

Theoretical Analysis of the Relationship Between Climate Change and Sustainable Development

Khalid KHRIBECH, (PhD Student)

*Faculty of Law, Economics, and Social Sciences of El Kelâa des Sraghna
 Cadi Ayyad University of Marrakesh, Morocco*

Mourad FAIZ, (Full Professor)

*Faculty of Law, Economics, and Social Sciences of El Kelâa des Sraghna
 Cadi Ayyad University of Marrakesh, Morocco*

Adresse de correspondance :	20-LO EL MENZEH 2-ESSAOUIRA EL JADIDA-ESSAOUIRA
Déclaration de divulgation :	Les auteurs n'ont pas connaissance de quelconque financement qui pourrait affecter l'objectivité de cette étude. Ils assument l'entière responsabilité de tout éventuel plagiat, de l'usage de l'intelligence artificielle dans la rédaction, ainsi que des résultats présentés dans cet article.
Conflit d'intérêts :	Les auteurs ne signalent aucun conflit d'intérêts.
Citer cet article	KHRIBECH, K., & FAIZ, M. (2026). Theoretical Analysis of the Relationship Between Climate Change and Sustainable Development. <i>International Journal of Accounting, Finance, Auditing, Management and Economics</i> , 7(13), 311–326. https://doi.org/10.5281/zenodo.23242769
Licence	Cet article est publié en open Access sous licence CC BY-NC-ND

Received: 02/09/2026

Accepted: 16/10/2026

International Journal of Accounting, Finance, Auditing, Management and Economics - IJAFAME

ISSN: 2658-8455

Volume 7, Issue 13 (2026)

Theoretical Analysis of the Relationship Between Climate Change and Sustainable Development

Abstract:

The adoption of the Paris Agreement and the 2030 Agenda for Sustainable Development has made the relationship between climate change and sustainable development a centre of interest for researchers. This work aims to analyse the theoretical dimensions that govern this relationship. For that reason, a systematic literature review was conducted following the PRISMA protocol, based on 17 selected peer-reviewed scientific papers. Content analysis was carried out using QualCoder software; the analysis reveals that the climate change–sustainable development relationship is overwhelmingly framed by the conceptual dyad of synergies and trade-offs (n=53 occurrences in a text passage) and systematically co-occurs in the same passages (n=16 co-occurrences). Furthermore, the code integration appears (n=15 occurrences) and is situated in opposition to the code separation. The relationship is primarily framed at local and national spatial scales. Additionally, concrete policy and research operationalisation have no occurrences in the text. Finally, the moderate quality of the selected articles, the limited size of the corpus, and the fact that the coding was performed individually are limitations of the study. This work represents an integrated conceptual mapping of the theoretical relationship; it adopts a coding framework that distinguishes it from previous work.

Keywords: sustainable development; climate change; systematic literature review; synergies; trade-offs.

JEL Classification: Q54, Q01, Q56

Paper type: systematic literature review with a theoretical focus

Résumé :

La relation entre le changement climatique et le développement durable est devenue un centre d'intérêt de la communauté scientifique, notamment après l'adoption de l'Accord de Paris en 2015. L'objectif de ce travail est d'analyser des dimensions théoriques qui régissent cette relation. Une revue systématique de la littérature est adoptée en utilisant le protocole PRISMA, s'appuyant sur 17 articles scientifiques sélectionnés. D'après une analyse menée avec l'outil QualCoder, la relation entre le changement climatique et le développement durable est régie par la dyade synergies-compromis, qui représente la majorité du contenu codé (n = 53 occurrences dans un passage textuel) et présente une cooccurrence dans les mêmes passages (n = 16 cooccurrences). En second lieu, le code d'intégration s'impose comme une approche dominante (n=15 occurrences), s'opposant au code de séparation. Toutes ces dimensions s'intègrent dans une échelle spatiale locale et nationale. De plus, les politiques concrétisées et la recherche opérationnalisée ont une occurrence nulle. Enfin, la qualité modérée des articles sélectionnés, la taille restreinte du corpus et la réalisation individuelle du codage sont des limitations du travail. Ce dernier représente une cartographie conceptuelle intégrée de la relation théorique ; il adopte un cadre de codage distinctif des travaux antérieurs.

Mots-clés : développement durable ; changement climatique ; revue systématique de la littérature ; synergies ; compromis.

JEL Classification : Q54, Q01, Q56

Type du papier : revue systématique de littérature à visée théorique

1. Introduction

The impacts of climate change are undeniable; they have caused damage to resources and living conditions on several levels. For instance, access to water, agriculture, and food (Stern, 2006). The extent of these impacts has been assessed, but reality has exceeded predictions (IPCC, 2022). As a result, the UN established a list of Sustainable Development Goals (SDGs) and adopted the 2030 Agenda in collaboration with public and private entities. The SDGs form an adopted plan to build a better future. This programme contains 17 objectives and 169 targets United Nations (2015). The 17 objectives are distributed over 3 pillars: economic, social and environmental, to favour a sustainable development (SDG 8, 9); for instance, is part of the economic pillar, promoting equality and justice (SDG 10) concerns the social pillar, and combating climate change and its impacts (SDG 13) relates to the environmental pillar. After the adoption of the Paris Agreement (UNFCCC, 2015) and the Agenda 2030 (United Nations, 2015), the international community focused on approaching the relationship between climate change and sustainable development in an integrated way. Finance, mitigation, and adaptation strategies are considered the fundamental elements of the Paris Agreement; each actor of the agreement has their rights and their obligations (UNFCCC, 2015, Art. 2(2), Art. 4). The funding devoted to developing countries, particularly the most vulnerable, is determined (UNFCCC, 2015, Art. 9.4). The interaction between mitigation, adaptation, and SDGs has revealed both co-benefits and trade-offs. For example, renewable energy minimises greenhouse gas emissions and enhances energy security at the same time (IPCC, 2022). As mentioned in the IPCC, the interaction between mitigation and adaptation policies and SDGs generates co-benefits and trade-offs, but the latter is undesirable. It differs depending on the context and scale of implementation (IPCC, 2023).

This systematic literature review has applied content analysis to assess how theoretical dimensions are distributed and interconnected across the scientific literature. It was conducted following the PRISMA protocol, based on 17 scientific articles selected through a robust screening process using QualCoder (version 3.8.2); the files were imported in .txt format. A content analysis was performed; the study outlines 9 thematic categories and 20 sub-codes through which the theoretical relationship between climate change and sustainable development is approached in the literature. The analysis explores the frequency, distribution, and co-occurrence of these codes across the corpus of papers to construct a synthesis of the theoretical landscape.

