Current Climate Change Reports (2026) 12:2
https://doi.org/10.1007/s40641-026-00209-6

REVIEW

Beyond Summary: How Review Papers Shape the Future of Climate Change Research

A. Collalti[1]

Received: 8 July 2026 / Accepted: 9 July 2026

Abstract

Scientific knowledge advances through the continuous accumulation of primary research. However, its true value emerges when individual findings are synthesized, integrated, and organized into coherent conceptual frameworks that not only advance scientific understanding but also support evidence-based decision-making and policy development. Review papers play a central role by consolidating scattered findings, identifying patterns across studies, and providing interpretative frameworks that guide both research and policy. In rapidly expanding and highly interdisciplinary fields such as climate change science, review papers are not auxiliary products of scholarship but essential instruments for investigating and managing complexity, identifying knowledge gaps, highlighting uncertainty, and assessing scale mismatches. They are particularly important in translating heterogeneous evidence, from observational records, experiments, and modelling, into coherent narratives that can inform mitigation and adaptation strategies. Review papers vary widely in scope, methodology: some are narrative and expert-driven, while others adopt systematic or quantitative approaches such as meta-analysis. Each type serves a different purpose, and each carries specific strengths and limitations. Understanding these differences is essential for evaluating the scientific contribution of a review and for producing high-quality syntheses. This paper briefly discusses the scientific role of review articles, the diversity of review methodologies, and their specific relevance in climate change research. It also provides a detailed and practical discussion of how to design and write a review paper, emphasizing clarity of research questions, methodological transparency, critical synthesis, and conceptual innovation. Ultimately, this review argues that review papers are not secondary outputs of scientific research but primary engines of scientific progress, shaping conceptual frameworks, identifying critical knowledge gaps, directing future research agendas, underpinning global assessments, and translating scientific evidence into informed policy and societal action.

Introduction

Scientific disciplines evolve through a cumulative process in which individual studies gradually build a broader understanding of natural and social phenomena. However, as knowledge accumulates, the sheer volume of published literature can become overwhelming, fragmented, and difficult to interpret. In such contexts, review papers emerge as essential tools for synthesizing information, reducing conceptual noise, and structuring scientific discourse, they are, indeed, not just 'critical evaluations of prior studies that have already been published' [1]. Nowhere is this need more evident than in climate change science [2, 3]. The field is inherently complex and interdisciplinary, involving atmospheric physics, oceanography, ecology, biogeochemistry, economics, and social sciences. It also operates across multiple temporal and spatial scales, ranging from instantaneous extreme events to century-long climate trends, and from local ecosystem responses to global Earth system dynamics (see for example [4–7]). The resulting body of literature is vast, heterogeneous, and often methodologically inconsistent, making synthesis not only useful but necessary. Review papers therefore play a crucial role in organizing this complexity. They do not simply summarize what is already known but instead interpret and integrate findings, often revealing patterns that are not apparent in individual studies (e.g [8]). By proposing new conceptual frameworks, identifying unresolved questions, and exposing conflicting

✉ A. Collalti
alessio.collalti@cnr.it

[1] Institute for Agricultural and Forestry Systems in the Mediterranean, National Research Council of Italy, Forest Modelling Laboratory, Via della Madonna Alta 128, Perugia 06128, Italy

Published online: 20 July 2026

evidence, they stimulate scientific debate, foster critical discussion, and ultimately contribute to the generation of new knowledge and research questions (e.g [9]). In doing so, they help define research frontiers, clarify conceptual frameworks, and translate scientific uncertainty into structured knowledge that can be used in decision-making contexts. Importantly, review papers also serve a communicative function. They provide entry points for new researchers, consolidate knowledge for interdisciplinary audiences, and support policy processes such as those led by the Intergovernmental Panel on Climate Change [10]. Without structured synthesis, the gap between scientific production and societal application would widen significantly. Yet, despite their importance, review papers are not uniform in quality or methodology [11]. Some lack transparency, relying heavily on selective citation or expert opinion, whereas others adopt rigorous, systematic, and reproducible approaches. This diversity raises fundamental questions about what distinguishes a scientifically robust review from a simple literature overview, how different review methodologies should be selected according to the research question, and which standards should be used to assess their quality, transparency, reproducibility, and scientific contribution. Addressing these questions is increasingly important as review papers become a cornerstone of evidence synthesis, influence research priorities, underpin international assessments, and inform policy decisions. This perspective aligns closely with the mission of *Current Climate Change Reports*, which aims to publish authoritative, interdisciplinary reviews that synthesize emerging knowledge, identify research frontiers, stimulate scientific debate, and facilitate dialogue across the diverse disciplines contributing to climate change science.

