ARTIFICIAL INTELLIGENCE AND OPTIMIZATION WITH THE METHOD REVIEW PROCESS INTEGRATED

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ABSTRACT - The present study explores possibilities for optimizing the literature review process by integrating Artificial Intelligence into its phases and stages. In this context, the PRIA method (Process of Review Integrated with Artificial Intelligence) is presented, developed with the aim of enhancing and streamlining the steps traditionally employed in systematic reviews of scientific literature. Based on five sequential and well-defined phases, the method begins with the detailed formulation of the research question, followed by the structured collection of articles, automated screening, critical analysis of the results, and finally (UCL, 2024), the writing and revision of the final manuscript. Throughout these phases, open-source AI-based tools are strategically employed to automate repetitive tasks, allowing researchers to focus more on analytical activities. The practical application of the PRIA method - Maciel et al.(2026), exemplified in this chapter, addressed the theme of sustainability in ecological restoration projects in the Brazilian Amazon, proving effective in identifying current scientific trends and highlighting research gaps, thereby making a significant contribution to the academic discourse.

KEYWORDS: Artificial intelligence; PRIA Method; Systematic review; Process of Review Integrated.

INTRODUCTION

Currently, researchers face significant challenges when conducting systematic reviews of scientific literature, especially due to the complexity of the procedures involved and the large volume of available information. Traditionally, carrying out this type of review requires a considerable investment of time and may present inconsistencies due to reliance on manual and repetitive processes (Sutton, 2017). In order to minimize these challenges and improve the quality of reviews, the PRIA METHOD – Integrated Review Process with Artificial Intelligence – was developed, Maciel et al.(2026).

The PRIA method consists of an innovative methodological approach that employs accessible tools based on artificial intelligence (AI). These tools are organized into well-defined stages, ranging from the formulation of the research question to the final writing of the scientific manuscript. As highlighted by Ge et al. (2024), "artificial

intelligence (AI) is transforming systematic reviews (SRs) in research by automating processes such as study screening, data extraction, and quality assessment."

The distinguishing feature of this method lies in the strategic use of automation in critical phases of the review, which allows the researcher to devote greater attention to the analytical and interpretative activities related to the findings.

As a practical example to demonstrate the application of the PRIA method, the present study addressed the topic of sustainability in native forest restoration projects in the Legal Amazon. The choice of this topic is justified by its relevance in light of contemporary environmental, economic, and social challenges (EMBRAPA, 2023). The practical application of the method enabled a detailed analysis of current scientific trends focused on ecological restoration, taking into account the ecological, economic, and social dimensions present in the Amazon region.

Thus, this study aims not only to validate the use of the PRIA method as an effective tool for conducting systematic reviews, but also to directly contribute to the scientific discussion related to sustainability and environmental restoration. It is expected that the example presented here will serve as a useful and practical reference for other researchers interested in adopting similar methods in different academic contexts, as highlighted by Pullin and Stewart (2005). *"There are significant benefits for conservation from using an evidence-based framework, but the scientific community needs to undertake and disseminate more systematic reviews before the full benefit can be realized"*.

ARTIFICIAL INTELLIGENCE (AI) AND THEORETICAL FRAMEWORK

The application of artificial intelligence in review processes represents a significant transformation in traditional methods of data analysis and systematization. In this context, the Integrated Review Process with Artificial Intelligence (PRIA) is structured as a modern and adaptable approach that utilizes algorithms and machine learning techniques to automate, optimize, and enhance different stages of scientific review across various contexts (Pai M, 2004).

In general terms, this process involves everything from clearly defining the objectives and scope of the review, through data collection, preprocessing, and critical analysis, to the implementation and continuous monitoring of results (OpenAI, 2024). The strategic use of AI-based tools makes it possible to eliminate repetitive steps, reduce human bias, accelerate workflow, and expand researchers' analytical capacity (Cuccurullo, 2017). Moreover, a general process can be adapted for different applications, according to *Williams* (2020), *"Clearly defined objectives, systematic data collection, and rigorous preprocessing steps are fundamental to ensure reliable outcomes in artificial intelligence-driven systematic reviews".*

(1) Definition of Objectives and Scope: (a) Objective: Determine what is expected to be achieved with the review (for example, improving text quality, identifying patterns in data, optimizing processes); and (b) Scope: Define the boundaries of what will be reviewed (for example, a specific document, a dataset, a production process) (Ge et al., 2024).

(2) Data Collection: (a) Data Sources: Identify and collect relevant data for the review. This may include texts, databases, process records, etc.; and (b) Data Format: Ensure that the data is in a format that can be processed by AI (Ge et al., 2024).

(3) Data Preprocessing: (a) Data Cleaning: Remove noise, correct errors, and normalize the data; and (b) Data Transformation: Convert the data into a suitable format for analysis (e.g., text tokenization, normalization of numerical values) (Fabiano et al., 2025).

(3) AI Model Training: (a) Algorithm Selection: Choose the most appropriate machine learning algorithm for the task (e.g., neural networks for natural language processing, regression algorithms for data analysis); and (b) Training: Use a training dataset to teach the model to identify patterns and perform the desired task (Fabiano et al., 2025).

(4) Model Application: (a) Automated Review: Apply the trained model to the data to be reviewed. This may include error correction in texts, anomaly detection in data, or process optimization; and (b) Real-Time Feedback: Provide immediate feedback on the review results, allowing for quick adjustments. The application of trained models to automate review tasks is already a reality in platforms such as EPPI-Reviewer, which combines machine learning algorithms with interactive interfaces, enabling automated screenings and real-time feedback for researchers, optimizing the review process and reducing errors (EPPI-CENTRE, 2025).

(5) Analysis and Interpretation of Results: (a) Evaluation: Compare the review results with the initial objectives and assess the effectiveness of the model; and (b) Interpretation: Analyze the results to understand the implications and identify areas for improvement (EPPI-CENTRE, 2025).

