



Principles for the Methodologies, Metrics & Indicators for Assessing climate change, especially on adaptation

February 2026

Climate Action Network (CAN) is a global network of more than 2500 civil society organisations in over 130 countries driving collective and sustainable action to fight the climate crisis and to achieve social and racial justice.

Introduction

Ten years after the Paris Agreement was signed, in 2025, global human-induced CO₂ and GHG emissions, mainly from fossil fuels, were the highest ever. The world's trajectory is on track to significantly miss the 1.5°C and 2°C temperature targets enshrined in the agreement. CO₂ concentrations in the atmosphere are estimated to be the highest in 14 million years. The consequences of this, already being experienced through erratic and extreme weather and climate anomalies, are expected to multiply and carry enormous costs and cause human suffering, especially among vulnerable communities, as well as large shifts in biodiversity. Impacts caused by heating, such as sea level rises or forest fires, are growing exponentially alongside the linear growth in GHG emissions. As emission reductions through mitigation action fail to halt climate change and avert its disastrous consequences, the need to adapt has intensified in urgency and scale.

The profound injustice of the unfolding climate crisis are not only the absolute costs on humanity and nature but the inherently inequitable way in which these will be distributed- those that have contributed (and benefitted) the least from the emissions of greenhouse gases which are at the root of the crisis bear the brunt of climate change and the burden of addressing it.

Adaptation interventions must be designed and implemented not only to improve adaptive capacity and resilience of societies. They must also address the inherent injustices and inequitable distribution of the costs and burden of action relative to the capabilities of communities around the world. A significant step towards devising a global path for adaptation was made at COP28 in Dubai with the agreement on the UAE Framework for Resilience that encapsulates and streamlines adaptation action across seven thematic areas covering water, food, ecosystems and biodiversity, health, infrastructure, poverty and livelihoods, and cultural heritage. The Framework also elaborates on four distinct dimensions of the adaptation cycle

covering planning and implementation- climate risk and vulnerability assessments, planning, implementation and monitoring, and evaluation and learning.

While the IPCC AR6 has made important progress in developing equity-centred approaches to assessing climate impacts and adaptation options through multidimensional analysis, significant gaps still exist in the effort to comprehensively evaluate the suitability and relevance of adaptation policies and implementation pathways. Policy-relevant metrics for assessment need people-centric principles, assessments and frameworks that adequately and comprehensively capture developmental and environmental needs, suitability, and requirements of adequate, equitable, and accessible means of implementation.

Metrics, methods and indicators to successfully capture these aspects require explicit and elaborate application of principles and frameworks that place equity and justice at the centre.

Equity and Justice Principles

Adaptation planning and implementation must be

- 1) Needs-based: Effective adaptation planning and implementation must identify and address context-specific needs, especially of the most vulnerable communities. This involves prioritising the factors that enable adaptation on the ground, including building adaptive capacity and institutional strength for implementation. Authors must recognise and apply the interconnected components of vulnerability reduction, resilience building, and adaptive capacity enhancement in deciding and designing metrics for evaluation. Assessment methods should employ integrated climate risk assessments that incorporate multidimensional criteria to understand how different groups experience climate impacts differently based on their roles, responsibilities, and resource access. These multidimensional criteria should have social, economic and environmental components, allowing to have an holistic understanding of the needs in each territory and community. By grounding indicators in locally-defined needs, adaptation planning moves beyond top-down technocratic approaches toward genuinely responsive and effective interventions that are needs based. The principles for Locally Led Adaptation developed under the Global Commission on Adaptation can provide valuable guidance on additional key considerations to ensure local actors are genuinely empowered to lead the design and implementation of adaptation projects, including identifying their own needs and priorities.
- 2) Rights-based: Adaptation must correspond to a rights-based understanding of climate action and human development that includes rights to life, physical and mental health, clean affordable and efficient energy, nutritious food, safe water, education, adequate housing, and culture, and captures the obligations of the state in designing and implementing policy. Methods and metrics of the AR7 must capture important aspects of adaptation planning and implementation including Free, Prior, and Informed Consent (FPIC) for Indigenous Peoples, people of African Descent, and local communities, the extent of employing non-discriminatory approaches to guarantee meaningful,

representative participation, and measures to ensure transparency and accountability. Integrating local, traditional and indigenous knowledge systems as well as best available science in all phases of the adaptation cycle through meaningful participation of Indigenous Peoples, people of African Descent, and local communities is critical for effective, sustainable and just adaptation action. Authors must explicitly incorporate rights-based assessments that measure how well adaptation policies and their implementation uphold substantive rights and whether (and how) rights-holders can seek remedy when violations occur.