The Scientific Importance of Review Papers

The importance of review papers in science stems primarily from their ability to transform large bodies of fragmented research into coherent systems of knowledge. Primary research articles typically address specific hypotheses under constrained conditions, often producing results that are context-dependent. While such studies are essential for scientific progress, they rarely provide a complete picture of complex phenomena. Review papers bridge this gap by integrating findings across multiple studies and identifying overarching patterns (e.g [4]). In doing so, they contribute to knowledge synthesis in a way that is qualitatively different from primary research. They do not generate new empirical data, but they often produce new insights by reinterpreting existing evidence. This interpretative function is particularly important in fields where individual studies may yield conflicting results or where methodological differences complicate direct comparison. In climate change science, this synthesis function is especially critical because of the inherent variability of the system under study. Climate processes are influenced by interacting physical, chemical, and biological mechanisms, many of which operate at different spatial and temporal scales [12]. For instance, carbon cycle feedbacks depend simultaneously on atmospheric CO_2 concentrations, vegetation dynamics, soil processes, and disturbance regimes such as fire or drought [13, 14]. Understanding such systems requires integration across disciplines, which is precisely what review papers provide. Another essential role of review papers is the identification of research gaps. By systematically examining the literature, review papers can reveal areas where evidence is sparse, inconsistent, or methodologically weak [15], while also identifying critical knowledge gaps and highlighting research questions that remain insufficiently addressed and require further investigation. This is particularly valuable for guiding future research priorities and funding decisions. In climate change research, where resources are limited and urgency is high, identifying the most critical knowledge gaps is essential for effective scientific planning. Review papers also contribute to conceptual development. Many influential ideas in ecology and Earth system science have emerged not from single empirical studies but from synthesis efforts that reframe existing knowledge [4, 16]. Several of the most influential concepts in contemporary environmental science—including ecological resilience, ecosystem services, planetary boundaries, and tipping points—have been consolidated and advanced through review and synthesis papers that integrated disparate evidence into coherent conceptual frameworks (e.g [17, 18]). In this sense, review papers are not merely descriptive but generative: they actively shape how scientific problems are defined and understood [19]. Finally, review papers are fundamental for policy translation. Climate change is a deeply policy-relevant field, and decision-makers require synthesized and reliable information rather than fragmented datasets. Review papers provide the basis for assessments such as those produced by the IPCC, which in turn inform international agreements, national mitigation strategies, and adaptation planning [20]. Without rigorous synthesis, the translation of science into policy would be severely limited.

Types of Review Papers and their Scientific Roles

Although all review papers aim to synthesize existing knowledge, they differ significantly in methodology, scope, and epistemological approach (see a description of different types of review papers in [11]). One of the most

common forms is the narrative review, which is typically written by experts who summarize and interpret a body of literature based on their own understanding (e.g [13, 14]). Narrative reviews are highly flexible and allow for conceptual discussion and theoretical development, but they are also inherently vulnerable to selection bias and lack of reproducibility. Their scientific value often depends on the expertise and objectivity of the author(s). In contrast, systematic reviews adopt (or they should adopt) a structured and transparent methodology for identifying, selecting, and analyzing literature. They begin with a clearly defined research question and employ explicit search strategies, inclusion criteria, and quality assessments [21]. This approach minimizes bias and enhances reproducibility, making systematic reviews particularly valuable in fields where evidence needs to be rigorously evaluated. In climate science, systematic reviews are increasingly used to assess the robustness of observed trends, model outputs, and impact assessments. A more quantitative form of synthesis is the meta-analysis, which statistically combines results from multiple studies to estimate overall effect. Meta-analyses are particularly powerful when individual studies report variable or conflicting results, as they allow for the quantification of variability and the identification of moderating factors sizes [22, 23]. In climate change research, meta-analyses are widely used in studies of species responses to warming, carbon sequestration rates, and ecosystem productivity responses to environmental change (e.g [24, 25]). The same Assessing Reports from the IPCC are, often a synthesis of them. Scoping reviews represent another important category. Unlike systematic reviews, they do not necessarily evaluate study quality or synthesize findings quantitatively. Instead, they aim to map the extent, range, and nature of research activity in a given field [26, 27]. Scoping reviews are especially useful in emerging areas where research is still fragmented or rapidly evolving, as is often the case in climate change adaptation research or novel Earth system modelling approaches (e.g [28, 29]). Critical reviews go further by explicitly challenging existing paradigms. They do not merely summarize knowledge but actively interrogate assumptions, identify conceptual inconsistencies, and propose new theoretical frameworks. Such reviews are often transformative, as they can lead to shifts in scientific thinking and open new research directions [30, 31]. Finally, conceptual reviews and meta-syntheses integrate theoretical and qualitative insights, particularly in interdisciplinary fields where quantitative synthesis alone is insufficient. These are especially relevant in socio-ecological systems research, where human and natural components are deeply intertwined.

