

Bibliometric analysis of Adaptation Strategies to Climate Change in European rural communities

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Abstract

Climate change presents significant challenges for European rural communities, necessitating robust adaptation strategies to enhance resilience and support sustainable development. This study employs a bibliometric analysis to map the academic landscape surrounding climate change adaptation strategies in European rural areas, identifying key research trends, influential studies, and thematic shifts over time. Using tools such as Biblioshiny and VOSviewer, the study analyzes a dataset comprising 291 documents from 158 sources published between 2005 and 2025. The findings reveal key research clusters, country-wise production, total citation per country, prominent journals, and significant contributing institutions, highlighting the increasing academic focus on adaptation strategies. The study also examines co-occurrence patterns of keywords, shedding light on dominant themes such as community-based adaptation, resilience, governance, and policy frameworks. Furthermore, it identifies critical research gaps and underscores the importance of integrating policy measures with localized, participatory solutions. By bridging scientific insights with practical applications, this research provides valuable contributions to policymakers, practitioners, and scholars engaged in rural sustainability and climate adaptation efforts.

Keywords: *climate change, rural communities, policy framework, adaptation strategies*

JEL Code: *Q54, R58, Q01*

Introduction

Climate change is disrupting rural communities globally, particularly in Europe, where extreme weather, shifting precipitation, and rising temperatures jeopardize agriculture, water resources, and economic foundations. These regions are more vulnerable due to their reliance on natural resources, demographic decline, and limited adaptive capacity (Margaretha et al. 2018; Annappa et al. 2023; Graus et al. 2024). Thus, adaptation is essential for rural resilience, aiming to mitigate risks and promote sustainable development.

Adaptation has been integrated into EU climate frameworks such as the European Green Deal, the (Common Agricultural Policy) CAP, and national strategies (Biesbroek et al. 2010). However, challenges persist in cross-sectoral coordination, financing, and local knowledge-sharing (Ellison, 2010). Effective adaptation combines top-down policy with inclusive, bottom-up approaches, necessitating evaluations of ongoing efforts to enhance their impact.

This bibliometric study explores key themes, policy evaluations, and community-based innovations in rural European adaptation. It highlights research gaps and emphasizes participatory processes for locally relevant and inclusive strategies.

Definition and importance of Climate Change Adaptation

The Intergovernmental Panel on Climate Change (IPCC), the leading scientific body on climate-related policies, defines climate change as long-term shifts in climate attributes (IPCC, 2007). Furthermore, Werndl (2016) defines climate as a finite distribution over time in the regime of changing conditions, addressing key issues and emerging as the most solid definition. However, definitional inconsistencies between the Framework Convention on Climate Change (FCCC) and IPCC have caused policy deadlocks that hindered adaptation efforts, as adaptation remains largely considered a cost by the FCCC rather than a necessary response to climate change (Pielke, 2004).

Adaptation focuses on reducing vulnerability to climate threats, such as extreme weather, biodiversity loss, and resource shortages (Schipper, 2007; UNDP, 2024). While historical adaptation to climate change is evident, contemporary adaptation requires planning, political backing, and economic integration (Fankhauser, 2017).

Rural areas, especially depopulating ones, are highly exposed to droughts, heatwaves, and wildfires, intensifying economic and resource stress (Margaretha et al. 2018; Graus et al. 2024). Migration weakens resilience and adaptive capacity. Effective measures should integrate local knowledge and foster cross-sector collaboration (Suprayitno et al. 2024). Linking adaptation and mitigation enhances resilience (Beermann, 2011), requiring shifts in institutional, public, and individual behaviors (Pielke, 1998).

European countries have made progress in National Adaptation Strategies (NASs), but gaps persist in coordination, stakeholder involvement, and financing (Biesbroek et al. 2010). Both top-down and bottom-up approaches are necessary. Adaptation frameworks must reduce social and economic vulnerabilities (Wheaton et al. 1999). Frameworks like Disaster Risk Reduction (DRR) and Climate Change Adaptation (CCA) help build resilience and promote sustainable development (Begum et al. 2014), though EU climate policy still favours mitigation over adaptation (Ellison, 2010).

Though impacts intensify, EU climate efforts lack momentum, hindered by inequality, nationalism, and implementation barriers. While the potential exists, stronger action is needed (Nayna, 2022). The EGD promotes sustainability, but uneven national commitments among EU member states obstruct implementation (Sikora, 2021; Maris et al. 2021).

Another framework is the Common Agricultural Policy (CAP), which is developed between society and agriculture to ensure a steady food supply, support farmers' incomes, protect the environment, and help maintain the vitality of rural areas (EU, 2025). The CAP supports sustainability but remains fragmented and lacks a comprehensive adaptation framework (Recanati et al. 2019; Mottershead et al. 2019).

The governmental agenda at the highest-level SDGs and the Paris Agreement call for urgency and transformational action to address climate change and ensure food security for a growing world population. To achieve the goals of the Paris Agreement to control global temperatures below 2°C, or ideally 1.5°C, massive-scale mitigation, particularly in the land sector, with a special focus on carbon sequestration, needs to be a focus on slowing greenhouse gas emissions from agriculture (Bombelli et al. 2019). National Determined Contributions (NDCs) are key in shaping action, but alignment with socioeconomic goals remains limited (Dzebo et al. 2019).