However, some limitations of selecting documents must be noted, such as the restriction of searching only the title, limiting the search to two databases, in addition to the small sample of the corpus. Hence, many pertinent works may have been excluded, but the corpus represents a coherent sample that provides a complete view of the principal trends regarding the subject.

The central question of this systematic literature review is: what are the dimensions of the theoretical relationship between climate change and sustainable development? And how are these dimensions distributed and interconnected?

Some sub-questions arise, for instance: what is the nature of categories that represent the themes connecting climate change and sustainable development? How do codes branch out from each category to build the code tree?

There is growing attention from researchers to the linkages between climate change and sustainable development goals; synergies and trade-offs have become a central concern for them. Some studies have approached the issue through the lens of climate change, while others have assessed it from the perspective of sustainable development. Cohen et al. indicate that mitigation actions have possible co-impacts on many objectives and sectors. Additionally, the identification of these co-impacts is necessary for each policy package (Cohen et al., 2021). Furthermore, Laumann et al. insist on switching from the traditional perspective that classifies

links as positive or negative through Pearson and Spearman correlations because it is restrictive and limiting (Laumann et al., 2022). Hsieh & Yeh revealed the growing number of interlinkages between climate change and sustainable development goals in research; the objective of this research is to implement strategies to find solutions to climate change issues (Hsieh & Yeh, 2024). Despite the importance given to this subject, the theoretical analysis of the climate–sustainable development relationship needs to be promoted. Existing studies commonly address specific aspects of the relationship separately without providing an integrated perspective of the conceptual map through which this relationship is theorized.

The positioning of the work among the increasing corpus of systematic and bibliometric reviews that analyze the relationship between climate change and sustainable development is necessary. The systematic literature review of Wouda Kuipers and Korwatanasakul (2024) is the most similar to our research; they adopted the PRISMA protocol to evaluate the interconnections between climate action and sustainable development goals using the dyad synergies and trade-offs. They worked on 21 papers selected from 487 references. Their review revealed 5 persistent gaps, particularly the scarcity of studies focusing on developing countries and the few studies treating the interconnections between climate change and sustainable development. Even though the adoption of the dyad synergies-trade-offs is pertinent, the work has a narrative character. Additionally, it lacks a structured code tree, a content analysis with software, quantification of occurrences, and a qualitative assessment of the 21 papers.

A category of bibliometric studies has dealt with the subject more broadly; they mapped the field quantitatively. Mishra et al. (2023) analyzed 12176 papers concerning the sustainable development goals (2015-2022). They revealed that one-third of world production comes from only 3 countries (the USA, China, and the United Kingdom), and they indicated that climate change is among the central themes of the field. Baidya and Saha (2024) adopted the PRISMA protocol and added 1696 papers derived from Scopus (1992-2022); they combined climate change with adaptation and mitigation in opposition to sustainable development goals. Hsieh and Yeh (2024) focused on the intersections between climate change and sustainable development goals by dividing 1220 documents into 19 groups depending on agricultural, hydric, and energetic themes. These studies are structured based on keywords and bibliographic metadata. They focused on what has been published rather than analyzing the conceptual relation between climate change and sustainable development

Another category of systematic review addresses this relationship at a sectoral or geographical scale. Risnawati et al. (2026) conducted an analysis based on PRISMA, focusing on 22 studies related to sustainable development and climate action, but it is limited to Southeast Asia. They determined 8 gaps and adopted integrative transdisciplinary models. Islam et al. (2026) conducted a systematic review concerning the role of environmental international organizations in climate governance; they revealed that previous research examines the field at the sectoral level or depends on one treaty instead of a systematic analysis. The systematic review of Nichols et al. (2009) is closest methodologically to our work; they combined a systematic review with a content analysis based on 36 studies in order to map the relationship between climate change and sustainable development. Moreover, they conducted a structured qualitative codification, but it was at a sectoral level.

From a global perspective, all the cited works indicated that the relationship between climate change and sustainable development is an active field and has an increasing trend. However, these systematic reviews do not combine qualitative codification using software with a global perspective. They do not map the conceptual architecture of the relationship; either they describe the points with narrative synthesis (Wouda Kuipers & Korwatanasakul, 2024), or they build a bibliometric regrouping of keywords (Mishra et al., 2023; Baidya & Saha, 2024; Hsieh & Yeh, 2024), or they analyze at the sectoral or regional level (Risnawati et al., 2026; Islam et

al., 2026; Nichols et al., 2009). Hence, this gap gives legitimacy to our systematic literature review.

2. Research methodology

2.1 Research Design

The study is a systematic literature review (SLR); this choice is related to many reasons: firstly, we aim to analyse the relationship between climate change and sustainable development theoretically. Secondly, SLR is a convenient tool to identify, organize, evaluate, and synthesize the research already established concerning the subject transparently, and to avoid subjectivity by adopting many criteria. For this reason, we use PRISMA 2020 as an updated reporting guideline for systematic reviews (Page et al., 2021).

2.2 Research Question

It is necessary to determine the main research question: what is the nature of the theoretical relationship between climate change and sustainable development? From this question, we can deduce many sub-questions, such as:

- What is the direction of influence between climate change and sustainable development?
- What is the nature of interactions between the two factors?
- At what spatial scale do they interact?

2.3 Search Strategy

We chose two databases to collect data, namely Web of Science and Scopus. Among many types of documents, we have chosen peer-reviewed journal articles, Books, book chapters, and conference papers. The search took place on 12 August 2026. Additionally, the keywords of the search are climate change, sustainable development, sustainable development goals, adaptation, and mitigation. Concerning Boolean operators, we used the following query in both databases, Web of Science and Scopus: (("climate change") AND ("sustainable development" OR "sustainable development goals")). Furthermore, we searched only in the title. Restricting the search process to titles guarantees high precision concerning the studied theme. The search is primarily in the core of the selected document, but a recall trade-off will be supported by the exclusion of some pertinent papers.

2.4 Eligibility criteria

The objective of this systematic literature review is to map how the relationship between climate change and sustainable development is theorized and conceptualized. Hence, the eligibility criteria included peer-reviewed journal articles, Books, book chapters, and conference papers. The function of all documents is to provide theoretical, conceptual, analytical, or empirical insights contributing to map the relationship between climate change and sustainable development.

