



From Research to Impact: Advancing Innovation and Partnerships in Rwanda

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PREAMBLE: The NCST Quarterly Newsletter – Issue 019 (January - March 2026) highlights Rwanda’s progress in advancing science, technology, and innovation (STI) for national development. This edition showcases NCST’s efforts in strengthening partnerships, promoting research commercialization, and building a resilient innovation ecosystem.

Key features include initiatives in higher education reform, nuclear infrastructure preparedness, and private sector engagement. It also highlights the growing impact of youth-led innovations supported through strategic programmes such as RISA. These efforts reflect Rwanda’s commitment to translating research into practical solutions for socio-economic transformation. NCST remains dedicated to driving collaboration, innovation, and sustainable growth toward a knowledge-based economy.

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Engaging partners in science technology and innovation (STI) for impact

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1. Reimagining Higher Education as a Catalyst for Research and Innovation in Rwanda

1.1. Background

On the 18th February 2026, a team from National Council for Science and Technology (NCST) participated and presented at a conference entitled, “*Re-imagining Higher Education as a Catalyst for Research and Innovation in Rwanda*” that was organized by Rwanda Higher Education Council (HEC). This conference that took place at Kigali Serena Hotel was attended by several participants from various Ministries and policy institutions such as Ministry of Education, universities, private sector and industry players as well as private for non-profit organizations. Key dignitaries included Hon. Minister Joseph Nsengimana who officiated over the conference, Dr Edward Kazozi the Director General of HEC, Prof Kayihura Didas the Vice Chancellor University of Rwanda, Dr Eugene Mutimura Executive Secretary of NCST, Dr Raymond Ndikumana Deputy Vice Chancellor for Strategic Planning & Administration at University of Rwanda, DG NIRDA Dr Christian Sekomo, AIMS President, Prof Sam Yala, among others.

1.2. Goals and Objectives

The conference aim was to convene policy makers and experts to deliberate and propose actionable consensus-based recommendations on how higher education can continue to catalyze research and innovation for impact in Rwanda.



Officials attending the conference

Key objectives were:

- i. To facilitate expert-led discussions on re-imagining higher education as a catalyst for research and innovation
- ii. To share national and international best practices on building higher education institutions and research ecosystems, including an overview of the state of research and innovation
- iii. To generate actionable, consensus-based recommendations to strengthen a coordinated national research and innovation ecosystem.

Key expected outputs were:

- a. Strengthened partnerships among academia, industry, policymakers, and development partners
- b. A shared national vision and roadmap for research-driven higher education reform
- c. A formal conference communiqué outlining evidence-based policy recommendations and strategic actions

1.3. Rationale

The premise for this conference was based on the role of higher education as a globally recognized driver of research and development (R&D), innovation and knowledge-based economic growth. Over the last 3 decades or so, the higher education sector in Rwanda has achieved a solid and steady progress; currently with over 40 public and private institutions of higher learning and Universities, including a multi-campus University of Rwanda (UR) as the largest university in Rwanda. The government of Rwanda's policy prioritizes science, technology, Engineering and Mathematics (STEM) disciplines in higher education so that priority sectors (*Sustainable Energy, Food Security and Modern Agriculture, Life and Health Sciences, Local Production and Value Addition, Digital Services, Products and Lifestyles; and Resilient Environment and Climate Change*) are pillars of economic development goals.



Panelists from different Institutions

Perhaps Rwanda's achievements in research and innovation are guided by improving higher education programs, that have been catalyzed by appropriate policies and strategies. These include but not limited to science technology and innovation (STI) policy as well as National Research and Innovation Agenda (NRIA) both of which underscore the need for use of digital frontier or emerging technologies to foster technological and R&D excellence. The goal is that technology and innovation result into tangible products and services that should continue to transform national economy and modernize the lives of Rwandans. In the next 2-3 decades, the role of emerging technologies as key enablers of industrial growth will contribute most to global market size. Therefore, research and innovation will continue to prioritize use of technologies such as artificial intelligence (AI), robotics, biotechnology, 5G, data science and analytics, nanotechnology, gene editing, 3D printing among others.

The development and outcome of Centers of Excellence (CoEs) in Rwanda has played a key role in higher education growth and scale of R&D and innovation (Table 1). The examples these CoEs at University of Rwanda (UR) include the African Center for Excellence in Internet of Things (ACEIoT), African Center for Excellence in Energy for Sustainable Development (ACE-ESD), African Center for Excellence in Data Science (ACEDS), African Centre of Excellence for Innovative Teaching and Learning Mathematics and Science (ACEITLMS), Regional



Centre of Excellence in Biomedical Engineering and e-Health (CEBE), Regional Centre of Excellence for Vaccines, Immunization and Health Supply Chain (RCESCM), Center of Excellence in Biodiversity and Natural Resources Management (CoEB), Centre of Mental Health, and Centre of Geographical Information System (GIS) and Remote Sensing. In addition, there are other institutional CoEs that support R&D and innovation such as Carnegie Mellon University Africa (CMU-A), University of Global Health Equity (UGHE), African Institute of Mathematical Sciences (AIMS), African Leadership University (ALU), and the African School of Governance (ASG) among others.