Review Papers in Climate Change Science

Climate change emerges from the interaction of physical climate systems, ecological processes, and human activities, all characterized by nonlinear dynamics, feedback mechanisms, and multiple sources of uncertainty [32]. Understanding such complexity requires more than the accumulation of evidence: it demands the integration of knowledge across disciplines, methodologies, and spatial and temporal scales. In this context, review papers provide the conceptual and methodological framework needed to organize diverse findings into coherent interpretations that advance both scientific understanding and evidence-based decision-making. One of the principal challenges in climate change research is uncertainty, which stems from observational limitations, model structure, parameterization, scenario assumptions, and the intrinsic variability of natural systems. By systematically comparing evidence across studies, review papers help characterize these uncertainties, evaluate the consistency of available knowledge, identify robust patterns, and distinguish well-supported conclusions from more speculative hypotheses [32–34]. Equally important, they expose areas of disagreement, highlight unresolved questions, and identify knowledge gaps, thereby improving transparency and helping define priorities for future research. A second challenge concerns scale. Climate processes operate over spatial dimensions ranging from individual organisms to ecosystems, continents, and the Earth system, and over temporal scales spanning individual extreme events, such as droughts, floods, and heatwaves, to long-term changes in global temperature, carbon cycling, and ecosystem functioning [35]. Review papers can provide the bridge between these scales, allowing local observations to be interpreted within broader regional and global contexts while linking short-term responses to long-term environmental change. Their integrative perspective is particularly valuable for translating findings obtained through field observations, experiments, remote sensing, and modelling into a unified understanding of climate-system dynamics. This integrative role extends beyond evidence synthesis. Review papers help establish a common scientific language by harmonizing terminology, definitions, conceptual frameworks, methodological approaches, equations, metrics, and indicators that are often used inconsistently across disciplines [36]. They also facilitate comparisons among studies conducted at different temporal and spatial scales or using different analytical and modelling frameworks. Such harmonization enhances reproducibility, improves the interoperability of heterogeneous datasets, strengthens interdisciplinary collaboration, and provides a more robust foundation for model development, global assessments, and evidence-based policy [37].

The impact of this synthesis is evident across climate science. In terrestrial ecosystems, review papers have been instrumental in consolidating knowledge on carbon sinks, forest responses to climate change, biodiversity dynamics, and disturbance regimes such as wildfire, pests, storms, and drought [4, 13, 16]. Likewise, in marine systems, they have integrated evidence on ocean acidification, circulation changes, deoxygenation, sea-level rise, and biological productivity, providing comprehensive assessments of the processes governing ocean responses to climate change (e.g [38]). A particularly important and rapidly evolving application concerns the attribution of climate impacts. As climate change intensifies, distinguishing the effects of anthropogenic forcing from natural climate variability has become increasingly important for both science and policy [39, 40]. By synthesizing methodological advances, evaluating the strength of available evidence, and clarifying causal relationships, review papers provide the conceptual foundation for attribution studies, support rapid assessments of extreme events, and strengthen the scientific basis for climate adaptation, risk management, and policy development.