Integrated, scalable, region-specific solutions are needed. Nature-Based Solutions (NBS), cross-sectoral collaboration, and system-level responses are vital (Ottaviani et al. 2022). Aligning EU adaptation efforts with broader frameworks must ensure fairness and inclusivity, avoiding rural marginalization.

Major Adaptation Strategies in European rural communities

Europe must shift from awareness to action. The EU's 2021 Adaptation Strategy targets climate resilience by 2050, emphasizing knowledge, technology adoption, and resilience (Isoard, 2011). Rural adaptation requires locally tailored actions, backed by EU frameworks and continuous data improvement (Tzilivakis et al. 2015).

The Rural Pact Support Office report (2024) describes the important role played by rural communities in climate change. The people's transformation project in Ireland promoting climate justice through community wealth-building methods and Schlosstonndorf Ecovillage in Germany, using land regeneration and cultural activities, shows how local initiatives can work towards the change. In the mountain regions, the MountResilience project highlights the need for context-specific adaptation strategies, while the Farm to Fork Academy for the Green Western Balkans builds capacity among local organizations. These grassroots initiatives demonstrate the value of local knowledge, bottom-up approaches and cross-border cooperation, aligned with Iglesias et al. (2022), who highlight integrating climate science and socioeconomics. Participatory, well-supported efforts promote resilience.

The Climate Action Network (CAN) calls for legally binding adaptation, strong implementation, and transparent financing. It emphasizes ecosystem-based strategies and EU-level funding through the Multiannual Financial Framework (MFF), the Common Agricultural Policy (CAP), and cross-border mechanisms (CAN, 2018).

Municipalities influence adaptation through land lease policies and multisector cooperation. Rural resilience is urgent as extreme events increase (Konečný et al. 2024). Rural areas—especially in Southern and Eastern Europe, depend on external funding like H2020 and LIFE+. Overcoming constraints requires tailored strategies and stronger climate services (Aguilar et al. 2018).

Effective adaptation depends on inclusive policy design involving trade unions and local actors. Aligning adaptation with socioeconomic priorities is key to building rural resilience (Susova et al. 2020).

The Role of community engagement and participatory approaches in adaptation

Research on climate change adaptation by Barth and Stephenson (2023) emphasizes the acknowledgment of local knowledge, building trust, and promoting inclusive governance as necessary for developing effective strategies. Key principles are climate justice and community-led development. Psychosocial factors, such as subjective norms and perceived behavioral control, significantly impact engagement intentions. Engaging stakeholders increases decision quality and enhances adaptation strategies using different types of knowledge (Luís et al. 2018). However, while Community-Based Risk Assessments (CRAs) support community adaptation initiatives, Van Aalst et al. (2008) highlight the need for a more systematic approach, proper methodologies, and better links to national and international climate-related information.

The table below summarizes arguments from relevant research to provide clarity regarding how different academicians view communities' capacities to adapt to climate change. Comparative analysis reveals the consensus that community involvement is beneficial and is critical to reaching sustainable and effective adaptation solutions.

Table 1 Perspectives from Key Studies on the role of community in Climate Change Adaptation

Authors	Perspective on Community Involvement	Key Arguments
Ross, H., Shaw, S., Rissik, D. et al. (2015). A participatory systems approach to understanding climate adaptation needs.	Support and Empowering.	Multitasking approaches build long-term adaptation capacity through learning, social networks and motivation.
Sartorius, J. V., Geddes, A., Gagnon, A. S., & Burnett, K. A. (2024). Participation and co-production in climate adaptation: Scope and limits identified from a meta-method review of research with European coastal communities.	Crucial.	Participation and co-production are key in addressing climate change by promoting the engagement of science and communities in executing knowledge. However, these approaches face challenges like power imbalances and uncertainties.
Skarzauskiene, A., Mačiulienė, M., & Kovaitė, K. (2024). Citizen engagement in climate adaptation surveyed: Identifying challenges in education and capacity building.	Essential.	Community awareness, skills training, and economic factors shape responses to climate hazards; personal experience and municipal support drive engagement.
Wamsler, C., Alkan-Olsson, J., Björn, H. et al. (2020). Beyond participation: when citizen engagement leads to undesirable outcomes for nature-based solutions and climate change adaptation.	Critical.	While citizen participation is important, it is limited by systemic barriers; broader institutional and political change is needed.
Brink, E., & Wamsler, C. (2019). Citizen engagement in climate adaptation surveyed: The role of values, worldviews, gender, and place	Inclusive.	Inclusive policies and communication must align with diverse values and identities for effective engagement.
Jose, A. L. (2013). Adapting locally to secure sustainable futures: Lessons learned from selected UNDP-GEF Community-Based Adaptation projects.	Crucial.	Community-based projects show real impact (improved yields, water use, and livelihoods) when combining local knowledge with participatory and policy support.

Source: Author's contribution

Case studies cited by IASC (2009) further support this view. In Bangladesh, Community-Based Adaptation (CBA) integrated local knowledge as farmers selected drought-resilient crops. In Nepal, participatory risk reduction guided Farmers' Climate Field Schools to adjust cropping practices. In Tuvalu, collaboration between the Red Cross and local NGOs boosted disaster preparedness. Ethiopia's livelihood diversification efforts, combining reforestation and income generation, also demonstrate the value of inclusive strategies. Together, these examples illustrate that well-planned, documented, and locally driven participation increases resilience and ensures long-term sustainability in climate adaptation.