2.4.1 Inclusion criteria:

- Document types: peer-reviewed journal articles, Books, book chapters, and conference papers, Open Access.
- Publication years: 2015-2026 (the Agenda 2030 and Paris Agreement were adopted in 2015).
- Languages: English, French.
- Subject area: Earth and Planetary Sciences, Economics, Econometrics and Finance, Environmental Science, Social Sciences, Energy, Agricultural and Biological Sciences, Chemical Engineering.

2.4.2 Exclusion criteria:

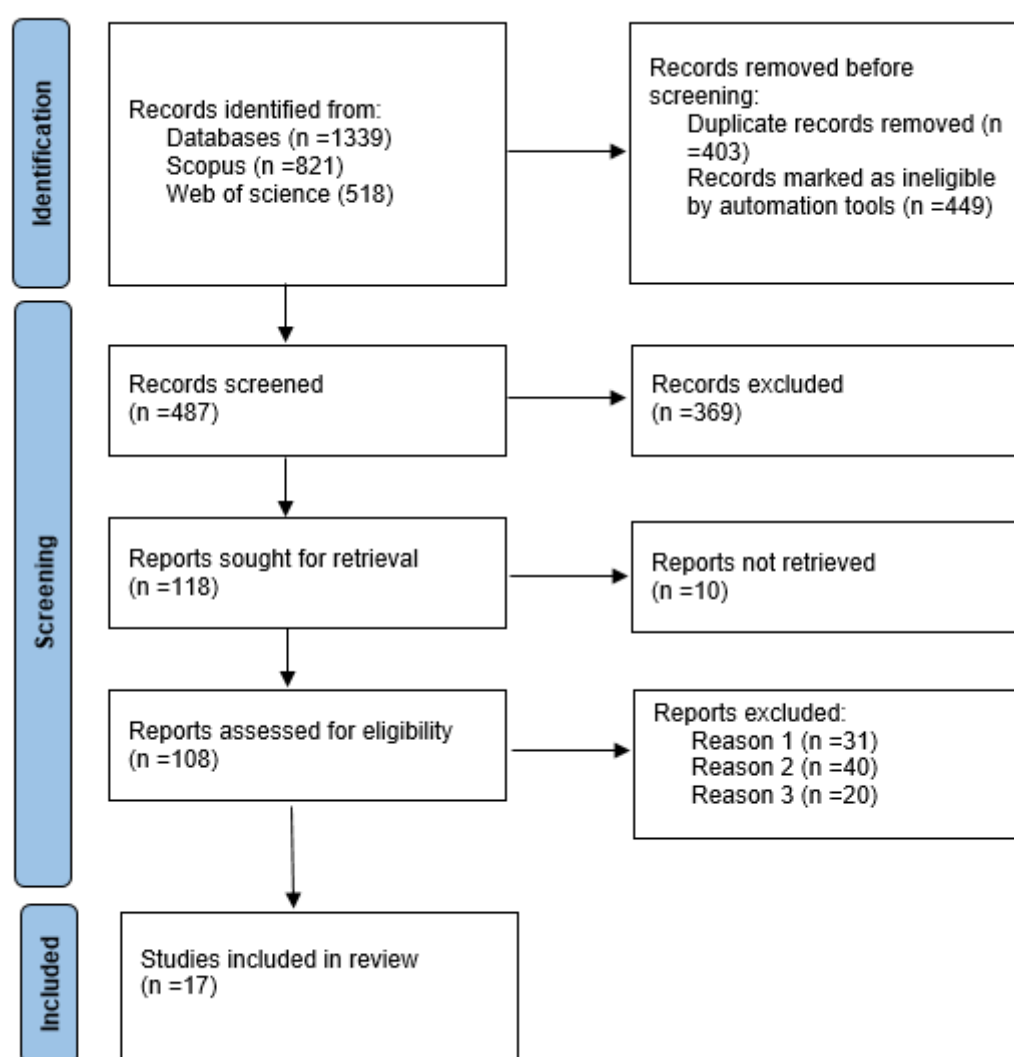
- Duplicates.
- Studies with no relation to the research question.
- Articles without access to full text.

The systematic literature review chooses a broad inclusion strategy, including theoretical and empirical articles, review papers, bibliometric studies, book chapters, and conference papers, because the objective is to map how the relationship between climate change and sustainable development is theorized. These chosen documents offered conceptual, theoretical, or analytical contributions relevant to the research question.

2.5 Study selection process

As shown in the PRISMA flow diagram (Figure 1), we went through four stages: identification, screening, eligibility, and inclusion. Firstly, the total number of records was 1339, comprising 821 from Scopus and 518 from Web of Science. Then, 403 duplicate records were removed, and 449 records were marked as ineligible by automated tools. Secondly, 369 records were excluded from the 487 screened records. Thirdly, 118 reports were sought for retrieval, but 10 were not retrieved. Finally, after assessing 108 reports for eligibility, 91 reports were excluded, and 17 studies remained as the final sample

Figure 1 : PRISMA Flow Diagram



Source: personal elaboration (2026)

Table 1 provides a general idea of the characteristics of the included studies: document type, geographic context, and methods used.

Table 1: Characteristics of the 17 selected papers

No.	Author(s), Year	Journal	Document Type	Geographic Context	Method
1	Beretić et al., 2024	Environmental Policy and Governance	Research Article	Sardinia, Italy	Participatory Living Lab
2	Dannevig et al., 2022	Climate Risk Management	Review article	Global	Review of 52 publications
3	Segger, 2016	Cambridge J. of Int'l and Comparative Law	Analytical (legal) article	Global	Doctrinal analysis
4	Halkos, 2015	Int. J. Innovation and Sustainable Development	Narrative review	Global	Economic narrative synthesis
5	Cohen et al., 2021	Sustainable Production and Consumption	Opinion Paper	Global	Conceptual framework
6	Laumann et al., 2022	The Lancet Planetary Health	Empirical article	181 countries	Network analysis
7	Smith et al., 2019	Book chapter	Book chapter	Global	Conceptual discussion
8	Baidya & Saha, 2024	Cleaner Engineering and Technology	Bibliometric study	Global	PRISMA + VOSviewer
9	Jakob & Steckel, 2016	Environmental Research Letters	Letter (empirical)	Global	Modelling
10	Serra et al., 2022	Sustainability	Empirical article	Italy	Case study
11	Fujimori et al., 2020	Environmental Research Letters	Paper (empirical)	Global	IAM modelling
12	Kowalska & Chomać-Pierzecka, 2025	Sustainability (MDPI)	Empirical article	Rural Poland	Attitude survey
13	Liu et al., 2021	Environmental Research Letters	Letter (empirical)	Global	Modelling
14	Chong, 2018	Social Alternatives	Themed (legal) article	Global	Extraterritorial obligations analysis
15	Hsieh & Yeh, 2024	Discover Sustainability	Bibliometric research	Global	CATAR + VOSviewer
16	Sohn, 2025	Sustainable Development (Wiley)	Research Article	OECD (26 countries)	Policy analysis
17	Bravo et al., 2025	Sustainability Science	Original Article (SLR)	Global	SLR + Causal Loop Diagrams