As shown in table 1, Rwanda has registered a growth of Gross domestic expenditure on R&D (GERD/Frw) of 0.66 % in 2015/2016 to 0.79% of GERD/Frw in 2022/2023. Although this is key, there is still much more to achieve in order to get at least GERD/Frw of 1% as recommended by African Union. There has also been an increase of researcher full time efforts (FTI) per 1 million population that increased from 14 in 2015/16 to 130 in 2022/23.

Table 1: Key indicators on growth of R&D in Rwanda

Key Indicator/Reference year	2015/2016	2018/2019	2022/2023
Gross domestic expenditure on R&D (GERD) (Frw)	44,457,113,816	70,601,673,966	129,931,312,584
Total researchers (FTE)	162	742	1,837
GERD as a percentage of GDP (%)	0.66	0.69	0.79
Total researchers (FTE) per 1 000 000 inhabitants	14	59	130
Definition	<ul style="list-style-type: none"> ❖ GERD expressed as a percentage of GDP indicates the R&D intensity in an economy, and is a measure of the innovation capacity as well as a measure of investments on innovation strategies for wealth creation and economic development. ❖ The researchers (in full-time equivalent - FTE) per million inhabitants is a direct measure of the number of research and experimental development (R&D) workers per 1 million people 		

1.4. Conclusions and recommendations

As R&D is central for the development of new knowledge, innovative products and services that enable economic growth in all societies, the following were key conclusions and recommendations:

1. Higher education should prioritize R&D and innovation growth through openness to global sources of knowledge and technologies exchange and transfer, as key benchmarks for growth
2. Promoting industrial competitiveness and optimizing R&D investment for socio-economic impact is key for Rwanda to achieve its aspirations of vision 2050 of becoming a high-income economy
3. Higher education should continue to play a key role for technology development towards products and services so that novel innovation becomes a key pillar for job creation and economic growth
4. There is a need for improved advocacy for funding R&D and innovations to develop an effective and economically viable National Innovation System (NIS)
5. There is a need for improved and outcome-based collaboration and partnerships between national, regional and global partners aimed at Joint R&D projects (local International, firms, Universities).
6. Policy is key to incentivize private sector and industries to play a more crucial role in investing and harnessing the power of R&D for growth.

2. NCST at the Forefront of Strengthening Rwanda’s Nuclear Infrastructure Preparedness

2.1. Background

Rwanda is steadily advancing toward the development of a safe, secure, and sustainable nuclear energy programme as part of its long-term vision for economic transformation. As the country positions nuclear energy at the center of its development strategy, the National Council for Science and Technology (NCST) continues to play a pivotal role in building the foundational pillars required for nuclear infrastructure preparedness.



2.2. A National Vision Anchored in Strong Institutions

During the Nuclear Energy Summit held in Paris in March 2026, President Paul Kagame reaffirmed Rwanda's commitment to integrating nuclear energy into

its energy mix to support its ambition of becoming a high-income country by 2050. He emphasized that achieving this goal requires strong institutions, sound regulatory frameworks, and a highly skilled workforce areas in which NCST is actively contributing.

Rwanda's progress has already been recognized internationally through the Integrated Nuclear Infrastructure Review (INIR) Mission conducted by the International Atomic Energy Agency (IAEA), which confirmed advancements across key pillars of nuclear readiness.



Participants Group photo

2.3. Supporting Policy and Regulatory Framework Development

NCST has been instrumental in supporting the development of science, technology, and innovation (STI)-informed policies that underpin Rwanda's nuclear programme. Through its coordination role, NCST contributes to strengthening governance systems, ensuring that nuclear development aligns with international standards and national priorities. During the INIR Mission (March 2-9, 2026), NCST actively participated in critical discussions on management structures, legal frameworks, regulatory systems, and human resource development, demonstrating its central role in shaping a robust and compliant nuclear ecosystem. These engagements highlight NCST's commitment to ensuring that Rwanda's nuclear ambitions are built on a solid institutional and policy foundation.



IAEA Experts on the INIR Mission in RWANDA

2.4. Facilitating Stakeholder Engagement and National Consultations

Beyond policy development, NCST plays a key role in convening stakeholders and fostering national dialogue around nuclear energy development. Through its collaboration with institutions such as the Rwanda Atomic Energy Board (RAEB), ministries, academia, and international partners, NCST contributes to organizing and participating in consultative workshops and awareness initiatives. These platforms are critical for:

- Enhancing stakeholder understanding of nuclear energy opportunities
- Promoting industrial participation and localization
- Aligning national priorities with global best practices

Notably, recent consultations on industrial participation in Rwanda's nuclear programme emphasized the importance of integrating local industries into the

nuclear value chain, an approach that supports economic diversification and strengthens domestic capacity.



