Briefing

Climate change; Policy and planning

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Policy pointers

Policymakers should support evaluations that are designed to enable a direct comparison of climate adaptation project outcomes; such results would support more informed decisions about effective future initiatives.

By adopting a base method for measuring the effectiveness of climate adaptation, practitioners and researchers will be able to compare and collate findings from different evaluations, conducted in different locations, at different times.

At the heart of every evaluation of climate resilience is an interaction between climate shocks and development outcomes; these interactions can generate standardised metrics to support clear communication with policymakers.

Practitioners and researchers designing climate adaptation evaluations can choose a method for calculating standardised metrics based on their existing capacity; several easily replicable methods are available.

How can standardised evaluation metrics increase climate resilience?

Climate shocks are hitting the Least Developed Countries with increased frequency, undermining development progress and leaving communities even more vulnerable. Adaptation initiatives seeking to combat this are hindered by a lack of clear information about what works, where and for whom. Evaluations of existing adaptation and resilience programmes should provide answers, but frequently fail to adequately define the relationships between climate shocks and development outcomes or to offer standardised metrics that allow outcomes of different initiatives in different locations to be compared. This briefing proposes that evaluation practitioners adopt a common base method that would address the current deficiencies and enable iterative learning. With this, decision makers could improve adaptation project design and select interventions that best serve individual communities' resilience needs. We suggest two evaluation methods to support this shift.

Rising temperatures and shifting seasonal rains are destabilising climate-sensitive livelihoods for people living in the Least Developed Countries (LDCs).[1] Climate hazards and pre-existing social vulnerability have a particularly negative effect on crop and livestock production and, ultimately, the physical wellbeing of individuals, families and communities.[2] This is being felt, for example, in poorer areas of Malawi, where smallholder reliance on limited, intensively farmed plots is speeding up soil degradation. When combined with low or intermittent seasonal rainfall, crop productivity falls or even fails completely. Over time, increasing exposure to climate shocks will constrain development progress across the region, rendering populations even more vulnerable and climate sensitive.

Current investments in climate adaptation and resilience projects seek to encourage behaviour change that supports resistance to, and recovery from, climate shocks.[3] Activities range from soil moisture initiatives assisting smallholder farmers to circumvent drought in the drylands of Kenya, to national planning directives linked to Nationally Determined Contributions (NDCs) in countries like India. While of varying scale, the consistent policy objective across these interventions is to establish 'climate-resilient pathways' that achieve 'climate-resilient development'.[4] This is particularly the case in the LDCs, where the sensitivity to a changing climate is most acute.

Where measurement falls short

Despite the pressing need to know what works best and where, demonstrating the

Policymakers need evidence that allows systematic comparison of findings on effective climate adaptation

effectiveness, impact and value for money of investments remains a significant challenge.[5] Current approaches do not allow us to compare the findings of evaluations or systematically build evidence about what worked where and learn how to design better programmes and projects.[6] To date, adaptation and resilience evaluators have used a variety of quantitative methods to design observation-based assessments, but these are based on poorly specified relationships between climate shocks and development outcomes.

To make effective decisions, policymakers need evidence that allows the systematic comparison of findings on effective climate adaptation and resilience. To achieve a clear understanding of what works, for whom and where, we need a methodology that enables different evaluations, conducted in different locations and at different times, to be meaningfully judged against one another. We argue that if those designing and conducting evaluations (including academics, policy researchers, evaluators and practitioners) adopt a **common base method**, their studies can then generate **standardised metrics** that enable two or more measurements of effectiveness to be compared. This base method would, in basic terms, be the inclusion of both climate shocks and development outcomes in all resilience evaluations (regardless of methodology) so that the links between them can be fully considered.

Current evaluation efforts

A range of think-tanks, academic institutions and consultancies are generating evidence on the resilience outcomes of climate programmes and projects. They often meet at conferences and workshops, such as Adaptation Futures[7] and the Resilience Measurement, Evidence and Learning (RMEL) conference,[8] where researchers and practitioners exchange recent findings on how interventions performed in terms of facilitating adaptation and building resilience. According to a recent review,[9] their evaluations tend to fall into one of three categories:

- **Composite indices** that bring together and weight multiple indicators thought to improve resilience. The assumed ingredients of climate resilience are then added together to see which entity (for example, a household) has the highest score, allowing beneficiaries to be ranked in hierarchical order of 'more or less' resilient.[10,11] But this index is reached without meaningfully assessing the interaction between climate shocks and development activity.
- **Linear and non-linear models**, which set out the relationship between development outcome variables and explanatory factors. For example, these approaches check to see whether beneficiaries are:

(a) Likely to engage in coping strategies after climate shocks[12]

(b) Able to recover from shocks,[13] or

(c) Able to maintain consumption after shocks.[14]

All of these elements will influence how effective an intervention can be.

- **Economic valuations** to frame resilience outcomes in terms of cost/benefit performance.[15,16] These approaches allow us to compare the monetary value of climate resilience interventions and so make a value-for-money judgement.

Evaluations conducted under these three categories produce idiosyncratic metrics to measure resilience that are only relevant to that evaluation, and so are very difficult to compare to the findings of other studies. For example, the 'net-present value' of an intervention is a key finding for evaluators conducting an economic valuation; in contrast, the main product of an index approach is a resilience score based on the total value of a given unit. On their own they are useful within the context of the individual evaluation, but there is no meaningful way of assessing relative effectiveness between them. While variations in approach allow for different insights into the benefits of particular interventions, the lack of a common base method represents an impediment to building an evidence base of what works, where, for whom and how.

