CALL FOR INNOVATION RESEARCH GRANTS ON RESPONSIBLE ARTIFICIAL INTELLIGENCE FOR CLIMATE ACTION

Launched and managed by

The Regional Universities Forum for Capacity Building in Agriculture (RUFORUM)

in partnership with

West African Science Service Centre on Climate Change and Adapted Land Use (WASCAL)

and

AKADEMIYA2063

The Call is part of the Artificial Intelligence for Development Africa Programme, funded by Canada's International Development Research Centre (IDRC) and the Swedish International Development Agency (SIDA)

Call ID: IDRC-SIDA-RUFORUM/WASCAL/A2063-IRG/2022

1. Overview

Call for proposals: AI for climate action Innovation Research projects
Launch date: May 2nd, 2022
Deadline for submission: June 30th, 2022
(17:00 PM Eastern Daylight Time)

Grant application budget should range between US$ 50,000 to US$ 60,000 and duration of up to 18 months will be considered

The initiative is part of the AI4D Africa program co-funded by IDRC and the Swedish International Development Cooperation Agency (SIDA).

2. Call for Innovation Research Proposals

The Regional Universities Forum for Capacity Building in Agriculture (RUFORUM; www.ruforum.org), on behalf of the Research and Innovation Network for Responsible Artificial Intelligence for Climate Action in Africa [**RESEN-**RAICAIA], in partnership with West African Science Service Centre on Climate Change and Adapted Land Use (WASCAL; www.wascal.org) and AKADEMIYA2063 (https://akademiya2063.org/), invites applications for innovation research proposals from eligible researchers universities and academic research institutions in Africa.

The general objective of the Network is to advance climate action in Africa through the responsible development and deployment of artificial intelligence innovations. Specifically, the Hub aims to; i) deepen understanding of how to develop and scale responsible Artificial Intelligence (AI) innovations for climate action in sub-Saharan Africa; ii) build the capacity of eight (8) groups of African innovators and researchers to develop, deploy and scale responsible AI applications in climate action; and iii) facilitate the contribution of African research to international AI policy and practice conversations.

The Call for Proposals is aimed at competitively identifying eight (8) innovation research projects in Responsible AI for Climate Action in Africa.

Funding for this Call for Proposals comes from the Artificial Intelligence for Development-Africa (AI4D) programme, a joint initiative funded by Canada's International Development Research Centre (IDRC) and the Swedish International Development Agency (SIDA). The call was developed in collaboration with Climate Change AI "

3. Background

Climate variability and change remains one of the most significant challenges for Africa in the 21st century. It threatens to undo the development gains made over the last two decades and could potentially reduce the region's capacity to attain the Sustainable Development Goals by 2030. Action is required to bolster the region's capacity to respond and urgently address the debilitating effects climate variability and change has on agricultural production, water resources, energy as well as the propagation of conflicts in the region. Deployment of Artificial Intelligence (AI) in other regions of the world especially in the global north has proven critical because of its ability to increase adaptation and mitigation capacity and improve the precision of evidence-based decision making. This climate change AI network seeks to advance climate action in Africa through the responsible development and deployment of artificial intelligence innovations with respect to: (i) development and scaling of responsible AI innovations for climate action in SSA, (ii) building capacity of African innovators and researchers, and (iii) increasing the contribution of African research to international AI policy and practice. Through this network, Africa's climate change research and innovations will be enhanced and application strengthened at various levels including the community. Women and youth that represent Africa's greatest capital today and the future will be at the forefront of science innovations and solutions development as well as innovations deployment at various scales required in the region.

This Call seeks to competitively select innovation research proposals that deploy responsible AI for climate action with demonstrated relevance/links to national processes and livelihoods of vulnerable communities.

4. Priority research topics

4.1 Emission of greenhouse gases

Africa contribution to greenhouse gas (GHG) emission is the lowest and stands at 4% due to the low level of industrialization. Consequently, several African countries have considered themselves as being net carbon sinks and/or carbon neutral. However, extensive land-use change occurring in many tropical countries including deforestation and other forms of land degradation; emergence of more Mega Cities may raise significantly the greenhouse gas emission of the continent. There are relatively few studies estimating GHG emissions in the Sub-Saharan Africa, especially within the agricultural sector. Also, comparative studies across major land-use types are scarce. The majority of practices and techniques

for adaptation to climate change that are now being advocated are largely based on knowledge generated in other parts of the world; whose estimate is heavily reliant on the lower tier IPCC methodologies. Measurements to validate the efficiency of some of practices being promoted in order to improve decision-making regarding climate change adaptation and mitigation are needed.