(6) Refinement and Iteration: (a) Model Adjustments: Refine the model based on the analysis of results, adjusting parameters or using new training data; and (b) Iteration: Repeat the review and analysis process until the objectives are satisfactorily achieved (CONFORTO, AMARAL, and SILVA, 2016).

(7) Implementation and Monitoring: (a) Implementation: Integrate the revised AI model into the target process or system; and (b) Monitoring: Continue to monitor the model's performance and make adjustments as needed (Zimelewicz et al., 2024).

Below, we present a table with descriptions of the main Large Language Models (LLMs) and Prompt Engineering Software currently available. It is worth noting that ChatGPT was not used as a source in this article; however, with the advancement of LLMs, this tool offers numerous features that can be used in a literature review (Lund & Wang, 2023).

Name	Developer	Release	Parameters (estimated)	Main Feature
GPT-4	OpenAI	Mar 2023	Trillions (undisclosed)	High performance, complex understanding, multimodal (text, image)
Claude 3.5	Anthropic	Jul 2024	Undisclosed	Advanced reasoning, safe use, clear explanations
Gemini Pro	Google DeepMind	Feb 2024	Trillions (undisclosed)	Connected to Google services, product integration
Gemini Flash	Google DeepMind	Feb 2024	Compact (fast)	Fast responses, ideal for simple tasks
Grok	xAI (Elon Musk)	2024	Unknown	Focus on free speech and transparency
LLaMA 3	Meta AI	Apr 2024	8B / 70B	Open-source, efficient training, multiple sizes
Mistral	Mistral AI	2023	7B / Mixtral (12.9B)	Open-source, competitive performance, optimized architecture
Command R+	Cohere	2024	Unknown	Focused on RAG and enterprise use
ChatGPT	OpenAI	Nov 2022	175B (GPT-3.5)	Multimodal, integration with plugins and web browsing

Table 1 - COMPARISON BETWEEN LLMS.

Source: Author, 2025.

Next, we present a table 2 with descriptions of the main tools currently available.

Operating System	Developer	Type	Open Source
Windows	Microsoft	Desktop	No
macOS	Apple	Desktop	No
Linux	Open Source Community	Desktop/Server	Yes
Android	Google	Mobile	Partially
iOS	Apple	Mobile	No
Ubuntu	Canonical	Linux Distribution	Yes
Fedora	Red Hat / IBM	Linux Distribution	Yes
Debian	Debian Project	Linux Distribution	Yes
Red Hat Enterprise Linux	Red Hat / IBM	Linux Distribution	Yes
Chrome OS	Google	Desktop (Cloud)	Partially

Table 2 - OPERATING SYSTEMS.

Source: Author, 2025.

Finally, we present a table 3 with descriptions of the main text editors, spreadsheet software, and available applications.

Application/Editor	Category	Platform	Open Source
Microsoft Word	Text Editor	Windows, macOS, Web	No
Google Docs	Text Editor	Web	No
LibreOffice Writer	Text Editor	Windows, macOS, Linux	Yes
Overleaf	LaTeX Editor	Web	No
Notion	Editor and Organizer	Web, Windows, macOS, iOS, Android	No
Scrivener	Text Editor and Organizer	Windows, macOS	No
Zotero	Reference Manager	Windows, macOS, Linux	Yes
Mendeley	Reference Manager	Windows, macOS, Linux	No
EndNote	Reference Manager	Windows, macOS	No
Obsidian	Text and Knowledge Editor	Windows, macOS, Linux	Yes
Microsoft Excel	Spreadsheet	Windows, macOS	No
Google Sheets	Spreadsheet	Web	No

LibreOffice Calc	Spreadsheet	Windows, macOS, Linux	Yes
Apple Numbers	Spreadsheet	macOS, iOS	No
OnlyOffice Sheets	Spreadsheet	Windows, macOS, Linux, Web	Yes

Table 3 - APPLICATIONS, TEXT EDITORS, REFERENCE MANAGERS, AND SPREADSHEET SOFTWARE.

Source: author, 2025.

METHODOLOGY

FOUNDATIONS OF THE PRIA METHOD

Recent advances in the field of artificial intelligence (AI) have revolutionized the landscape of academic research, especially in meticulous and intensive processes such as literature review. Traditionally, the literature review is characterized by a series of manual steps, often complex, that are time-consuming and may be subject to methodological flaws and inconsistencies.

In this context, PRIA (Integrated Review Process with AI) emerges as a systematic and innovative method designed to leverage the use of AI in key stages of the process, promoting greater efficiency without compromising academic rigor standards (Ge et al., 2024).

PRIA was developed to address the limitations of traditional methods, establishing a methodological model with the following main objectives: (a) Optimize the literature review process by eliminating redundant steps and simplifying workflows; (b) Incorporate AI-based tools to ensure greater accuracy and speed in analyses, while maintaining a high level of scientific criticality; (c) Democratize access to the methodology by prioritizing the use of open-source or widely accessible tools, enabling its implementation in various academic and institutional contexts.

The PRIA methodological approach is organized into five well-defined phases, ranging from the formulation of the research question to the writing and final revision of the manuscript. Each phase is supported by the application of specific tools, carefully selected to maximize efficiency and integration throughout the process. The following sections detail the structure and functioning of PRIA, emphasizing its relevance as a replicable and robust model for researchers across various fields of knowledge.

STRUCTURE OF THE PRIA METHOD

The PRIA method (Integrated Review Process with Artificial Intelligence) is organized into five sequential, thoroughly structured, and clearly defined phases. Each phase has specific objectives, practical activities, and associated technological tools, carefully selected to ensure scientific rigor, methodological clarity, and operational efficiency (Angelini, Daraio & Urban, 2022). Below are the method's phases, including their respective activities, tools used, and expected outcomes.

(i) PHASE 1 – DEFINITION OF THE RESEARCH QUESTION

This phase has as its main objective the formulation and refinement of a clear and relevant research question that will guide the entire systematic review process.