Source: personal elaboration (2026)

2.6 Data extraction

We extracted all categories and codes from each article. Categories represent all possibilities of relation between climate change and sustainable development, such as action domains, direction of the relationship, and mode of collaboration. Under each category, there are many codes. For example, under action domains, there are policy and research. Figure 2 shows clearly the categories and their codes.

Figure 2: Tree of Thematic Categories and Codes Generated from Content Analysis

Thematic Category	Associated Codes
Action Domains	Policy
	Research
Costs, Damages / Benefits, Opportunities	Benefits and Opportunities
	Costs and Damages
Direction of the Relationship	The Lens of Climate Change
	The Lens of Sustainable Development
Level of Development	Developed Countries
	Developing Countries
Mode of Collaboration	Cross-sectoral
	Sectoral
Policy Interactions	Synergies
	Trade-offs
Relationship Approach	Integration
	Separation
Research Orientation	Applied Approach
	Theoretical Approach
Spatial Scale	International
	Local
	National
	Regional

Source: personal elaboration (2026)

2.7 Quality assessment

The assessment of the methodological quality of the selected corpus by the AMSTAR-2 tool (Shea et al., 2017) was conducted independently by two evaluators. After that, a consensus was obtained after discussing the disagreements. The inter-rater reliability was measured by consensus using the mean of Cohen's kappa coefficient ($k=0.5$). Consequently, we scored the chosen articles as moderate; this means there is more than one non-critical weakness. Despite the moderate ranking, the articles were selected because they are the most relevant theoretical literature representing the relationship between climate change and sustainable development.

2.8 Data synthesis and analysis

The content analysis adopted a mixed deductive-inductive approach (Miles & Huberman, 1994). On the one hand, we determined the categories based on the theoretical framework, including the category Action Domain that comprises the codes Policy and Research (Sharifi et al., 2026). On the other hand, the in-depth reading of the 17 papers allowed us to determine the codes. We conserved the category with null occurrence concerning policy and research because it constitutes an empirical result in itself and indicates a gap in the analyzed literature.

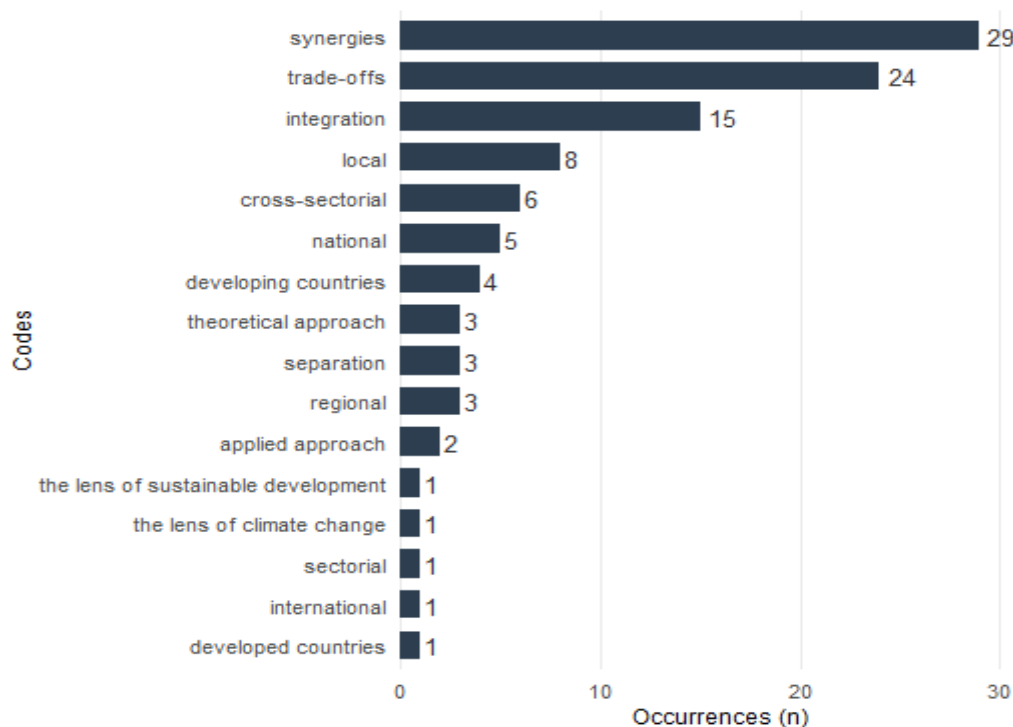
Results of the analysis concern the frequencies of each code, as well as graphs and plots generated using QualCoder (version 3.8.2) (Curtain & Grech, 2024). It is free, open-source software for coding. It has many functionalities suited to systematic content analysis of academic literature, such as literature organization and coding, as well as rigorous reporting; it generates visual graphs to help synthesize literature themes. All included studies were imported into QualCoder (version 3.8.2) and systematically coded.

