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Epistemic Diplomacy: Building bridges, not silos in  
climate-risk mapping in the global South**

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# The Tyranny of Metrics, the Power of Stories and Epistemic Diplomacy

Building bridges, not silos in climate-risk mapping in the global South

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## Abstract

This working paper argues that climate-risk mapping in the global South is trapped between ‘precisionism’ (indices, dashboards, model pipelines) and ‘groundtruthing’ (ethnography, participatory mapping, lived narratives). Precisionism offers speed, comparability and auditability but often produces a ‘metrics mirage’ that depoliticises inequality, flattens justice claims and misdiagnoses needs – especially for marginalised people living in informal settlements with unregistered land rights and/or insecure tenure, gendered and generational vulnerabilities and data-poor contexts. While groundtruthing restores meaning and accountability to the narrative, the approach has struggled to scale, translate across bureaucracies or secure policy traction in legal-centric and economics-biased indicator-driven systems. The result is ineffective policy and poorly targeted interventions. To break this stalemate, the paper proposes ‘epistemic diplomacy’: a power-aware, procedural approach to integrating quantitative and qualitative evidence under post-normal conditions (uncertain facts, disputed values, high stakes, urgent timelines). The framework sets out five principles (pluralism, power-awareness, procedural clarity, proportionality, public value) and a three-phase, ten-step operating model covering co-framing, mixed evidence generation with triangulation and disagreement rules, and joint interpretation linked to equity filters and decision translation. It also codifies governance safeguards, authorship equity, iterative consent and stewardship, anti-tokenism requirements and versioning, to prevent extraction and ensure accountability. Practical method pairings (e.g. hydraulic models with community story-maps; heat sensors with social diaries; SLR scenarios with tenure/livelihood profiles) show how ‘boundary objects’, ‘procedural compacts’ and ‘stewardship regimes’ can convert contested evidence into policy-ready artefacts (O&M-first specs, trigger matrices, managed-

retreat briefs). The payoff is not softer rigor but broader quality: risk maps that carry both precision and meaning, improving allocation fit, distributional fairness and institutional uptake while making disagreement visible and governable.

**Keywords:** *climate risk, global South, climate change, adaptation, climate justice, informal settlements, quantitative, qualitative*

## 1. Introduction

Across much of the global South, climate-risk decisions are increasingly steered by indices, dashboards and model outputs that promise neutrality, comparability, economics and speed. This technocratic turn, what can be termed precisionism, privileges standardised metrics (e.g. composite vulnerability scores, exposure heat maps, resilience indices) as primary arbiters of truth and action. While these tools are valuable, their authority often sidelines the lived realities, social meanings and political claims that shape how climate risk is produced, experienced and governed on the ground. In practice, the ascent of precisionism has created a metrics mirage: a sense that once we have the right indicators, the politics of risk will recede. Empirically, however, risk remains deeply social and contested, and communities frequently experience climate interventions as misaligned with their needs, histories and everyday strategies for coping and adapting (Funtowicz and Ravetz, 1993; Erkkilä, Peters and Piironen, 2016).

The philosophical foundations of precisionism are not new. They trace to positivist ambitions to extend the methods of the natural sciences to social life (Comte, 1858) and to a broader epistemic desire for universal, observer-independent knowledge. But as Kuhn reminds us, what counts as valid knowledge is organised within paradigms that shape problems, methods and standards of proof (Kuhn, 1997). In climate governance, as in other policy spaces, the ascendancy of metricised paradigms increasingly defines what is legible to decision makers, what enters cost–benefit rationalities and whose realities ‘count’. Haraway’s critique of the ‘god trick’ – the illusion of a view from nowhere – exposes how claims to objectivity can erase positionality and power (Haraway, 2013). Latour similarly insists that science and politics are co-produced, not separable spheres (Latour, 2004). Together, these insights suggest that climate-risk metrics are never just mirrors of reality; they are political artifacts that privilege some voices and values over others.

The problem, then, is not metrics per se but metrics without meaning, risk apparatuses that depoliticise entrenched inequalities and obscure situated knowledges. Consider three recurrent patterns. First, infrastructure-centric assessments highlight physical fragility while underplaying governance bottlenecks and maintenance politics (Adeoti, Kandasamy and Vigneswaran, 2024). Second, epidemiological and environmental models quantify exposure and outcomes yet struggle to represent how poverty, housing insecurity and labour precarity shape vulnerability and adaptive capacity (Slesinski et al., 2025). This

situation is mirrored for example through widespread land and natural-resource dispossession by apartheid-era governments in southern Africa. Third, coastal and drought risk projections sharpen spatial foresight but can flatten justice claims around land, livelihoods and mobility that are central to risk governance (Ashrafuzzaman, 2023). The net effect is a performance of objectivity that relates well in policy, but that can misdiagnose problems and legitimise misfit interventions. On the other side of the ledger, groundtruthing, participatory, qualitative and narrative approaches surface the lived grain of risk. In Mozambique, gender-attentive accounts following Cyclone Idai demonstrate how displacement and recovery are patterned by social roles, care burdens and power asymmetries that seldom enter standard indicators (Maviza et al., 2024). Research with Turkana pastoralists compiles detailed drought coping strategies: mobility, herd diversification, reciprocal networks, that alter both the timing and meaning of ‘early action’ (Opiyo et al., 2015). Critical reviews of ‘IKS + GIS’ integrations in South African informal settlements show both the promise and pitfalls of hybrid mapping, warning against extractive uses of local knowledge as cheap data (Membele, Naidu and Mutanga, 2022). And participatory environmental health syntheses underline that without community co-design, research risks reproducing injustice even when well-intended (Davis and Ramírez-Andreotta, 2021).

Yet groundtruthing faces its own challenges. Qualitative evidence is often discounted as ‘subjective’, hard-to-scale or insufficiently comparable; it can be co-opted to legitimate pre-set agendas; and it must guard against romanticising ‘the local’, ignoring intra-community conflict and elite capture (Congretel and Pinton, 2020). The result is a persistent stalemate: precisionism commands policy traction but risks misrecognition; groundtruthing anchors justice claims but can struggle to travel across bureaucracies that are wired for indicators, audits and performance regimes (Erkkilä, Peters and Piironen, 2016).

This working paper steps into that stalemate with three guiding questions:

1. Whose objectivity counts? In other words, how do different knowledge traditions (model-driven, narrative-driven) acquire authority in climate-risk mapping, and with what distributional consequences (Latour, 2004; Haraway, 2013)?
2. How can metrics and stories be reconciled? Not by averaging them, but by negotiating protocols for co-production, triangulation and disagreement that respect the integrity of each mode of knowing (Ostrom, 1996; Klenk et al., 2017; Vincent et al., 2018).
3. What governance changes enable integration? Beyond methods, what procurement rules, authorship norms, consent practices and accountability mechanisms make hybrid evidence both legitimate and actionable in municipal and national decision arenas (Erkkilä, Peters and Piironen, 2016; Davis and Ramírez-Andreotta, 2021)?