Planned activities: (a) Initial formulation of the research question based on a topic previously defined by the researcher. (b) Refinement of the initial question using Artificial Intelligence (AI) tools, aiming to ensure clarity, scientific relevance, and methodological accuracy. (c) Structured definition of the search strategy, establishing clear criteria for querying relevant scientific databases.Utilizada: Gemini (AI) – an open and accessible tool used to support the refinement of the research question and the development of the search strategy.

Expected outcome: Development of a well-structured research question and a clear strategy for conducting the search.

(ii) PHASE 2 – SYSTEMATIC LITERATURE SEARCH

In this phase, the objective is to collect scientific articles relevant to the proposed topic, generating an organized database that will be submitted to subsequent phases of analysis.

(a) Planned activities:

- Conduct a systematic search in internationally recognized scientific databases, especially Web of Science (WoS) and Scopus.

- Apply specific filters, such as time period, type of publication, languages, and field of knowledge.

- Export and organize the results obtained in standardized formats compatible with bibliographic management tools.

(b) Tools used and justification:

- **Web of Science (WoS) and Scopus –** databases recognized for their reliability and scientific comprehensiveness.

- **Zotero –** a free and open-source software for efficiently organizing the collected results.

Expected outcome: A structured database containing scientific articles relevant for the next phase.

(iii) PHASE 3 – AUTOMATED SCREENING AND SELECTION

In this phase, a detailed screening of the collected articles is carried out, using objective criteria to eliminate duplicates and incomplete or irrelevant references.

Planned activities:

- Conversion of exported files (WoS and Scopus) into a single integrated database using statistical and bibliometric tools.

- Automatic preprocessing of data, identifying and removing duplicate or incomplete articles.

- Rigorous application of specific criteria, including publication period, existence and validity of DOI, number of citations received, and journal impact factor.

Tools used and justification:

- **R, RStudio, and Bibliometrix –** free tools used for the quantitative and qualitative analysis of bibliometric data.

- **Excel –** a complementary tool for further adjustment and organization of the results.

Expected outcome: A refined final database composed exclusively of scientifically valid and relevant articles for the research.

(iv) PHASE 4 – ANALYSIS AND CRITICAL SYNTHESIS

This phase is dedicated to the in-depth critical analysis of the selected articles, aiming to identify methodological and thematic patterns, as well as potential gaps in the existing literature.

Planned activities:

- Critical and detailed reading of the selected articles, focusing on identifying the main themes addressed, methodologies employed, and results obtained.

- Construction and interpretation of citation networks using specific tools that allow for the visualization of connections and relationships among the analyzed articles and authors.

- Production of a critical synthesis, highlighting the main contributions found, predominant themes, and gaps for future research.

Tools used and justification:

- **Zotero –** used for note-taking, systematic organization of readings, and critical annotations.

- **Litmaps –** software for building citation networks and visualizing scientific relationships among studies.

Expected outcome: A clear and robust academic synthesis, highlighting the main contributions of the reviewed literature and identifying gaps for future studies.

(v) PHASE 5 – WRITING AND FINAL REVIEW

In this final phase, the detailed writing of the scientific manuscript is carried out, ensuring methodological rigor, textual clarity, and academic integrity for publication.

Planned activities:

- Preparation of the final scientific manuscript based on the information obtained throughout the previous phases, structuring the literature review and conclusions in a logical and cohesive manner.

- Detailed text revision and academic formatting, ensuring compliance with the scientific standards required by ABNT (BRAZIL, 2023).

- Verification of textual originality using specific plagiarism detection tools, ensuring the academic and scientific integrity of the work produced.

Tools used and justification: **(a) Microsoft Word integrated with Zotero –** for automatic insertion of citations and references according to technical standards. (b) **CopySpider –** a free tool widely used to ensure the originality of the written text. (c) **Expected outcome:** Completion of a finalized scientific manuscript, ready for submission to academic journals, ensuring technical quality, originality, and compliance with scientific standards. Figure 1 presents a graphical summary of the methodology.
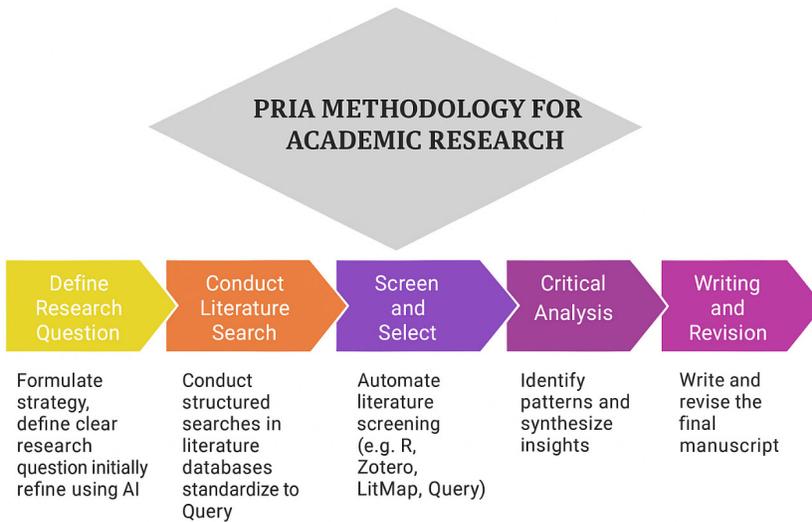
Figure 1 – PRIA Methodology.

Source: author, 2025

DISTINCTIVE FEATURES OF INTEGRATED REVIEW PROCESS WITH AI

PRIA (Integrated Review Process with AI) presents itself as a distinct methodological approach, grounded in its operational simplicity and analytical robustness. Unlike traditional methods, which are characterized by extensive manual processes, PRIA implements the strategic integration of artificial intelligence tools (GOLAN et al., 2023), significantly reducing the time and effort spent conducting literature reviews without compromising the quality or scientific rigor of the analyses performed.

AMONG THE MAIN DISTINCTIVE FEATURES OF PRIA, THE FOLLOWING STAND OUT:

- Intelligent Automation: The application of AI tools allows for the automation of critical stages, such as literature screening and analysis, ensuring efficiency and precision in the results.