Material and method

Bibliometric analysis was chosen as a systematic measure in this study to analyze the academic landscape on climate change adaptation, specifically in rural contexts of Europe. Bibliometric analysis is increasingly accepted as a powerful tool for analyzing scientific literature, providing structured, evidence-based insights into research trends, key contributions, and emerging disciplines (Pasas, 2024). The employment of bibliometric analysis in this study provides a global view of the thematic development, citation patterns, and intellectual structure of the area being studied.

This bibliography analysis data was extracted from the Web of Science (WoS). A well-defined search strategy was employed to render a more focused and relevant data set based on the combination of relevant keywords and Boolean operators. The search string applied was:

(“climate change adaptation” OR “climate adaptation” OR “adaptation strategies”) AND (“rural communities” OR “rural areas” OR “agriculture” OR “farming sector”) AND (“Europe” OR “European Union” OR “EU”) AND (“policy framework” OR “governance” OR “sustainability” OR “resilience”) (Abstract) AND Community-based Adaptation (OR – Search within the topic).

To keep up the contemporary relevance of the study, the materials reviewed were limited to journal articles, conference proceedings, and book chapters published in English from 2005 to 2025. This period allows for the inclusion of the latest advancements and policy developments that are relevant to climate adaptation strategies within rural areas of Europe.

The selection of studies followed a rigorous screening process based on predefined inclusion and exclusion criteria:

- Inclusion: Studies focused on climate adaptation strategies in rural Europe, governance frameworks, or community-based approaches to adaptation.
- Exclusion: Those studies dealing with mitigation rather than adaptation studies, studies not conducted in Europe, and articles lacking a sufficient bibliometric repository, among others. The removal of duplicates and unobtainable complete articles further ensures that the dataset derived would be reliable and consistent.

Additionally, the analysis in this study was performed using Biblioshiny and other features of the bibliometrics package in RStudio. For added analysis, VOSviewer was used as an open-source software tool to assemble and display bibliometric networks. It aided in mapping the co-authorship networks, citation relationships, and keyword co-occurrence to track influential authors, key research clusters, and thematic connections across the discipline.

Recently, bibliometric science mapping has assumed great importance owing to the increasing complexity of knowledge accumulation across disciplines. By applying Bibliometrix and VOSviewer, an in-depth reading of the academic discourse on climate adaptation strategies in rural Europe is possible (Aria-Cuccurullo, 2017). In this context, bibliometric analysis, by systematically ordering and synthesizing existing works, is a primary step toward deepening scholarly discourse and policy frameworks in climate adaptation research.

Results

This dataset comprises scholarly publications dated from 2005 to 2025, with a total of 291 documents encompassing 158 sources, including journals, books, and conference proceedings. The field has demonstrated a steady expansion, including an annual growth rate of 10.96%. A total of 901 authors have contributed to the body of literature, highlighting their diversity and active research

community. The largest number of documents is contributed by journals (225) and then followed by book chapters (13) and four book reviews.

Table 2 Descriptive statistics of the dataset

Main Information about Data	Results
Timespan	2005:2025
Sources (Journals, Books, etc.)	158
Documents	291
Annual Growth Rate %	10.96%
Authors	901
Document Types	Results
article	225
article; book chapter	13
book review	4

Source: Authors' explanation based on Biblioshiny

The annual scientific production from 2005 to 2025 demonstrates a clear upward trend, reflecting a growing research interest in the field. While the period from 2005 to 2012 shows relatively low publication numbers, a steady increase is observed from 2013 onwards, peaking in 2018 with 38 publications. This peak suggests that this period was characterized by much research activity and interest. After a slight decrease in publication numbers in 2019, the publication output remained very high almost consistently, with significant outputs of 31 in 2020, 30 in 2021, and 28 in 2024. The observed fluctuations may be influenced by various factors, such as funding availability, emerging research trends, and academic collaboration. The decline observed during 2023 may be attributed to the ongoing research process and lags in publication. Nonetheless, scientific data shows a continued existence and evolution of scholarly activities within this area.

