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2025

SAMEA

STRENGTHENING THE SOUTH AFRICAN M&E COMMUNITY:
CELEBRATING A LEGACY OF 20 YEARS

Contributions and contradictions of AI in climate-focused evaluations

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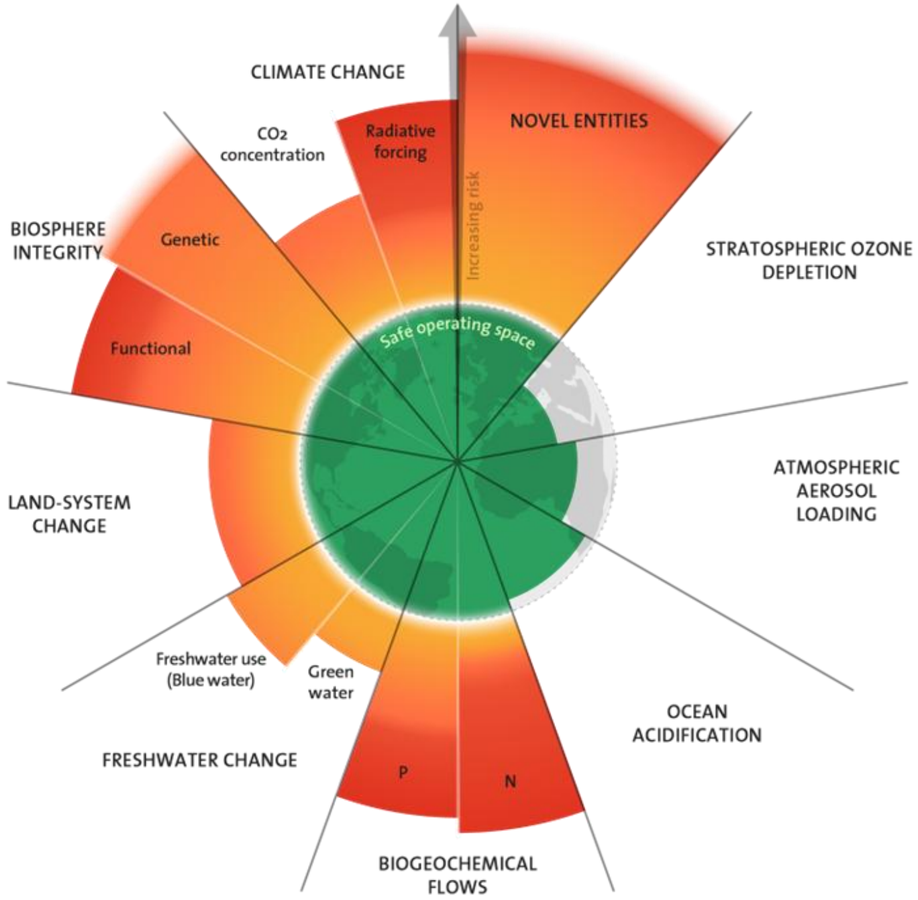
4 June 2025; 14h00 SAST

The current realities of our planet



Credit: "Azote for Stockholm Resilience Centre, based on analysis in Richardson et al 2023"

https://human-level.ai/widening-gaps-how-ai-could-exacerbate-global-inequality/

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“Like climate change, AI represents another major shift that we must navigate collaboratively. … Our experience addressing the climate transition offers crucial insights for the ongoing AI governance discussion. The key justice principles—distributive, procedural, and recognition—that guide climate action also apply to the AI transition.”
Canpolat & Rahim, World Bank Blogs March 2024

Speakers

Sinenhlanhla Tsekiso
SAMEA Board Member;
CLEAR-AA

Jason Bygate
Director, Capacitate Social Solutions
SAMEA MERL Tech Working Group

Rebecca Mbaya
Researcher, Writer & Social Innovation Strategist

Jennifer Norins
SAMEA Chair;
MIET Africa

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Session focus

- Explore the contributions and contradictions of AI and big data in relation to issues of climate change and just transition, specifically as it relates to evaluation
- Jason Bygate will speak to the opportunity that AI presents for evaluation and climate change evaluation in particular
- Rebecca Mbaya will focus on the social and environmental costs of AI
- Jennifer Norins will introduce participants to evaluation criteria looking at issues of equity and climate and ecosystems health
- Question and Answer segment providing participants an opportunity to engage the speakers

The Promise of AI in Climate-Focused (and other) Evaluations

04-05-2025

Jason Bygate
jason@capacitate.co.za

The Potential

Moving From Data Overload to Climate Foresight – How AI is Changing the Game

"We’re drowning in data, but starving for insight."