The paper’s contribution is a practical framework of *epistemic diplomacy* for climate-risk mapping in the global South. By epistemic diplomacy, we mean a power-aware, procedural approach for integrating quantitative and qualitative evidence that is explicit about

positionality, transparent about uncertainty and designed to surface, not suppress, productive disagreements. Rather than treating integration as a purely technical problem of data fusion, epistemic diplomacy frames it as an institutional and ethical problem: who frames questions; who defines indicators; how are narratives curated; how are trade-offs adjudicated; and how is credit, consent and stewardship shared? The framework synthesises insights from post-normal science (Funtowicz and Ravetz, 1993), feminist epistemology (Haraway, 2013), science–policy studies (Latour 2004), and co-production literatures (Ostrom, 1996; Klenk et al., 2017; Vincent et al., 2018) and it is grounded in illustrative domains where metric dominance and narrative erasure are most visible: informal settlement flooding, gendered displacement, pastoral drought adaptation and coastal planning (Opiyo et al., 2015; Ashrafuzzaman, 2023; Maviza et al., 2024).

Why now? Three converging pressures heighten the need. First, the speed–legibility demand: governments and donors require standardised evidence to make time-bound budget and programme decisions, which ratchets up reliance on indices and league tables (Erkkilä, Peters and Piironen, 2016). Second, the datafication of governance: remote sensing, machine learning and digital registries are rapidly expanding what can be measured, often outpacing commensurate advances in ethics, consent and interpretive governance (Davis and Ramírez-Andreotta, 2021; Membele, Naidu and Mutanga, 2022). Third, the justice turn in climate policy: communities, civil society and scholars are insisting that adaptation be not only efficient but fair, responsive to histories of dispossession and to differentiated vulnerabilities that metrics frequently flatten (Klenk et al., 2017). In this context, staying with business-as-usual metrics risks reproducing maladaptation – interventions that entrench exposure or shift harms onto already marginalised groups. Thus, undermining the efforts towards the restorative, procedural and distributive justice goals of climate transition.

This working paper offers a conceptual synthesis and implementable heuristics: principles, process steps and boundary objects that practitioners, researchers and policymakers can adapt to their contexts, while pointing to literatures and cases that justify why these heuristics matter (Funtowicz and Ravetz, 1993; Klenk et al., 2017; Vincent et al., 2018).

## **2. The ideological battleground**

### **2.1 Precisionism and the Tyranny of Metrics**

Precisionism grows from a long positivist tradition that privileges quantification as the royal road to truth (Comte, 1858). By definition, precisionism refers to the epistemic and institutional preference for quantified, standardised, and ostensibly objective forms of knowledge, particularly in the form of indices, scores, dashboards and models, as the primary basis for understanding complex phenomena and guiding policy decisions. In climate governance, this lineage expresses itself through index cultures, that is league tables, composite vulnerability scores, risk dashboards that promise neutrality, comparability and

speed. Indicators are not merely descriptive; they organise what becomes legible to decision-makers and donors by making complex phenomena tractable to ranking and audit (Erkkilä, Peters and Piironen, 2016). The resulting metrics mirage arises when technical refinement is mistaken for epistemic sufficiency: more precise numbers appear to eliminate ambiguity, even as uncertainty, value-conflict and stakes remain high (Funtowicz and Ravetz, 1993).

The authority of metrics can depoliticise questions that are in fact distributive and historical. In infrastructure risk assessments, for instance, the focus on asset fragility and hazard frequencies may eclipse maintenance politics, institutional capacity failures or long-standing investment biases that concentrate harms in poorer neighborhoods (Adeoti, Kandasamy and Vigneswaran, 2024). In health-focused risk mapping, epidemiological models quantify exposure, incidence or mortality but often struggle to encode the lived determinants of vulnerability: precarious work, informal housing or care burdens, thereby naturalising unequal outcomes as if they were solely biophysical (Slesinski et al., 2025). Coastal planning offers another illustration: high-resolution sea-level projections sharpen foresight but without attention to land tenure, livelihoods or political voice, they can flatten justice claims and legitimise relocations that burden those already marginalised (Ashrafuzzaman, 2023).

Philosophically, these slippages reflect what Haraway calls the ‘god trick’ – claims to a view from nowhere that obscure positionality and power (Haraway, 2013). Latour’s account of science–politics co-production further reminds us that metrics are not neutral windows on nature; they are social instruments that stabilise particular worlds (Latour, 2004). In practice, the dominance of precisionism reconfigures institutional attention toward what is easily measured, scripting decision cycles around indicator movement rather than lived problem definitions (Erkkilä, Peters and Piironen, 2016). When numbers travel faster than meanings, the politics of who is heard, and how, are effaced.

## **2.2 Groundtruthing & Situated Knowledges**

Groundtruthing originally referred to the process of validating remote-sensing data or model outputs by comparing them with direct observations from the field, ‘truthing’ data against what is actually on the ground (Krig, 2016). The term emerged in disciplines like geography, cartography and remote sensing, where satellite imagery or aerial data needed to be checked against physical site visits to ensure accuracy. Over time, groundtruthing has evolved beyond its technical roots to become a broader methodological and epistemological practice. In the context of climate risk and development, it now refers to the effort to align abstract or modelled representations such as metrics, indices or simulations, with the lived realities, contextual knowledge and social dynamics experienced by affected communities. This expanded usage includes ethnographic research, participatory mapping, storytelling and community-based monitoring – methods that bring forward agency, meaning and relational understandings of risk. These approaches are essential for effective policymaking as they reveal the everyday dynamics (social norms, informal governance and lived trade-offs) that determine whether interventions succeed or fail once implemented. Uncovering how people actually experience, interpret and respond to risk, such grounded evidence helps policymakers anticipate unintended consequences, target resources more accurately and design measures that are both technically sound and socially legitimate. In contexts where

standardised data are sparse or mistrusted, these methods also build the relational trust and procedural legitimacy that enable policy uptake and sustained community engagement.

As used in this paper, groundtruthing refers to embedding technical assessments within local lived contexts, making space for alternative knowledge systems and highlighting the situated, contested and political nature of risk itself. Groundtruthing counters abstraction by foregrounding context, agency and the social meanings of risk. Ethnographic and participatory work on water, informality and inequality in cities like Cape Town, for example, shows how infrastructures and governance arrangements co-produce vulnerability and how residents' knowledge recalibrates what counts as risk, resilience and appropriate intervention (Bhanye, 2025a). Gender-attentive accounts following Cyclone Idai in Mozambique illuminate how displacement and recovery are patterned by social roles, care responsibilities and power asymmetries that rarely enter technical metrics (Maviza et al., 2024). Research with Turkana pastoralists systematically documents indigenous drought adaptations: mobility, herd composition shifts, reciprocal support, that change both the timing and the content of 'early action' (Opiyo et al., 2015). These approaches align with Haraway's situated knowledges, which refuse the fiction of view-from-nowhere objectivity and instead insist on accountable, located claims (Haraway, 2013).