- Reduction of Complexity: The five-phase modular structure provides a clear and organized workflow, eliminating redundancies and simplifying processes without sacrificing the depth of analysis.

- Democratization and Accessibility: The commitment to using open-source and accessible tools enables the implementation of the method in different institutional and geographical realities, making it viable for researchers in both well-funded institutions and those in resource-limited contexts (UCL, 2024).

- Flexibility and Adaptation: PRIA is adaptable to various fields of knowledge, allowing it to be adjusted to meet the specificities of scientific areas with distinct characteristics and demands.

- Methodological Rigor: The integration of modern tools is complemented by an emphasis on critical analysis, ensuring that the reviews meet the standards required by the academic community.

- These distinctive features make PRIA a highly replicable, applicable, and relevant methodological model, promoting not only the advancement of science but also the inclusion of researchers in an increasingly complex global informational landscape.

PRACTICAL APPLICATION OF PRIA

Aiming to demonstrate the application of the method, we will conduct a study focused on exploring the trends in sustainability in native forest restoration in the Legal Amazon, using PRIA as follows:

(i) Phase 1: Definition of the Research Question

Activity 1: Based on a topic of interest, we formulated the following base question: What are the sustainability trends of native forest restoration projects in the Legal Amazon?

Activity 2: The following text was entered into the app: Refine the following question to make it clearer and more objective, with a focus on scientific approaches to sustainability in native forest restoration projects in the Legal Amazon: What are the sustainability trends of native forest restoration projects in the Legal Amazon? The response can be found at the link: https://g.co/gemini/share/dedc1d79f49b.

Activity 3: The following text was entered into the Gemini app, including the question obtained in Activity 2: Create a search strategy to obtain results in the Web of Science database containing specific articles related to the following question: "What are the current scientific trends for sustainability in native forest restoration projects in the Legal Amazon, considering the ecological, social, and economic

dimensions?" The response can be found at the link: https://g.co/gemini/share/ f0422d170c95.

(ii) Phase 2: Search for Relevant Literature

Activities: Conduct the search in the Web of Science (WoS) and Scopus databases, applying the filters (period = 2010 to 2024; study type = Peer-reviewed articles; languages = English and Brazilian Portuguese). Queries used:

a. WOS – ("forest restoration" OR "ecological restoration" OR "reforestation" OR "forest recovery") AND ("sustainability" OR "sustainable development" OR "ecological sustainability" OR "social sustainability" OR "economic sustainability") AND ("Amazon" OR "Brazilian Amazon" OR "Amazonia Legal" OR "Amazon basin") AND ("ecological dimension" OR "social dimension" OR "economic dimension") AND ("scientific trends" OR "current research" OR "innovation" OR "emerging technologies").

Three searches were conducted. The first one with the full query returned no results. The second one with the query excluding the last topic ("scientific trends" OR "current research" OR "innovation" OR "emerging technologies"), The search returned 4 articles, Figure 2.
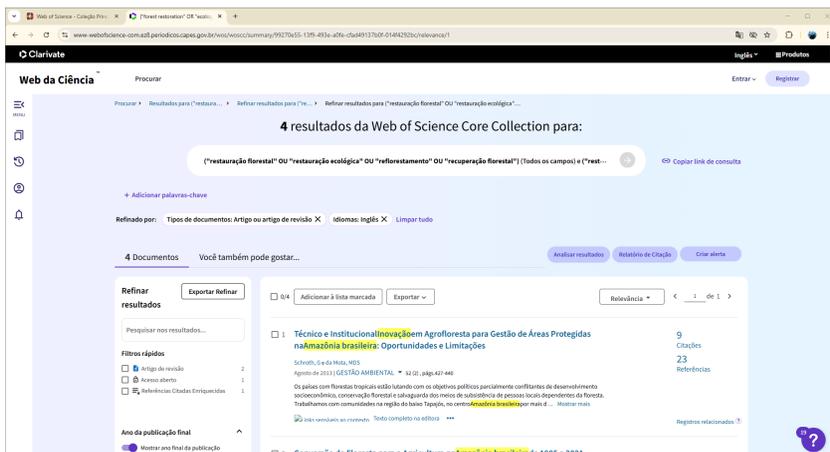
Figure 2 – Second search conducted in the Web of Science database

Source: author, 2025

The third search with the query excluding the last two topics ("scientific trends" OR "current research" OR "innovation" OR "emerging technologies") and ("ecological

dimension" OR "social dimension" OR "economic dimension") returned 4 articles, Figure 3 – search page with the query applied, and Figure 4 – search results page with 63 articles found.
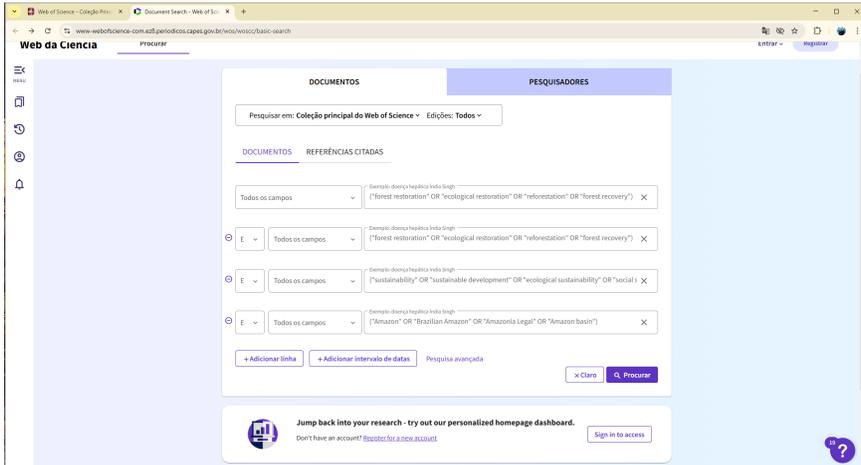
Figure 3 – Third search, Web of Science search page

