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NEW CHALLENGES FOR CITIES IN THE TWENTY-FIRST CENTURY

Regenerative Design - Climate Adaptation & Mitigation
Circular Economy - Citizen Agency - Urban Livability

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TeMA Journal has the objective of fostering and integrating studies on urban transformation and urban mobility, within a scientific context focused on adapting cities to global warming and oriented towards economic, social and environmental sustainability. The three issues of the 2026 propose articles that deal with the effects of climate change adaptation, reduction of energy consumption, AI-driven solutions to support urban planning, immigration flows, optimisation of land use, analysis and evaluation of civil protection plans in areas especially vulnerable to natural disasters.

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REVIEW NOTES - Reports and documents

Adaptation insight: the state of climate knowledge

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Abstract
Starting from the relationship between urban planning and mobility management, TeMA has gradually expanded the view of the covered topics, always remaining in the groove of rigorous scientific in-depth analysis. This section of the Journal, Review Notes, is the expression of continuously updating emerging topics concerning relationships between urban planning, mobility, and environment, through a collection of short scientific papers written by young researchers. The Review Notes are made of five parts. Each section examines a specific aspect of the broader information storage within the main interests of TeMA Journal. In particular, the Urban planning literature review section presents recent books and journals on selected topics and issues within the global scientific panorama.
For the first issue of volume 19 of TeMA Journal, this section offers a critical and comparative reading of recent reports and documents related to climate adaptation in urban areas. These reviews line up to explore both the similarities and differences between the approaches, priorities, and strategies of the reports analysed, with the purpose of strengthening the dialogue between science, policy, and climate planning practices. This first contribution is dedicated to a review of reports on the state of knowledge on climate change in terms of emerging risks, observed impacts, and the conditions of vulnerability that amplify its effects in different territorial and social contexts.

Keywords
Climate change; Adaptation; Global reports

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1. Introduction

In recent decades, the increasing frequency and intensity of extreme weather events have made climate risk one of the key drivers of the global economy (Pennino, 2025). According to the World Economic Forum's (WEF) Global Risk Report, the failure of climate policies, extreme weather events and the loss of biodiversity are among the three main systemic risks that humanity will face in the coming decade (World Economic Forum, 2022). At the urban level, the most recent estimates indicate that around 44% of the GDP generated in global cities, corresponding to over 31 trillion dollars, is currently exposed to the risk of destruction resulting from the loss of natural ecosystems and the climate crisis (World Economic Forum & AlphaBeta, 2022). These figures point to a transformation in the relationship between urban systems and the climate system, which calls for a fundamental rethinking of the strategies through which institutions and governments prepare to address future risks (Ascione et al., 2025). In this context, climate adaptation has gradually taken on a central role in international political agendas (Longato et al., 2025). Although mitigation initially dominated the global climate debate, the realisation that some of the climate change currently underway is now impossible to avoid has shifted the focus towards the need to adapt territorial and social systems to different climatic conditions (Bichueti et al., 2025; Alexandrov, 2023). This changing perspective was formally recognised at an institutional level by the Paris Agreement (UNFCCC, 2015), which for the first time accorded adaptation the same political importance as mitigation, and was further reinforced by the Sendai Framework for Disaster Risk Reduction 2015–2030 (UNDRR, 2015), which explicitly integrated climate risks into the global framework for disaster risk reduction. In this context, the main international reports on climate change and climate risk serve a function that goes far beyond summarising the available scientific knowledge (Sharek & Shah, 2021). These documents do not merely record the state of the art in research but actively contribute to defining how climate risks are conceptualised, which dimensions of the problem are made visible, and which solutions are identified as priorities for public policy. In this sense, these reports constitute genuine instruments for shaping the global climate agenda (Jasanoff, 2010).

This paper proposes a critical and diachronic analysis of several international reports on climate adaptation to trace how understanding of adaptation has evolved over the last decade. The analysis does not merely compare different reports. Still, it traces the evolution of specific reports published by UNEP and UNDRR, to highlight how the dominant conceptual frameworks, priorities and language used to describe risks, and possible responses have changed over the years. The underlying assumption is that this evolution reflects not only advances in scientific knowledge, but is also the result of institutional pressures, extreme events and political negotiations that have redefined what matters. The paper is structured as follows. Section two discusses the role of global reports as tools for building institutional climate knowledge, and section three analyses the evolution of the Adaptation Gap Reports and the Global Assessment Report, respectively. Section four discusses emerging cross-cutting trends and unresolved gaps. Section five concludes with implications for research.