From a methods standpoint, groundtruthing can also enable translation across communities of practice. Critical reviews of 'IKS + GIS' hybrids in South African informal settlements show how participatory mapping and narrative methods can reframe hazard layers, revealing exposure pathways and coping practices that remote sensing alone would miss (Membele, Naidu and Mutanga, 2022). Participatory environmental health syntheses further demonstrate that co-design with affected communities not only improves construct validity but also mitigates ethical risks in data collection and use (Davis and Ramírez-Andreotta, 2021). In short, groundtruthing restores meaning to metrics by embedding numbers in lifeworlds, histories and power relations.

Groundtruthing is not a panacea. First, there is the risk of romanticising 'local knowledge' and overlooking internal heterogeneity, conflict or exclusion. Work on indigenous and local knowledge warns that uncritical celebration can obscure knowledge politics, including intra-community hierarchies and selective memory (Congretel and Pinton, 2020). Second, participatory processes can be co-opted, run as consultation theatre that extracts stories to legitimise preset plans, or that translates nuanced narratives into decontextualised anecdotes appended to dashboards (Klenk et al., 2017). Third, qualitative evidence often faces reproducibility anxieties in indicator-centric bureaucracies: officials ask for representativeness, margins of error or standardised categories that qualitative methods are not designed to provide. Finally, scale and comparability remain practical hurdles: narrative richness can struggle to travel across administrative levels and funding cycles that prize quick, comparable scores (Erkkilä, Peters and Piironen, 2016).

These risks argue not for abandoning groundtruthing but for designing it with power-awareness and procedural clarity: explicit sampling rationales; attention to dissenting voices; safeguards against tokenism; and protocols for how narratives inform decisions alongside models (Klenk et al., 2017; Davis and Ramírez-Andreotta, 2021).

### 2.3 Why the stalemate between groundtruthing and precisionism persists

The persistence of the stalemate between groundtruthing and precisionism is rooted in the hierarchies of credibility that structure evidence-based policymaking. Within dominant governance cultures, quantitative, model-based and indicator-driven forms of evidence enjoy an elevated status as the most legitimate and actionable knowledge. They align neatly with bureaucratic requirements for auditability, standardisation and cross-context comparability, which gives them procedural authority over narrative or experiential accounts. Precisionism thus delivers administratively legible outputs (scores, ranks, thresholds) that plug seamlessly into budgeting, procurement, performance management and donor reporting. These artefacts satisfy audit cultures and allow organisations to demonstrate ‘progress’ through indicator movement (Erkkilä, Peters and Piironen, 2016). By contrast, groundtruthing yields situated claims that demand interpretive labour: time to convene, negotiate meanings and steward relationships. When officials are evaluated on delivery against numeric targets within short cycles, it becomes rational to privilege metrics, even when they misdiagnose problems.

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Donor architectures often impose short proposal and reporting timelines, standardised logframes and cross-country comparability requirements. This biases evidence production toward tools that can be scaled quickly across contexts. Participatory components, if included, risk becoming add-ons that confer legitimacy without altering core decisions (Klenk et al., 2017). Meanwhile, many climate risks unfold over long horizons, but funding and political mandates turn over quickly, favoring interventions that produce immediately countable outputs (Funtowicz and Ravetz, 1993).

Remote-sensing products, digital registries and model pipelines are increasingly embedded in government IT stacks. Once procured and institutionalised, these systems create path dependencies: staff are trained to use them; contracts and maintenance cycles entrench them; and maps produced by these systems become the default boundary objects for interdepartmental work (Membele, Naidu and Mutanga, 2022). Qualitative repositories, story archives, oral histories, participatory maps, lack equivalent infrastructural backbone and often sit outside official data governance, making them harder to ‘see’ and reuse in formal processes (Davis and Ramírez-Andreotta, 2021).

Under conditions of high uncertainty and high stakes, officials face blame if decisions appear subjective. Metrics offer political cover: acting ‘according to the index’ diffuses responsibility even when the index is contestable (Funtowicz and Ravetz, 1993). Narratives that foreground injustice, by contrast, can render responsibility more explicit, potentially uncomfortable for institutions. The politics of who bears risk, who is heard and who must change are thus mediated by the evidentiary form itself (Latour, 2004; Haraway, 2013).

Even when mixed-methods projects exist, translation falters at the moment of decision. Without agreed protocols for triangulation, disagreement and weighting, teams revert to the most legible artefact, usually the map or score. Co-production literatures show that durable integration requires shared problem-framing, negotiated rules of evidence and boundary objects that honour both precision and meaning (Ostrom, 1996; Vincent et al., 2018). Absent these, integration is reduced to tokenistic annexing of quotes to indicator reports or, conversely, to dismissing models as ‘mere numbers’.

Grounded accounts frequently implicate land governance, informality regulation and political representation – issues that are administratively difficult and politically sensitive. It is institutionally easier to fund a sensor network or produce a new index than to address tenure insecurity or discriminatory service delivery. Consequently, the evidentiary forms that do not force structural questions forward are tacitly privileged.

### **3. Theoretical Framework**

#### **3.1 Paradigms and ‘normal science’ under stress (Kuhn; post-normal science)**

Kuhn’s account of scientific change is a useful starting point because it ties methods to historically situated paradigms, shared exemplars, problem frames and standards of validity that guide ‘normal science’ until anomalies accumulate (Kuhn, 1997). In climate-risk mapping, the dominant paradigm is metricised: hazards are modelled, exposures tallied, vulnerabilities indexed and risks ranked. This paradigm performs well where problems are tightly bounded, error structures are knowable and the politics of evidence are muted. But climate governance in the global South routinely violates these conditions: infrastructures are fragile and unevenly maintained, data are patchy, the distribution of harm is structured by history and decisions are high-stakes and value-laden. Kuhn’s lens helps explain why dissenting evidence – community narratives that challenge model outputs or qualitative accounts that reveal misfit interventions – tends to be treated as anomaly rather than as impetus for reframing the paradigm.

Funtowicz and Ravetz sharpen this diagnosis with their notion of post-normal science: contexts where ‘facts are uncertain, values in dispute, stakes high, and decisions urgent’ (Funtowicz and Ravetz, 1993, p. 744). Climate-risk governance fits this description precisely. Under post-normal conditions, the appropriate ‘peer community’ must expand beyond credentialed experts to include those who bear the risks and consequences of decisions. Crucially, post-normal science reframes quality control as extended peer review, where diverse stakeholders interrogate assumptions, boundary choices and the implications of uncertainty (Funtowicz and Ravetz, 1993). For climate-risk mapping, this implies that the legitimacy of a vulnerability index is not secured by statistical finesse alone, but by the participatory governance of its assumptions, calibration and use in decisions. Put differently, paradigms designed for laboratory-style certainty are under stress in field realities characterised by contested values and uneven power.

