Cunha, A.P.M.A., Brito, S.S.B., et al. (2019). Drought monitoring in the Brazilian Semiarid region.
- Regina da Cal Seixas, et al. (2014). Perception of fishermen and shellfish producers on global environmental changes in the Northern Coast of São Paulo State, Brazil.

In the search ‘Loss and Damage’ AND ‘Global South’. Only four articles returned, with little relation to the topic; two of the articles deal only with the issue of Loss and Damage related to health conditions and diseases. The other two articles have a slightly closer relationship. Although they deal specifically with the subject of public health, they bring a correlation between Loss and Damage in the public health sector and floods; both articles were written by the same authors (Minervino and Duarte):

- Millar, A., Joubert, K., Naude, A. (2020). Prevalence of hearing loss and tinnitus in a group of adults with Human Immunodeficiency Virus. *S Afr J Commun Disord*.
- Hassan-Moosa, R., et al. (2017). Cytomegalovirus retinitis and HIV: Case reviews from KwaZulu-Natal Province.
- Minervino, A.C., Duarte, E.C. (2016). Loss and Damage affecting the public health sector and society resulting from flooding and flash floods in Brazil between 2010 and 2014—based on data from national and global information systems. *Cien Saude Colet*.
- Minervino, AC, Duarte, E.C. (2018). Material damage caused to public health and society due to inundations and flash floods in Brazil, 2010-2014.

Finally, the search for ‘Loss and Damage’ AND ‘Global South’ AND ‘Climate’ did not return the mention of any article; the same happened for the last search on ‘Loss and Damage’ AND ‘Paris Agreement’ did not mention any article.

## 4.2 Redalyc

The first search in the Redalyc database with the descriptor ‘Loss and Damage’ returned 149 articles

(**Figure 6**), most of them in the large areas of Agro-Sciences and health. From the second search with the terms ‘Loss and Damage’ AND ‘Climate’, try to refine the search for articles dealing with ‘Loss and Damage’ in the context of climate change, excluding articles in AgroSciences and health. Fifty-two articles returned, most still in AgroSciences, but now followed by administration, accounting, and earth sciences.

- Loss and Damage affecting the public health sector and society resulting from flooding and flash floods in Brazil between 2010 and 2014—based on data from national and global information systems.
- The UN Framework Convention on Climate Change and the Paris Agreement: Challenges of the Conference of the Parties Prolegómenos. *Derechos y Valores*, 2019.
- Lara, E., Lázaro, T., Michel, S. (2014). Cambio climático: Un negocio de alto riesgo?

The third search with the terms ‘Loss and Damage’ AND ‘Climate’ AND ‘Brazil’. Sixteen articles returned. The articles originate from the following countries (**Figure 7**):

- Brazil (12), Mexico (2), Portugal (1) and Bolivarian Republic of Venezuela (1).
- Loss and Damage affecting the public health sector and society resulting from flooding and flash floods in Brazil between 2010 and 2014—based on data from national and global information systems.
- Global justice and environmental governance: An analysis of the Paris Agreement. *Revista Brasileira de Política Internacional*. 2017, 60(1).

The fourth search with the terms ‘Loss and Damage’ AND ‘Climate’ AND ‘Global South’. Returned twenty-eight articles. The articles originate from the following countries (**Figure 8**):

- Brazil (9), Mexico (5), Colombia (5), Portugal (2), España (2), Costa Rica (2), Puerto Rico (1), Argentina (1), Bolivarian Republic of Venezuela (1).