3. Results and discussion

The content analysis of 17 selected studies using QualCoder (version 3.8.2) generated a total of 107 coded segments related to 9 thematic categories and 20 codes. Results are presented following the logic of the code tree, beginning from the most frequently coded categories to the least. Figure 3 is a horizontal bar chart; The horizontal axis shows the raw frequency count of

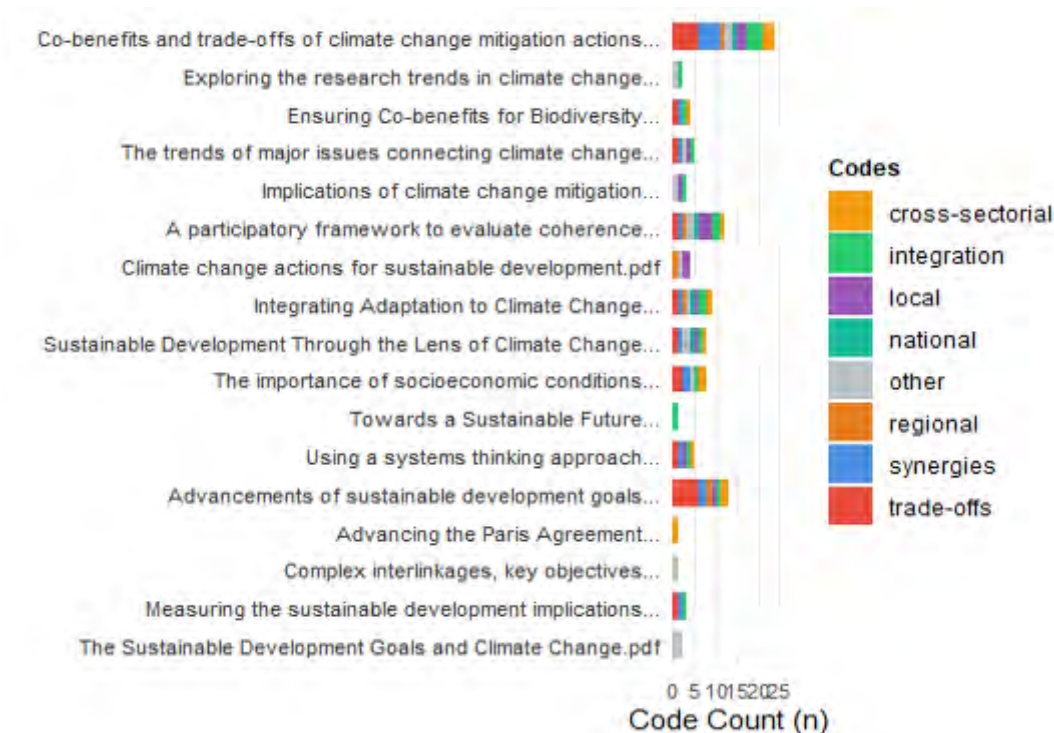
each of the 20 codes, each bar length indicates how many times that code was applied in all cases, while the vertical axis highlights the individual codes by name. Additionally, Figure 4 is a horizontal stacked bar chart in which the horizontal axis shows how many times codes were cited in that paper, while the vertical axis represents all 17 reviewed papers.

Figure 3: Overall Code Frequency Distribution



Source: personal elaboration (2026)

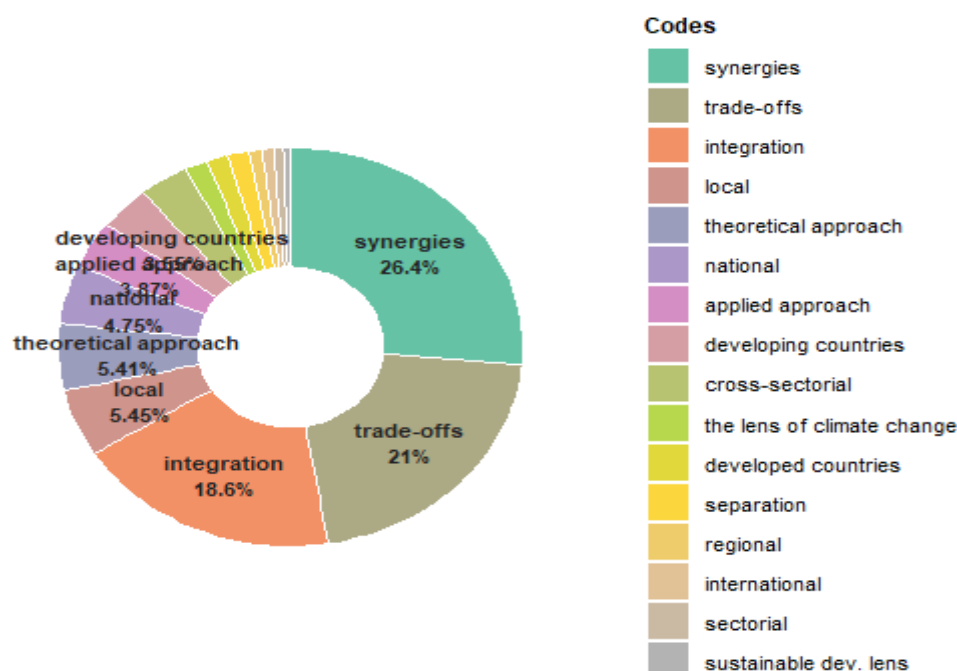
Figure 4: Distribution of Codes Across the 17 Reviewed Papers



Source: personal elaboration (2026)

3.1. Policy Interactions: Synergies and Trade-offs

Figure 5: Proportional Distribution of Codes by Character Count



Source: personal elaboration (2026)

Table 2: Ranked List of Co-occurrence Codes Identified in the Systematic Literature Review

Code pair	Co-occurrences
Synergies ↔ Trade-offs	16
Integration ↔ Local	4
Integration ↔ National	3
Integration ↔ Regional	2
Regional ↔ Local	4
Cross-sectorial ↔ Trade-offs	3
Cross-sectorial ↔ Synergies	2
Separation ↔ Integration	2
Synergies ↔ Local	2
Developing countries ↔ Cross-sectorial	1
Developing countries ↔ Developed countries	1
Integration ↔ Trade-offs / Synergies	1 each

Source: personal elaboration (2026)

The dominant category is Policy Interactions with 53 codes. It has the most frequent appearance. In addition, it is clearly shown on the pie chart Figure 5 which indicates the textual weight of each code; it is equal to 26.4% for synergies and 21% for trade-offs, so the two codes represent approximately 47.4% of all coded content. When it comes to the co-occurrence matrix, it clearly shows that the two preceding codes occurred 16 times in the same passage. The literature shows them always together, as illustrated by the co-occurrences presented in Table 2, the co-occurrence analysis shows the presence of two distinct codes within the same textual segment. Moreover, the paper *Co-benefits and trade-offs of climate change mitigation actions* (Cohen et al., 2021) is the most coded paper after that; it comes second, behind *Using a systems thinking approach to assess the complex interplay between sustainable development goals, climate change, and humanitarian operations* (Bravo et al., 2025). In contrast, *Advancing the Paris Agreement on Climate Change for Sustainable Development* (Segger, 2016) and

Towards a Sustainable Future: Addressing Climate Change and Promoting Sustainable Development (Sohn, 2025) are the least coded papers, as shown in Figure 4.

