



Development of a Governance Resilience Index (GRI) for measuring climate adaptation governance

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Climate change is affecting the frequency and intensity of rainfall extreme events worldwide. Despite the growing global awareness, assessing and enhancing adaptive capacity has proven to be a major challenge. To assess the lack of coping capacity measures that a country cannot cope with water-related disasters through the government's effort and existing infrastructure with the impact of the hazard, exposure, and vulnerability for Kenya and Zambia. We combined two global sources, namely Index for Risk Management (INFORM) and the Emergency Events Database (EM-DAT), to assess the existing infrastructure, and governance with climate risk indicators. The study analyzes the linkages of governance indicators to evaluate the performance of resilience using these datasets for the period 2014-2022 for climate adaptation governance. A global cluster analysis using historical governance, hazard, and resilience information was performed to obtain three clusters. Countries such as Zambia and Kenya with similar emergent characteristics are grouped under single cluster. Further, countries such as Guatemala, Morocco, South Africa, Senegal are under developing economy cluster and Germany, Japan and United Kingdom are under the developed economy cluster. With the governance and natural disaster information as the driving variable and resilience as the dependent variable, five regression models- Bayesian, ridge regression, decision tree, k-nearest neighbors, and support vector machine are built. The best ML model - Bayesian ridge regression is used to model the resilience indicators- Communication, Access to health care and Physical infrastructure with the governance and natural disaster information. For Zambia, climate resilience prediction up to 2035, under the Business-as-usual scenario, with governance worsening by 20%, it is observed that the communication and physical infrastructure are least affected, with the access to health care worsening by 10%. On the other hand, for Kenya, governance improved by 10% and all resilience related indicators have remained unchanged. For the emerging economies, the governance is significantly related to the health care indicator compared to the physical infrastructure and communication indicators. However, for the developing and developed economy, the governance is related to other resilience factors. Also, we should emphasize that these are preliminary findings, and the cause-and-effect relationships are yet to be further examined by detailed studies. In conclusion, we identified the lack of coping capacity and vulnerability are two important aspects relates to the ability of a country to cope with current and future disasters that the country's government, as well as the building of resilient infrastructure, capacity and awareness raising among policymakers contributes to the reduction of disaster risk.