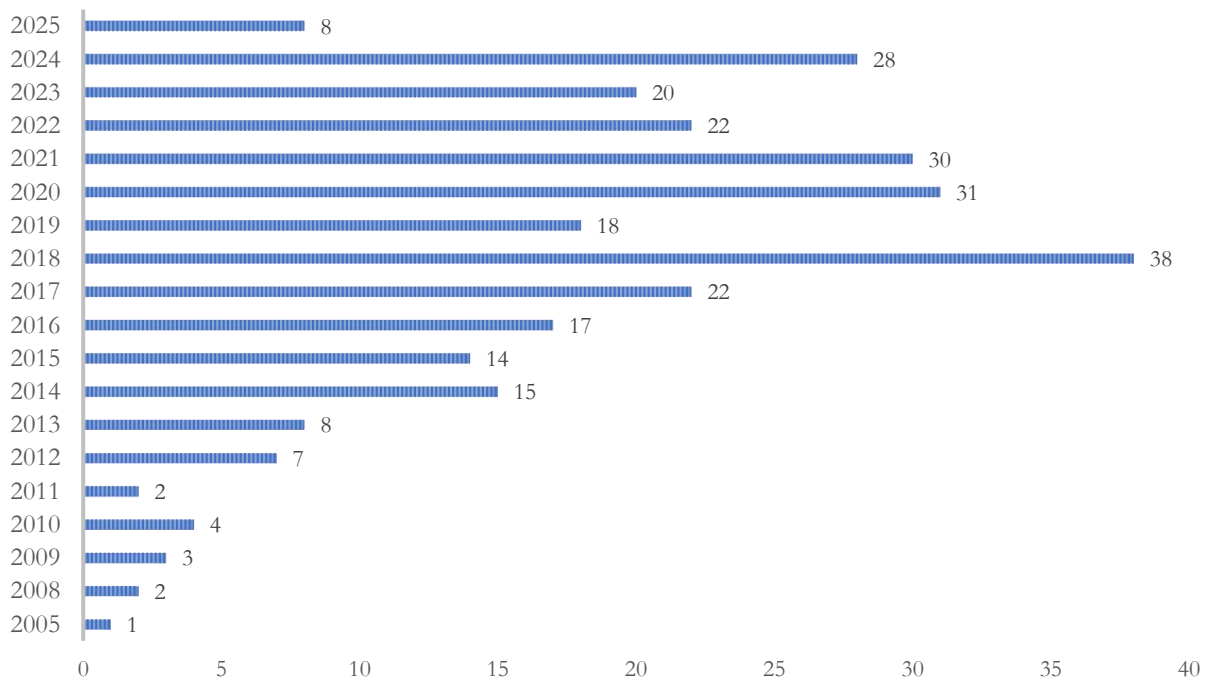


Figure 1 Annual scientific production

Source: Authors' explanation based on Biblioshiny

Prolific journals

The table below presents the leading journals publishing on climate change issues from 2005 to 2025 ranked in terms of publication activity (PA) and impact, based on the Scimago Journal Rank (SJR) and total citations (TC). Among these, *Climate and Development* is the most valuable source, with 37 publications and 455 citations (TC), and it is in the Q1 ranking. *Climate Policy* marks its presence with 6 publications, also in the Q1 rank, and 148 citations. *Regional Environmental Change* is in the Q2 rank, with 11 articles published and receiving 220 citations. Additionally, *Climatic Change* and *Wiley Interdisciplinary Reviews-Climate Change*, both Q1 journals, have each contributed 4 publications, with 345 and 229 total citations, respectively.

These data reflect the dominance of high-impact journals (Q1 and Q2) in climate change research, consolidating their influence and role in determining the academic discussion in this area.

Table 3 Leading journals published between 2005 to 2025 on the issues of climate change

Order	Sources	PA	Ranked by Scimago list	TC
1	Climate and Development	37	Q1	455
2	Climate Policy	6	Q1	148
3	Regional Environmental Change	11	Q2	220
4	Climatic Change	4	Q1	345
5	Wiley Interdisciplinary Reviews-Climate Change	4	Q1	229

Source: Authors' explanation based on Biblioshiny

Most importantly affiliated institutions

Figure 2 highlights the top affiliated institutions in climate change research from 2005 to 2025. CGIAR leads with 16 publications, followed by the University of Queensland with 15, and the University of Melbourne with 11 publications. Other contributors are Griffith University, Florida State University System, and the University of Adelaide (10), indicating a global effort in research.