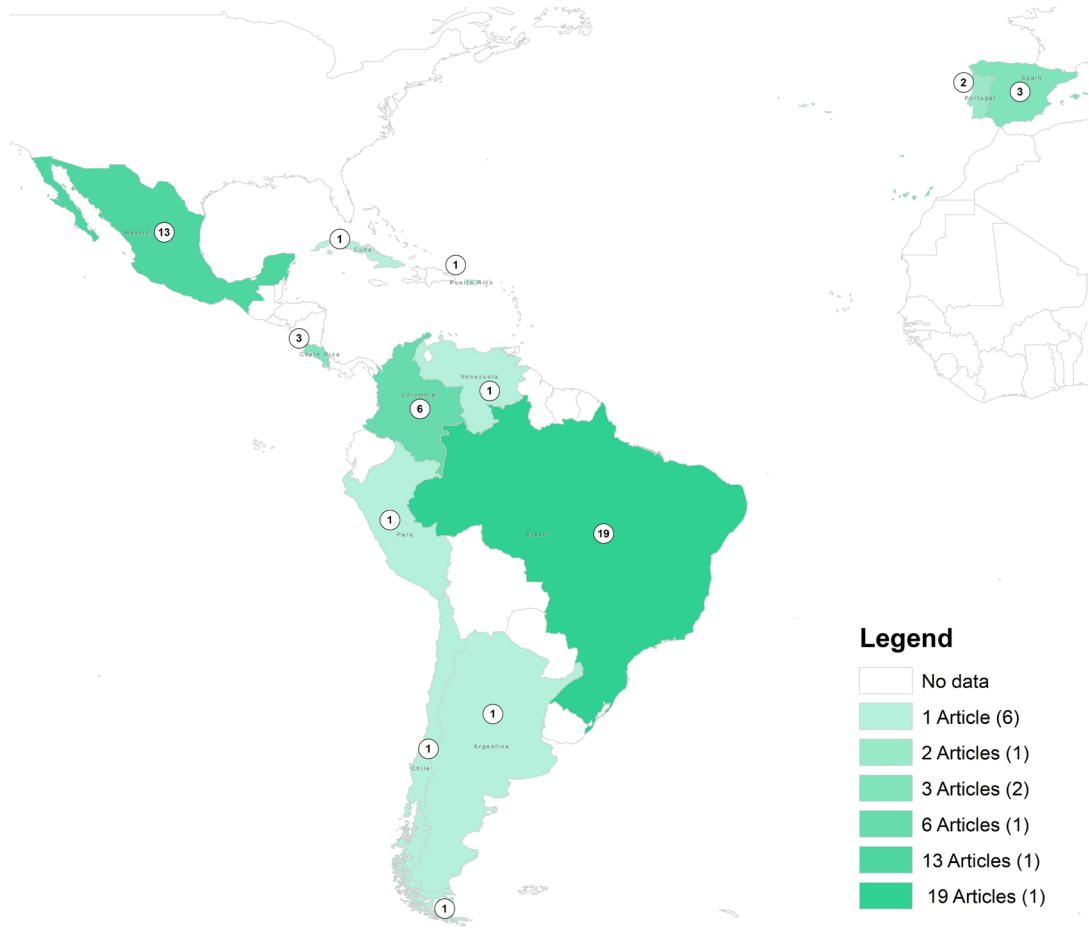


Figure 6. Cartography of Redalyc search.

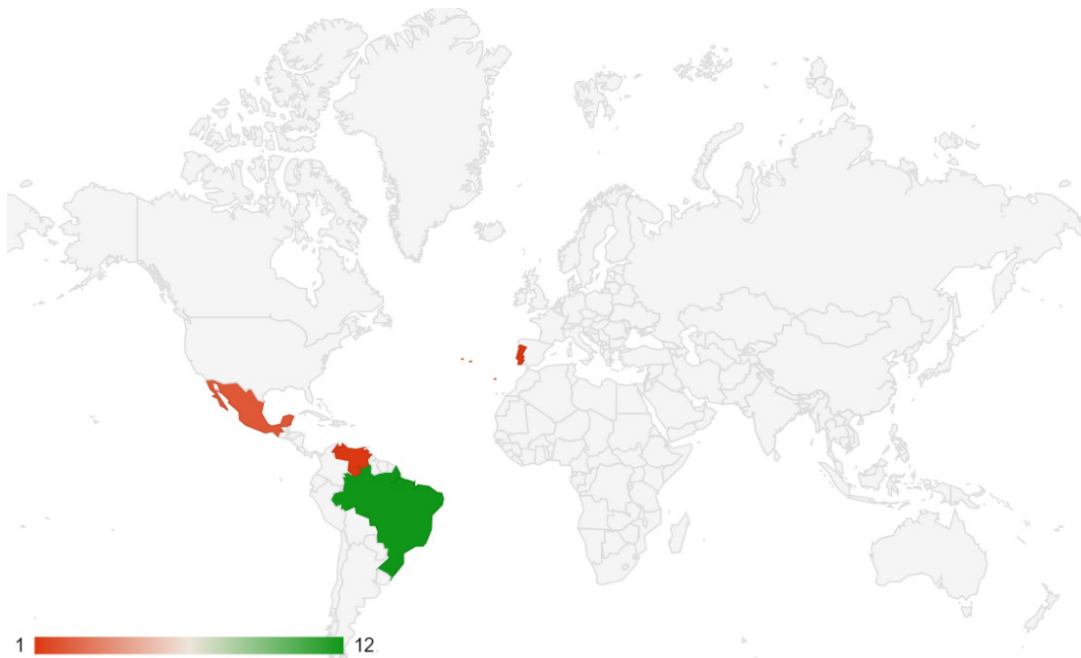


Figure 7. Redalyc global distribution of the results 1.

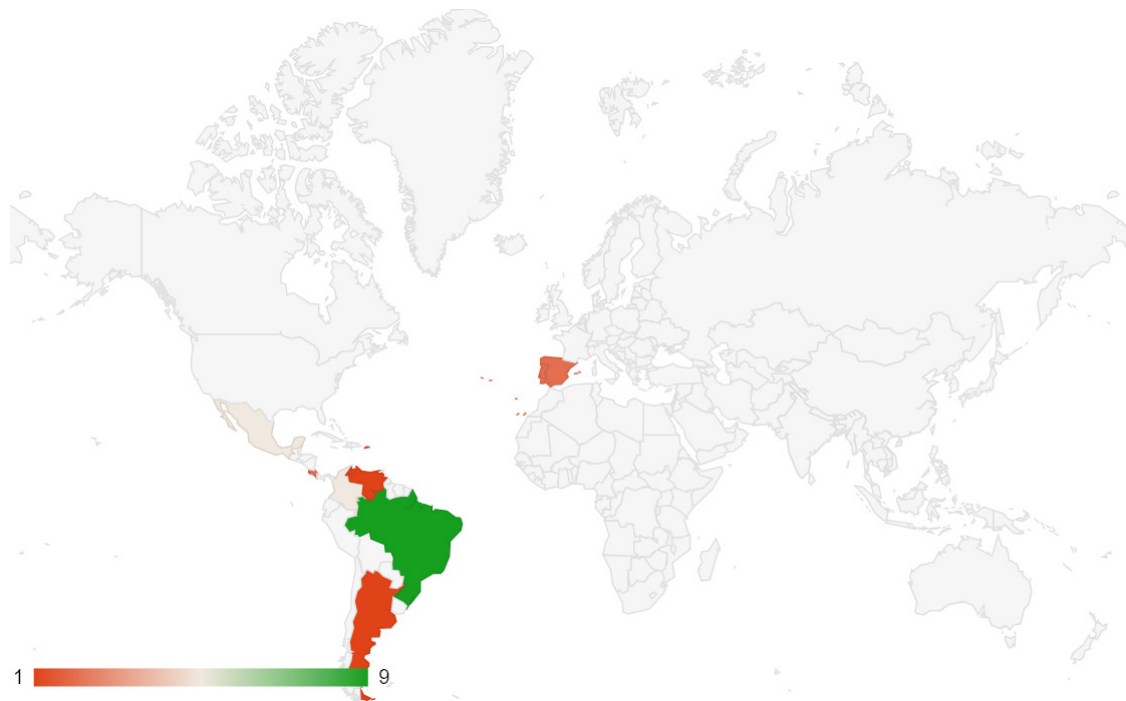


Figure 8. Redalyc global distribution of the results 2.