Rights-based assessment thus ensures that adaptation planning protects human dignity, upholds legal obligations, combats environmental racism and unjust extractivism, and empowers those most affected by climate change to shape their own resilience pathways. This approach ensures also that dignity and rights of individuals are respected before, during and after an extreme weather event, upholding international human rights law.

- 3) Ecosystems-based: Adaptation to climate change is fundamentally important for the broad three categories of life-sustaining ecosystems for all species including humankind, a) managed ecosystems like forestry, agriculture, aquaculture, b) already impacted, deforested vulnerable, overused, eroded ecosystems and c) natural, pristine ecosystems like undisturbed forests, savannahs, peatlands, mangroves, corals and other terrestrial and marine coastal ecosystems . While there is no one-size fits all approach, CAN supports the scientifically assessed need to protect biodiversity by conserving nature of at least 30% terrestrial and marine spaces. In particular, biodiversity and carbon-rich forests, peatland and savannahs need upfront protection. Managed and already human-impacted ecosystems need to strongly follow a restoration and diverse multi-species policy including o. Organic farming. Forestry, and agriculture in particular, might then deliver higher resilience to climate change. Such a more biodiverse approach will strongly enhance more resilient ecosystems, food security etc. And it has the co-benefits to also enhance soil and vegetational organic matter, contributing to larger carbon sinks. The holistic approach of ecosystem-based adaptation leverages biodiversity and ecosystem services to help communities cope with climate impacts: it reduces climate vulnerabilities, generates a wide range of societal and economic benefits, helps maintain and restore ecosystem health, supports equitable governance and aligns with policies across the climate, development and nature nexus. The integrated locally led, ecosystem-based adaptation tool offers practical guidance on designing adaptation projects that are effective, sustainable, and socially just, as well as on generating robust evidence of adaptation impact.
- 4) Capabilities approach: The capabilities approach provides a normative framework for evaluating human well-being by focusing on what individuals are effectively able to do and be (their "capabilities") rather than merely on the resources they possess or their subjective satisfaction. Authors must be cognisant of the fact that an individual's or community's ability to convert resources into outcomes that reinforce their adaptive capacity depends on (a combination of) personal, social, and environmental factors, and incorporate this understanding in methods and metrics used in AR7. Climate events reduce capabilities by destroying opportunities and diminishing adaptive capacity, with

recovery requiring financial and institutional support that can equitably restore these freedoms. A *Wellbeing Index (WI)* based on the capabilities approach can gauge the multidimensional impacts of climate events, including societal, health, and distributional effects often overshadowed by narrow economic metrics. Researchers have also developed capability-based justice frameworks for climate resilience that includes guidance the distribution of advantages and disadvantages along those dimensions which could be useful in assessing the salience and effectiveness of adaptation approaches. The capability approach, when combined with probabilistic models, can also help estimate the risk of decreased individual/community well-being under climate stressors, adding granularity to spatial assessments.

- 5) **Corrective approaches:** Corrective justice addresses the fundamental question of remedy for the harms caused by historical emissions and adaptation failures. This framework conceptualizes those affected by climate impacts as potential or actual claimants of justice who may be owed rectification for inflicted harm. To operationalize corrective approaches through metrics and indicators, authors must employ methods and metrics that can enable the design of rectificatory policies. Additionally, methods, metrics and indicators for loss and damage must be designed and selected in a way that distinguishes between economic damage, non-economic losses, and non-economic damage through attribution-based indicators that link specific climate harms to historical emissions patterns, enabling targeted remediation. In that context, repeated recognition of the various physical, technical, political limits of adaptation must be recognised. And inclusive considerations of Loss and damage must be part of any inclusive approach. Corrective justice indicators within broader climate justice frameworks can also assess whether policies address historical wrongs such as the disproportionate contributions of some nations to greenhouse gas emissions. Further, metrics that assess restorative outcomes can evaluate whether adaptation interventions actively repair past damage through land restoration, livelihood rehabilitation, and formal acknowledgement of historical injustices, including those caused by colonial processes.