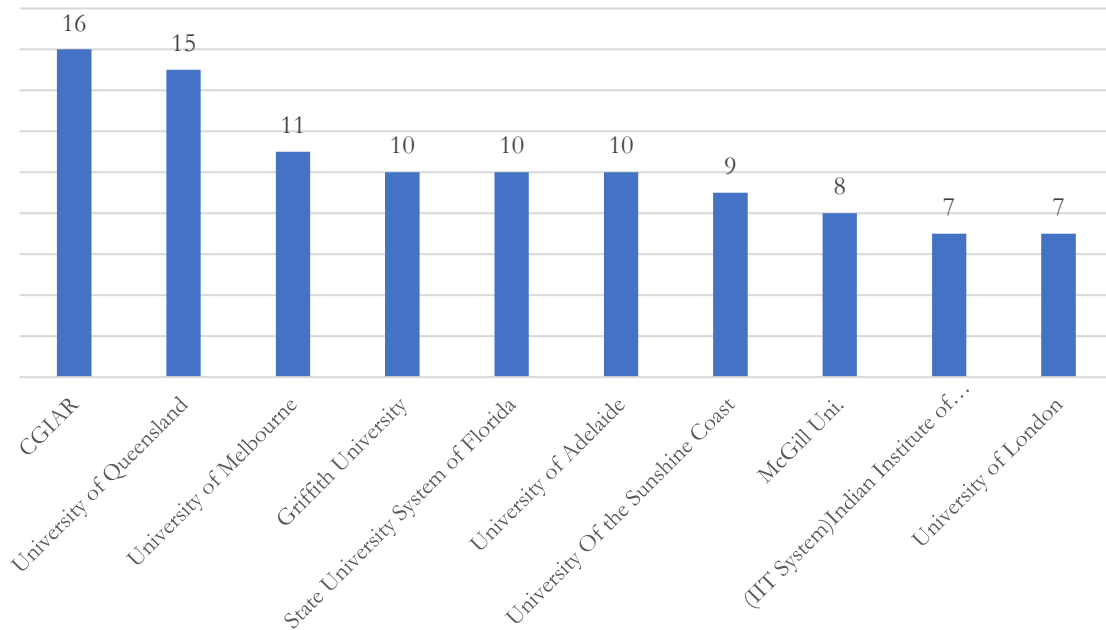


Figure 2 Top 10 productive institutions in the number of publications

Source: Authors' explanation based on Biblioshiny

Table 4 indicates the most important nations in terms of total citations received, and it characterizes their impact on research. The United Kingdom leads the list with 1,265 citations, followed closely by the USA with 1,229 citations and Australia with 960 citations, strong markers as far as academic influence is concerned. South Africa (359) and Canada (321) moderate their impact.

Other European Union nations, such as the Netherlands (228), Sweden (150), and Denmark (116) show their contributions to highly cited research. India (167) and Bangladesh (146) have emerging academic research with little but growing impacts.

Table 4 The top 10 countries in terms of total citations received (TC)

Country	TC
United Kingdom	1265
USA	1229
Australia	960
South Africa	359
Canada	321
Netherlands	228
India	167
Sweden	150
Bangladesh	146
Denmark	116

Source: Authors' explanation based on Biblioshiny

The data in Table 5 provides an overview of scientific output in several countries relative to international collaboration as determined by bibliometric analysis. Australia leads in total publications (46), followed by the USA (43) and the UK (32). While Australia and the USA maintain a good mix of domestic (SCP) and internationally co-authored (MCP) research, the UK stands out high for international collaboration among the major high-output countries, with 59% of its pub-

lications being MCPs. On the other hand, the Netherlands has the highest MCP ratio (73%), indicating strong international engagement; publications from India and China do not engage internationally, with all their counterpart publications being from single countries. Canada (31%), Germany (33%), and South Africa (27%) display moderate international collaboration, balancing domestic and global research efforts. From mid-range, Bangladesh (50%) collaborates with international co-authors for half of its publications. Overall, higher MCPs are found among those countries such as the UK and the Netherlands that have good research nexus with the world, while lower MCPs interact more or less nationally, as is the case of India and China. Thus, the USA, Australia, and Canada ensure a balance of local innovation and international impact.

Table 5 Scientific production and international collaboration by country

No. Countries	Articles	SCP	MCP	MCP_Ratio
Australia	46	27	19	0.413043478
USA	43	27	16	0.372093023
United Kingdom	32	13	19	0.59375
Canada	16	11	5	0.3125
Netherlands	11	3	8	0.727272727
South Africa	11	8	3	0.272727273
Bangladesh	10	5	5	0.5
India	8	8	0	0
China	7	7	0	0
Germany	6	4	2	0.333333333

Source: Authors' explanation based on Biblioshiny

Co-occurrence analysis of keywords

Two important developments have taken place in co-word analysis: sources of the words and methods of measurement. Co-word analysis has widened its scope to words from titles, abstracts, and full texts, thereby reducing indexer bias, while earlier was based on indexed keywords. Measurement techniques have also improved and can provide finer metrics like e-coefficient, density, and centrality to allow a more detailed analysis of themes (He, 1999). To complement the analysis, VOSviewer comes into play by visually mapping keyword inter-relationships in large datasets for easy interpretation and evidence of thematic connections (van Eck-Waltman, 2010). Co-word analysis uses the actual words in articles to identify significant themes and trends, mapping the intellectual structure of a field (Callon et al. 1983). Thus, moving forward through the generative visualization of evolving interconnections within research areas helps to guide future work (Škare et al. 2022). This figure illustrates a network of keywords that are interconnected within the field of climate change adaptation research, whereby larger terms like “community-based adaptation”, “vulnerability”, “resilience”, and “adaptive capacity” show dominant themes. Different colors denote sets of related topics, which include governance and equity among the reds, environmental challenges among the blues, and policy strategies among the yellows. This level of deep connections gives insight into how these concepts interplay, illustrating the intricate nature of endeavors for climate adaptation. This analysis identifies some key areas of research and relationships among them for dominant themes in the field.

Source: Authors' explanation based on VOSviewer

Conclusions

The bibliometric analysis conducted in this study underscores the evolving nature of research on climate adaptation strategies for European rural communities. Findings suggest that while significant progress has been made in policy formulation, there remains a gap between theoretical frameworks and practical implementation. The European Green Deal and the Common Agricultural Policy have played essential roles in shaping adaptation strategies, yet challenges such as fragmented policy enforcement, limited funding mechanisms, and inconsistent local engagement persist.

The study highlights the steady expansion of research in this field, with an annual growth rate of 10.96% and an increasing number of interdisciplinary collaborations. However, while scientific production has grown, the research remains concentrated in specific high-impact journals, with Climate and Development, Climate Policy, and Regional Environmental Change emerging as leading sources of climate adaptation research. The study also identifies CGIAR, the University of Queensland, and the University of Melbourne as key contributing institutions, reflecting a global effort in this field.