Enhanced Data Analysis and Predictive Modelling

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AI algorithms can process vast datasets from diverse sources—satellite imagery, sensor networks, and historical climate records—to identify patterns and predict future climate scenarios with greater accuracy.

For instance, AI models have been instrumental in forecasting extreme weather events, enabling timely interventions and resource allocation.

Configurable Agentic AI: The Next Frontier in Real-Time Climate Intelligence

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- Dynamically Curating Knowledge Bases for Retrieval Augmented Generative (RAG) AI
- APIs for Database conversations
- MCP servers extending the range of agent capabilities and data sources
- Real-time monitoring and workflow with Agent swarms

AI and the Convergence of Emerging Technologies: Expanding the Climate Intelligence Ecosystem

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The convergence of AI with the Internet of Things (IoT), blockchain, and drone technology diversifies the range of data available for AI to assimilate and analyse.

- **IoT**: Sensors collect real-time environmental data, which AI analyzes to monitor climate variables and ecosystem health.
- **Blockchain**: Ensures data integrity and transparency, facilitating trust in climate data reporting and carbon credit systems.
- **Drones**: Provide high-resolution imagery for monitoring deforestation, glacier retreat, and other environmental changes, with AI enhancing image analysis and interpretation.

Decision-Making in a World on Fire – AI as Your Policy Partner

Decision Support and Policy Formulation

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AI-driven insights inform policymakers by simulating the outcomes of various climate interventions, aiding in the formulation of effective and adaptive strategies.

The Pitfalls

Ethical Considerations and Exclusion

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1. Cultural Bias in AI Systems

- AI models are only as unbiased as the data they are trained on. Predominantly Western-centric datasets can lead to models that don't accurately reflect or serve diverse populations, particularly in the Global South.
- This bias can result in misinformed policies that fail to address the specific needs and contexts of marginalized communities.

Ethical Considerations and Exclusion

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2. Barriers to Access and Inclusion

- The deployment of AI technologies often requires substantial infrastructure, technical expertise, and financial investment—resources that are scarce in many developing regions.
- This digital divide exacerbates existing inequalities, leaving vulnerable populations without the benefits of AI-driven solutions.

Towards a Human-Centred Approach

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To harness AI's potential responsibly, we must:

- Promote Inclusive Data Practices: Ensure datasets represent diverse populations and contexts to mitigate bias.
- Enhance Accessibility: Invest in infrastructure and capacity-building in underserved regions to democratize AI benefits.
- Prioritize Sustainability: Develop energy-efficient AI models and consider the environmental footprint of AI technologies.
- Foster Ethical Governance: Establish frameworks that guide the ethical development and application of AI, emphasizing transparency, accountability, and community engagement.


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The Hidden Cost of AI in Climate-focused Evaluation

04-05-2025

Rebecca Mbaya
reambaya@outlook.com

AI is not Weightless

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AI hardware relies heavily on 3 critical minerals

1. Cobalt: DRC supplies **76% of global cobalt** production (**244,000 tonnes in 2024**), driven by industrial mining giants.

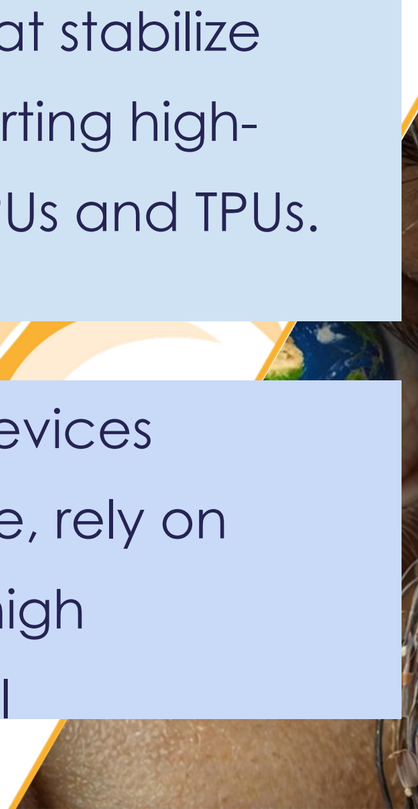
→ Lithium-ion batteries, which power AI servers/data centres, mobile devices, and electric vehicles (EVs)

2. Coltan: DRC holds **60%** of **global coltan reserves**, primarily in the conflict-prone Kivu region.

→ Essential for capacitors that stabilize voltage in AI chips, supporting high-speed computation in GPUs and TPUs.