Justice Frameworks for Adaptation

Distributive justice

The distributive justice framework addresses a central question in climate adaptation: who gets what, and who bears the burdens? It moves beyond a one-size-fits-all approach to climate resilience, focusing instead on the fair allocation of both the benefits of adaptation projects and the unavoidable impacts of climate change, recognising that climate change exacerbates existing social and economic vulnerabilities. Deliberate consideration in the AR7 can assist policy makers avoid adaptation approaches and intervention that could widen socioeconomic inequalities and provide guidance on the prevention of maladaptive consequences.

In practice, distributive justice in adaptation planning manifests through strategies that enhance access to finance, essential goods, services, rights and infrastructure for vulnerable and marginalized communities such as displaced peoples, or the most economically precarious

individuals and households. While distributive justice considerations have featured in several climate policy planning documents around the world, empirical assessments reveal a gap between theory and practice with plans frequently overlooking the potential negative impacts of proposed adaptation strategies, such as "climate gentrification," - where new resilience infrastructure increases property values and displaces the communities it was meant to protect - or further exclusion of already-marginalised and fragile communities

Embedding the distributive justice framework into assessment metrics and indicators requires moving beyond aggregate data to distributional analysis, for which disaggregated outcome indicators are essential. Instead of measuring only the total number of people served by an adaptation-oriented intervention, authors should seek to track who is being served using data disaggregated by gender, age, income, race, and tenure status. Further, vulnerability-based targeting metrics can guide resource allocation through robust overlaying of climate hazard maps with socioeconomic vulnerability indices, which would provide valuable insights into the need for (public) investments in areas where physical risk, vulnerability and social sensitivity converge. Lastly, it is important to measure the repeated occurrence of climate hazards in particular areas. Cross-analyzing these patterns with socioeconomically prioritized regions can help determine where climate change may place the greatest burden on already fragile communities.

One key problem CAN identified with AR6, was the lack of granularity and specificity in identifying the financial needs for adequate adaptation policies and for the recovery of/from Losses and Damages due to climate change impacts, how these relate to mitigation efforts and trajectories of temperatures and associated impacts, and the existing gaps in the available means of financing.

Procedural Justice

Procedural justice in climate adaptation focuses on the fairness and inclusivity of decision-making processes, ensuring that affected communities and marginalized groups have meaningful ways of participating in planning and implementation. A procedural justice framework necessitates the examination of the rules, institutions, and practices that govern modes of decision-making including its representative elements. The Adaptation Justice Index (AJI) offers an ex-ante approach for evaluating adaptation plans by coding policy documents for attributes of inclusive processes, such as evidence of stakeholder engagement, mechanisms for public input, and provisions for transparency in decision-making. Further granularity can be achieved through Community Participation Scores that quantify procedural inclusion by tracking metrics such as the diversity of participants in planning meetings, the collection of community data using citizen-generated data methodologies, the number of engagement events held in vulnerable neighborhoods, and the integration of community-generated priorities into final plans, which can enable continuity in monitoring and support accountability.

Additionally, methods that incorporate institutional network analysis can effectively examine policy documents for provisions that enable affected groups to influence decisions, access

information, hold implementers accountable, and revise flawed processes. This allows for assessments of whether institutional structures can meaningfully engage communities and address historical inequalities that have deepened the urgency of adaptation, strengthening spaces and recourse for justice for affected communities.

Recognitional justice

Recognitional justice focuses on identifying which groups are most vulnerable to climate change and understanding how past injustices contribute to current susceptibility. Without recognition, adaptation efforts risk reinforcing existing inequalities by overlooking the specific barriers faced by marginalized populations. As with other dimensions of justice in adaptation planning and implementation, the Adaptation Justice Index (AJI) offers an approach for evaluating whether adaptation plans recognize past and current disadvantages in society.