- Loss and Damage affecting the public health sector and society resulting from flooding and flash floods in Brazil between 2010 and 2014—based on data from national and global information systems.
- The un Framework Convention on Climate Change and the Paris Agreement: Challenges of the Conference of the Parties Prolegómenos. Derechos y Valores, 2019.
- Lara, E., Lázaro, T., Michel, S., et al. (2014). Cambio climático: Un negocio de alto riesgo?

The fifth search with the term “Loss and Damage AND Climate AND Global South AND Paris Agreement”. Six articles returned. The articles originate from the following countries:

- Portugal (2), México (2), Costa Rica (1), Brazil (1).
- International climate framework in the making: The role of the basic countries in the negotiations towards the Paris agreement. (2016).

The sixth search with the terms ‘Loss and Damage’ AND ‘Climate’ AND ‘Global South’ AND ‘Paris Agreement’ AND ‘Brazil’.

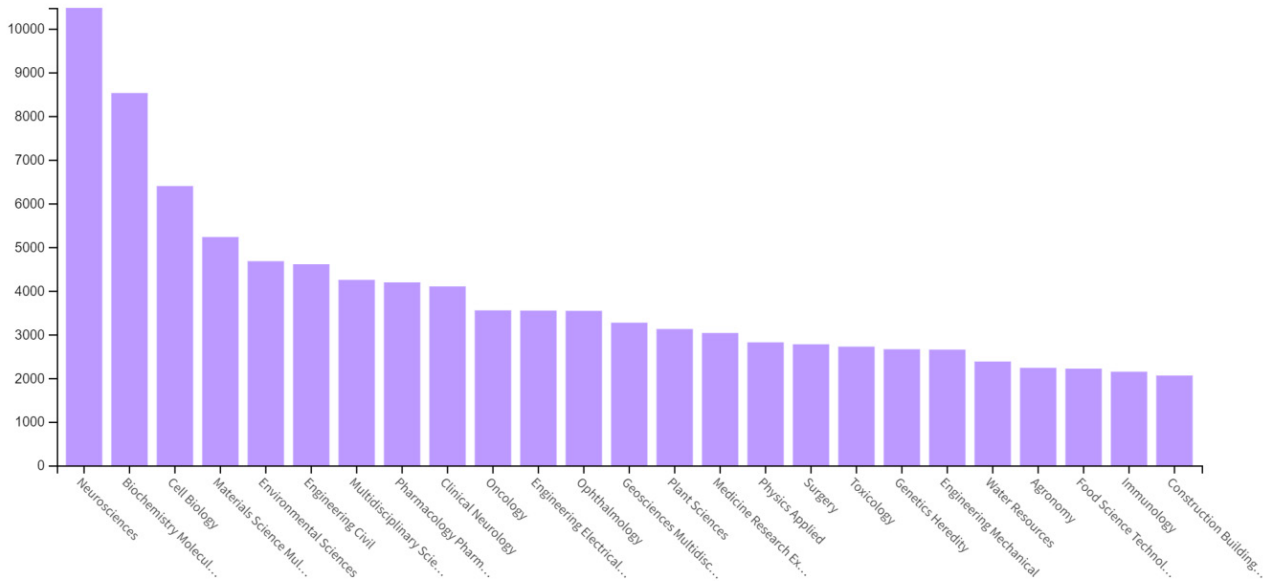
Returned only one article.

Brazil (1)

- Bueno, M.D.P., Pascual, G. (2016). International climate framework in the making: The role of the basic countries in the negotiations towards the Paris agreement.

#### 4.3 Web Of Science (WoS)

The first Web of Science search used the descriptor “Loss and Damage”, which returned 115,314 studies. WoS includes articles, book chapters, notes, editorial material, and news items. WoS already shows in graphs (**Graphic 1**) which area most studies are in, and the first ten areas were: Neurosciences, Biochemistry Molecular Biology, Cell Biology, Materials, Multidisciplinary Science, Environmental Sciences, Civil Engineering, Multidisciplinary Sciences, Pharmacology Pharmacy, Clinical Neurology, Oncology. WoS’s filters were applied using the same descriptor, including areas of environment and social sciences. Forty-nine inclusion filters were applied, and it returned 24,477 texts.



Graphic 1. WoS most studies on Loss and Damage.

Of the “most cited first” and the first ten articles, six were still in medicine. The 6th was in the environmental area, about invasive species in the USA. The 7th text was closer to the theme, as it was about the destruction caused by cyclones in the last 30 years. The 8th article focuses on the loss of crops to pests. Finally, the 10th text researches the loss of plantations to drought (water stress).