2. Summary of the evolving landscape of climate adaptation

Adaptation Gap Report (UNEP)



Fig. 1 Collection of covers of the Adapation Gap Reports analysed

The series of Adaptation Gap Reports published by UNEP was launched in 2014 in response to the need to address the lack of a systematic tool for monitoring global adaptation. There was a lack of shared metrics to assess progress in this area after the UNFCCC had established the political importance of adaptation. The first editions (2014), published in the year of COP20 in Lima, together with the 2015 and 2016 editions focuses almost exclusively on the adaptation finance gap: the gap between the funding needed to address expected climate impacts and the funding actually mobilised. The framework is largely quantitative and reflects the logic of international negotiations at that time, which were based primarily on financial resources, to understand how much might be needed or where it is being allocated (UNEP, 2014). The 2017 and 2018 editions mark the first change of direction. The adoption of the Paris Agreement in 2015 established a Global Goal on Adaptation, which called for new tools to assess progress that could not be reduced to financial considerations alone.

The 2017 AGR, focuses on the methodological challenges of measuring adaptation on a global scale, explicitly acknowledging that progress in adaptation is inherently difficult to quantify. Unlike greenhouse gas emissions, adaptation does not have a universal unit of measurement (UNEP, 2017). The 2018 AGR expands on this by introducing the distinction between planning gaps and implementation gaps: it is not enough to adopt national adaptation plans; these must be translated into concrete actions on the ground. This shift is conceptually significant because it shifts responsibility from the realm of resources to that of institutional capacity. It implicitly acknowledges that the problem of adaptation is not merely financial, but political and organisational (UNEP, 2018).

The 2020–2022 editions represent a phase of consolidation and radicalisation. The reports from these years gradually incorporate the evidence that progress on adaptation is consistently insufficient compared to the speed at which climate risks are intensifying (UNEP, 2022). The 2022 GAP, explicitly titled 'Too Little, Too Slow', marks a turning point. The language of the reports becomes more urgent, estimates of the gap between needs and actions more worrying, and, for the first time, the issue of maladaptation emerges strongly. Maladaptation is defined as the risk that poorly designed adaptation measures may reduce vulnerability in the short term, whilst increasing it in the long term (UNEP, 2022). The report also introduces a more systematic focus on regional disparities. For examples, the reports talk about the low-income countries and small island states that show the greatest adaptation deficits precisely where climate risks are most acute. This dimension revealing a structural injustice that previous editions had treated more marginally.

The most recent editions, AGR 2023 and AGR 2024, continue in the vein of previous reports, introducing two significant new conceptual elements. The first is the issue of loss and damage, that is, the explicit recognition that there are climate impacts that can no longer be prevented or adapted to, requiring compensation mechanisms distinct from adaptation policies. This marks a break from the framework of previous editions, according to which every climate risk is, in principle, manageable with sufficient resources (UNEP, 2023; UNEP, 2024). The second element is the recognition of the limits of adaptation. Acknowledging that there are thresholds beyond which adaptation is no longer possible, or no longer desirable, implies a profound revision of the optimistic framework that had characterised the first editions of the series. The AGR 2025, recently published under the title 'Running on Empty', also reinforces this direction by highlighting how the funding gap for adaptation in developing countries is putting lives, livelihoods and entire economies at risk (UNEP, 2025).

Global Assessment Report (UNDRR)



Fig. 2 Collection of covers of the Global Assesment Reports analysed

The Global Assessment Reports (GARs) have a slightly different, albeit related, focus compared to the AGRs: disaster risk reduction. The reports are published every two years by UNDRR and primarily refer to the Sendai Framework for Disaster Risk Reduction 2015–2030, which sets targets for reducing disaster losses in terms of fatalities, people affected, and economic and infrastructure damage (UNDRR, 2015). The gradual integration of climate change into the GARs framework reflects the growing difficulty in distinguishing extreme weather events (natural hazards) from current climate trends that are increasing the frequency and intensity of such events.

The 2022 edition, entitled 'Our Shared Responsibility', introduces the concept of systemic risk as a central framework (UNDRR, 2022). The underlying argument is that disaster risks can no longer be understood by isolating one system at a time. The impacts of an extreme event propagate through interconnected economic, social and infrastructural systems, generating cascading risks that amplify losses beyond the geographical and sectoral scope of the original event (Thompson et al., 2024). This perspective has direct implications for urban and climate governance, as traditional disaster management structures, organised by sector and across separate territorial scales, are now inadequate for addressing risks (UNDRR 2022). The GAR 2022 therefore proposes an agenda for reforming risk governance, focused on cross-sectoral approaches and multi-level coordination.