For spatial assessment, a recognitional justice deficit indicator can be constructed by overlaying climate hazard maps with socio-demographic data capturing demographic and socio-economic indicators. A historical vulnerability index can assess whether adaptation plans explicitly link current social vulnerability to past policies that led to discriminatory outcomes. Epistemic indicators can further advance assessments of whether local and traditional knowledge systems are fairly represented in adaptation planning and implementation. Effective and meaningful application of these indicators can ensure that marginalized and vulnerable communities are recognised not only as vulnerable populations but as knowledge holders whose expertise informs adaptation solutions.

Structural Justice

Structural justice addresses entrenched power imbalances, institutional rules, and political-economic systems that create and sustain inequality and negatively affect the effectiveness of adaptation policies. This framework recognizes that climate impacts are superimposed upon pre-existing societal structures of resource control, historical marginalization, and institutional exclusion.

The Structural justice framework demands a shift from treating symptoms to recalibrating the institutional relationships that dictate access to adaptive capacity, including land tenure, political voice, and capital flows. Authors must recognise and incorporate indicators and metrics that assess how interventions and adaptation approaches intersect and affect existing power asymmetries. Methods and metrics used in the IPCC AR7 must employ institutional design typologies to assess how policies interact with stakeholders/rights-holders and whether it creates opportunities for lasting structural changes that improve equitability of costs and benefits of adaptation approaches and interventions.

Literature on the recognition and repair of structural drivers provides useful evaluation parameters focused on identifying whether adaptation interventions address the historical and institutional causes of vulnerability, rather than merely mitigating surface-level impacts. This

includes assessing whether plans acknowledge how past discriminatory policies and contemporary asymmetries in power contribute to present-day vulnerability patterns.

Bibliography

- Araos, Malcolm et al. Equity in human adaptation-related responses: A systematic global review (2021). *One Earth* 4(10).
- Ayompe LM (2025) Achieving climate justice: addressing disparities and enhancing equity in global climate policies. *Front. Sustain. Energy Policy*.
- Bernetti, I., Barbierato, E., Capecchi, I., & Saragosa, C. (2020). Climate Change and Urban Wellbeing: A Methodology Based on Sen Theory and Imprecise Probabilities. *AESTIMUM*.
- Bobadilla, H. F., Di Capua, G., Hesselbein, C., Peppoloni, S., & Lampis, F. (2024). Advancing Epistemic Justice with Local Knowledge: A Process Indicator for EU Climate Adaptation Policymaking. *Strengthening European Climate Policy*. Springer.
- Brousseau, J. J., Stern, M. J., & Hansen, L. J. (2024). Unequal considerations of justice in municipal adaptation planning: an assessment of US climate plans over time and by context. *Local Environment* 29(10), 1344–1362.
- Brousseau, J. J., Stern, M. J., Pownall, M., & Hansen, L. J. (2024). Understanding how justice is considered in climate adaptation approaches: a qualitative review of climate adaptation plans. *Local Environment* 29(12), 1644–1663.
- Cannon, C. E. B., Chu, E. K., Natekal, A., & Waaland, G. (2024). Institutional Designs for Procedural Justice and Inclusion in Urban Climate Change Adaptation. *Journal of Planning Education and Research*.
- Cañizares-Gaztelu, J. C., Copeland, S., & Doorn, N. (2024). Assessing the capability approach as a justice basis of climate resilience strategies. *Journal of Global Ethics* 20(1), 31–55.
- Chu, E. K., Natekal, A., Waaland, G., & Cannon, C. E. B. (2025). An evaluation of U.S. cities' efforts to further distributive justice in climate adaptation planning. *Urban Sustainability* 5(41).
- Climate Action Transparency Initiative. (2025). *Monitoring the Just Transition towards a Low-Carbon, Climate-Resilient Future: Lessons from Brazil, Nigeria, and South Africa*.
- de Vries, L. A. J., Werner, G., Wijnhuizen, E., Toom, V., Bovens, M., & Hulscher, S. (2024). *Justice in Climate Policy: Distributing Climate Costs Fairly*. Springer.
- Doorn, N., Copeland, S., & Cañizares, J. C. (2025). Embedding Justice Considerations in Climate Resilience.
- DTU Research Database. (2024). *Enhancing Climate Change Adaptation through Amartya Sen's Capability Approach*.
- *Environmental Science & Policy*. (2025). Bridging equity and resilience: A systematic review of social sustainability in climate change mitigation and adaptation.
- Florence School of Regulation. (2024). Climate justice: multiple ways to look at it.
- Fontana, C., Testi, A., Allegretti, G., Zetti, I., & Rossi, M. (2025). Embedding justice into climate policies through participatory approaches: prospects and pitfalls toward community-based adaptation pathways in Bologna, Italy. *Cities*.
- Friends of Ecosystem-based Adaptation, *Ecosystem-based Adaptation Framework* (2017)