The second search with the descriptor ‘Loss and Damage’ AND ‘Climate’ returned 3,296 articles. Exclusion filters were applied, excluding the study areas: Sport Sciences, Reproductive Biology, Radiology Nuclear Medicine Medical Imaging, Optics, Computer Science Theory Methods, Pharmacology Pharmacy, Engineering Aerospace, Biochemistry Molecular Biology, Astronomy Astrophysics, Computer Science Information Systems, Physiology. Environmental Sciences is the area with the highest scientific production using the two descriptors ‘Loss and Damage’ + ‘Climate’.

The third search with ‘Loss and Damage’ AND ‘Climate’ AND ‘Global South’ returned 178 articles. Sorting them by “most cited first” analyzing the titles and abstracts of the first 5, which only contained the terms ‘Loss and Damage’, and sometimes not together, just as separate words, and therefore, outside the topic. Note: Even the articles focusing on climate

change did not have ‘Loss and Damage’ as a clear concept mentioned in the abstracts.

The final and fourth search with ‘Loss and Damage’ AND ‘Climate’ AND ‘Global South’ AND ‘Paris Agreement’ returned thirteen articles (Figure 9).

Eight of the thirteen articles had ‘Loss and Damage’ directly cited in the abstract. From the summaries of the thirteen, seeking to identify if they discussed a little about ‘Loss and Damage’ or if they only quoted, five articles were found:

- Mechler, R., Singh, C., Ebi, K. et al. (2020). Loss and Damage and limits to adaptation: recent IPCC insights and implications for climate science and policy.
- Mayer, Benoit. (2017). Migration in the UNFCCC Workstream on ‘Loss and Damage’: An Assessment of Alternative Framings and Conceivable Responses.
- Winkler, H. (2020). Putting equity into practice in the global stocktake under the Paris Agreement.
- Jacobs, M. (2022). Reflections on COP26: International Diplomacy, Global Justice and the Greening of Capitalism.
- Puig, D. (2022). Loss and Damage in the global stocktake.

Using the WoS “exact search” feature with the

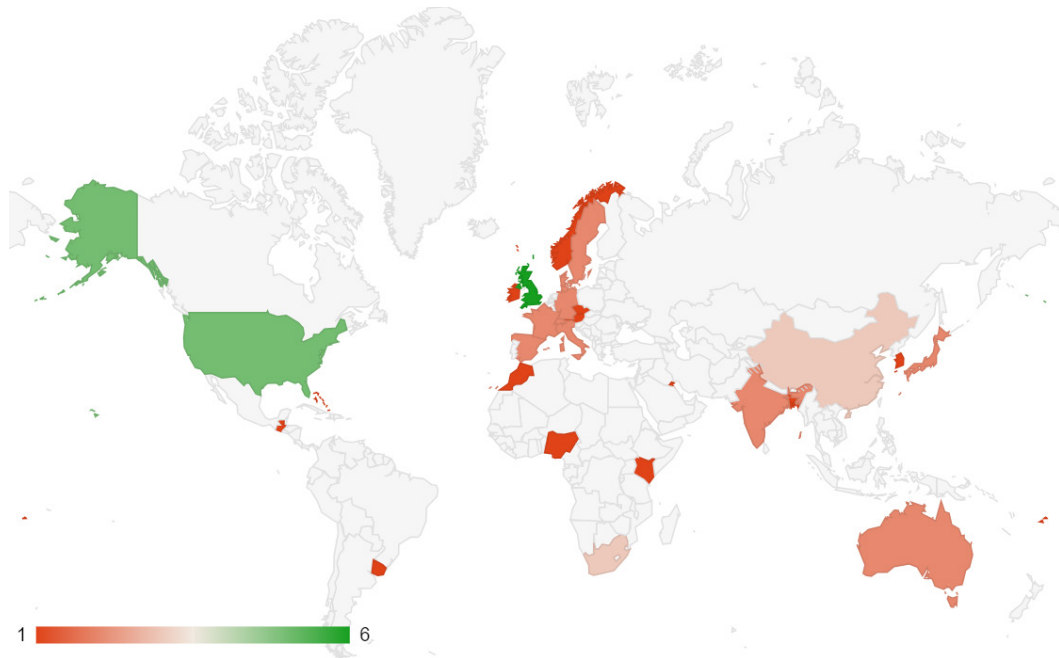


Figure 9. WoS global distribution of the results.

‘Loss and Damage’ descriptor, the search returned 89,836 articles. Even so, classified by “most relevant first”, articles related to the environmental dimension appear. With the ratings “recently added”, “newest”, “oldest”, “most cited”, “least cited”, and “use: all the time”, the top ten are not related to the environment in general but to medicine. The second exact search, ‘Loss and Damage’ AND ‘Climate’, returned 2,039 articles. On the other hand, the third exact search, ‘Loss and Damage’ AND ‘Climate’ AND ‘Paris Agreement’, returned 66 articles. In this search, the titles and abstracts of the first ten articles discuss the concept of ‘Loss and Damage’, and the 7th article discusses ‘Climate Justice’.

Fourth exact search “Loss and Damage” AND “Climate” AND “Paris Agreement” AND “Global South” returned 11 texts. Analyzing the abstracts of the eleven, all discuss Loss and Damage directly related to climate change, except for the two highlighted in orange below. Origin of the thirteen articles:

- Winkler, H. (2020). Putting equity into practice in the global stocktake under the Paris Agreement.
- Puig, D. (2022). Loss and Damage in the global stocktake.
- Mayer, Benoit, (2017). Migration in the UNF-

CCC Workstream on ‘Loss and Damage’: An Assessment of Alternative Framings and Conceivable Responses.