#### **3.2 Situated objectivity and the politics of nature/knowledge**

If post-normal science widens the circle of legitimate knowers, Haraway articulates why that widening is epistemically necessary. Her critique of the 'view from nowhere' rejects the fiction of disembodied objectivity and instead advances situated knowledges, claims that are accountable to the positions, relations and purposes that produce them (Haraway, 2013). 'Objectivity', in this sense, is not abandoned; it is re-specified as reflexive, located and responsive to power. In climate-risk mapping, a flood model and a resident's displacement narrative make different truth-claims because they are produced from different *standpoints*, with different entailments for whose safety counts and which losses matter (Bhanye, 2025b). A situated objectivity demands that we surface these standpoints (modeller, municipality, informal settlement resident), examine how they shape the categories we use (e.g. 'exposure', 'affected household') and design protocols that prevent any one standpoint from masquerading as universal.

Latour complements this move by refusing the separation of science and politics. In his account, facts are forged through networks of instruments, institutions and interests; nature is never simply 'out there', waiting to be read off a device (Latour, 2004). Metrics stabilise worlds by disciplining controversy and aligning actors; they are political technologies even when dressed in technical garb. For climate-risk mapping, this means vulnerability indices are not neutral mirrors; they enact a particular ontology of risk (e.g. as a summable composite attribute of places) and organise authority (whose models/thresholds govern allocation). Haraway and Latour together undercut the claim that the tension between 'metrics and stories' is a clash between objectivity and subjectivity. It is a clash between competing objects and competing publics, different ways of world-making with distinct accountability relations and distributional consequences (Latour, 2004; Haraway, 2013).

### 3.3 From extraction to co-production

Recognising the politics of evidence does not entail epistemic relativism. It points to the need for co-production: institutionalised practices that bring heterogeneous knowers into the design, generation and interpretation of evidence. Ostrom's work on polycentric governance and co-production in development emphasised that durable solutions emerge when users and producers of services cooperate across organisational boundaries, sharing problem definition and responsibility (Ostrom, 1996). Translated into climate-risk mapping, co-production means communities are not consulted merely as data sources; they are co-framing risk questions, co-designing indicators and co-interpreting outputs.

Klenk et al. (2017) push this further by warning against 'knowledge extraction', the instrumental harvesting of local knowledge to retrofit expert frameworks. Instead, they argue for moving from extraction to co-production frameworks that redesign power relations: negotiating ownership, authorship and benefit sharing; making room for dissent; and protecting the integrity of local categories rather than forcing them into expert taxonomies. Vincent et al. (2018) distil lessons for climate services: co-production is not a workshop but a process with multiple phases, relationship-building, joint design, iterative testing and decision translation, each with distinct capabilities and governance needs. Across this literature, the through-line is that integration is not a matter of stitching datasets together; it is a matter of institutions that govern who gets to define problems, what counts as evidence and how uncertainty and disagreement are handled.

A corollary is methodological. Co-production aims not to average away differences but to stage them productively. Mixed-method designs (e.g. mobile heat sensors + social diaries; participatory mapping + hydraulic modelling) are powerful only when paired with explicit triangulation and disagreement protocols, rules for when stories should override metrics (e.g. when models misrepresent lived access routes), when metrics should bound narratives (e.g. to avoid anecdotal overgeneralisation), and how to document residual disagreements alongside decisions (Klenk et al., 2017; Vincent et al., 2018). Without such rules, 'integration' collapses into tokenism: quotes pasted beside dashboards or, conversely, model skepticism that dismisses quantification wholesale.

### 3.4 Epistemic diplomacy: Working definition

Building on these strands, we define epistemic diplomacy as the deliberate, power-aware integration of quantitative and qualitative evidence through negotiated rules, joint interpretation and governance safeguards. It is deliberate: integration is planned as a multi-phase workflow with explicit roles, timelines and products (Vincent et al., 2018). It is power-aware: positionalities, ownership, authorship and consent are surfaced and governed so that communities' knowledge is not reduced to 'metrics fodder' (Haraway 2013; Klenk et al. 2017). It uses negotiated rules: teams agree ex ante how to weigh conflicting signals, how to treat uncertainty and how to revise models in light of grounded challenges – an operationalisation of post-normal extended peer review (Funtowicz and Ravetz, 1993). It centres joint interpretation: modellers, officials and community representatives sit together around boundary objects (maps, profiles, narratives) to make sense of patterns and to record both agreements and principled disagreements (Ostrom, 1996; Vincent et al., 2018). And it embeds governance safeguards: protocols for data stewardship, re-consent, attribution, benefit sharing and redress so that the process remains accountable over time (Klenk et al., 2017).

This working definition clarifies what epistemic diplomacy is not. It is not a call to dilute standards of rigour; rather, it multiplies them by adding reflexivity, positional accountability and extended peer scrutiny to conventional validation. It is not a technocratic recipe for 'data fusion'; it is a constitutional stance on how evidence is made authoritative in plural societies. And it is not a kumbaya of consensus; it institutionalises disagreement where appropriate, making dissent visible and decision-relevant instead of smoothing it away. Practically, epistemic diplomacy yields three families of artefacts:

1. **Boundary objects** that travel across communities of practice without erasing difference – e.g. dual-layer risk atlases where each metricised layer is paired with a situated narrative layer, each with provenance, confidence statements and justice notes (Latour, 2004; Haraway, 2013; Vincent et al., 2018).
2. **Procedural compacts**, that is, lightweight agreements that specify sampling logics, indicator/narrative pairings, escalation steps when signals diverge, and how decisions and trade-offs will be recorded and communicated (Funtowicz and Ravetz, 1993; Klenk et al., 2017).
3. **Stewardship regimes**, authorship and data-governance arrangements that recognise community contributions, permit re-use under negotiated terms and require periodic re-consent when products are repurposed (Ostrom, 1996; Klenk et al., 2017).

Taken together, Kuhn's paradigm lens explains why a metrics-first style became normal science in climate-risk mapping and why it resists challenge; post-normal science explains why that normal science is insufficient under real governance conditions; Haraway and Latour show that any evidentiary practice is positioned and political; and co-production scholarship provides actionable design principles for doing something better. Epistemic diplomacy names the institutional craft that operationalises these insights: a way to build bridges, not silos, so that risk maps carry both precision and meaning into decisions that shape lives and futures in the global South (Funtowicz and Ravetz, 1993; Ostrom, 1996; Latour, 2004; Haraway, 2013; Klenk et al., 2017; Vincent et al., 2018).

#### **4. Climate-risk mapping in practice: where gaps show**

##### **4.1 Typical pipelines (hazard → exposure → vulnerability → risk)**

Most government and donor toolkits operationalise climate risk through a linear pipeline: hazard (frequency, intensity, spatial footprint) → exposure (assets/people in harm's way) → vulnerability (susceptibility/adaptive capacity) → risk (often hazard × exposure × vulnerability). Hazard layers are commonly derived from historical observations and forward-looking models (e.g. rainfall extremes, coastal surge, heatwaves); exposure is tallied from census or asset inventories; vulnerability is compressed into a composite index (e.g. housing materials, income, age, disability); and a final risk surface is generated for prioritisation (Erkkilä, Peters and Piironen, 2016). This pipeline satisfies audit and procurement logics: standardised inputs, replicable steps, a single 'answer' that travels across departments and donors (Erkkilä, Peters and Piironen, 2016). Under post-normal conditions, uncertain facts, contested values, high stakes, the promise of linear tractability is attractive (Funtowicz and Ravetz, 1993).