The GAR 2025, entitled 'Resilience Pays: Financing and Investing for our Future', represents the most recent development (UNDRR, 2025). Its main contribution is not only analytical but also policy oriented. The report systematically argues that investing in risk reduction is not only necessary but also economically viable, and that a failure to invest leads to spiralling debt, a loss of insurability and structural humanitarian need (UNDRR 2025). The figures presented in the report are striking whilst the direct costs of disasters averaged $70–80 billion annually between 1970 and 2000, they rose to $180–200 billion between 2001 and 2020; and when indirect impacts and ecosystem costs are included, the total estimated annual cost of disasters exceeds $2.3 trillion (UNDRR, 2025). This figure, almost ten times higher than the direct losses reported in official statistics, constitutes one of the strongest arguments in favour of a paradigm shift in public and private investment policies. The alignment with the climate adaptation agenda is more explicit in this edition; indeed, the GAR 2025 openly acknowledges that systemic disaster risk and long-term climate risk are two sides of the same structural problem, and that addressing them separately, as has been done for decades, is one of the main causes of the inadequacy of current responses (UNDRR, 2025).

3. Discussions and critical overview

An analysis of AGRs and GARs shows that, although they began as reports with distinct objectives, over the last decade, they have converged in a single direction. The AGR has shifted from an almost entirely financial framework to one focusing on institutional and political dimensions and vulnerability. Meanwhile, despite continuing along its trajectory of disaster risk reduction, the GAR has arrived at the conclusion regarding cascading risks and the need to implement multi-sectoral actions. The consequence of this alignment is that both reports ultimately point to the inadequacy of traditional sector-specific tools given the interconnected nature of risks. However, one question that remains unanswered is how to translate the reports' recommendations into operational governance tools that are genuinely different from existing ones. Among the most significant data from the GAR is the estimate that the total annual cost of disasters exceeds 2.3 trillion dollars. The difference compared with the losses recorded over the previous two decades is staggering and makes it clear that climate risk has been underestimated. This data takes on further significance when read alongside the latest UNEP reports, which document the inadequacy of responses to the actions required. There is not only a lack of political commitment to implement effective measures, but also a failure to allocate sufficient investment to prevention and adaptation. Taken together, the two reports thus describe the two sides of the same problem: on the one hand, the growing gap between needs and resources for adaptation; on the other, the economic underestimation of the costs of inaction. The conceptual convergence between the two approaches does not remove differences that remain significant. GAR retains an event-oriented approach; indeed, its primary unit of analysis is the disaster as a measurable event. AGR, on the other hand,

consists of reports that track long-term trends and processes. This difference in temporal focus leads to practical recommendations that are not always consistent with one another

4. Conclusions

This paper aims to reconstruct, through a critical and diachronic analysis, a series of reports on the state of knowledge regarding climate adaptation and how this has evolved over recent decades. The intention was to highlight how priorities have shifted over time. In terms of research, the most significant gaps identified by this review concern three dimensions. The first is the marginalisation of local scales and the cultural dimensions of adaptation. To produce a global report, local contexts must also be generalised, rendering invisible the contextual specificities that determine whether and how policies work in practice (Stufano Melone & Camarda 2025). The second is the difficulty of measuring adaptation quantitatively, in order to understand whether the measures implemented actually reduce vulnerability or risk of maladaptation. The third concerns the power dynamics in knowledge production. In this case, the convergence between AGR and GAR also reflects a convergence between institutional communities with very different resources and visibility, and it would be important to analyse whether and how the voices of the most vulnerable contexts manage to influence the dominant frames, or whether they remain structurally excluded. At a more practical level, the most pressing message that emerges is the need to bridge the gap between climate adaptation and disaster risk reduction and to consider them in parallel. However, moving from the theory set out in these documents to practice by translating this knowledge into operational tools remains a challenge to this day. This review represents the first such general overview. The two subsequent reviews will examine, respectively, the mechanisms through which the knowledge produced by these reports is, or is not, translated into national and local policies, and the metrics used to monitor progress in adaptation at global and local scales. Together, these three contributions aim to offer a critical and systematic analysis of institutional climate knowledge, at a time when the pressure of events makes it increasingly urgent to translate this knowledge into action.

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Image Sources

Fig.1: https://unepccc.org/adaptation-gap-reports/

Fig.2: https://www.undrr.org/gar

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