Source: Author, 2025
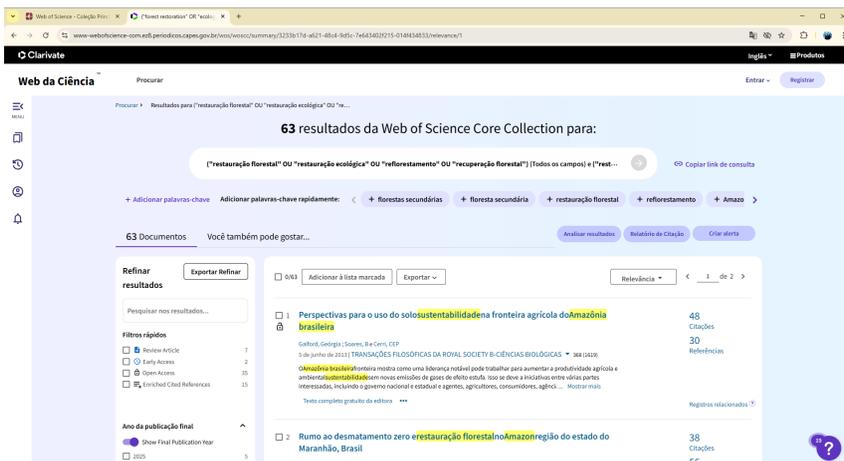
Figure 4 – Third search, Web of Science results page

Source: Author, 2025

Results obtained and exported in compatible formats (BibTeX or RIS), Figure 5.
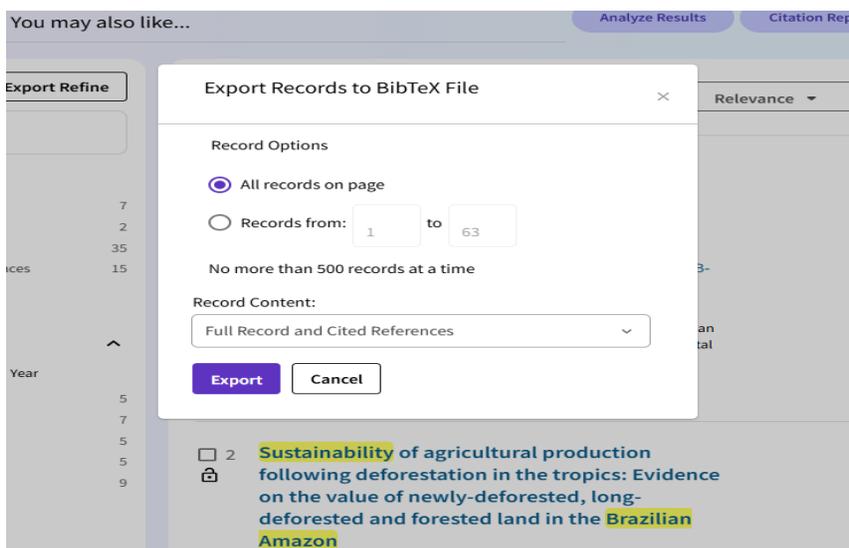
Figure 5 – BibTeX file export tab

Source: Author, 2025.

b. SCOPUS - "forest restoration" OR "ecological restoration" OR "reforestation" OR "forest recovery") AND ("sustainability" OR "sustainable development" OR "ecological sustainability" OR "social sustainability" OR "economic sustainability") AND ("Amazon" OR "Brazilian Amazon" OR "Amazonia Legal" OR "Amazon basin") AND ("ecological dimension" OR "social dimension" OR "economic dimension") AND ("scientific trends" OR "current research" OR "innovation" OR "emerging technologies".

Three searches were conducted. The first one with the full query returned 4 articles, Figure 6. The second one with the query excluding the last topic ("scientific trends" OR "current research" OR "innovation" OR "emerging technologies"), returned 25 articles, Figure 7. The third search with the query excluding the last two topics ("scientific trends" OR "current research" OR "innovation" OR "emerging technologies") e ("ecological dimension" OR "social dimension" OR "economic dimension"), returned 1,395 articles, Figure 8.
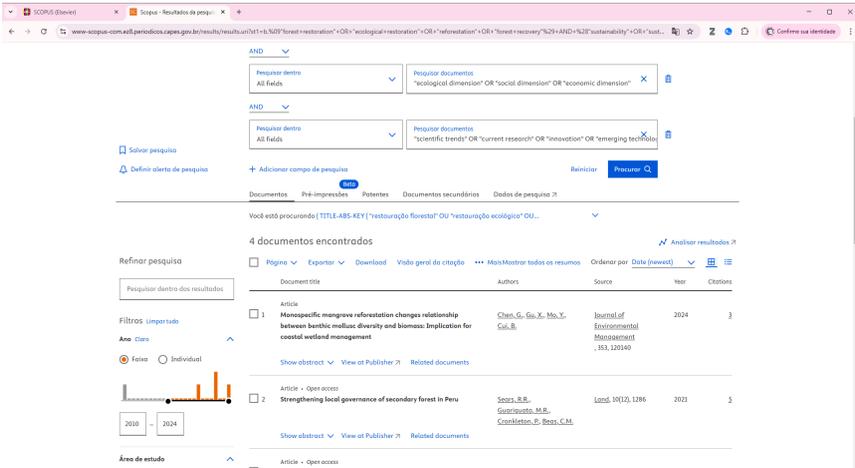
Figure 6 – First search with no results

Source: Author, 2025.
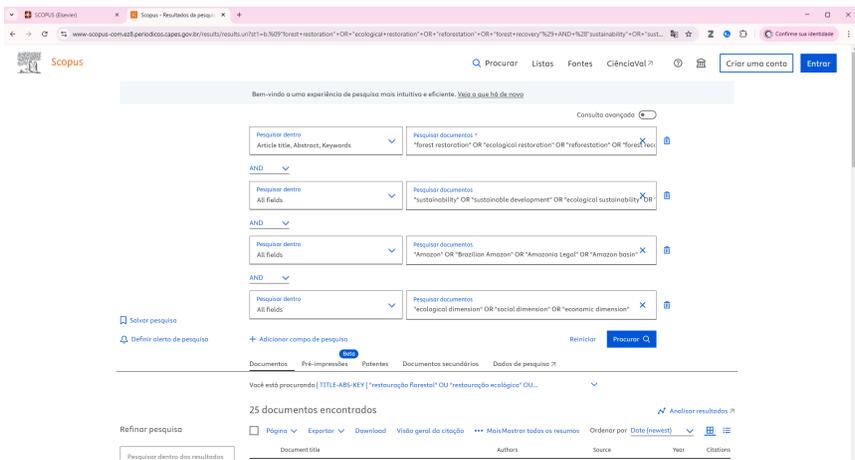
Figure 7 – Second search with 25 articles found

Source: Author, 2025.