In practice, the pipeline privileges what is measurable at scale and 'clean' enough for compositing. Physical hazards are richly parameterised; exposure is approximated with gridded population/asset data; and vulnerability becomes a score. The result is an elegant cartography of risk hot spots that can be compared year-on-year or city-to-city, precisely the legibility that index cultures reward (Erkkilä, Peters and Piironen, 2016). Yet that very elegance conceals systematic blind spots and distortions once the maps hit the ground.

##### **4.2 Where metrics fail: blind spots in informal settlements, gendered risks, data poverty**

###### **4.2.1 Informal settlements**

Composite indices frequently miss or misclassify risks in informal settlements because the data scaffolding is misaligned with lived urban form. Parcel and dwelling registries are incomplete; census small-area statistics are outdated or smoothed; drainage, tenure and service networks are poorly documented. Hydrological and GIS models can therefore generate plausible flood layers while under-representing how blocked drains, unlawful dumping linked to service gaps, and maintenance politics shape inundation pathways across shack settlements. Critical reviews of 'IKS + GIS' integrations confirm the pattern: remote-sensing proxies capture ponding but not access routes, emergency dispersion or micro-

elevations created by household adaptations (Membele, Naidu and Mutanga, 2022). Infrastructure-focused risk diagnostics compound the problem by emphasising asset fragility (pipes, culverts) while downplaying governance routines, procurement cycles, operations and maintenance, and tariff politics that produce vulnerability (Adeoti, Kandasamy and Vigneswaran, 2024).

#### **4.2.2 Gendered risks**

Heat-health, flood displacement and WASH burdens are routinely gendered, but vulnerability layers often operationalise gender as a binary demographic share rather than as socially produced roles and constraints (Udo et al., 2024). Systematic evidence shows that exposure to heat and adaptive capacity are stratified by work type, care responsibilities and housing conditions – dimensions that standard indices rarely encode (Slesinski et al., 2025). Following Cyclone Idai in Mozambique, gender-attentive narratives demonstrate how recovery is mediated by unpaid care, gendered access to documentation and assistance, and norms governing mobility – factors invisible to hazard and exposure arithmetic (Maviza et al., 2024). When these lived mechanisms are absent, maps risk naturalising disparate outcomes as if they were merely biophysical.

#### **4.2.3 Data poverty and false precision**

Where administrative data are sparse, indices lean on modelled surrogates (e.g. night-lights for income, roof reflectance for materials, gridded population for household counts). These can be useful, but they invite false precision: highly resolved risk rasters that rest on weak or context-insensitive proxies (Erkkilä, Peters and Piironen, 2016). Coastal risk mapping illustrates the point. High-resolution sea-level projections and digital elevation models sharpen spatial foresight, yet without attention to tenure regimes, livelihood dependencies and political voice, they can flatten justice claims and legitimise relocations that shift harms onto already precarious groups (Ashrafuzzaman, 2023). Similarly, ‘evidence-based’ land-use responses to deforestation in Brazil often hinge on aggregate indicators that obscure local political economies and enforcement asymmetries (Souza, 2024). In short, metrics travel well but can misdiagnose when the social production of risk is not modelled.

At root, these failures reflect the paradigm: a metrics-first ontology that treats vulnerability as a composite attribute of places rather than as a historically produced relation of power and infrastructure (Kuhn, 1997; Latour, 2004). Haraway’s critique of the ‘view from nowhere’ helps explain the allure: numbers appear universal, while situated narratives look parochial, reversing the real direction of accountability (Haraway, 2013).

### **4.3 Where stories struggle: policy uptake, comparability, scale**

If metrics stumble on meaning, stories stumble on uptake. Ethnographies and participatory accounts excel at tracing how risk is lived and governed, who gets flooded, who gets help, which infrastructures fail and why (Davis and Ramírez-Andreotta, 2021). But three hurdles recur.

**(a) Policy uptake and bureaucratic fit:** Narrative evidence demands interpretive labour, co-framing problems, convening deliberation, mediating disagreement – activities that do not slot easily into indicator-driven performance systems (Erkkilä, Peters and Piironen, 2016). Without procedural hooks (e.g. requirements for co-interpretation workshops or narrative indicators in TORs), stories are annexed as ‘context’ rather than treated as evidence that can discipline or revise models (Klenk et al., 2017).

**(b) Comparability and representativeness:** Decision makers trained in audit cultures request margins of error, sampling frames and harmonised categories that qualitative methods are not designed to provide. This creates reproducibility anxieties that can unfairly discount narrative findings or force premature quantification that strips them of meaning. Participatory work from environmental justice shows that co-designed protocols can strengthen construct validity, but only when knowledge governance is explicit about what stories are for in the decision pipeline (Davis and Ramírez-Andreotta, 2021).

**(c) Scale and durability:** Stories travel poorly without boundary objects: maps, briefs, dashboards that preserve their integrity while interfacing with model outputs. Absent such objects, narratives stay local; with them, they risk tokenism if reduced to illustrative quotes that decorate dashboards (Klenk et al., 2017; Membele, Naidu and Mutanga, 2022). Work with Turkana pastoralists demonstrates what successful travel can look like: indigenous mobility logics and reciprocal support networks were translated into anticipatory-action triggers and route planning because methods were paired with decision-specific artefacts (Opiyo et al., 2015).

These constraints do not indict qualitative or participatory approaches; they indict institutions that have not been designed to receive them. Post-normal science anticipates this: when values are in dispute and stakes are high, extended peer review is not a luxury but a quality-assurance requirement (Funtowicz and Ravetz, 1993).

#### **4.4 Diagnostic: a ‘failure modes’ matrix (methods × decision context × power relations)**

Climate-risk mapping rarely fails on technique alone; it fails where methods collide with decision contexts and underlying power relations. Building on the arguments above, this section introduces a practical matrix (Table 1) that pairs methods emphasis (metrics-dominant, story-dominant or mixed-method) with typical decision arenas (e.g. emergency allocation, urban upgrading, coastal retreat, donor budgeting, early warning, regulatory reform, multi-stakeholder planning and programme M&E). For each pairing, we flag a recurrent failure mode, the operational signals that it is occurring and concrete fixes that embed epistemic diplomacy (triangulation rules, co-interpretation, equity filters, governance diagnostics, consent/re-consent, versioning).