Adopting standardisation: why and how

Disciplines outside of international development have long been aware of the need for standardised evaluation approaches. The concept of replication is a cornerstone of the scientific method and the basis of iterative learning. It requires that participants agree on the definitions of basic terms, follow similar procedures to collect and analyse data, and are transparent in their reporting. Contributions to an evolving debate can then build on past knowledge in a way that aligns with, and speaks directly to, past studies. Each contribution to the field then has a clear pathway to build the total knowledge base in the same coherent way.

If evaluators working on adaptation and resilience interventions adopted some of the key elements of replication as guiding principles (enshrined in a common base method), it would be possible to provide policymakers with clarity and coherence on the comparative effectiveness of outcomes, enabling them to make informed choices about future projects and programmes.

The core elements of resilience and adaptation evaluations are climate variability or stimuli, and climate-sensitive development outcomes in their numerous forms. The former can be shown using climate information (such as trends in daily, monthly or annual indications of rainfall, temperature or more idiosyncratic shocks); the latter can be anything from disease rates within a population, the proportion of flood-inundated households, or more commonly used metrics such as crop and livestock production (see Box 1 for an example). By using what is common to all such evaluations — some form of interaction between climate and development — we can develop a universal template for different evaluations to work from, and then communicate and build knowledge.

Achieving standardised metrics

To illustrate how theory could be made reality, we propose two evaluation methods that are able to integrate climate shocks into assessments of climate-sensitive development outcomes. The first, simple linear regression, is less technically complex than the second, Gaussian Process Regression (GPR).[17] Professional evaluators will recognise these methods, so rather than define them, we focus on describing their respective relevance to achieving standardised metrics in Box 2. The two methods also share beneficial features:

- Allowing climate shocks to be included within the assessment of relationships between shocks and outcomes
- Enabling the prediction of 'expected' levels of the climate-sensitive development outcome, given the level of climate shock/stress experienced (in the language of the evaluation community, the 'expected' level of the outcome represents the 'counterfactual', or what would have happened with the intervention being implemented).

Linear regression and GPR can be designed to use historical climate data and climate-sensitive development outcomes to produce a standardised metric in the form of the distance between the expected level of the development outcome and the actual level achieved under the project or programme. This distance between the two could be in almost any relevant form that an evaluation of climate adaptation is likely to take — such as number of people affected by floods, crop yield or malaria rates — but the overall distribution of the data can be used to calculate the difference in terms of standardised deviations (also known as 'z-scores').

If other assessments followed the same basic process of considering climate shocks and development outcomes (allowing for a range of diverse evaluation modeling methods to be built on top of this core relationship), standardised

Box 1. Climate shocks and development outcomes: interacting in Kenya

Livestock herders in Kenya's drylands are suffering from a lack of access to pasture. Together with **climate variability** of increasing consecutive dry days, this scarcity causes a decline in animal health that is sometimes fatal. Programmes designed to inoculate animals from common diseases (which can systemically weaken the herd) improve climate resilience: healthier animals survive for longer during protracted dry spells. This improvement in animal herd health — a **climate-sensitive development outcome** — can be observed by evaluators that assess historical trends in livestock production without such interventions (the counterfactual) as well as compared with progress made under the programme.

Box 2. Evaluation methods able to deliver standardised metrics: two examples

Simple linear regression, an evaluation method suitable for practitioners and policy researchers, investigates which climate shocks are most associated with a climate-sensitive development outcome. The approach does not assume that climate shocks, such as aggregate seasonal rainfall, are linked to development outcomes; instead it uses simple (bivariate) linear regression to test for a link between different weather-based indicators (for example, number of dry days, rainfall over seven days) and climate-sensitive development outcomes. The approach allows practitioners to investigate the trends across different types of climate indicators and discover which is most important for the development outcome under evaluation. The magnitude and strength of the relationship determines which indicator(s) to include.

The second method, designed for evaluation teams with a more research and academic background, uses **Gaussian Process Regression (GPR)** learning to simultaneously integrate all available climate-related indicators into a model to assess the impact on a climate-sensitive outcome. This accounts for the reality that more than one climate indicator can influence the development outcome at the same time. GPR can also:

- Provide reliable results with very small datasets
- Take account of unusual swings in values (non-linearity)
- Update the probability for a hypothesis as more evidence becomes available.

The approach limits the inputs to climate-only specifications, but this can serve as the basis for a larger model to be built by researchers who want to include alternative explanations for changes in the specific development outcome.

deviations between 'expected' and 'actual' results would enable policymakers to systematically compare programmes, projects and interventions in terms of their effectiveness.

Will evaluation evolve?

Evaluations of climate resilience and adaptation initiatives in the LDCs seek to generate information on effectiveness that can be fed into the design of future projects and programmes. However, their larger objective is improving the performance of government and non-government institutions seeking to support poor households to navigate climate variability and change. We propose that the best route to improve programmes and projects — and ultimately to secure climate-sensitive livelihoods and physical security for vulnerable populations — is to provide policymakers with a coherent body of knowledge that will allow them to clearly determine what works, where and for whom.

But while the evaluation community is capable of developing standardised metrics for adaptation and resilience effectiveness, the will and funding to do so have not yet materialised. We recommend that think-tanks, colleges, NGOs and evaluation consultancies work to develop a means to standardise metrics and findings, and begin to foster cross-evaluation communication. We welcome dialogue with those working on adaptation evaluation and project design to better understand the barriers to such an approach, including the practicalities of implementation, resource and capacity constraints, and donor objectives.

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Notes

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