How to Write a Scientific Review Paper

Writing a high-quality review paper begins with the formulation of a clear, focused, and scientifically meaningful research question [1, 21]. Without a well-defined objective, reviews risk becoming descriptive compilations of literature rather than structured and critical syntheses. The research question should define not only the topic under investigation but also the spatial, temporal, methodological, and conceptual boundaries of the review. A carefully formulated question also determines the type of review that is most appropriate, whether narrative, systematic, scoping, meta-analytical, or integrative, and ultimately shapes the entire structure of the manuscript. Once the research question has been established, the next step is to develop a transparent and reproducible strategy for identifying, selecting, and evaluating the relevant literature. Even narrative reviews benefit from explicitly describing search strategies, databases consulted, inclusion and exclusion criteria, and the rationale behind the selection of key studies. Such transparency increases credibility, minimizes selection bias, and enables readers to understand the scope and limitations of the synthesis. In systematic reviews, these elements become essential components of a formal protocol designed to ensure reproducibility and methodological rigor. The synthesis phase is arguably the most intellectually demanding component of the review process. Rather than simply summarizing individual studies, authors should critically compare findings, identify recurring patterns and inconsistencies, evaluate the strength of the available evidence, and explore the mechanisms that may explain apparently conflicting results. This process requires moving beyond the individual publication to recognize broader trends and emerging themes that define the current state of knowledge. An effective review should also provide genuine conceptual integration. This involves organizing disparate evidence into coherent frameworks that explain relationships among processes, variables, and mechanisms, often through conceptual diagrams, synthesis figures, or graphical models. Such integrative frameworks frequently represent the most enduring contribution of review articles because they establish a common language, facilitate interdisciplinary communication, and provide reference points for future investigations. inally, a high-quality review should move beyond summarizing existing knowledge by critically identifying uncertainties, knowledge gaps, methodological limitations, unresolved scientific questions, and proposing new conceptual and methodological avenues to advance the field. Highlighting knowledge gaps is important not only because it reveals where evidence remains insufficient, but also because it helps define priorities for future research and encourages the development of new hypotheses, experimental approaches, and modelling strategies. This forward-looking perspective transforms the review from a passive summary of existing literature into an active instrument for advancing scientific understanding and shaping the future direction of the discipline.

Conclusions

Review papers occupy a central position in scientific knowledge production, particularly in complex and rapidly evolving fields such as climate change science. They are essential for integrating fragmented evidence, identifying research gaps, and translating scientific findings into policy-relevant knowledge. Far from being secondary literature, they represent a distinct and highly influential form of scientific contribution. The diversity of review types reflects the diversity of scientific questions they address, ranging from narrative synthesis to quantitative meta-analysis and critical conceptual evaluation. Each type plays a specific role in advancing knowledge, and the most effective reviews often combine multiple approaches. Ultimately, the quality of a review paper depends on clarity of purpose, methodological transparency, critical synthesis, and conceptual innovation. As climate change accelerates and scientific literature continues to expand, the importance of high-quality review papers will only increase, making them indispensable tools for both science and society. As climate change science continues to expand in scope and complexity, journals dedicated to critical synthesis, such as *Current Climate Change Reports*, will

play an increasingly important role in promoting interdisciplinary integration, identifying emerging research priorities, and translating scientific knowledge into evidence that supports both research and policy.

Meet the New Editor-in-Chief

Alessio Collalti is a Senior Research Scientist at the National Research Council of Italy (CNR), where he serves as Head of the Forest Modelling Laboratory and Head of the Perugia Research Unit of the Institute for Agricultural and Forestry Systems in the Mediterranean (CNR-ISAFOM). His research focuses on understanding how forests respond to global environmental change through the integration of ecophysiological theory, long-term observations, Earth observation products, and process-based ecosystem modelling. Over the past fifteen years, he has led the scientific development of the 'Three-Dimensional Coupled Model Carbon Cycle–Forest Ecosystem Module' (3D-CMCC-FEM), a process-based modelling platform designed to investigate forest productivity, carbon and water cycling, ecosystem resilience, biodiversity, and the impacts of climate change under alternative management and environmental scenarios.

His research spans a broad range of topics, including forest carbon dynamics, carbon and water use efficiency, forest resilience to drought and disturbances, ecosystem services, nature-based climate solutions, and the interactions between climate, vegetation, and biogeochemical cycles. A recurring theme of his work is the integration of empirical evidence with ecological theory to improve our understanding of ecosystem functioning across scales. In particular, his contributions to the study of carbon and water use efficiency have helped reconcile competing definitions, test long-standing ecological hypotheses using evidence synthesized across organisms and ecosystems, and develop unified conceptual frameworks that have advanced both ecological theory and process-based modelling. More broadly, his research combines observations, experiments, and modelling to address fundamental questions in ecosystem ecology while providing scientific support for climate mitigation, adaptation, and sustainable forest management. He has contributed to numerous international initiatives and collaborative projects on climate change, forest management, and Earth system science, including Horizon Europe projects and the Inter-Sectoral Impact Model Intercomparison Project (ISIMIP). His research has been published in leading international journals in ecology, forestry, and global change science, and has contributed to advancing the understanding of forest ecosystem functioning under changing climatic conditions.