- ***Relationship Approach: Integration vs. Separation***

This is the second-largest category, with code integration (n=15 occurrences) and code separation (n=3 occurrences), indicating that climate change and sustainable development should be unified. According to the co-occurrence data, separation and integration co-occurred twice.

- ***Spatial Scale of Application***

It is the third category; it contains 17 occurrences, namely Local (8 occurrences), National (5 occurrences), Regional (3 occurrences), and International (1 occurrence). Moreover, it is observed clearly in the co-occurrence data that the code integration occurs with the codes local, regional, and national, respectively, 4, 3, and 2 times.

- ***Mode of Collaboration: Cross-sectoral vs. Sectoral***

The code cross-sectoral (6 occurrences) dominates over sectoral (1 occurrence) in the literature. Concerning co-occurrence data, the code cross-sectoral is strongly paired with the two codes synergies and trade-offs.

- ***Research Orientation and Direction***

The literature is more conceptual than empirical because of the appearance of the code theoretical approach (3 occurrences) versus applied approach (2 occurrences). The two codes appear in the same passage once. When it comes to the direction of relationship (2 codes), one paper adopted the lens of climate change to interpret sustainable development, and the other used the lens of sustainable development to interpret climate change.

- ***Level of Development and Geographical Context***

The code Developing Countries dominates over the code Developed Countries. On the other hand, the co-occurrence data show that developing countries are paired with cross-sectoral once and synergies once.

- ***Action Domains***

Finally, the interpretation of the null occurrence of the codes policy and research relates to a gap in the literature that theorises the relationship between climate change and sustainable development; the theoretical relationship needs to be translated into implemented policy measures and operational research instruments. It is a gap in theoretical literature that has not been examined in the broader field.

Results of the systematic literature review are described clearly in this section. The interpretation and meaning of all points are discussed below.

3.2. Discussion

The aspects of the theoretical relationship between climate change and sustainable development were examined in this systematic review across 17 scientific papers. The content analysis revealed that this relationship is dominated by synergies and trade-offs between the components of climate change, namely mitigation and adaptation, and those of sustainable development. This relationship is also characterized by integration rather than separation. Additionally, it is analysed particularly at local and national scales.

The findings align partially with what we have cited in the literature review and conflict at the same time. Cohen et al. (2021) also indicated in their findings that synergies and trade-offs are

the dominant framework in the relationship between climate change and sustainable development, but their analysis focused only on mitigation action. In contrast, this literature review covers both mitigation and adaptation. We determined the weights of both of them precisely: 29 for synergies and 24 for trade-offs.

Laumann et al. (2022), in their analysis, reveal that trade-offs between sustainable development goals are substantial, and they reject primarily the binary positive/negative, unlike our findings, which indicate that integration through the relationship between climate change and sustainable development (n=15 occurrences) dominates separation (n=3 occurrences). This conflict is interpreted by the nature of the two works: the theoretical and qualitative analysis is characterized by a normative trend, while the quantitative analysis is marked by an objective trend.

Hsieh and Yeh (2024) conducted a bibliometric clustering that covers the agriculture, water, and energy fields; the divergence between their findings and ours concerns spatial scale and mode of collaboration. This divergence is related to the unit of analysis: Hsieh and Yeh (2024) used keyword co-occurrence, while thematic content coding was adopted in our literature review

The divergences observed between studies are not contradictions, but they are related to the methods used, the different scales, and contexts. The persistence of separation in the literature reflects the real organization of institutions that fragment climate and development policies, managed by distinct ministries, as shown by Beretić et al. (2024) and Dannevig et al. (2022). It is the same for studies that focus on trade-offs rather than synergies, such as Laumann et al. (2022); they generally use in general quantitative data able to detect specific sectoral conflicts. These conflicts are less noticeable on a conceptual scale in the corpus of our literature review. Overall, the findings about the relationship between climate change and sustainable development vary systematically depending on the method and the analysis scale

Additionally, synergies and trade-offs form the dominant framing in the theoretical analysis, due to several reasons: firstly, the adoption of the Paris Agreement and the Agenda 2030 (United Nations, 2015) shifted researchers' attention to this dyad. Secondly, there is an institutional concern about this scientific evidence in order to maximise synergies and minimise trade-offs. In this context, synergies and trade-offs always appear in pairs, about 16 times in the same passage. It is a matter of pairs, not opposites.

Furthermore, the literature indicates that climate and sustainable development policies should be integrated. But separation persists in some cases (n=3 occurrences); this is an obstacle to be overcome by researchers and policymakers.

In terms of spatial scale, local and national dominate over the international. Despite the global concern of climate change, the literature review shows a high frequency of the local and national codes when compared with the international code. Priority is given to local concerns in order to realize adaptation and mitigation policies. Moreover, most of the literature review takes local case studies as a subject of analysis.

The literature indicates that realizing synergies and reducing trade-offs requires cross-sector coordination. This is proven by the co-occurrence finding that cross-sectoral appears with both trade-offs and synergies 3 and 2 times, respectively. Accordingly, all actions taken should be approached with a cross-sectoral vision.

Beyond that, in the literature review, theoretical orientation is slightly dominant over applied orientation. Since the selected papers focus on theoretical analysis, the overemphasis on theory naturally dominates the analysis.

In addition, the code Developing Countries dominates over developed ones because of the vulnerability and deficits that mark least developed countries. The relationship between climate change and sustainable development in these countries is marked by conflict in terms of actions and policies.

Finally, one of the most important findings is the absence, in the literature review, of any code concerning research and policy under the category Actions Domain. Although theory characterizes this literature, it is not translated into the actions domain.

Concerning limitations of the literature review, there is the temporal dimension; the code tree does not include a time dimension. The relationship between climate change and sustainable development changes over time, but it was not analysed dynamically. The observation in the frequency counts (n=53 occurrences) for both synergies and trade-offs n=8 for local, and n=1 for international) is interpreted by the thematic presence rather than statistical inferences. Indeed, the corpus was not selected randomly; it adopted eligibility criteria for selection. The few occurrences of some codes (local = 8 occurrences, international = 1 occurrence) are interpreted as instability of the sample; removing a paper from the corpus can change the proportions. This instability characterizes small samples and represents a limitation for small-corpus qualitative content analysis

Overall, a set of points can be extracted from the literature review analysis: synergies and trade-offs govern all conceptualisation of policies, taking into account the integration of the two components of this work, climate change and sustainable development.