4.2 Predicting climate hazards and disasters through improved climate modelling

a. Climate Hazards and disaster risks assessment

Various parts of the continent are facing several hazards including climatological (drought, wildfire, heat waves), hydrological (flood and flash flood), meteorological (Tropical cyclones and hurricanes, heavy storms) and biological hazards among others - https://www.nature.com/articles/s41467-022-29285-6). Drought is the most studied hazard across Africa. A large part of Africa is susceptible to drought, and as such several drought episodes have been registered, and have been reported to become more frequent, intense and widespread. Wildfires have been more localized particularly in the recent history in Zimbabwe and Lesotho. It is ignited naturally by lightning and peat; respectively. Heat waves have been caused by the warming over the past century. Increase in the incidence of extreme temperatures as well as longer heat waves have been observed in several parts of the continent. As temperatures are expected to continue rising in the future, heat waves are predicted to also become more frequent particularly in urban areas.

Understanding the drivers of droughts in Africa is key to understanding and predicting the drought characteristics (i.e., location, area coverage, intensity, and duration) and its propagation in both present-day and future climates. Previous studies on African droughts have often focused on understanding individual influence processes on drought by establishing statistical relationships between climate variables or indices.

Both riverine and flash floods are devastating. The increased frequency of heavy rainfall in different regions of the continent is likely to induce a lot of damage on infrastructure and crops, trigger landslides, and spread diseases. More multi-scale studies are needed to predict incidence and severity of the floods and propose their management.

Tornados are among the most severe and destructive of all-weather phenomena. Hailstorms are associated with thunderstorm activity caused by intense convection and occur in areas such as the South African Highveld, causing damage to property, crops and livestock. The forecasting of tornadoes and hailstorms is challenging as their effects are localized in the Indian Ocean islands and of relatively short duration (30 minutes), though they can penetrate as far as 1000 km inland. There are no warning systems for tornadoes and hailstorms anywhere in Africa currently, yet 12 cyclones are reported to occur annually making Madagascar, Comoros and Mozambique more vulnerable to this hazard. There is concern that Atlantic Ocean hurricanes could affect West African countries such as Senegal. Further research is needed to assess the risk.

b. Hazards which affect climate

Dust storms are also another form of hazard on the continent that is known to alter air quality, affecting animals, plants and the weather - Natural and Human-Induced Hazards and Disasters in Africa on JSTOR. The Sahel region is one of the largest sources of dust storms in the world. Summer dust storms are associated with convective rain-bearing storm systems, whereas winter dust storms are associated with the Harmattan winds. This hazard is associated with the lethal meningitis outbreaks that often hit the Sahel and Caribbean regions and it is believed to affect hurricane activity. Understanding the future

pathway of this hazard and its likely effect on geo-chemical processes is key in prediction of future hurricanes.

c. Better climate prediction

(i) Improving prediction of extreme rainfall events by atmospheric models.

Numerical weather prediction models are an integral part of operational weather forecasting. Output from these models can assist with decision making to reduce the impacts of disasters from extreme rainfall events (like thunderstorms, mesoscale convective systems, tropical cyclones).

(ii) Improving climate change projections over Africa.

Application of climate change projection tools/products and innovation are increasingly becoming important for climate change impact studies and adaptation strategies in Africa. However, the reliability of the tools/products depends on the accuracy of the projections. The call for innovation grants invites proposals that aim to: 1) propose and develop new products; 2) improve existing products; 3) improve the reliability of climate ad weather projections that feed into those products; 4) enable a more inclusive and equitable use of those products, etc.…

5. Assessment of impacts of climate change and adaptation practices using AI

Changes to temperature and precipitation have immediate implications for food production and security, water and energy availability among others across the continent. There is need to determine the efficiency of currently used adaptation practices on crop yields, and associated impacts on the environment. Layout 1 (ipcc.ch).

6. Climate smart agriculture

Climate-smart agriculture (CSA) is widely acknowledged and promoted approach for reorienting agricultural development under climate change conditions (https://doi.org/10.3389/fsufs.2019.00055). It is a multi-dimensional approach targeting productivity, adaptation, and mitigation in the context of increasing scarcity of resources induced by demographic pressure and poor management, uncertainty surrounding climate impacts, and the spatio-temporal scales dependencies that may affect the efficiency of CSA adoption (Climate-Smart Agriculture (worldbank.org))

7. Climate smart cities development

It is anticipated that much of the urban development will come from the developing world by 2050. It is forecasted that African cities with more than five million inhabitants will rise from six million in 2015 to 17 million by 2030 and cities with over ten million people will increase from three to five, and these will include Cairo, Lagos, Kinshasa, Dar es Salaam and Luanda. Cities are increasingly feeling the effects of extreme weather (https://doi.org/10.1186/s40852-017-0063-2).