A key takeaway from this study is the importance of integrating top-down and bottom-up approaches to adaptation. While national and European policies provide overarching guidelines, localized strategies that incorporate community knowledge and participatory decision-making processes are essential for ensuring long-term resilience. The study highlights successful case studies where grassroots initiatives, such as nature-based solutions and community-led adaptation projects, have contributed to enhanced resilience in rural areas. Technological advancements and digital tools have also emerged as critical enablers of adaptation. However, disparities in access to new technologies, particularly in economically disadvantaged rural areas, present an ongoing challenge that requires targeted policy interventions.

Moreover, co-occurrence analysis of keywords reveals dominant themes in community-based adaptation, vulnerability, resilience, and adaptive capacity. However, interdisciplinary collaboration remains limited, and greater integration of environmental sciences, social sciences, and policy studies is needed to foster a more comprehensive understanding of adaptation strategies.

Looking ahead, future research should focus on evaluating the long-term effectiveness of adaptation policies and identifying scalable models that can be replicated across different rural contexts. Strengthening cross-sectoral collaboration and increasing financial investments in adaptation measures will be essential in addressing the growing climate risks facing rural Europe. Ultimately, this study contributes to the ongoing discourse on climate change adaptation by providing a structured analysis of research trends and offering insights into policy and practice integration for enhanced rural resilience.

References

- Aguiar, F. C. – Bentz, J. – Silva, J.M. – Fonseca, A.L. – Swart, R. – Santos, F.D. – Penha-Lopes, G., (2018): Adaptation to climate change at local level in Europe: An overview. *Environmental Science & Policy*, 86, 38–63. <https://doi.org/10.1016/j.envsci.2018.04.010>
- Annappa, N.N. – Bhavya, N. – Kasturappa, G. – Rangaiah, K. M. and Others (2023): Climate change's threat to agriculture: Impacts, challenges, and strategies for a sustainable future. In *Climate Change and Agriculture*. New Delhi: AkiNik Publications. 136 p. <https://doi.org/10.22271/ed.book.2395>

- Aria, M. – Cuccurullo, C. (2017): Bibliometrix: An R-tool for comprehensive science mapping analysis. *Journal of Informetrics*, 11(4), 959–975. <https://doi.org/10.1016/j.joi.2017.08.007>
- Beermann, M. (2011): Linking corporate climate adaptation strategies with resilience thinking. *Journal of Cleaner Production*, 19(8), 836–842. <https://doi.org/10.1016/j.jclepro.2010.10.017>
- Begum, R. A. – Sarkar, M. S. K. – Jaafar, A. H. – Pereira, J. J. (2014): Toward conceptual frameworks for linking disaster risk reduction and climate change adaptation. *International Journal of Disaster Risk Reduction*, 10, 362–373. <https://doi.org/10.1016/j.ijdr.2014.10.011>
- Biesbroek, G. R. – Swart, R. J. – Carter, T. R. – Cowan, C. – Henrichs, T. – Mela, H. – Morecroft, M. D. – Rey, D. (2010): Europe adapts to climate change: Comparing National Adaptation Strategies. *Global Environmental Change*, 20(3), 440–450. <https://doi.org/10.1016/j.gloenvcha.2010.03.005>
- Bombelli, A. – Di Paola, A. – Chiriaco, M. V. – Perugini, L. – Castaldi, S. – Valentini, R. (2019): Climate Change, Sustainable Agriculture and Food Systems: The World After the Paris Agreement. In R. Valentini, J. Sievenpiper, M. Antonelli and K. Dembska, eds. *Achieving the Sustainable Development Goals Through Sustainable Food Systems*. Springer, Cham. https://doi.org/10.1007/978-3-030-23969-5_2
- Brink, E. – Wamsler, C. (2019): Citizen engagement in climate adaptation surveyed: The role of values, worldviews, gender and place. *Journal of Cleaner Production*, 209, 1342–1353. <https://doi.org/10.1016/j.jclepro.2018.10.164>
- Callon, M. – Courtial, J.-P. – Turner, W. A. – Bauin, S. (1983): From translations to problematic networks: An introduction to co-word analysis. *Social Science Information*, 22(2), 191–235. <https://doi.org/10.1177/053901883022002003>
- Ellison, D. (2010): Addressing Adaptation in the EU Policy Framework. In E. Keskitalo, ed. *Developing Adaptation Policy and Practice in Europe: Multi-level Governance of Climate Change*. Springer, Dordrecht. https://doi.org/10.1007/978-90-481-9325-7_2
- Fankhauser, S. (2017): Adaptation to climate change. *Annual Review of Resource Economics*, 9(1), 209–230. <https://doi.org/10.1146/annurev-resource-100516-033554>
- Graus, S. – Ferreira, T. M. – Vasconcelos, G. – Ortega, J. (2024): Changing Conditions: Global Warming-Related Hazards and Vulnerable Rural Populations in Mediterranean Europe. *Urban Science*, 8(2), 42. <https://doi.org/10.3390/urbansci8020042>
- He, Q. (1999): Knowledge discovery through co-word analysis. *Library Trends*, 48(1), 133–159.
- Iglesias, A. – Quiroga, S. – Moneo, M. et al. (2012): From climate change impacts to the development of adaptation strategies: Challenges for agriculture in Europe. *Climatic Change*, 112, 143–168. <https://doi.org/10.1007/s10584-011-0344-x>
- Isoard, S. (2011): Perspectives on Adaptation to Climate Change in Europe. In J. Ford and L. Berrang-Ford, eds. *Climate Change Adaptation in Developed Nations*. Advances in Global Change Research, vol. 42. Springer, Dordrecht. https://doi.org/10.1007/978-94-007-0567-8_4
- Konečný, O. – Šerý, O. – Zavadil, T. – Duží, B. – Kozumplíková, A. – Trojan, J. – Martinát, S., Novák, R. – Kotek, O. – Leheček, J. (2024): Adapting rural communities to climate change: The undervalued potential of agricultural land. *Journal of Rural Studies*, 111, p. 103391. <https://doi.org/10.1016/j.jrurstud.2024.103391>
- Luís, S. – Lima, M. L. – Roseta-Palma, C. – Rodrigues, N.P. – Sousa, L. – Freitas, F.L. – Alves, F., Lillebø – A.I., Parrod, C. – Jolivet, V. – Paramana, T. – Alexandrakis, G. – Poulos, S. (2018): Psychosocial drivers for change: Understanding and promoting stakeholder engagement in local