- Mechler, R., Singh, C., Ebi, K. et al. (2020). Loss and Damage and limits to adaptation: recent IPCC insights and implications for climate science and policy.
- Mead, S., Wewerinke-Singh, M. (2021). Recent Developments in International Climate Change Law.
- Skeie, R. B. et al. (2017). Perspective has a strong effect on the calculation of historical contributions to global warming.
- Jacobs, M. (2022). Reflections on COP26: International Diplomacy, Global Justice and the Greening of Capitalism.
- Pretis, F., Schwarz, M., Tang, K., et al. (2018). Uncertain impacts on economic growth when stabilizing global temperatures at 1.5 °C or 2 °C warming.
- Yumashev, D., Hope, C., Schaefer, K., et al. (2019). Climate policy implications of nonlinear decline of Arctic land permafrost and other cryosphere elements.
- Klinsky, S, Winkler, H. (2018). Correction to ‘Building equity in: strategies for integrating

equity into modelling for a 1.5 °C world’.

- Angulo, E., Hoffmann, B.D., Ballesteros-Mejia, L. et al. (2022). Economic costs of invasive alien ants worldwide.

Of the eleven, only one focuses on the Global South:

- Mead, S. Wewerinke-Singh, M. (2021). Recent Developments in International Climate Change Law.

#### 4.4 Scopus

The first search used “exact term” in the Scopus database, which is identified by the square brackets {loss and damage} and returned 2,614 texts. The two major areas of the articles are Environmental Sciences (1,292) and Social Sciences (1,124), followed by Earth and Planetary Sciences (663). Adding the application of filters to exclude areas: Medicine, Biochemistry, Genetics and Molecular Biology, Physics and Astronomy, Neuroscience, Pharmacology, Toxicology and Pharmaceuticals, Immunology and Microbiology, Veterinary, and Dentistry 2,262 texts returned.

The second search {loss and damage} AND {climate} returned 1,869 texts. In comparison, the third search {loss and damage} AND {climate} AND {global south} returned 147 texts within the areas: of

Social Sciences (115), Environmental Science (76), Earth and Planetary Sciences (30), and others.

On regions/countries of the studies, results bring a predominance of papers from the Global North, United States, and United Kingdom among the firsts: United States (48), United Kingdom (30), Canada (21), Germany (20), Australia (18), Netherlands (12), South Africa (11), and others (**Figure 10**). Brazil appears with only one publication: Simpson, N.P., Clarke, J., Orr, S.A., et al. (2022). Decolonizing climate change-heritage research. *Nature Climate Change*. 12(3), 210-213. <https://doi.org/10.1038/s41558-022-01279-8>

Fourth search {loss and damage} AND {climate} AND {global south} AND {Paris agreement} returned 49 texts along areas such as Social Sciences (40), Environmental Sciences (31), and Earth and Planetary Sciences (8). With these filters, the regions/countries are the US (16), Canada (7), UK (7), Netherlands (5), and others below 5 (**Figure 11**). Brazil does not appear.

Adding a new filter {loss and damage} AND {climate} AND {Brazil}, the search returns 179 texts along the areas: Environmental sciences (102), Social sciences (86, Earth and Planetary Sciences (51), then all areas under 15 articles. Articles generally address extreme events, such as droughts and heavy

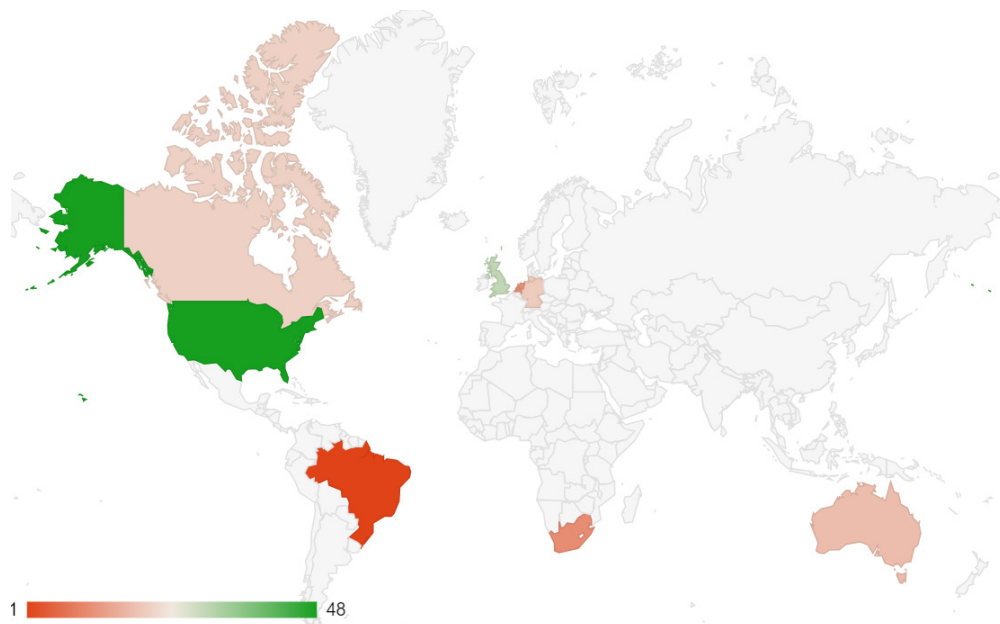


Figure 10. Scopus global distribution of the results 1.