**Table 1: Diagnostic ‘failure modes’ matrix (methods × decision context × power relations)**

Methods emphasis	Decision context (power/audit conditions)	Typical failure mode	Signal to watch for	Practical fix (what to add/require)
Metrics-dominant (RS, hydro/heat models, composite indices)	Emergency allocation under time pressure (centralised; high auditability)	Threshold tyranny: preset cut-offs gate resources; small biases exclude vulnerable groups	Clean dashboards; muted community dispute; edge cases falling below cut-off	Publish confidence statements; add disagreement protocols; allow narrative overrides for edge cases; record rationale for exceptions
Metrics-dominant	Urban upgrading & service planning (multi-actor; entrenched inequalities)	Infrastructure essentialism: assets drive priorities; tenure/informality/O&M vanish	Capex clusters where data are richer, not where need is higher	Pair indices with governance diagnostics (O&M, procurement, tenure) + participatory transects; require co-interpretation workshops before final ranking
Metrics-dominant	Coastal retreat/adaptation (contested land & livelihoods)	Decontextualized foresight: elevation+SLR justify relocations that externalise costs	Technocratic plans with weak livelihood/tenure analysis	Embed justice notes + livelihood/tenure profiles alongside hazard layers; use dual-layer atlases (metric+narrative)
Story-dominant (ethnography, life histories, participatory mapping/storytelling)	Strategic budgeting & donor negotiations (cross-city comparability)	Local richness, global silence: narratives don't translate; budgets revert to indices	Strong case reports, weak budget traction	Co-design portable indicators from narratives (e.g. access-disruption days, care-burden multipliers) and pair with minimal metrics for comparability
Story-dominant	Early warning & anticipatory action	Untriggered wisdom: local thresholds not wired into EWS triggers	After-action praise for local knowledge; triggers remain purely meteorological	Co-produce trigger matrices that integrate local signals with forecasts; specify who can pull the trigger and evidence required
Story-dominant	Regulatory reform & rights claims (tenure, informality, resettlement)	Testimony fatigue: rich accounts, no institutional hooks; reforms stall	Recurring hearings/consultations; little rule change	Create procedural compacts: narrative evidence requirements in EIAs/relocation TORs; timelines + escalation steps when narratives and metrics diverge
Mixed-method (integration intended; weak rules)	Multi-stakeholder planning (city climate strategies)	Tokenistic annexing: single composite map dominates; stories as sidebars	Final output = one map + quotes	Joint authorship of products; publish versioned disagreements (model vs. community; why both persist)
Mixed-method	Programme M&E (justice + effectiveness)	What counts is what can be counted: qualitative outcomes excluded	Glossy scorecards; thin learning loop	Adopt hybrid metrics derived from participatory outcomes; include qualitative indicators with governance for verification

Across the matrix, the root cause is not that one method is ‘wrong’, but that power-aware rules of engagement are missing. Absent negotiated protocols, metrics obtain default authority because they satisfy audit cultures and plug into data infrastructures; stories remain advisory. Conversely, elevating stories without guardrails can invite overgeneralisation or elite capture (Congretel and Pinton, 2020). Post-normal science offers the quality principle – extended peer review and co-production provides the institutional grammar (relationship-

building, joint design, iterative testing, decision translation) for stitching the parts together (Funtowicz and Ravetz, 1993; Ostrom, 1996; Vincent et al., 2018).

What follows in the paper operationalises this diagnosis into epistemic diplomacy: boundary objects (e.g. dual-layer risk atlases with justice notes), procedural compacts (triangulation and disagreement rules; authorship/attribution norms) and stewardship regimes (consent/re-consent; benefit sharing) that allow metrics and meanings to co-govern climate-risk decisions in context (Latour, 2004; Haraway, 2013; Klenk et al., 2017; Vincent et al., 2018).

## 5. Epistemic Diplomacy Framework (the 'how')

This section turns diagnosis into design. Epistemic diplomacy is not a slogan for 'being inclusive'; it is a concrete, governable workflow for producing, weighing and using mixed evidence under post-normal conditions, where facts are uncertain, values disputed, stakes high and decisions urgent (Funtowicz and Ravetz, 1993). It is grounded in situated objectivity (Haraway, 2013), treats metrics and narratives as co-produced political technologies (Latour 2004) and operationalises co-production so that communities are partners in framing, generating and interpreting evidence (Ostrom, 1996; Klenk et al., 2017; Vincent et al., 2018). Below, we articulate five first-order principles, a three-phase operating model with ten steps, governance safeguards to prevent extraction and tokenism, and a methods menu to help teams assemble practical, robust pairings of quantitative and qualitative techniques.

### 5.1 Principles (the five Ps)

1. **Pluralism:** Treat multiple knowledge traditions as necessary for quality under conditions of uncertainty and contestation. This is the implication of post-normal science's extended peer community: those who bear consequences must also shape evidence and its quality control (Funtowicz and Ravetz, 1993). Pluralism is not an aesthetic preference; it improves construct validity and problem fit (Davis and Ramírez-Andreotta, 2021).
2. **Power-awareness:** Make positionalities and asymmetries explicit. Metrics and maps travel with more institutional authority than stories; conversely, narratives often carry justice claims that unsettle allocation routines (Latour, 2004; Haraway, 2013). Power-aware practice designs for these asymmetries, e.g. through authorship rules, benefit sharing and escalation pathways when methods disagree (Klenk et al., 2017).
3. **Procedural clarity:** Agree, in advance, on rules of evidence: how to triangulate, how to register disagreement and how to revise models or narratives when challenged. Without such rules, 'integration' collapses into tokenistic annexing of quotes to dashboards (Klenk et al., 2017; Vincent et al., 2018).
4. **Proportionality:** Match evidentiary burden to decision impact. High-stakes, irreversible choices (e.g. managed retreat) require deeper co-production, stronger consent and thicker triangulation than exploratory scoping (Funtowicz and Ravetz, 1993; Klenk et al., 2017).
5. **Public value:** Aim beyond technical adequacy to justice-sensitive usefulness: evidence should improve how risks are governed for those most exposed, not only how they are

measured. This requires embedding equity checks directly into mapping and translation steps (Vincent et al., 2018).

## 5.2 Operating model (three phases, ten steps)

To move from principles to practice, this section specifies a governable workflow for producing and using mixed evidence under post-normal conditions. The model unfolds in three phases, (I) co-frame & design, (II) generate, document & adjudicate, and (III) make sense, decide & learn, broken into ten concrete steps that lock in pluralism, power-awareness and procedural clarity. Each step names its purpose, core activities, expected artefacts and the safeguards that prevent tokenism and false precision (e.g. consent ladders, triangulation and disagreement logs, equity filters, versioning).

Table 2 summarises the operating model as a compact, reusable checklist: start in Phase I to define the decision and data design with affected publics; execute Phase II to generate paired quantitative–qualitative streams with transparent provenance and conflict mediation; and complete Phase III to convert evidence into policy-ready artefacts while documenting equity impacts and versioned changes.