Figure 8 – Third search with 1,371 articles found

Source: Author, 2025.

Results obtained and exported in compatible formats (BibTeX or RIS), Figure 9.Figura

Export 1.371 documents to BibTeX ⊘

What information do you want to export?

☑ Citation information ☑ Bibliographical information ☑ Abstract & keywords ☑ Funding details ☑ Other information

☑ Author(s)	☑ Affiliations	☑ Abstract	☑ Number	☑ Tradenames & manufacturers
☑ Document title	☑ Serial identifiers (e.g. ISSN)	☑ Author keywords	☑ Acronym	☑ Accession numbers & chemicals
☑ Year	☑ PubMed ID	☑ Indexed keywords	☑ Sponsor	☑ Conference information
☑ EID	☑ Publisher		☑ Funding text	☑ Include references
☑ Source title	☑ Editor(s)			
☑ Volume, issues, pages	☑ Language of original document			
☑ Citation count	☑ Correspondence address			
☑ Source & document type	☑ Abbreviated source title			
☑ Publication stage				
☑ DOI				
☑ Open access				

Select all information ☐ Save as preference **Export**

Note: In this activity, it is important for the researcher to have access to the databases via the CAPES journal portal, with the "CAFe" subscription. This ensures access to the main collections, which are paid. Link: https://www.periodicos.capes.gov.br/.

Figure 9 – BibTeX file export tab

Source: Aauthor, 2025.

(iii) Phase 3: Screening and Selection

✓ **Activities:**

Use R, RStudio, and Biblioshiny (Cuccurullo, 2017), Excel, in order to preprocess the files and generate a unified article database, making the screening process easier.

- Create a specific project folder to store the files downloaded from the WOS and SC databases, as well as the files generated during the processes via R.

- Open R and RStudio, and convert the files to Bibliometrix. Use the link to download the script, which also includes the step-by-step instructions: https://drive.google.com/file/d/1Ko01nKgzv-_6HZlX89FliKaiuHg1_dPk/view?usp=sharing

- Create a unified database

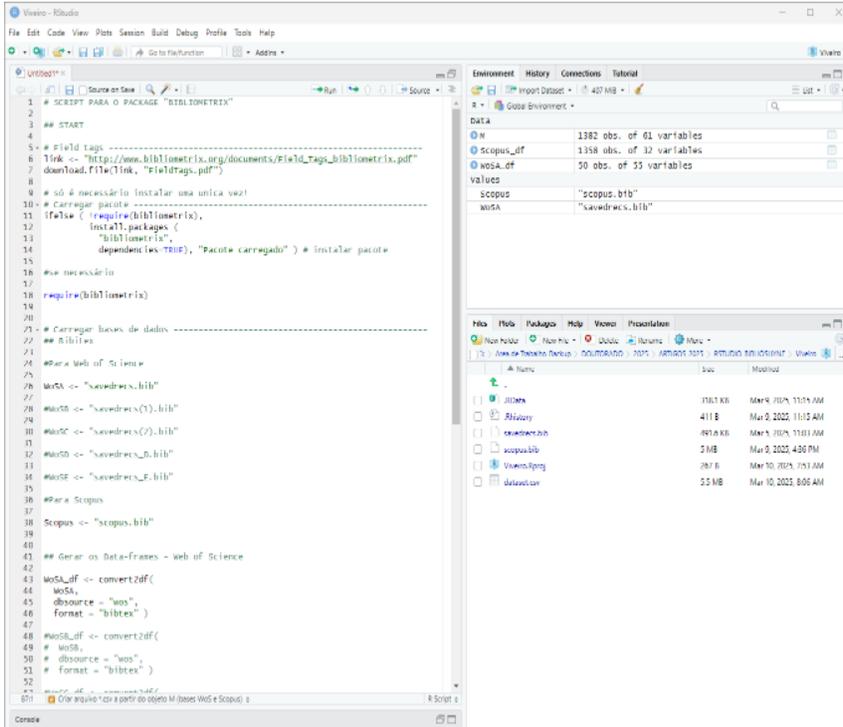Generate the .CSV file from the unified database and process it using Excel.

Figure 10 shows the entire process, including the script, file importation, creation of the unified database, removal of duplicate articles, and creation of the unified file in CSV format.

Source: Author, 2025

Figure 11 shows the entire content of the created project folder.

Figure 11 – Project folder

Source: Author, 2025

When creating the BibTeX file from WOS in R, the created file retained only 50 articles from the original database, which contained 63 articles. This happens because the program identifies articles with invalid or incomplete data. The same occurs with the Scopus database, where the number of articles drops from 1,371 to 1,358 valid articles.

When creating the unified database "M," the program checks the articles and removes any duplicates. As a result, the total number of articles across the databases was 1,408, but after processing, it became 1,382 articles, as shown in Figure 11.

The .CSV file for the unified database "M" was generated, and it was verified that all 1,382 articles are present in the generated file.

Processing the data in the generated database, converting the .CSV file to XLSX. Verifying the data using filters to eliminate incomplete articles, analyzing by publication year, checking the existence of DOI, number of citations, and classifying by citation count and impact factor.