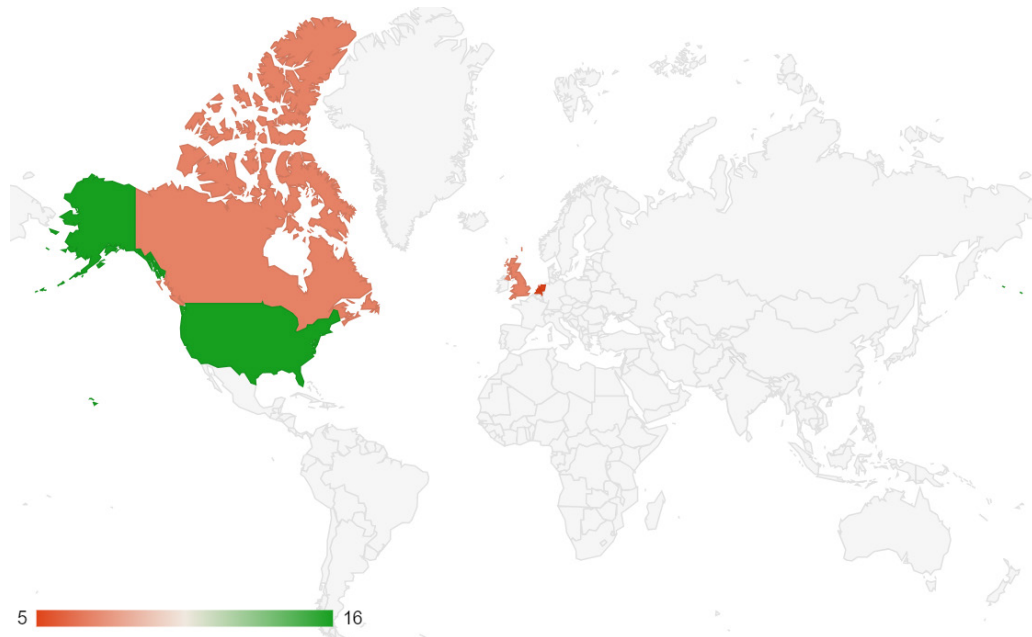


Figure 11. Scopus global distribution of the results 2.

rains. Regions/countries: Interestingly, even with the descriptor {Brazil}, the countries that produced the most in this search were the United States (45), United Kingdom (35), Germany (31), Brazil (24), Canada (21), the others, under 17 articles (Figure 12).

Finally, a new search with all keywords {loss and

damage} AND {climate} AND {global south} AND {Paris agreement} AND {Brazil} returned six texts. The areas were: Social sciences (5), Environmental sciences (3), Regions/Countries (Figure 13): India (2), China (1), Italy and Spain (1), USA (1), Undefined (1).

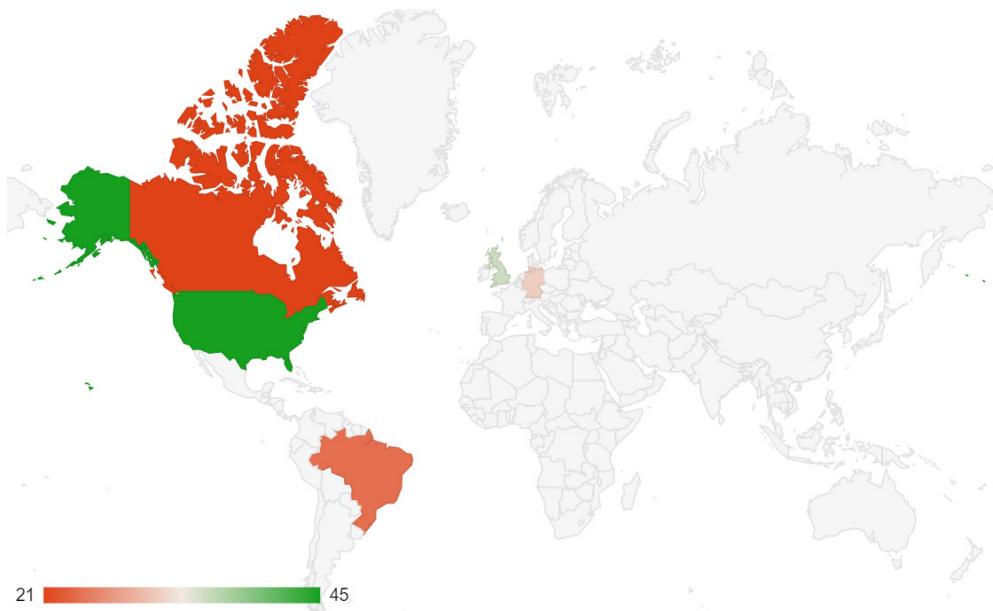


Figure 12. Scopus global distribution of the results 3.