4. Conclusion

This work aimed, through a systematic literature review, to analyse the theoretical relationship between climate change and sustainable development, based on 17 peer-reviewed studies selected through a PRISMA methodology. QualCoder (version 3.8.2) was used to conduct the content analysis; a structured code tree comprising 9 thematic categories and 20 sub-codes was elaborated in order to achieve the analysis results.

The analysis indicates the dominance of the two codes, synergies and trade-offs, over all other codes. They appear together in the same passage. Hence, the theoretical relationship between climate change and sustainable development is interpreted through this dyad. Mitigation and adaptation policies, as well as sustainable development goals, can be achieved by considering synergies and trade-offs.

Furthermore, the relationship between climate change and sustainable development is approached through integration as the second most dominant code. It is the opposite of separation, which sometimes characterizes the relationship, but as an undesirable characteristic. Local and national scales dominate in this relationship, confirming the influence of NDC frameworks and the SDG localization agenda. Moreover, it is analysed through a cross-sectoral lens. After listing all dominant elements in this relationship, despite the development of theoretical approaches in this field, there is a lack of concrete action frameworks; this should be noted as a gap in this subject. Additionally, the reliability of the codification needs to be proven scientifically.

This systematic literature review provides a clear, structured overview of the theoretical dimensions through which the relationship between climate and development is understood. It forms a conceptual framework for this relationship and defines the gaps in this field. Furthermore, the findings constitute a contribution for researchers designing empirical studies in this field, as well as for policymakers seeking theoretical grounding.

Regarding recommendations aimed at public decision-makers, firstly, Climate negotiators could use the dominance of the synergies-trade-offs dyad to conduct a systemic audit within the global stocktake. Second, since local and national framings dominate international ones, national authorities responsible for NDCs could incorporate this point into the assessment as early as the design phase. Thirdly, development cooperation agencies could adopt the premise that integration takes precedence over separation when designing funding and programming

requirements. In general, the framework comprising 9 categories and 20 codes serves as a basis for practical diagnostic tools for stakeholders.

We acknowledge several limitations in this systematic literature review. Firstly, the search method is restricted to the title field and open-access documents, and two databases may exclude some relevant documents. Secondly, the small sample of selected documents (17 studies) affects the statistical stability of the frequency of codes. Thirdly, even though the AMSTAR-2 tool was conducted by two evaluators with a moderate agreement (Cohen's $k = 0.5$), the codification was designed by a single coder. Consequently, it constitutes a source of bias in the coding strategy. Finally, the study does not take into consideration the temporal dimension and does not consider the dynamics of the relationship between climate change and sustainable development over time.

Future research must prioritize operational frameworks that convert synergies and trade-offs into measurable policy indicators, particularly for developing countries. Furthermore, concerning methodology, the corpus should be expanded by adding several databases such as WoS and Google Scholar, including paid resources, and integrating empirical studies in order to consolidate the robustness of selected papers. Moreover, adopting a dual-coder approach with inter-rater agreement protocols, such as Cohen's kappa, can improve reliability and minimize subjective findings. Finally, future research should adopt dynamic and longitudinal methods of evaluating the relationship between climate change and sustainable development; this can show how this relationship changes over time

Références

- (1). Baidya, A., & Saha, A. K. (2024). Exploring the research trends in climate change and sustainable development: A bibliometric study. *Cleaner Engineering and Technology*, 18, 100720. <https://doi.org/10.1016/j.clet.2023.100720>
- (2). Beretic, N., Bauer, A., Funaro, M., Spano, D., & Marras, S. (2024). A participatory framework to evaluate coherence between climate change adaptation and sustainable development policies. *Environmental Policy and Governance*, 34(3), 275–290. <https://doi.org/10.1002/eet.2076>
- (3). Bravo, R. Z. B., Cunha, L. R. A., Cardoso, B., Sarges, B., Barros, C., Rodrigues, V., & Leiras, A. (2025). Using a systems thinking approach to assess the complex interplay between sustainable development goals, climate change, and humanitarian operations. *Sustainability Science*, 21(1), 95–120. <https://doi.org/10.1007/s11625-025-01727-2>
- (4). Chong, D. (2018). The sustainable development goals and climate change. *Social Alternatives*, 37(1), 43–48.
- (5). Cohen, B., Cowie, A., Babiker, M., Leip, A., & Smith, P. (2021). Co-benefits and trade-offs of climate change mitigation actions and the Sustainable Development Goals. *Sustainable Production and Consumption*, 26, 805–813. <https://doi.org/10.1016/j.spc.2020.12.034>
- (6). Curtain, C., & Grech, T. (2024). QualCoder (Version 3.8.2) [Computer software]. GitHub. <https://github.com/ccbogel/QualCoder>
- (7). Dannevig, H., Korsbrekke, M. H., & Hovelsrud, G. K. (2022). Advancements of sustainable development goals in co-production for climate change adaptation research. *Climate Risk Management*, 36, 100438. <https://doi.org/10.1016/j.crm.2022.100438>
- (8). Fujimori, S., Hasegawa, T., Takahashi, K., Dai, H., Liu, J. Y., Ohashi, H., Xie, Y., Zhang, Y., Matsui, T., & Hijioka, Y. (2020). Measuring the sustainable development implications of climate change mitigation. *Environmental Research Letters*, 15(8), 084016. <https://doi.org/10.1088/1748-9326/ab9966>