**Table 2: Operating model (three phases, ten steps)**

Phase	Step	Purpose	Key inputs & activities	Outputs / boundary objects	Governance & safeguards (examples)
<b>I. Co-frame &amp; design</b>	1. Co-framing problems & ethics	Define the decision, scale(s), and ethical baseline; bring extended peers in <i>upstream</i> .	Convene modelers, municipal officials, community reps; agree consent/re-consent, data-use; surface locally salient categories (access routes, caregiving burdens, tenure precarity).	Problem brief; stakeholder map; ethics/consent note.	Consent plan; roles & responsibilities; dissent capture; extended peer review.
	2. Joint data design (quant + qual)	Decide what will be measured and listened to—and why.	Specify RS/sensors/admin data alongside ethnography, CB-GIS, life histories; document sampling logics (for numbers & narratives); pre-pair indicators ↔ narratives (e.g., flood depth ↔ evac-blockage storylines).	Data-design sheet; indicator–story pairing matrix; metadata templates.	Authorship expectations; access tiers for sensitive assets; minimum metadata.
<b>II. Generate, document &amp; adjudicate</b>	3. Data generation	Produce the mixed evidence.	Deploy sensors/assemble model inputs; transect walks, interviews, photovoice, community mapping; note O&M, procurement delays, informal workarounds.	Cleaned datasets; story sets; flood/heat rasters; governance notes.	Safety plans; anonymisation; fair compensation for participation.
	4. Meta-dataing	Make provenance, positionalities, uncertainty, and gaps explicit.	Record model assumptions, training-data gaps, uncertainty bands; sampling frames, dissenting voices; write confidence narratives for qualitative streams.	Provenance registry; confidence table (quant + qual).	Re-use conditions; re-consent triggers; privacy-by-design.

	5. Triangulation	Systematically classify agreement/divergence before interpretation.	Apply pre-agreed rules: upgrade where signals converge; trigger diagnostics where they diverge (proxy wrong? boundary mis-set?).	Triangulation log; 'evidence traffic-light' overlays.	Third-party check of rules; publish log.
	6. Conflict mediation	Treat persistent divergence as decision-relevant; resolve or record.	Commission micro-surveys, targeted re-modelling, sensor micro-studies + diaries; convene mediators.	Mediation memo; revised/annotated layers; recorded reasons.	Time-boxed escalation path; impartial facilitation; carry forward principled disagreement.
<b>III. Make sense, decide &amp; learn</b>	7. Co-interpretation workshops	Joint sense-making using boundary objects.	Put dual-layer maps, risk profiles, traffic-lights on the table; derive options; record agreements + principled disagreements.	Versioned atlas; decisions-rationale sheet.	Participation quorum; anti-tokenism rule (no final map without co-interpretation).
	8. Equity filters	Embed justice checks pre-decision.	Run 'who benefits/loses?'; check tenure/care burdens; ensure O&M/governance bottlenecks addressed—not just capex.	Equity-impact note; mitigation list.	Public disclosure; grievance/redress route; distributional analysis.
	9. Decision translation	Fit evidence to bureaucratic pathways without dissolving meaning.	Draft procurement-ready specs (engineering + O&M/governance), budget notes, relocation briefs (livelihood/tenure), EWS trigger matrices (model thresholds + local signals).	Policy-ready artefacts; SOP/trigger matrices.	Attribution & licensing; include narrative-derived indicators in criteria.
	10. Iteration & versioning	Keep products alive; enable learning and scrutiny.	Publish v1.0 layers + narrative overlays; update to v1.1 after mediation; maintain living working paper (methods, assumptions, disagreements, decisions).	Change-log; updated maps/dashboards; lessons log.	

Each step addresses a specific failure mode identified earlier: co-framing counters problem mis-specification; joint design prevents extraction; meta-dataing undercuts the 'god trick'; triangulation/mediation prevent both threshold tyranny and untriggered wisdom; equity filters resist infrastructural essentialism; decision translation prevents rich evidence from dying in reports; versioning builds institutional memory (Latour, 2004; Haraway, 2013; Klenk et al., 2017; Vincent et al., 2018; Adeoti, Kandasamy and Vigneswaran, 2024).

### 5.3 Governance safeguards

Governing mixed evidence requires more than good intentions; it needs rules that redistribute credit, protect participants and hard-wire accountability. First, authorship and credit must reflect co-production rather than extraction. Maps, briefs, codebooks and dashboards should be jointly authored with explicit contribution statements so community partners are visible as co-producers, not mere data suppliers. This rebalances epistemic credit and shifts incentives away from harvesting stories to genuinely sharing authority (Klenk et al., 2017).

Second, data stewardship and provenance should be formalised. Teams need a living register of datasets and narratives that records access conditions, consent status and re-use constraints. FAIR-style practices only go so far; they must be coupled with community-centred governance that specifies who may download narrative assets, when re-consent is triggered and how derivative products attribute sources (Vincent et al., 2018; Davis and Ramírez-Andreotta, 2021).

Third, treat consent as iterative, not a one-off signature. Initial consent covers collection; new uses, such as repurposing story material for a citywide dashboard – require re-consent. Refusals and dissent should be recorded and refusal must never bar access to programme benefits. This approach recognises that risk profiles change as products travel and audiences widen (Davis and Ramírez-Andreotta, 2021).

Fourth, adopt anti-tokenism rules that prevent decorative participation. No composite map should be deemed final without a co-interpretation workshop; disagreements between models and narratives must be logged and made public; and for high-stakes decisions at least one narrative-derived indicator should be included in the formal criteria. These guardrails ensure that stories shape outcomes rather than garnish them (Klenk et al., 2017).

Fifth, prioritise safeguarding and harm minimisation. Narrative material can re-identify vulnerable groups, especially in contexts of tenure precarity or policing. Apply privacy-by-design, aggregation, masking, controlled access and conduct risk assessments before releasing any product that could enable targeting or stigmatisation (Haraway, 2013; Davis and Ramírez-Andreotta, 2021).

Finally, ensure institutional anchoring so safeguards survive personnel changes and project cycles. Build requirements into terms of reference and procurement: mixed-method co-production, equity filters, disagreement logs and versioned artefacts should be contractual deliverables. Embedding these elements aligns epistemic diplomacy with the ‘index cultures’ that otherwise privilege metrics alone, and helps make justice-sensitive evidence auditable within standard bureaucratic routines (Erkkilä, Peters and Piironen, 2016; Vincent et al., 2018).

#### **5.4 Methods menu for integration (practical pairings)**

This section turns epistemic diplomacy into concrete method pairings that teams can deploy under real programme constraints. Table 3 lists actionable mixes of quantitative and qualitative approaches, organised by climate decision arena, and shows (i) what each stream contributes, (ii) the rules for stitching signals together (triangulation and disagreement protocols), and (iii) the policy-ready artefacts you can hand to officials (e.g. trigger matrices, O&M specifications, managed-retreat briefs). The aim is not to be exhaustive, but to provide reusable templates that travel across cities without erasing context. The menu below is not exhaustive, but it illustrates pairings that have proven actionable in global South contexts and why.