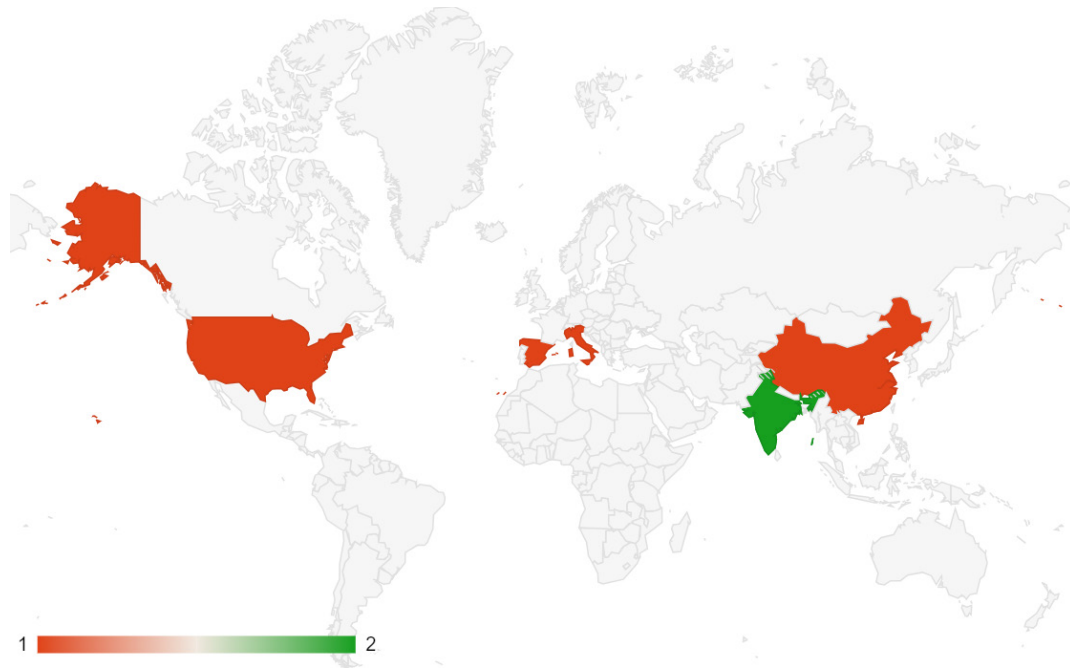


Figure 13. Scopus global distribution of the results 4.

## 5. Discussion

Despite the progress of establishing a Loss and Damage fund at COP27, it is essential to emphasize that the debate on Loss and Damage goes beyond the economic aspects involved. Through an interdisciplinary analysis, Balzter et al. (2023) show that it is necessary to consider the complexity involved in managing the fund, considering the difficulty in monitoring and implementing the fund in a just way. In addition, it is vital to take into account the frequent inadequacy of plans for climate adaptation, which are often done top-down when they should be co-constructed with local communities, an essential aspect for the Loss and Damage associated with climate change to be at the core the cultural specificities of the communities.

Dialoguing with the above statements, Adger <sup>[24]</sup> states that “The Loss and Damage issue is a further manifestation of the requirement for solidarity and recognition of the multi-dimensional injustices of climate change” and that:

“Loss and Damage brings the issues of climate justice into sharp relief: climate change is not simply about technologies, carbon markets, and alternative imagined futures, but about the lived experience

of climate change consequences for life and livelihoods” (Adger, 2023, p. 147).

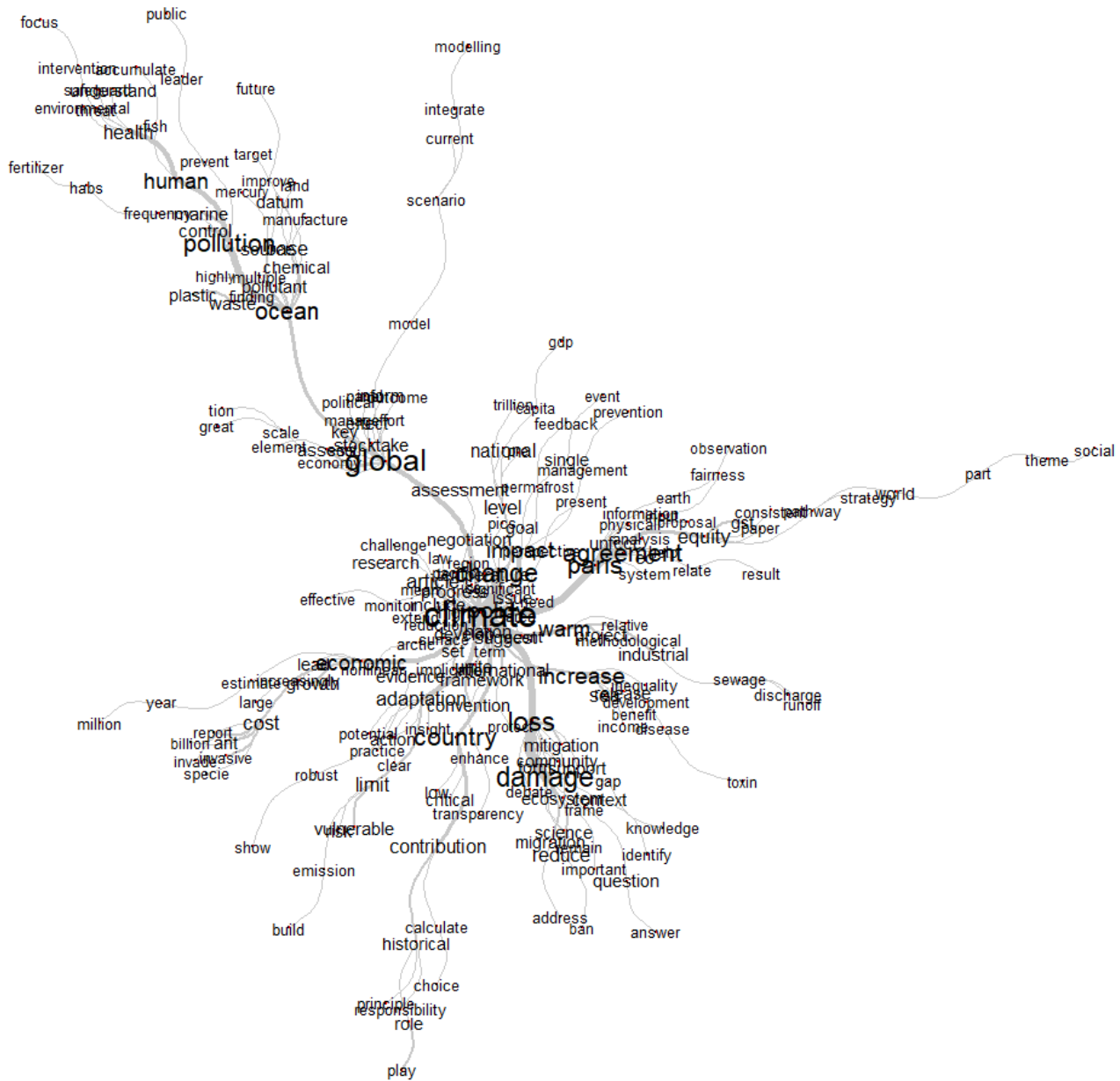
Therefore, it is necessary to advance in the concrete implementation of a fund for Loss and Damage without losing sight of the fact that climate change is a phenomenon permeated with injustices and that the construction of responses must have as a central focus the communities that are the target of these injustices, as this reduces. There is the risk of an ineffective fund that is incapable of adapting and reproduces injustices. This brings us back to the initial issue in this paper of the importance of differentiating policies, plans, and programs aimed at Loss and Damage from those specific to adaptation. Differentiating this seems essential even from the point of view of financial distribution and hierarchy in public management, the payment of climate debts between rich and historically more polluting countries on an international scale, and the specific strengthening of climate capabilities and constituencies in the territories.