8. Climate change, landscapes and renewable energy

Projected climate changes are likely to have profound effects on ecological processes in and functioning of landscapes. This will be manifested through change in land use/cover, ecosystem services, as well as the behaviour of humans (https://doi.org/10.1177/03043754211040698). There is need to understand the trajectory of decarbonisation of the landscape and develop more compatible energy systems for landscapes.

9. Climate change and water resources

Accurate and adequate monitoring of hydrological systems and water resources is still lacking in many parts of the continent compromising the possibility of meaningful planning of the increasing scarce resources (Addressing Climate Change in Long-Term Water Resources Planning and Management (usbr.gov).

10. Climate change and biodiversity

Climate change is affecting plant and animal diversity and subsequently the eco-systemic services. Several studies have shown that the loss in biodiversity occurred in the past years due to human activities (agriculture, fishing, hunting, charcoal production etc). The loss of biodiversity has affected CO_2 absorption and impact rainy seasons.

11. Gender

Gender inclusion in climate change is paramount and will generate significant gains for the agricultural sector and for society. This could raise total agricultural output and reduce the number of hungry people on the continent. There are good reasons to expect that women inclusion and gender equity generates dynamics that lend themselves to radical innovation, including in climate sciences and Artificial Intelligence.

12. Responsible Artificial Intelligence and climate science

Society must provide responsible solutions to the likely impacts of climate change in different sectors. Artificial intelligence present significant opportunities to accelerate climate action via applications such as forecasting, optimization, identification of degradation hotspot. These solutions can be rapidly deployed and scaled across key sectors. Building capacity in AI on the continent is key in knowledge generation, technological innovations and systems integration of AI and climate applications within highly-regulated sectors such as energy, transportation, agriculture, and heavy industry.

13. Eligibility

a) The call is open to researchers from accredited universities, public and private research institutions, with mandate and expertise in Artificial Intelligence and Climate Change research in Africa
b) Participation of an accredited university in Africa is imperative to be able to train post-graduate students in Africa
c) Research should be conducted in Africa
d) Collaborating researchers may be from government departments, local and international research centres, NGOs, private sector or other relevant institutions
e) As much as possible research teams should have equal representation of women and men. In any case, participation by women should not be less than 40%.
f) The research should be participatory and demonstrate its relevance and/or response to demand. It should have a monitoring and evaluation component, clearly highlighting the deliverables and dissemination strategy for the results of the research
g) All applications must get support letters from official university administrative offices (Principal, Dean or Head of Department).

14. General Guidelines for Proposal Format

The complete proposals must be 1.0 spacing, Times New Roman, font size 11 with normal margins (1 inch all through; top, bottom, left and right).

Main proposal

i) Cover page (1 page)

- Title of the proposal
- Call ID: IDRC-SIDA-RUFORUM/WASCAL/A2063-IRG/2022
- Name of Principal Investigator and institutional affiliation with full addresses including email and telephone (WhatsApp if available).
- Names of participating researchers and their institutions with full addresses including email.
- Project duration : (18 months);
- Total Budget requested in US$ (US$ 50,000 to US$ 60,000).

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ii) Summary (500 words maximum)

Provide a succinct summary of the project including rationale, objectives, outputs to be delivered by the project and potential impacts to be achieved.

iii) Background (1 page)

Provide background information relating to the problem your research and innovation will address. Your background should also introduce readers/evaluators to the issue(s) which your project seeks to address and how this will lead to the outcomes that are envisaged. Clarify alignment of your proposal to local, national and development as well as at the African Union level Agenda2063 and the Sustainable Development Goals (SDGs) and the Paris Climate Agreement. Demonstrate how this build on previous related initiatives. Who are the target beneficiaries and what process has been undertaken to engage them in the development of the proposed action? What are the needs and challenges of each of the target groups identified and how do these relate to the action proposed? What value proposition does your innovation bring. You can create sub-sections to this broad section to keep you organised if you deem it relevant but not more than two sub-section headers.

iv) Literature Review (1 page max.)