> 18 records without a DOI were identified. After reading the title, abstract, citation count, and impact factor, only two had an impact factor between 0 and 1 and relevant citations above 30. However, all were outside the period set as a criterion, between 2010 and 2024. All 18 were removed from the database. It was also checked for duplicate DOIs, and the result was negative.

Reprocess the generated .xlsx database in order to extract the title, author, and abstract using R.

After processing, the result was a new base file renamed to "abstracts.bib," see Figure 12.

Figure 12 – Data from the file generated in this step

Source: Author, 2025

Verify the alignment with the research question. If the volume of articles is considered large, above 200 articles, perform a semantic analysis on the database to delimit and reduce the number of articles, while correlating the articles with the Research Question. Use the script provided in the following link:https://drive. google.com/file/d/1bfJorjOSyYrSLLoqmHQzNEB9z2krqWwY/view?usp=sharing

The objective is to interpret the most representative terms and check if they encompass the relevant dimensions of the research question.

✓ Tools Used: R, RStudio, and Excel

- Justification: R, in conjunction with RStudio, are free tools that automate the manipulation of the generated data, unifying, excluding, and reorganizing the files. They facilitate the screening of scientific literature based on objective criteria, significantly reducing manual effort. Excel allows, using the files generated in R, the process of filtering, selecting, and cleaning based on the same or new criteria, enabling further processing and ensuring the elimination of biases.

✓ Expected Outcome: A refined selection of essential articles for the analysis and synthesis stages.

(iv) Phase 4: Analysis and Critical Synthesis

Objective: Critically evaluate the selected articles, identifying patterns, gaps, and significant contributions to the field of study.

✓ Activities:

- Analyze the selected articles to identify thematic and methodological patterns, as well as gaps in the literature.

In this activity, the database containing the articles was imported into the Zotero tool, and the abstracts were read. Figure 13 shows a screenshot of the tool's interface.
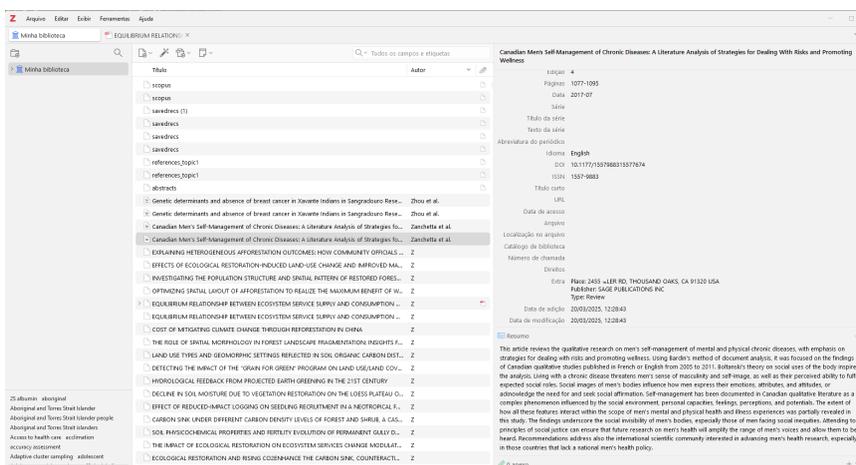

Figure 13 – Screenshot of the Zotero interface containing the article data.

Source: Author, 2025

- Build citation networks and relationship visualizations using Litmaps, exploring the interconnections between the studies.

In order to ensure the connection between the articles, we selected 10 articles from the database and checked them in the Litmaps tool. Figure 14 shows the connections found. In this activity, it is important to verify not only the relationship between the articles in the database but also with other references that will be identified by the tool. In this case, the DOI of the article was used:https://doi.org/10.1177/1557988315577674.
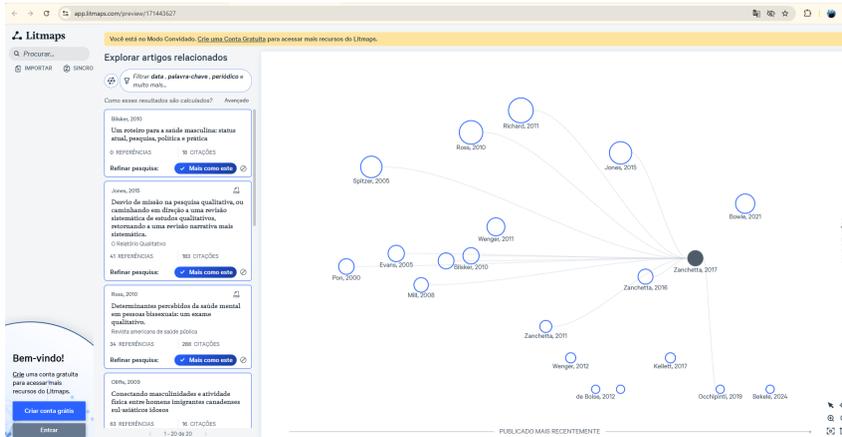
Figure 14 – Screenshot of the Litmaps interface.

Source: Author, 2025

In this activity, a complete analysis of the articles was conducted, and the references to be included in the paper were selected. The note-taking and other information were done using the Zotero tool.

✓ Tools Used: ZOTERO and Litmaps

Justification:

- Litmaps provides interactive visual mapping of citation networks, allowing a systemic analysis of the connections between articles.

- Zotero provides the aforementioned information.

✓ Expected Outcome: A consolidated synthesis of the literature, highlighting the main contributions and identifying gaps for future investigations.

(v) Phase 5: Writing and Revision

- Objective: Write a cohesive scientific manuscript aligned with academic standards, focusing on clarity and technical rigor.