#### **Table 3: Methods menu for integration (practical pairings)**

Climate decision arena	Pairing (Quant ↔ Qual)	What each adds	How to stitch them (rules/triangulation)	Policy-ready artefact
Urban heat & health	Heat sensors ↔ Social diaries	Micro-climates ↔ Symptoms, work/care rhythms, night sleep disruption	If diaries show severe distress but ambient peaks are moderate, probe indoor heat, housing materials, and care burdens; derive a portable 'heat-interference days' indicator	Targeting note for cooling/retrofit; clinic staffing & outreach plan
Flooding in informal settlements	CB-GIS (household/transect mapping) ↔ Risk ranking with depth-duration rasters	Pathways, blockages, safe nodes ↔ Hydraulics and depth	Allow narrative overrides where modeled flows contradict observed micro-elevations/adaptations; pair with O&M duties	O&M-first spec + micro-works list; ward-level risk atlas
Coastal/riverine risk	LiDAR/DEM + SLR scenarios ↔ Transect walks & access audits	Inundation corridors ↔ Evacuation feasibility shaped by tenure, fences, policing	Apply equity filters: no relocation/protection without livelihood & tenure profiles; attach justice notes to maps	Managed-retreat brief with compensation & sequencing options
Food insecurity under climate stress	Market/price time-series ↔ Food diaries & focus groups	Supply shocks & volatility ↔ Meal skipping, substitution, care redistribution	Assistance trigger matrix = price threshold and diary threshold; document sampling & limits	Targeting matrix for cash/food aid; surge SOPs
Heat/flood morbidity pathways	Epidemiological time-series ↔ Photovoice & home audits	Facility cases ↔ Causal pathways (water ingress, mold, heat traps)	Mediation protocol: if clinic data ≠ lived symptoms, commission targeted micro-surveys/sensor study before scaling	Clinic-community joint brief; retrofit checklist for homes/clinics
Deforestation / urban expansion	Remote sensing of land change ↔ Policy ethnography & document analysis	Hotspots & trends ↔ Enforcement asymmetries, land deals, political economy	Pair alerts with accountability trail; report response time and rule bottlenecks; prioritise rule reforms not just surveillance	Enforcement dashboard with context notes; regulatory amendment memo
Pastoral systems (anticipatory action)	Drought indices (SPEI/NDVI) ↔ Mobility mapping & reciprocity networks	Vegetation/moisture signals ↔ Social response capacity & routes	Co-designed trigger matrices combining model + local thresholds; specify who can pull the trigger and evidence required	Anticipatory-action SOP with dual triggers; pre-positioning plan
Urban services resilience	Infrastructure stress testing ↔ Governance diagnostics (O&M, procurement, tariffs, informal provision)	Physical fragility ↔ Institutional bottlenecks causing failure	Make capex contingent on O&M reforms; publish maintenance SLAs; include community-supervised routines	

Across these pairings, the unit of quality is not any single dataset but the protocol that binds them: co-framed questions, documented positionalities, triangulation and disagreement rules, and equity filters that shape translation into policy (Funtowicz and Ravetz 1993; Klenk et al., 2017; Vincent et al., 2018). This is what distinguishes epistemic diplomacy from ad hoc mixed methods. Practiced faithfully, epistemic diplomacy produces (i) boundary objects that travel across communities of practice without erasing difference; (ii) procedural compacts that stabilise how evidence is compared, contested and used; and (iii) stewardship regimes that honour authorship, protect against harm and sustain learning through versioning. In

short, it operationalises plural, power-aware, public-value evidence for climate-risk decisions – so that the maps we make carry both precision and meaning (Funtowicz and Ravetz, 1993; Ostrom, 1996; Latour, 2004; Haraway 2013; Klenk et al., 2017; Vincent et al., 2018).

## 6. Conclusion: From silos to bridges

Climate-risk mapping in the global South remains trapped in a counterproductive binary. On one side, precisionism: indices, dashboards and models, offers legibility and speed, yet too often treats technical refinement as if it were sufficient, producing a metrics mirage that depoliticises inequality and misdiagnoses need. On the other, groundtruthing, ethnography, participatory mapping and life histories restore meaning and justice claims, but struggle to travel through bureaucracies optimised for standardised numbers. Neither side can carry the full burden of decision quality when facts are uncertain, values are contested, stakes are high, and timelines are urgent. What is needed is epistemic diplomacy: a power-aware, procedural craft that integrates quantitative and qualitative evidence through negotiated rules, joint interpretation and governance safeguards.

Plural evidence is not a concession to politics; it is a condition for quality. Objectivity becomes stronger when it is situated, when positionalities are made explicit and claims are held accountable to the social relations that produce them. Maps and metrics are not neutral mirrors; they are political technologies that organise attention, align interests and stabilise particular worlds. In this light, quality is not merely a property of datasets, but the outcome of procedures that widen who counts as a knower and make disagreement visible and governable. This paper has translated that stance into five principles (the five Ps), a three-phase, ten-step operating model, concrete boundary objects (story-enabled atlases, dual-layer dashboards, evidence traffic lights) and governance safeguards (authorship equity, consent ladders, provenance and versioning).

The payoffs are practical. In flood mapping, pairing hydraulics with community story-maps shifts resources from capital-expenditure-only fixes to maintenance and micro-works that residents know will unblock systemic failures. In heat-health, narrative-derived indicators such as ‘heat-interference days’ direct targeting toward indoor heat traps and care burdens that ambient metrics miss. In coastal planning, adding tenure and livelihood justice notes curbs relocations that would externalise costs onto precarious groups. In pastoral systems, combining mobility logics with vegetation and drought indices authorises earlier, smarter anticipatory action. Across these domains, versioned products and disagreement logs convert contestation from a reputational risk into a core mechanism of quality assurance.

The call to action is deliberately pragmatic. First, turn triangulation rules, mediation steps and equity filters into contractual deliverables and auditable items in monitoring and evaluation, not workshop aspirations. Second, embed authorship equity, consent and re-consent, and data stewardship in procurement, terms of reference and funding agreements so that participatory outputs are not reduced to ‘metrics fodder’. Third, require governance diagnostics alongside engineering designs; otherwise, model-led projects will continue to ignore the operations-and-maintenance, tenure and service-delivery politics that actually produce vulnerability. None of this dilutes rigour; it expands what rigour must include under real governance conditions.

Next steps should be concrete and comparative. Launch city- or county-scale pilots that adopt the full epistemic-diplomacy bundle for a specific decision arena – such as informal-settlement flood mitigation, heat-health targeting or coastal retreat – and treat each pilot as a living working paper with public change-logs, confidence narratives and disagreement registers. Fund paired studies that compare ‘model-only’ against ‘hybrid-protocol’ workflows on the same problem, evaluating not just predictive accuracy but allocation fit, distributional outcomes and institutional uptake, and explicitly measuring how equity filters and narrative-derived indicators change targeting and costs. Build and maintain an open repository of tools – methods cards for narrative-derived indicators, exemplar justice notes, consent-ladder templates, triangulation and mediation checklists, provenance registry schemata and dual-layer atlas layouts – so teams can reuse, adapt, and iterate rather than relearn. Include governance components such as contribution statements and reuse licences alongside code and data formats, recognising that infrastructures stabilise worlds, not only workflows.

The stakes are high. As climate impacts intensify, index cultures will continue to reward what travels quickly. Epistemic diplomacy offers a way to match that legibility with justice-sensitive usefulness, so that the maps we make carry both precision and meaning into the decisions that determine who floods, who moves, who pays and who thrives. The bridge is built not by averaging numbers and stories, but by institutionalising the protocols that let them contend productively, in public, and for the public good.

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