3. Lithium: production is geographically dispersed including Australia (52%), Chile (25%), and China (13%).

→ Essential for portable AI devices renewable energy storage, rely on lithium's lightweight and high electrochemical potential



Hidden Cost 1: Resource Wars, Community Displacement & Environmental destruction

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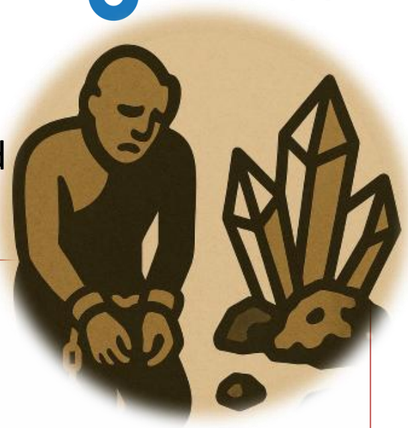
Tech/AI Companies

Demand drives conflict over mineral resources for AI development

Resource Wars

Armed groups control mining territories

Communities caught in conflict zones and forced in mining activities



Unethical Mining

Cobalt: Industrial mining emits 15–20 kg of CO_2 per kg of cobalt, with artisanal mining causing soil erosion and water contamination.

Coltan: Deforestation for mining in Kivu has reduced biodiversity by **40%** since 2010.

Mining Environmental Impact

The Evaluation Blind Spot: We measure intervention outcomes but not evaluation tool impacts

- Soil degradation affecting agricultural communities
- Energy consumption: Diesel generators in remote mining areas
- **e-waste**: After 2-3 years, obsolete AI hardware returns to these same communities as toxic e-waste

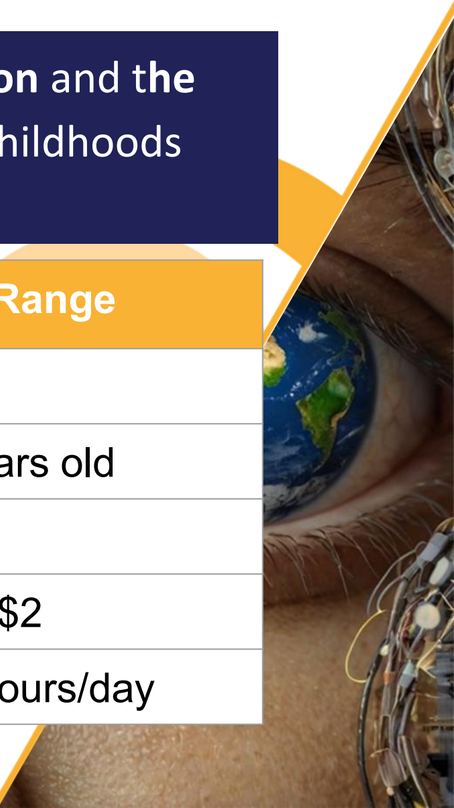
Hidden Cost 2: Child Labor

Right now, a child in the DRC is mining cobalt that will power:

1. The AI model predicting tomorrow's drought in Kenya
2. The climate interventions developed based on those AI predictions
3. The AI tools that evaluators will use to assess these interventions
4. The celebration of all 3 as 'climate progress' at the next Global AI Summit on Africa

The child powers **the prediction**, **the intervention**, **the evaluation** and t**he celebration,** but none will mention the 40,000 children whose childhoods were stolen…

Key Statistics	Estimate/Range
Estimated child miners (nationwide)	~40,000
Age range	From 6 years old
Children identified in Haut-Katanga & Lualaba by ILO	6,200+
Typical daily wage	Less than $2
Typical working hours	Up to 12 hours/day



The four-stage cycle breakdown

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AI Prediction
=
Primary Exploitation

1

The exploitation becomes embedded in the foundation of climate response systems

AI-enabled interventions
=
Systemic Exploitation

2

The exploitation gets legitimacy = Evaluators use of AI evaluation tools give scientific credibility to the exploitative system

AI-assisted Evaluation
=
Validated Exploitation

3

The exploitation becomes invisible in success narratives = the child disappears completely from official narratives of success

AI Celebration
=
Institutionalized Erasure

4

Celebration creates more demand, more mining, more children

You Are Here

Implications for Low-Resource Settings

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Should We Be Concerned About Digital Tech Resource Demands?