Activities:

- Write the text based on the analyses conducted in the previous phases, organizing the literature review in a logical and systematic manner. In this activity, the ZOTERO tool was used as a complement in Microsoft Word

through the plugin. The text should be written using the functionalities found in the main tool tab of Word, as shown in Figure 15.
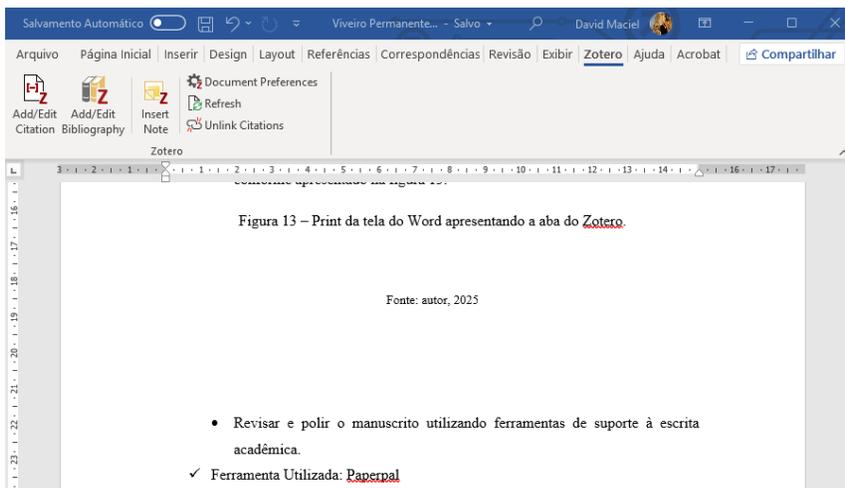

Figure 15 – Screenshot of the Word screen showing the Zotero tab.

Source: Author, 2025

- Revise and adjust the manuscript using tools for academic writing support. Microsoft Word was used, although other tools are available. It is important to remember that the use of tools and apps does not exclude the author's critical reading at all stages of the article writing process (Kang, 2021).

- Plagiarism analysis: in this activity, the CopySpider tool was used due to its user-friendly interface and effectiveness, as shown in Figures 16 and 17.

Figure 16 – Screenshot of the CopySpider main screen.
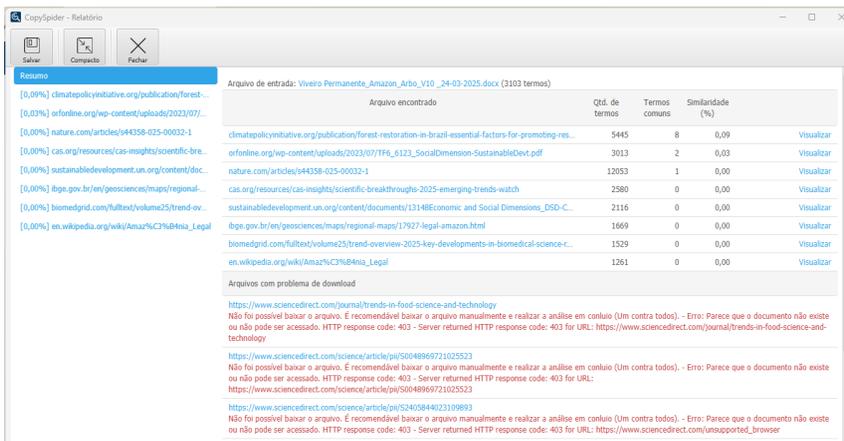
Source: Author, 2025

Figure 17 – Screenshot of the CopySpider report screen.

Source: Author, 2025

- Tools Used: Microsoft Word

- Justification: Microsoft Word offers advanced features for reviewing and adjusting scientific texts, with accessible options that ensure compliance with international academic standards.

✓ Tools Used: CopySpider

- Justification: A free tool widely used in the Brazilian academic community, it allows the automatic detection of textual similarities with content available on the internet, academic repositories, and other previously analyzed documents. It is also compatible with texts in Portuguese (COPYSIDER, 2013).

RESULTS AND DISCUSSIONS

The practical application of the PRIA method (Integrated Review Process with AI) demonstrated significant gains in efficiency and robustness in conducting the systematic review on sustainability in native forest restoration projects in the Legal Amazon. Initially, the structured search strategy, using Gemini, enabled the precise refinement of the research question, making it clear and objective.

During the search stage in the Web of Science (WoS) and Scopus databases, 1,408 articles were initially identified. After a rigorous process of eliminating duplicates and incomplete information, the final set comprised 1,382 valid articles. The use of R and RStudio, complemented by the Bibliometrix package, allowed for efficient preprocessing of the data, significantly reducing manual effort and ensuring a consistent unified database for the subsequent stages (Falagas et al., 2008).

In the screening phase, objective criteria such as publication year, presence of DOI, number of citations, and journal impact factor were applied, resulting in a further reduction of the final set to 1,364 articles. These articles were subjected to a detailed critical analysis.

Using the tools Zotero (Corporation for Digital Scholarship, 2010) and Litmaps (Litmaps Ltd, 2015), the predominant thematic and methodological patterns were clearly identified, as well as the most influential citation networks.

The analysis revealed that interconnected articles often address the ecological, social, and economic dimensions in an integrated manner, highlighting emerging trends and pointing out important gaps for future investigations. Furthermore, the potential of permanent nurseries as effective solutions for ecological restoration became evident, directly aligning with the Sustainable Development Goals (SDGs) and international commitments, especially the Paris Agreement (COP29, 2024).

CONCLUSION

The PRIA method proved to be effective in conducting detailed and consistent systematic reviews. It stands out particularly for integrating open and accessible

technologies, complemented by artificial intelligence, resulting in significant time savings while maintaining a high level of precision and scientific rigor.

This study demonstrated the adaptability and practical applicability of the PRIA method in addressing a complex topic such as sustainability in the Legal Amazon. The identified trends confirm the strategic relevance of permanent nurseries for ecological restoration, promoting environmental, social, and economic benefits. These nurseries contribute not only to achieving large-scale environmental goals but also enhance job and income generation in local communities.

Finally, it is evident that the PRIA method constitutes an innovative and widely applicable approach, especially recommended for researchers interested in optimizing the efficiency, precision, and quality of their scientific outputs. Moreover, it promotes greater accessibility and inclusion in the academic landscape, democratizing the use of advanced technologies in various research contexts.

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