Alongside his research activities, Dr. Collalti has played an active role in the scientific publishing process as Associate Editor, Section Editor, Editorial Board member, and Guest Editor for several international journals covering ecology, forestry, and environmental sciences. These editorial experiences have reinforced his interest in scientific synthesis and interdisciplinary research, particularly in rapidly evolving fields such as climate change science. In 2026, he was appointed Editor-in-Chief of *Current Climate Change Reports*. In this role, he is committed to promoting rigorous, transparent, and forward-looking review articles that integrate knowledge across disciplines, identify emerging research frontiers, and strengthen the dialogue between science, policy, and society.

Author Contributions A.C. wrote the main manuscript text.

Funding Open access funding provided by Consiglio Nazionale Delle Ricerche (CNR) within the CRUI-CARE Agreement.

Data Availability No datasets were generated or analysed during the current study.

Declarations

Competing interests The authors declare no competing interests.

References

1. Bem DJ. Writing a review article for psychological bulletin. Psychol Bull. 1995;118:172–7.
2. Berrang-Ford L, Pearce T, Ford JD. Systematic review approaches for climate change adaptation research. Reg Environ Change. 2015;15:755–69.
3. Shaffril HAM, Samah AA, Samsuddin SF. Guidelines for developing a systematic literature review for studies related to climate change adaptation. Environ Sci Pollut Res. 2021;28:22265–77. https://doi.org/10.1007/s11356-021-13178-0.
4. Seidl R, Thom D, Kautz M, et al. Forest disturbances under climate change. Nat Clim Chang. 2017;7:395–402. https://doi.org/10.1038/nclimate3303.
5. Kenney MA, Gerst MD. Synthesis of Indicators, Datasets, and Frameworks Available to Establish Resilience and Adaptation Indicators: Case Study of Chesapeake Bay Region, USA. Curr Clim Change Rep. 2021;7:35–44. https://doi.org/10.1007/s40641-021-00170-6.