- adaptation to climate change in three European Mediterranean case studies. *Journal of Environmental Management*, 223, 165–174. <https://doi.org/10.1016/j.jenvman.2018.06.020>
- Maris, G. – Flouros, F. (2021): The Green Deal, National Energy and Climate Plans in Europe: Member States' Compliance and Strategies. *Administrative Sciences*, 11(3), 75. <https://doi.org/10.3390/admsci11030075>
- Ottaviani Aalmo, G. – Gioli, B., Rodriguez – D. G., Tuomasjukka, D. – Liu, H., Pastore – M. C., Salbitano, F. – Bogetoft, P. – Sæbø, A. – Konijnendijk, C. (2022): Development of a novel framework for the assessment and improvement of climate adaptation and mitigation actions in Europe. *Frontiers in Sustainable Cities*, 4, 833098. <https://doi.org/10.3389/frsc.2022.833098>
- Passas, I. (2024): Bibliometric analysis: The main steps. *Encyclopedia*, 4 (2), 1014–1025. <https://doi.org/10.3390/encyclopedia4020065>
- Pielke, R. A. Jr. (2004): What is climate change? *Energy & Environment*. 15 (3), 515–520. <https://doi.org/10.1260/0958305041494576>
- Pielke, R. A. (1998): Rethinking the role of adaptation in climate policy. *Global Environmental Change*, 8 (2), 159–170. [https://doi.org/10.1016/S0959-3780\(98\)00011-9](https://doi.org/10.1016/S0959-3780(98)00011-9)
- Recanati, F. – Maughan, C. – Pedrotti, M. – Dembska, K. – Antonelli, M. (2019): Assessing the role of CAP for more sustainable and healthier food systems in Europe: A literature review. *Science of The Total Environment*, 653, 908–919. <https://doi.org/10.1016/j.scitotenv.2018.10.377>
- Ross, H. – Shaw, S. – Rissik, D. et al. (2015): A participatory systems approach to understanding climate adaptation needs. *Climatic Change*, 129, 27–42. <https://doi.org/10.1007/s10584-014-1318-6>
- Sartorius, J. V. – Geddes, A. – Gagnon, A. S. – Burnett, K. A. (2024): Participation and co-production in climate adaptation: Scope and limits identified from a meta-method review of research with European coastal communities. *Wiley Interdisciplinary Reviews: Climate Change*, 15 (3), e880. <https://doi.org/10.1002/wcc.880>
- Schwerdtle, P. N. – Cavan, E. – Pilz, L. – Oggioni, S. D. – Crosta, A. – Kaleyeva, V. – Karim, P. H. – Szarvas, F. – Naryniecki, T. – Jungmann, M. (2022): Interlinkages between Climate Change Impacts, Public Attitudes, and Climate Action – Exploring Trends before and after the Paris Agreement in the EU. *Sustainability*, 15 (9), 7542. <https://doi.org/10.3390/su15097542>
- Sikora, A. (2021): European Green Deal – legal and financial challenges of climate change. *ERA Forum*, 21, 681–697. <https://doi.org/10.1007/s12027-020-00637-3>
- Škare, M. – Blanco-Gonzalez-Tejero, C. – Crecente Romero, F. – del Val, T. (2022): Scientometric analysis on entrepreneurial skills - creativity, communication, leadership: How strong is the association? *Technological Forecasting and Social Change*, 182 (4), 121851. <https://doi.org/10.1016/j.techfore.2022.121851>
- Skarzauskiene, A. – Mačiulienė, M. – Kovaitė, K. (2024): Citizen engagement in climate adaptation surveyed: Identifying challenges in education and capacity building. *European Journal of Education*, 59(4), e12732. <https://doi.org/10.1111/ejed.12732>
- Suprayitno, D. – Iskandar, S. – Dahurandi, K. – Hendarto, T. – Rumambi, F. J. (2024): Public policy in the era of climate change: Adapting strategies for sustainable futures. *Migration Letters*, 21 (S6), 945–958.
- Tzilivakis, J. – Warner, D. J. – Green, A. et al. (2015): Adapting to climate change: assessing the vulnerability of ecosystem services in Europe in the context of rural development. *Mitigation and Adaptation Strategies for Global Change*, 20, 547–572. <https://doi.org/10.1007/s11027-013-9507-6>