Results indicate that despite recent severe events in the Global South, such as floods in Pakistan, droughts in India, hurricanes in Mozambique, or droughts, fires, and floods in Brazil, Loss and Damage remains a theme predominantly focused on or

produced from the Global North. Within the Global South, Brazil stands out among the countries mentioned. According to research carried out on the WoS database of 118 works found in the Global South on Loss and Damage, more than half (67) include the country. It is also possible to learn from the research that there is a considerable discrepancy in the research bases, which can bring problems and biased

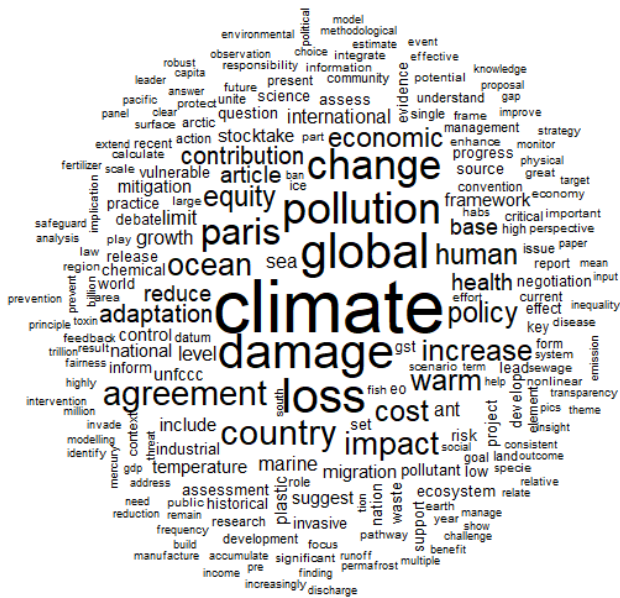
results in future review research.

It is still too early to understand the nuclei, fields, and subfields of study on the topic of Loss and Damage from the results generated. However, as shown in the figures below (**Figures 14 and 15**), the theme of climate change is the nucleator; others, such as pollution, the ocean, and the Paris Agreement, are emerging among the themes addressed in the research.



**Figure 14.** Issues addressed by Loss and Damage papers.





**Figure 15.** Word cloud with main cited terms among the articles.

## 6. Conclusions

The present work contributes to reducing the knowledge gap that exists on Loss and Damage—related to climate change—academic production. The article contributes to understanding the challenges and opportunities presented by climate change adaptation and planning, focusing on the Global South. It seeks to address inequality, environmental justice, and climate justice while discussing the potential impacts of Loss and Damage. The illustrative case of Brazil sheds light on these topics and offers insights that could be applicable to other countries in similar contexts.

Urban and regional planning in the face of climate change must incorporate dialogue with what Quay <sup>[11]</sup> proposes as anticipatory governance and uncertainty, shifting business as usual planning system for a new one. Conversely, especially in the Global South, the problem must be tackled with two complementary fronts: adaptation to the climate and social inequalities. In this sense, the debate on justice (climate justice and climate colonialism) and inequality need to be contained in the planning, not only including the communities in the planning process but also creating arenas in which they can propose and plan

their demands, equipping them with the available scenarios and technologies that expose the risks and their vulnerabilities. It is also essential to ensure that the global-local (glocal) understanding distinguishes the cross-scale dimensions of ecosystem services that will be impacted and must be confronted locally from a regional perspective, especially in megacities or city regions.

This will be fundamental to advance both the climate change adaptation agenda and the Loss and Damage policies that should emerge in the coming years. Differentiating, training, planning, and managing these issues are challenges that planners and managers must recognize in the face of the climate emergency and the data presented by the scientific community and by communities and traditional and ancestral knowledge.

## Author Contributions

Conceptualization, P.H.C.T.; Data curation, P.H.C.T, B.D.D, I.C.C; Formal analysis, P.H.C.T., G. P. A; Investigation, P.H.C.T, G.P.A, B.D.D, I.C.C, M.T. A.F.; Methodology, P.H.C.T; Supervision, P.H.C.T; Validation, P.H.C.T, G.P.A, M.T. A.F. Writing—original draft, P.H.C.T, G.P.A; Writing—review & editing, P.H.C.T. All authors have read and agreed to the published version of the manuscript.

## Conflict of Interest

There is no conflict of interest.

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