Policy attribution Brief II

Why socio-economic complexity must be central in the climate attribution of past extreme events

Beyond climate hazards, socio-economic factors matter for understanding disaster impacts.
Climate change is increasing the intensity and likelihood of many extreme weather events. However, evidence from the COMPASS project shows that the impacts of these events are often driven as much by socio-economic factors —such as population growth, urban development, poverty, governance, and infrastructure— as by climate change itself. Effective adaptation and resilience policies therefore require understanding both climate and socio-economic drivers of risk.

Why This Matters? Traditional climate attribution studies focus on how human-induced climate change influences hazards such as floods, storms, heatwaves, and droughts. While essential, this approach explains only part of the story.

The COMPASS project demonstrates that real-world impacts depend on three interacting factors: **Hazard** – the climate event itself; **Exposure** – people, assets and infrastructure located in harm's way; **Vulnerability** – the ability of individuals, communities and systems to prepare for, respond to and recover from impacts
Ignoring exposure and vulnerability risks misidentifying the true causes of losses and may lead to ineffective adaptation investments.

Key Findings from COMPASS:

Economic growth, urban expansion and population increases can amplify disaster losses substantially.

Examples from COMPASS show:

- For Storm Xynthia (France), economic growth since the 1950s increased losses by over 600%, far exceeding the estimated contribution of climate change.
- Population growth further increased impacts.
- At Luton Airport (UK), rapidly growing passenger numbers greatly increased the disruption caused by heat-related runway failure.

Policy implication: Managing exposure through spatial planning and resilient infrastructure is often as important as addressing climate hazards.

Communities facing poverty, weak governance, inadequate infrastructure, insecurity, poor health services or limited preparedness experience disproportionately higher impacts.

COMPASS findings show that:

- Improved preparedness measures reduced vulnerability and losses in France.
- In Honduras and Mozambique, poverty, insecurity, weak infrastructure and limited services significantly increased impacts from tropical cyclones.
- Extreme events can create reinforcing cycles where each disaster increases future vulnerability.

Policy implication: Reducing vulnerability is one of the most effective forms of climate adaptation.

Key Findings from COMPASS:

3 Disasters Result from Cascading and Compounding Risks

Impacts rarely occur through a single pathway. COMPASS case studies reveal:

- Multiple hazards occurring close together can overwhelm response capacity.
- Flooding can trigger cascading impacts on health, livelihoods, education, food security and poverty.
- Strong governance, resilient infrastructure and effective public services can significantly reduce these cascading effects.

Policy implication: Adaptation planning should consider interconnected risks across sectors rather than addressing hazards in isolation.

4 Data Gaps Limit Effective Risk Assessment

Many countries lack:

- High-resolution exposure datasets
- Information on vulnerable populations
- Infrastructure condition data
- Time-series data on land-use change
- Information on informal settlements and service access

As a result, attribution studies may overestimate climate influences simply because climate data are more readily available than socio-economic data.

Policy implication: Investments in socio-economic data systems are essential for evidence-based adaptation planning.

Policy Recommendations

✓ Integrate Socio-Economic Factors into Attribution and Risk Assessments

- Include socio-economic counterfactual scenarios alongside climate scenarios.
- Combine quantitative modelling with stakeholder knowledge and qualitative analysis.
- Strengthen representation of vulnerability in impact models.
- Apply systems-based approaches that capture cascading impacts.

✓ Strengthen Data and Monitoring Systems

- Develop high-resolution datasets on population, infrastructure, land use and exposure.
- Prioritize data improvements in highly vulnerable regions.
- Build capacity within national statistical and sectoral institutions.
- Promote open data standards and interoperability across countries.

For more information, please read the full Policy Attribution Brief II available on the COMPASS website:

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