CONCEPT NOTE FOR THE WEBINAR

LEVERAGING MATHEMATICAL SCIENCES FOR CLIMATE RESILIENCE SOLUTIONS (Math4CCR)

SUBMITTED

BY:

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To

The International Development Research Centre (IDRC)

OCTOBER, 2024

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Introduction and Rationale

Climate change is one of the most pressing global challenges, affecting ecosystems, economies, and communities globally. Africa is hard hit by the impacts of climate change despite its low emission rate of greenhouse gases (GHGs) (AfDB, 2019. This has been attributed to overdependence on climate-sensitive sectors and the lack of the necessary institutional, technological, and financial capacity by these countries to reduce emissions and build resilience against climate change (Doku et al., 2021a, 2021b; Mekonnen et al., 2021; Phiri & Doku, 2024). As the impacts of climate change intensify, the need for innovative, data-driven solutions becomes more urgent. Mathematical sciences and artificial intelligence (AI) are proving to be essential tools in developing and deploying climate resilience strategies (Ferrari, 2024). These fields supports the design of models, forecasts, and decision-making systems that are crucial for understanding, predicting, and mitigating climate risks.

The role of mathematical modeling and Artificial Intelligence (AI) is becoming increasingly crucial in strengthening climate information systems and predictions for resilience planning (Amiri et al., 2024). Building on its data analysis, prediction, and decision support capabilities, M-AI plays a critical role in developing early warning systems that alert communities to impending disasters. By analyzing vast datasets from satellites, weather stations, and other sources, AI-powered systems can detect patterns and identify the early signs of extreme weather events, including areas likely to experience changes in temperature and precipitation patterns. This crucial information allows for timely and effective responses, benefiting planning efforts across sectors, especially for farmers and others highly vulnerable to climate variations (Jain et al., 2023; Weaver et al., 2022)

However, a major challenge hinders progress: the lack of adequate skills to deploy and interpret AI/mathematics in climate modeling for resilience planning and resource allocation across contexts. This gap stems primarily from two factors: limited training opportunities in AI-related Science, Technology, Engineering, and Mathematics (STEM) subjects within Africa, and a persistent gender disparity within the AI field, reflected in the low number of women in academia and the AI workforce. The need to build capacity in M-AI for early career researchers and policymakers in Africa is particularly critical. Governments and stakeholders across the continent face challenges in adopting adequate and inclusive reporting frameworks for climate action. M-AI expertise can significantly enhance Africa's ability to strengthen resilience, and effectively report on progress towards these goals.

This webinar seeks to explore the intersection of mathematical sciences, AI, and climate resilience, highlighting their role in enhancing adaptive capacities across various sectors including agriculture, infrastructure, energy, and disaster management among others. By fostering collaboration between experts in

mathematical sciences, AI, and climate science, this event aims to stimulate innovative approaches to building more resilient societies and ecosystems.

Objectives of the Webinar

1. To use the platform to popularise widely the IDRC-funded project on leveraging mathematical Sciences for climate resilience
2. Enhance participants' understanding of how mathematical models and AI-driven solutions can be applied to climate resilience, adaptation, and mitigation strategies.
3. Raise awareness of the potential for AI and mathematical sciences to contribute to sustainable and climate-resilient solutions, engaging a wider audience in these disciplines.

Expected Outcomes

a) Enhanced collaboration between academia, government, and the private sector to develop and implement climate resilience solutions.

b) Strengthened of interdisciplinary networks focused on tackling climate challenges through data-driven innovations.

Suggested Topics of Discussion and Potential Speakers

1. **Dr. Humphrey Agevi-Africa Research and Impact Network (ARIN):** The landscape of Artificial Intelligence (AI) for climate resilience in Africa
2. **Dr. Francis Oloo: Technical University of Kenya (TUK):** Opportunities and Challenges for Capacity Strengthening by higher learning institutions in AI for climate change in Africa
3. **Mr Josephat Isaiah Ligami-Ligarmy Space Solutions:** The critical role of big data, AI, and machine learning algorithms in analyzing large-scale environmental data to predict climate trends, enhance disaster preparedness, and optimize resource use.
4. Opportunities, Challenges, and Emerging Trends in AI-driven climate Research,
5. The integration of AI and mathematical models into policy-making processes to develop more effective climate resilience strategies.

Mode of Delivery

The webinar will be through online platform, a link for registration of the participants will be created by (ARIN) and shared with potential stakeholders.

Date of the webinar: First Week of November, 2024

Webinar Format

The webinar will be structured as a half-day virtual event consisting of:

a. *Keynote Presentations:* Experts in mathematical sciences and AI will present cutting-edge research and applications in the field of climate resilience.
b. *Panel Discussion:* A panel of interdisciplinary experts will discuss how mathematical and AI-driven tools are being applied to climate-related challenges and what opportunities exist for future collaboration.
c. *Case Studies:* Presentations of real-world projects where mathematical modeling and AI have been successfully deployed to address climate resilience issues.
d. *Q&A Session:* Participants will have the opportunity to engage with speakers and panelists to deepen their understanding of the topics discussed.

Targeted Audience and Institutions

1. The webinar will target the following audiences:
2. Climate scientists and researchers
3. AI and data science professionals
4. Mathematicians and statisticians
5. Environmental and climate policymakers
6. Non-governmental organizations (NGOs) and civil society organizations (CSOs) working on climate resilience
7. Private sector entities interested in sustainable business practices and climate adaptation
8. Students and educators in mathematics, AI, and environmental sciences

These will be drawn from the following institutions among others:

i. Universities: Private and Public universities within the country, regionally teaching science-related courses
ii. African Climate and Development Initiative (ACDI) at the University of Cape Town
iii. University of Glasgow
iv. National Meteorological and Hydrological Services (NMHSs)
v. IGAD Climate Prediction and Application Centre (ICPAC)
vi. Africa Women in Mathematical Association
vii. Mathematical Association of Kenya
viii. International Mathematics Union
ix. Google
x. Microsoft ADC
xi. ARIN Fellows

References

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