- (9). Halkos, G. E. (2015). Climate change actions for sustainable development. *International Journal of Innovation and Sustainable Development*, 9(2), 118–136. <https://doi.org/10.1504/IJISD.2015.068785>
- (10). Hsieh, Y. L., & Yeh, S. C. (2024). The trends of major issues connecting climate change and the Sustainable Development Goals. *Discover Sustainability*, 5(1), 183. <https://doi.org/10.1007/s43621-024-00183-9>
- (11). IPCC. (2022). *Climate Change 2022: Impacts, Adaptation, and Vulnerability. Contribution of Working Group II to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change* (H.-O. Pörtner, D. C. Roberts, M. Tignor, E. S. Poloczanska, K. Mintenbeck, A. Alegría, M. Craig, S. Langsdorf, S. Löschke, V. Möller, A. Okem, & B. Rama, Eds.). Cambridge University Press. <https://doi.org/10.1017/9781009325844>
- (12). IPCC. (2023). *Climate Change 2023: Synthesis Report. Contribution of Working Groups I, II and III to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change* (Core Writing Team, H. Lee, & J. Romero, Eds.). IPCC. <https://doi.org/10.59327/IPCC/AR6-9789291691647>
- (13). Islam, S., Sultana, B. C., Rahman, M., Reza, A., Islam, T., & Alam, E. (2026). Environmental international organizations in climate change governance: A systematic review of their contributions to SDGs 6–14. *Frontiers in Environmental Science*, 14, 1778154. <https://doi.org/10.3389/fenvs.2026.1778154>
- (14). Jakob, M., & Steckel, J. C. (2016). Implications of climate change mitigation for sustainable development. *Environmental Research Letters*, 11(10), 104010. <https://doi.org/10.1088/1748-9326/11/10/104010>
- (15). Kowalska, M., & Chomać-Pierzecka, E. (2025). Sustainable development through the lens of climate change: A diagnosis of attitudes in southeastern rural Poland. *Sustainability*, 17(12), 5568. <https://doi.org/10.3390/su17125568>
- (16). Laumann, F., von Kügelgen, J., Kanashiro Uehara, T. H., & Barahona, M. (2022). Complex interlinkages, key objectives, and nexuses among the Sustainable Development Goals and climate change: A network analysis. *The Lancet Planetary Health*, 6(5), e422–e430. [https://doi.org/10.1016/S2542-5196\(22\)00070-5](https://doi.org/10.1016/S2542-5196(22)00070-5)
- (17). Liu, J.-Y., Fujimori, S., Takahashi, K., Hasegawa, T., Wu, W., Geng, Y., Takakura, J., & Masui, T. (2021). The importance of socioeconomic conditions in mitigating climate change impacts and achieving Sustainable Development Goals. *Environmental Research Letters*, 16(1), 014020. <https://doi.org/10.1088/1748-9326/abcac4>
- (18). Miles, M. B., & Huberman, A. M. (1994). *Qualitative data analysis: An expanded sourcebook* (2nd ed.). Sage Publications.
- (19). Mishra, M., Desul, S., Guimarães Santos, C. A., Mishra, S. K., Mustafa Kamal, A. H., Goswami, S., Mukalazi Kalumba, A., Biswal, R., Marques da Silva, R., Costa dos Santos, C. A., & Baral, K. (2023). A bibliometric analysis of Sustainable Development Goals (SDGs): A review of progress, challenges, and opportunities. *Environment, Development and Sustainability*, 25(10), 10485–10525. <https://doi.org/10.1007/s10668-023-03225-w>
- (20). Nichols, A., Maynard, V., Goodman, B., & Richardson, J. (2009). Health, climate change and sustainability: A systematic review and thematic analysis of the literature. *Environmental Health Insights*, 3, 63–88.
- (21). Page, M. J., McKenzie, J. E., Bossuyt, P. M., Boutron, I., Hoffmann, T. C., Mulrow, C. D., ... & Moher, D. (2021). The PRISMA 2020 statement: An updated guideline for reporting systematic reviews. *BMJ*, 372, n71. <https://doi.org/10.1136/bmj.n71>
- (22). Risnawati, D., Mulka, S. R., & Amalia, D. R. (2026). Sustainable development in climate change in Southeast Asia: A systematic literature review. *Problemy Ekorozwoju*

- / Problems of Sustainable Development, 21(2), 224–238. <https://doi.org/10.35784/preko.8844>
- (23). Segger, M.-C. C. (2016). Advancing the Paris Agreement on Climate Change for Sustainable Development. *Cambridge International Law Journal*, 5(2), 202–237. <https://doi.org/10.7574/cjicl.05.02.202>
- (24). Serra, V., Ledda, A., Ruiiu, M. G. G., Calia, G., & De Montis, A. (2022). Integrating adaptation to climate change into sustainable development policy and planning. *Sustainability*, 14(13), 7634. <https://doi.org/10.3390/su14137634>
- (25). Sharifi, A., Sobhaninia, S., Esfandi, S., & Amirzadeh, M. (2026). Co-benefits and trade-offs of urban resilience for sustainable development goals (SDGs). *Habitat International*, 170, 103735. <https://doi.org/10.1016/j.habitatint.2026.103735>
- (26). Shea, B. J., Reeves, B. C., Wells, G., Thuku, M., Hamel, C., Moran, J., ... & Henry, D. A. (2017). AMSTAR 2: A critical appraisal tool for systematic reviews that include randomised or non-randomised studies of healthcare interventions, or both. *BMJ*, 358, j4008. <https://doi.org/10.1136/bmj.j4008>
- (27). Smith, R., Guevara, O., Wenzel, L., Dudley, N., Petrone-Mendoza, V., Cadena, M., & Rhodes, A. (2019). Ensuring co-benefits for biodiversity, climate change and sustainable development. In W. L. Filho, J. Barbir, & R. Preziosi (Eds.), *Handbook of climate change and biodiversity* (pp. 151–166). Springer. https://doi.org/10.1007/978-3-319-98681-4_9
- (28). Sohn, W.-S. (2025). Towards a sustainable future: Addressing climate change and promoting sustainable development. *Sustainable Development*, 34(S1), 226–247. <https://doi.org/10.1002/sd.70105>
- (29). Stern, N. (2006). *The economics of climate change: The Stern review*. HM Treasury.
- (30). UNFCCC. (2015). *Adoption of the Paris Agreement* (Report No. FCCC/CP/2015/10/Add.1). United Nations Framework Convention on Climate Change.
- (31). United Nations. (2015). *Transforming our world: The 2030 Agenda for Sustainable Development* (Resolution A/RES/70/1). United Nations. <https://sdgs.un.org/2030agenda>
- (32). Wouda Kuipers, J., & Korwatanasakul, U. (2024). Interlinkages between climate action and the Sustainable Development Goals: Trends from the recent decade. *SAGE Open*, 14(3), 1–15. <https://doi.org/10.1177/21582440241267354>

Declaration of Generative AI and AI-Assisted Technologies in the Manuscript Preparation Process:

Artificial intelligence tools were used exclusively for translation and language editing purposes, without contributing to the research design, data analysis, or interpretation of results. The authors take full responsibility for the final content of the article and have reviewed and verified all modifications made.