6. Kafi KM, Ponrahono Z, Salisu Barau A. Addressing knowledge gaps on emerging issues in weather and climate extreme events: a systematic review. Clim Change. 2024;177:56.
7. Sierra CA, Trumbore S. Radiocarbon and the Transit Time of Carbon in Terrestrial Ecosystems. Curr Clim Change Rep. 2026;12:1. https://doi.org/10.1007/s40641-025-00208-z.
8. Collalti A, Prentice IC. Is NPP proportional to GPP? Waring's hypothesis 20 years on. Tree Physiol. 2019;39:1473–83.
9. Landsberg JJ, Waring RH, Williams M. The assessment of NPP/GPP ratio. Tree Physiol. 2020;40:695–9.
10. Hulme M, Mahony M. Climate change: what do we know about the IPCC? Prog Phys Geogr. 2010;34:705–18.
11. Paul J, Criado AR. The art of writing literature review: what do we know and what do we need to know? Int Bus Rev. 2020;29:101717.
12. Cheng R. Solar-Induced Chlorophyll Fluorescence (SIF): Towards a Better Understanding of Vegetation Dynamics and Carbon Uptake in Arctic-Boreal Ecosystems. Curr Clim Change Rep. 2024;10:13–32. https://doi.org/10.1007/s40641-024-00194-8.
13. Du E, de Vries W, Collalti A, De Marco A. Climate warming alters nutrient cycling and its constraint on CO2 fertilization in global forests. Curr Clim Change Rep. 2025;11:3.
14. Gharun M, Angove C, Migliavacca M, Zhou Y, Buckeridge K, Branquinho C, et al. Perspectives: Effect of global change drivers on carbon fluxes and resilience of European forests. Ecol Manag. 2026;616:123844.
15. Hu Z, Yan P, Li B, Song X, Li J, Peñuelas J, et al. Global change impacts on forest elementomes and insights for improved management practices. Curr Clim Change Rep. 2025;11:4.
16. McDowell NG, Sapes G, Pivovaroff A, Adams HD, Allen CD, Anderegg WR, et al. Mechanisms of woody-plant mortality under rising drought, CO2 and vapour pressure deficit. Nat Rev Earth Environ. 2022;3:294–308.
17. Carpenter SR, Mooney HA, Agard J, Capistrano D, DeFries RS, Díaz S, et al. Science for managing ecosystem services: Beyond the Millennium Ecosystem Assessment. Proc Natl Acad Sci USA. 2009;106:1305–12.
18. Lenton TM, Williams HT. On the origin of planetary-scale tipping points. Trends Ecol Evol. 2013;28:380–2.
19. Rockström J, Donges JF, Fetzer I, et al. Planetary Boundaries guide humanity's future on Earth. Nat Rev Earth Environ. 2024;5:773–88. https://doi.org/10.1038/s43017-024-00597-z.
20. Mach KJ, Lemos MC, Meadow AM, Wyborn C, Klenk N, Arnott JC, et al. Actionable knowledge and the art of engagement. Curr Opin Environ Sustain. 2020;42:30–7.
21. Hedges LV, Gurevitch J, Curtis PS. The meta-analysis of response ratios in ecology. Ecology. 1999;80:1150–6.
22. Koricheva J, Gurevitch J, Mengersen K, editors. Handbook of Meta-analysis in Ecology and Evolution. Princeton (NJ): Princeton University Press; 2013.
23. Gurevitch J, Koricheva J, Nakagawa S, Stewart G. Meta-analysis and the science of research synthesis. Nature. 2018;555:175–82.
24. Way DA, Oren R. Differential responses to changes in growth temperature between trees from different functional groups and biomes. Tree Physiol. 2010;30:1–13.
25. Fernandez-Martinez M, Vicca S, Janssens IA, et al. Nutrient availability as the key regulator of global forest carbon balance. Nat Clim Chang. 2014;4:471–6.
26. Pham MT, Rajić A, Greig JD, Sargeant JM, Papadopoulos A, McEwen SA. A scoping review of scoping reviews: advancing the approach and enhancing consistency. Res Synth Methods. 2014;5:371–85.
27. Munn Z, Peters MDJ, Stern C, Tufanaru C, McArthur A, Aromataris E. Systematic review or scoping review? Guidance for authors when choosing between a systematic or scoping review approach. BMC Med Res Methodol. 2018;18:143.
28. Boulton CA, Good P, Lenton TM. Supporting evidence-based policy for Earth system modelling. Environ Res Lett. 2015;10:123004.
29. Fisher RA, Koven CD. Perspectives on Earth system model development. Nat Clim Chang. 2020;10:737–40.
30. Loehle C, LeBlanc D. Model-based assessments of climate change effects on forests: a critical review. Ecol Model. 1996;90:1–31.
31. Parmesan C, Burrows MT, Duarte CM, Poloczanska ES, Richardson AJ, Schoeman DS, Singer MC. Beyond climate change attribution in conservation and ecological research. Ecol Lett. 2013;16:58–71.
32. Moure M, Jacobsen JB, Smith-Hall C. Uncertainty and Climate Change Adaptation: a Systematic Review of Research Approaches and People's Decision-Making. Curr Clim Change Rep. 2023;9:1–26. https://doi.org/10.1007/s40641-023-00189-x.
33. Hawkins E, Sutton R. The potential to narrow uncertainty in projections of regional precipitation change. Clim Dyn. 2009;37:407–18.
34. Knutti R. The end of model democracy? Nat Geosci. 2010;3:104–5.
35. Xiong J, Yang Y. Climate Change and Hydrological Extremes. Curr Clim Change Rep. 2025;11:1. https://doi.org/10.1007/s40641-024-00198-4.
36. Puchi PF, Saurer M, Collalti A. One metric, many meanings: Reconciling Water Use Efficiency definitions. Authorea Preprints. 2025.
37. Wilkinson MD, Dumontier M, Aalbersberg IJ, Appleton G, Axton M, Baak A, et al. The FAIR Guiding Principles for scientific data management and stewardship. Sci Data. 2016;3:1–9.
38. Rahmstorf S. Ocean circulation and climate during the past 120,000 years. Nature. 2002;419:207–14.
39. Thornton PK, Ericksen PJ, Herrero M, Challinor AJ. Climate variability and vulnerability to climate change: a review. Glob Chang Biol. 2014;20:3313–28.
40. Abbass K, Qasim MZ, Song H, Murshed M, Mahmood H, Younis I. A review of the global climate change impacts, adaptation, and sustainable mitigation measures. Environ Sci Pollut Res. 2022;29:42539–59.