Provide the body of knowledge related to your research and highlight how your research will add value to existing knowledge. In particular outline earlier research that underpins what your project will be doing; and why it should be done. The literature review needs to be focused to the **specific** research addressed in this proposal and provide evidence of understanding of the main issues to be researched, and of the current literature on the topic.

v) Objectives (1/2 page)

What are the overall and specific objectives of your proposed research and innovation against which success or failure can be assessed?

vi) Key Research Question(s) and Hypotheses to be tested (1/2)

It is important, where applicable, to include underlying research questions that drives the research and then to provide some general hypotheses to be tested.

vii) Research Approach and Conceptual Framework (2 pages max.)

Outline how you will approach the problem, where the students, the farmers and partner agencies are involved and in particular identify the main concepts that underpin your approach to carrying out the research, relating this to the literature review. You need to specifically outline the participation of graduate students and how this is related to the problem framework. However, depending on your use of resources, you may have more than two students engaged in the research process. You should - within the description of your conceptual framework - articulate the innovative nature of this proposed project detailing out what is new. Provide a conceptual framework.

viii) Methodology (3 pages max.)
Provide the methodology. Highlight what research will be undertaken and how. Include the roles of each graduate student and where possible, describe what each graduate student will do including draft objectives/ hypotheses/research questions. Please indicate how you will engage and involve stakeholders in the research especially the national agencies researching, collecting and collating data on climate change - they should not be passive "subjects of research" but active participants. It is also important to state how gender and other cross cutting issues will be addressed in differentiating management system impacts. There is need to elaborate on the expected dataset quality and likely impact. There is also need to demonstrate that the innovation will be conducted in ethical manner.

ix) Description of the innovation (1 page max.)
Applicants should provide a clear description of the innovation to be developed, and justify their approach, articulating how the innovation addresses the identified climate related problem and demonstrate how it contributes to the national and regional effort of adaptation and mitigation of climate change effects. Where appropriate, also outline the potential impact of the innovation to the targeted communities.

x) Deliverables and expected results (1/2 page max.)
Clearly indicate the deliverables the project is going to make available. This could be the technologies. What are the expected results the project is going to develop?

xi) Gender and inclusion (1/2-page max.)
Describe how you intend to achieve equitable participation of women, men and youth. Also elaborate how you intend to engage vulnerable members of the community such as economically disadvantaged and disabled in the innovation generation and how they will negatively or positively impact by the innovation.

xii) Ensuring Responsible Artificial Intelligence (1/2-page max.)
Briefly describe how your research and innovation project will take into account the principles of responsible AI including transparency, accountability, risks, privacy and carbon throughout the entire lifecycle of the innovation.footprint.
S-JOURNAL-ICTF.VOL1-2018-1-P01-PDF-E.pdf (itu.int)
A practical guide to Responsible Artificial Intelligence (AI) (pwc.com)

xiii) Dissemination and communication (1/2-page max.)
Indicate how the results of your research will be disseminated to the various stakeholders. Be realistic and not overambitious and show that the dissemination strategy is linked in with the available budget or other support sources.

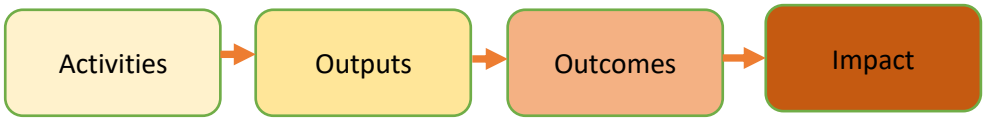
xiv) Sustainability (1/2-page max.)
Show how you will ensure environmental, social and financial sustainability arising from innovation development and deployment. For example, under the environmental sustainability, demonstrate how you will reduce carbon footprint of the research activities. Under social sustainability, how can this innovations be scaled out and what are your team intends to put in place to source for funding for sustainability of the innovation.

xv) Project Management

a) Team organization and qualification (1/2-page max.)
How do you propose to organize your team in order to achieve your project objectives? The role of each team member must be clearly described. Include CVs for the project team (use the template provided).

b) Monitoring and evaluation (1 page max.)
How will the project's achievements be monitored and evaluated to ensure proper management and enable early corrective action where necessary? Indicate clear milestones that will demonstrate progress whilst describing how the project will monitor progress towards milestones.

c) Results Framework (1 pages max.)
Please prepare concise narrative of the results framework with a diagrammatic illustration using the format below



xvi) Budget (1page max.)
Give the anticipated cost of your project, with explanatory notes where necessary using the attached budget template. All budgets must be in United States Dollars (use the template plate provided).

xvii) Timeline
All innovation research projects are 18 months (use the template provided).

15. Proposal Evaluation Criteria

RUFORUM, WASCAL and AKADEMIYA2063 rely on the professional expertise, experience and judgment of the independent reviewers in the Proposal review process.