- Van Aalst, M. K. – Cannon, T. – Burton, I. (2008): Community level adaptation to climate change: The potential role of participatory community risk assessment. *Global Environmental Change*, 18 (1), 165–179. <https://doi.org/10.1016/j.gloenvcha.2007.06.002>
- van Eck, N. J. – Waltman, L. (2010): Software survey: VOSviewer, a computer program for bibliometric mapping. *Scientometrics*, 84, 523–538. <https://doi.org/10.1007/s11192-009-0146-3>
- Wamsler, C. – Alkan-Olsson, J. – Björn, H. et al. (2020): Beyond participation: when citizen engagement leads to undesirable outcomes for nature-based solutions and climate change adaptation. *Climatic Change*, 158, 235–254. <https://doi.org/10.1007/s10584-019-02557-9>.
- Werndl, C. (2016): On defining climate and climate change. *The British Journal for the Philosophy of Science*. 67 (2), 337–364. <https://doi.org/10.1093/bjps/axu048>
- Wheaton, E. – Maciver, D. (1999): A framework and key questions for adapting to climate variability and change. *Mitigation and Adaptation Strategies for Global Change*, 4, 215–225. <https://doi.org/10.1023/A:1009660700150>

Online references

- Barth, J. – Bond, S. – Stephenson, J. (2023): Community engagement for climate change adaptation. Research Summary for the South Dunedin Future Programme. Centre for Sustainability, University of Otago. <https://ourarchive.otago.ac.nz/esploro/outputs/report/Community-engagement-for-climate-change-adaptation/9926478484701891>
- Breil, M. – Downing, C. – Kazmierczak, A. – Mäkinen, K. – Romanovska, L. (2018): Social vulnerability to climate change in European cities – state of play in policy and practice. *European Topic Centre on Climate Change impacts, Vulnerability and Adaptation (ETC/CCA) Technical paper 2018/1*. https://doi.org/10.25424/CMCC/SOCVUL_EUROP_CITIES.
- Climate Action Network (CAN) Europe (2018): *CAN Europe position on adaptation to climate change in Europe*. Climate Action Network (CAN) Europe. <https://www.caneurope.org/content/uploads/2018/07/CAN-Europe-Position-on-EU-Adaptation.pdf>
- Dzebo, A. – Janetschek, H. – Brandi, C. – Iacobuta, G. (2019): Connections between the Paris Agreement and the 2030 Agenda: The case for policy coherence. *Working paper*, Stockholm Environment Institute. <https://www.sei.org/wp-content/uploads/2019/08/connections-between-the-paris-agreement-and-the-2030-agenda.pdf>
- European Commission (2021): *Forging a climate-resilient Europe: The new EU strategy on adaptation to climate change (COM(2021) 82 final)*. In: European Union homepage <https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A52021DC0082>.
- European Union (2025): *Vision for agriculture and food: Ensuring the future of our farmers and food*. Common agricultural policy. https://agriculture.ec.europa.eu/overview-vision-agriculture-food/vision-agriculture-and-food_en
- Parry, M. – Canziani, O. – Palutikof, J. – van der Linden, P. – Hanson, C. (2007): *Climate Change 2007: Impacts, Adaptation and Vulnerability*. Contribution of Working Group II to the Fourth Assessment. Cambridge University Press, Cambridge, UK. 976 p. https://www.ipcc.ch/site/assets/uploads/2018/03/ar4_wg2_full_report.pdf
- Jose, A. L. (2013): Adapting locally to secure sustainable futures: Lessons learned from selected UNDP-GEF Community-Based Adaptation projects. *United Nations Development Programme*. https://weadapt.org/wp-content/uploads/2023/05/spa_cba_casestudies_final.pdf
- Mottershead, D. – Maréchal, A. – Allen, B. – Keenleyside, C. – Lórànt, A. – Bowyer, C. – Martin, I. – Daydé, C. – Bresson, C. – Panarin, M. – Martineau, H. – Wiltshire, J. – Menadue, H. – Vedrenne, M. – Coulon, A. – Karoglan Todorovic, S. – Znaor, D. – Pražan, J., et al.

- (2019): Evaluation study of the impact of the CAP on climate change and greenhouse gas emissions: Final report. *Publications Office of the European Union*.: <https://doi.org/10.2762/54044>
- Rural Pact Support Office (2024): Practice webinar highlights report: Rural communities tackling climate change [Webinar]. Organiser: Rural Pact Support Office.
- Schipper, E. L. F. (2007): Climate change adaptation and development: Exploring the linkages. *Tyndall Centre Working Paper No. 107*. Bangkok: Tyndall Centre for Climate Change Research, 13 p. https://www.preventionweb.net/files/7782_twp107.pdf
- Susova, L. – Mailleux, F. – Voet, L. (2020): A guide for trade unions: Adaptation to climate change and the world of work. *European Trade Union Confederation (ETUC)*. <https://www.etuc.org/en/adaptation-climate-change>

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