- *Frontiers in Public Health* (2025). Assessment of climate justice in outdoor cooling spaces under extreme heat: A case study of Gulou District, Fuzhou.
- García-Portela, L. (2025). *Rectifying Climate Injustice: Reparations for Loss and Damage**. Routledge.
- Global Impact Investing Network. (2024). *Adaptation Needs Assessment*.
- Heikkinen, M., Ylä-Anttila, A., & Juhola, S. (2022). Connecting climate justice and adaptation planning: An adaptation justice index. *Environmental Science & Policy*.
- Hulme, M., et al. (2025). Justice can and should become a part of feasibility assessments for climate mitigation policies. *Climate Action 4(48)*.
- International Institute for Sustainable Development. (2024). *How to Make Nature-Based Solutions for Adaptation Work for Everyone*. IISD.
- IPCC, Climate Change 2022: Impacts, Adaptation and Vulnerability, *AR6 WG2 Report* (2022)
- IPCC, AR6 Synthesis Report (2023).
- Juhola, Heikkinen et al. Connecting climate justice and adaptation planning: An adaptation justice index (2022). *Environmental Science & Policy* (136), 609-619.
- Lwasa, S. K., et al. (2023). *A Needs-based Approach to Loss and Damage*. Zenodo.
- Nives Dolšak, Aseem Prakash, Three Faces of Climate Justice (2022). *Annual Review Political Science* (25), 283-301.
- Owen (2021), Equity and justice as central components of climate change adaptation. *One Earth 4(10)*, 1373 - 1374.
- Piloting the Locally Led, Ecosystem-Based Adaptation Tool: Insights from conservation practice in Nicaragua, *Flora & Fauna* (2025).
- Prantl, J., et al. (2024). *Building Capabilities for Earth System Governance*. Cambridge University Press.
- Ruiz de Gopegui, M., Olazabal, M., & Casán-Broto, V. (2024). Examining Climate Justice in Urban Public Space Adaptation: A Thematic Synthesis of the Literature. *Journal of City Climate Policy and Economy 2(3)*.
- Selje, T., Schmid, L. A., & Heinz, B. (2024). Community-Based Adaptation to Climate Change: Core Issues and Implications for Practical Implementations. *Climate 12(10)* 155.
- S.E. Walker, E.A. Smith et al. Defining and conceptualizing equity and justice in climate adaptation (2024). *Global Environmental Change, Volume 87*.
- Soanes, M., Bahadur, A., Shakya, C., Smith, B., Patel, S., Rumbaitis del Rio, C., Coger, T., Dinshaw, A., Patel, S., Huq, S., Musa, M., Rahman, M., Gupta, S., Dolcemascolo, G. and Mann, T. (2021). Principles for locally led adaptation. IIED, London
- Special Report on the Ocean and Cryosphere in a Changing Climate, IPCC (2022)
- Special Report on Climate Change and Land, IPCC (2022)
- *Sustainability Directory*. (2025). Just Adaptation Planning.
- *Sustainability Directory*. (2025). Just Adaptation Pathways.
- Thornton, F. (2020). Of Harm, Culprits and Rectification: Obtaining Corrective Justice for Climate Change Displacement. *Transnational Environmental Law*.
- University of Waterloo. (2025). Climate-Geoengineering as Development: Applying the Capabilities Approach to Climate Responses in South-Asia.

- Yarish, M. (2025). Operationalizing Equity in Urban Redevelopment: A Justice-Centered Metrics Framework. *Scientia Moralitas Journal* 10(2), 140–153.
- Zimm, C., Mintz-Woo, K., et al. (2024). Justice considerations in climate research. *Nature Climate Change*.