Yes, because these demands create **New Dependencies**:

- Computing infrastructure: Requires massive energy investment
- Technical expertise: Brain drain to wealthy nations
- Data sovereignty: Loss of control over local climate data
- Economic dependency: Paying for tools built with their resources

Current Efforts to address the hidden costs of AI tools

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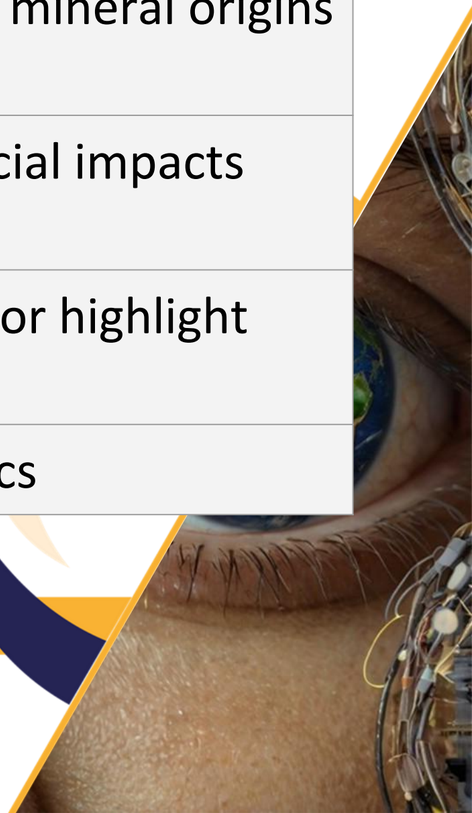
Due Diligence Frameworks	The OECD and ILO provide guidelines for supply chain transparency, requiring companies to investigate and mitigate child labor risks
	Initiatives like the Responsible Minerals Initiative pilot blockchain and AI tools to trace cobalt and cotton supply chains
AI-Driven Solutions	Blockchain traceability and AI-powered analytics are being used to map mineral origins and flag high-risk suppliers
	Tools like sustainability scoring systems evaluate environmental and social impacts across supply chains
Regulatory Pressure	Lawsuits against major tech firms for alleged complicity in DRC child labor highlight legal and reputational risks
	The EU AI Act and GDPR mandate stricter oversight of supply chain ethics

While awareness of AI's hidden costs is growing, the evaluation field has yet to systematically embed these considerations into standard practice.



The Evaluator's Unique Position

We can't step outside these extractive systems, but we can choose how we participate and move from complicity to consciousness/embed these considerations into standard practice.

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True Cost Accounting

1. Acknowledge Complicity

- Our evaluation (tech)tools are embedded in extractive systems
- We benefit from infrastructure built on exploitation
- Our silence legitimizes these systems

2. Choose Conscious Participation

- Center affected communities in our methodologies
- Question power structures in our frameworks

3. Evaluate Responsibly

- Draft a Personal AI policy for evaluation work
- Create concrete tools to measure the impacts of AI tools used:
  - Carbon footprint calculators for digital evaluation methods
  - Supply chain impact assessments for evaluation technologies
  - Community consent protocols for AI-assisted data collection
- Disclose AI use transparently in all evaluation reports and methodology sections (name the hidden costs in our evaluation reports)
- Report the tool impact findings alongside program impact findings
- Mentor other evaluators on conscious AI use and hidden cost awareness


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Criteria for including equity and climate and ecosystem health in evaluations

04-05-2025

Jennifer Norins
chair@samea.org.za

The human/environment nexus

We need to move away from nature as something to be exploited, to an understanding that **only through a healthy ecosystem can humans thrive.**

Fixing structural social deprivation must be part of solution – from private luxury for a few to public abundance and private sufficiency.

How can M&E contribute?

- **Mainstreaming climate/ecosystems and equity into all evaluations**, so all interventions are looking at how they can be regenerative, and respond to the social needs of citizens

Criterion	**Transformative equity -** The extent to which an intervention's objectives, design, implementation and impact contribute to, or do not contribute to, addressing systemic inequities and promote a more inclusive society
Dimensions	**1. Population/ populace**: Who benefits/who loses, Who is included/who is excluded e.g., engagement with African women, children and young people, NEETs, and persons with disabilities
	2. Cause and effect: How does inequity play out and how is the intervention responding to inequality e.g., ownership and control of assets, wage disparities between sectors, and disparities in quality of education between schools in former homelands and former all-white schools
	3. **Space**: Where do key inequities persist and what are the geographical and spatial factors affecting equity. e.g., differential effects of interventions play out in different communities such as rural, informal settlements, formalised peri-urban townships, traditional formal urban centres.
	4. **Content and intention**: What is the transformative change potential of the intervention? Are interventions designed to contribute to the progressive change for a more equitable South Africa?
	5. Time: When is intervention/evaluation taking place? What is durability of equity results? e.g., monitor political discourse on subject; document historical context
Notes	By including “transformative,” the criterion underscores the assumption that reaching equity requires a transformation of systems and structures, both of the evaluand and of the evaluation approach. Systemic inequities refer to the ways systems have been designed, established and maintained that perpetuate inequities. In South Africa, the persistent social inequities are remnants of the system of apartheid, and levels of inequality, as measured under the economic dimension by the GINI coefficient, are now the highest documented in the world .

