



**African Climate Hazard Assessment**  
A Composite Index Assessing National Vulnerability  
to Climate Change

---

**Josefine Falk, Otto Fjelkner**  
Environmental and Energy System Studies LTH, Lund University



## African Climate Hazard Assessment - A composite index assessing national vulnerability to climate change

**The world is facing the undeniable presence of global warming in the form of record-high temperatures worldwide. Urgent action is being taken to reduce greenhouse gas emissions. COP27 in 2022 shed light on the Loss and Damage Fund, aimed to support the Global South in building adaptive capacity to cope with the negative impacts of climate change. But are we acting too late? Africa is already facing “climate fever” and is affected by irreversible changes, requiring the vulnerable continent to adapt. This study maps the vulnerability of African countries to climate-related risks. It provides a climate risk assessment to assist Loss and Damage decision-makers in strengthening Africa's resilience to climate change. By understanding the crucial aspects of Africa's climate vulnerability, we can take proactive measures to protect communities, ecosystems and economies.**

The vulnerability of African nations is highlighted by the creation of a composite index. The ACHA Index combines the six most severe physical climate hazards with three systemic vulnerability dimensions, providing an in-depth view into a country's vulnerability to climate change. Climate hazards are the intrinsic physical consequences of climate change, allowing the user of the index to see what country is most vulnerable to each of the following hazards; *Temperature Rise, Precipitation Change, Sea Level Rise, Drought, Floods, and Tropical Cyclones*. In order to cope with and adapt to these hazards, the systemic abilities of a country play a key role. The index therefore includes the systemic vulnerability regarding three dimensions; *Humanitarian, Economic and Governance*. This multidimensional approach utilises 61 different indicators, employing higher scores to greater climate vulnerability in the final aggregated score.

The results of the ACHA index revealed the profound influence of a country's systemic robustness when responding to climate change impacts, as the inclusion of systemic hazards had a considerable effect on the final aggregated score. The index illustrated the diverse risk profiles of vulnerable countries, that varies greatly, and that severe vulnerability to one or few hazards can amount to similar levels of risk as a widespread vulnerability to many different hazards. The index highlights that while some nations may endure more perilous climate change impacts, other nations with lower physical exposure may lack the necessary resources and organisational capacities to handle the risks, rendering them more susceptible. Somalia and South Sudan appeared the most vulnerable, primarily due to the high burden in all three systemic dimensions combined with a high hazard exposure. Liberia faced the highest aggregated vulnerability to the physical hazards, but its systemic efficiency allows them to better cope with these risks. Meanwhile, countries such as Cabo Verde and Tunisia showcased strong and more resilient systems, making them better placed to respond to climate change impacts.

The index fills a vital role in offering valuable insights into the factors that render African nations vulnerable to climate change which provides guidance on allocating resources for adaptation and mitigation initiatives. It strives to convey the complex and intricate climate change impacts in a transparent and easy to understand manner while remaining relevant and actionable for policymakers. Lowering the threshold for assessing and comparing the vulnerability to climate change can act as a call to action and help further initiate the dialogue on climate change adaptation in Africa. The indicators used in the index can help guide policy-makers and other stakeholders in assessing future risks, find suitable adaptation efforts and track their progress towards climate resilience.

Researchers:

Josefine Falk, +46720179791, [jo3632fa-s@student.lu.se](mailto:jo3632fa-s@student.lu.se);

Otto Fjelkner, +46705852445, [ot4287fj-s@student.lu.se](mailto:ot4287fj-s@student.lu.se)

Read more at: <https://doi.org/10.5281/zenodo.7937089>