	Evaluation Criterion	Weight
1.	Quality of the proposal (Background, clarity of the problem statement, the quality of research questions, clarity of methodology; Dataset quality and impact; Responsible AI/ML relevance; Climate relevance)	35%
2.	Quality and feasibility of the project pathway to impact	10%
3.	Demonstration that the innovation will be conducted in an ethical and responsible manner	10%
4.	Importance/relevance of the innovation	5%
5.	Expertise of team	15%
6.	Feasibility of the study within the time frame (18 months) and budget (between US$50,000 and US$60,000)	10%
7.	Equity (Gender balance in research team, and gender balance in student recruitment, inclusion of vulnerable community groups, etc.))	15%

8. Data requirements and Intellectual Property Rights

The winning proposal must:

a) demonstrate innovative use of existing datasets, and/or active collection and generation of new dataset.

b) be compliant with the FAIR Data Principles (Findable, Accessible, Interoperable and Reusable)
c) ensure that the dataset/simulator produced and (if applicable) trained models or detailed descriptions of architectures and training procedures are made publicly available under an open license.
d) All grant Intellectual Property — e.g., the dataset/simulator produced and (if applicable) trained models or detailed descriptions of architectures and training procedures — must be made publicly available under an open license

9. Submission of applications

e) Release date: May 2, 2022
f) Deadline for submission: June 30, 2022
g) Applications should be done via the RUFORUM Information Management System (RIMS) http://rims2.ruforum.org/
h) Prior to submission, prepare the following items:
   (i) Register in RIMS as outlined in the below section. Only the Lead Researcher is required to register
      (a) Proposal document in a pdf file
      (b) CVs of the Lead Researcher and Co-researchers in a single pdf file
      (c) Cover letter supporting the application from the authorised administrative office
   (ii) Budget and budget justification in Microsoft excel template provided. Eligible expenses include monthly honorarium for Investigators, student's stipend and tuition, and research stuff (materials, equipment, software, computer; and participation to conferences, project-related travel) and field expenses. Institutional overhead at a maximum rate of 5% of the total amount requested.

10. Time Frame

The foreseen time frame for the award process is as follows:

i. The deadline for receiving applications at RUFORUM Secretariat is June 30, 2022.
ii. Administrative check / Compliance Review and feedback to applicants by July 5, 2022.
iii. Review of Proposals completed by July 25, 2022.
iv. Communication to Successful applicants by July 30, 2022.
v. RUFORUM Secretariat sends out Grant Award letters by August 10, 2022
vi. Official commencement of project implementation August 21, 2022

11. Please complete the application online.

a) Open this website link: http://rims2.ruforum.org/
b) If you do not have an account you will be asked to register here: http://rims2.ruforum.org/contacts/register/
c) After registering successfully, you will be taken to your dashboard. What you see on your dashboard depends on the permissions that you have been assigned by the RIMS Administrator.
d) For most members of the RUFORUM network we have captured your emails in RIMS. So, the system might tell you that your account already exists. If this is the case, then follow the steps related to resetting your password or forgotten password

What to do if you have forgotten your password or need to reset your password

a) Open this website link: http://rims2.ruforum.org/
b) Instead of logging on, Click "Forgot Password"
c) You will be asked to enter your email address and then click reset password
d) The link to enable you to reset your password will be sent to your email address. Please also check for this link in your spam folder in case it is delivered to your spam. Follow the instructions to reset your password
e) Use your email and the new password to log into RIMS
f) After successfully logging on you will be taken to your dashboard. What you see on your dashboard depends on the permissions that you have been assigned by the RIMS Administrator

How to log on if you have an existing account

a) Open this website link: http://rims2.ruforum.org/
b) Click to log into RIMS by entering your email as the username and your password

After successfully logging on you will be taken to your dashboard. What you see on your dashboard depends on the permissions that you have been assigned by the RIMS Administrator.

How to submit a fellowship grant application via RIMS

1. After successfully logging on click '**Apply for a Grant'**
2. Choose correct call ID which is: **Call ID: IDRC-SIDA-RUFORUM/WASCAL/A2063-IRG/2022**
3. Complete the online application form.

For any quick inquiries, please write to b.yamungu@ruforum.org with a copy to cgs@ruforum.org
For further details, please visit the project website at:
RUFORUM: https://www.ruforum.org
WASCAL: https://wascal.org
AKADEMIA2063: https://akademiya2063.org
Climate Change Artificial Intelligence: **https://www.climatechange.ai**

GOOD LUCK WITH YOUR APPLICATION!