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Equity Principles for evaluations

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- **Equality, justice + respect for human dignity:** How does the ***intervention or the evaluation process itself promote equality*** and human dignity? Does intervention and evaluation promote justice?
- **Awareness of power and voice:** Evaluators, commissioners, and funders must be prepared to explicitly search for ***how power manifests*** in the intervention and influences the evaluation process.
- **Ubuntu:** Evaluators and commissioners of evaluation are urged to consider the ***multiple and interconnected ways of knowing and ways of being*** that will influence how an intervention is experienced and how values are determined and to ensure that benefits accrue equitably
- **Inclusivity:** Inclusivity reflects **the *intentional inclusion of the multiple identities and geographies*** that are affected (directly or indirectly) by a given intervention and ensure adequate representation of these identities and geographies in different phases of the evaluation including preparation, implementation, and follow-up
- **Systems thinking:** Evaluation practice needs to incorporate ***analyses of interactions and inclusivity within systems***. This can be achieved by mapping and understanding the components of sub-systems of interest and understanding their needed contributions within the overall system

Criterion	**Climate and ecosystems health (CEH)** – does the intervention degrade or regenerate CEH and how will it be affected by changes in CEH?
Dimensions to assess/ track	1. The **impacts (degenerative, neutral, regenerative) on CEH** of the resources consumed and the waste/pollution generated in the implementation of the intervention;
	2. The impacts of climate change and ecosystem degradation **on the operation, outcomes and sustainability of the intervention**; ● Possible direct effects of extreme weather events and disasters (e.g. floods or wildfires); drought; soil degradation; disrupted water, sanitation, energy and food supplies; forced displacement; or unrest and conflict.
	3. The extent to which the **intervention design facilitates or inhibits** the capacity of the intervention and its beneficiaries to adapt to the effects of climate change and ecosystem degradation. ● Does the intervention increase adaptive capacity and resilience of the intervention, its beneficiaries or other stakeholders, to withstand the damage from disasters, heatwaves, droughts etc. This could be immediate (e.g. dealing with a disaster); a short-term measure (e.g. planting crops that can withstand droughts or higher temperatures; medium-term,
Recommendations	● How detrimental practices can be reduced or eradicated and what new practices can be introduced that could make positive contributions to CEH (mitigation and regeneration); ● How the adaptive capacity of the intervention and its beneficiaries can be strengthened
Notes	"Climate health" refers to global temperatures returning to a safe level; "Ecosystems health" refers to the capacity of ecosystems to remain stable, sustainable and resilient to external influences thereby supporting a diversity of life forms and being able to provide key benefits to society such as the provision of clean water and food.

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Criterion: Climate and Ecosystems Health

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1. Impacts of the intervention on CEH
   - Resource use
   - Waste and pollution
   - Mitigation and adaptation
2. Impact of climate crisis/ecosystems breakdown on the intervention
3. Adaptive capacity of the intervention

https://www.youtube.com/watch?v=GhUiU7IVCME

Q&A

A Provocation

Let's say you're running a marathon as a charity runner and organizing a fundraiser to support your cause. You ask an AI model 15 questions about the best way to fundraise.

Then you make 10 attempts at an image for your flyer before you get one you are happy with, and three attempts at a five-second video to post on Instagram.

You'd use about 2.9 kilowatt-hours of electricity—enough to ride over 100 miles on an e-bike (or around 10 miles in the average electric vehicle) or run the microwave for over three and a half hours.

MIT TECH REVIEW by
James O'Donnell
Casey Crownhart
May 20, 2025

global evaluation initiative

SAMEA
South African Monitoring and Evaluation Association

Thank you!

Stay in touch:

www.samea.org.za

www.capacitate.co.za;

jason@capacitate.co.za

reambaya@outlook.com;

https://www.linkedin.com/in/rebeccambaya/