2.5. Advancing Human Capacity Development



A cornerstone of nuclear infrastructure preparedness is the development of a skilled workforce. In this regard, NCST works closely with the University of Rwanda and other partners to support human capital development in nuclear science and technology. During the INIR Mission, NCST contributed to discussions on human resource development, reflecting its role in:

- Promoting STEM education and research aligned with nuclear science
- Supporting capacity-building programmes for scientists, engineers, and regulators
- Encouraging collaboration between academia and industry to develop relevant skills

Through these efforts, NCST helps ensure that Rwanda builds a knowledge-based workforce capable of sustaining a nuclear energy programme.

2.6. Driving Innovation and Research for Nuclear Development

NCST's broader mandate in promoting research and innovation also contributes directly to nuclear preparedness. By supporting research initiatives, fostering innovation ecosystems, and encouraging interdisciplinary collaboration, NCST helps create a strong scientific base necessary for nuclear technology adoption and adaptation. This aligns with Rwanda's ambition not only to adopt nuclear technology but also to

internalize knowledge and participate in high-value segments of the global nuclear value chain.

2.7. Looking Ahead

As Rwanda progresses to the next phase of its nuclear programme, institutions like NCST remain central to ensuring that development is inclusive, well-coordinated, and aligned with international standards. With continued investments in policy development, stakeholder engagement, and human capacity building, Rwanda is laying a strong foundation for a nuclear energy programme that will Enhance energy security, Drive industrial growth and Support sustainable socioeconomic transformation.



Celebrating Research and Innovation impact: Youth-led Innovation Advancing Rwanda' Agriculture, Health and Technology Sectors through RISA Funding

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1. Introduction

On 04 March 2026 at the Kigali Convention Center (KCC), delegates and representatives from the Government of Rwanda, development partners, private sector, innovators and researchers came together to celebrate key achievements and impact on strategic partnerships in strengthening and driving Rwanda's research and innovation (R&I) ecosystem.

The event was organized by RISA (Research and Innovation System for Africa) fund, a flagship programme funded by UK International Development through Foreign Commonwealth Development office (FCDO) aimed at strengthening research and innovation ecosystems across Africa. The RISA programme focuses on improving policy coherence, unlocking sustainable financing, strengthening institutional capacity, and catalyzing inclusive partnership among governments, academia, private sector and society.

In Rwanda, the RISA fund programme has worked closely with government institutions, universities and private sector, including the Ministry of ICT and Innovation (MINICT), Rwanda Agriculture and Animal Resources Development Board (RAB), National Council for Science and Technology (NCST), University of Rwanda (UR), Rwanda Polytechnic (RP), INES Ruhengeri, and R&I ecosystem actors such as innovators, start-ups and researchers. From 2023 to 2026, the RISA fund programme has funded a number of projects in Rwanda focusing on: Strengthening institutional readiness and coordination within the national R&I ecosystem; ii) Supporting research



Group photo of participants



Group photo RISA fund, FCDO, MINICT, NCST and UR representatives

commercialization and the translation of research into socio-economic impact; iii) Unlocking sustainable and innovative financing mechanisms for research and innovation; iv) Advancing inclusivity, gender responsiveness, and the participation of early-career researchers; and v) Catalysing partnerships between public institutions, the private sector,

and development partners. Through RISA fund, young innovators and researchers in Rwanda have developed a number of projects aimed at addressing challenges in sectors such as agriculture, health and emerging technologies including Artificial Intelligence (AI) and Internet of Things (IoT).

As the RISA fund programme drew to a close, the organized event on 04 March 2026 at KCC provided an opportunity to reflect on achievements and impact, share lessons learned and explore pathways for sustaining and scaling gains within Rwanda’s research and innovation ecosystem. From climate-smart agriculture, strengthened value chains to AI and IoT innovation hubs, the progress achieved demonstrates what is possible when government leadership, academia, and development partners align around a shared national vision. This milestone is not just about closing a chapter it is about celebrating impact and reinforcing Rwanda’s position as a knowledge-driven, innovation-led economy.

2. Youth-led Innovation driving practical solutions

Young innovators and researchers in Rwanda have received support to implement a number of projects in national priorities sector such as agriculture, health, energy and climate change through applications of emerging technologies including AI and IoT.

Among the innovators is Happy Axel Muyombano, a Master’s student in Embedded Computing Systems at the UR-ACEIoT, who developed an irrigation drone designed to help farmers improve efficiency and productivity in line with efforts to mechanize and professionalize agriculture. Muyombano’s project goal is to reduce cost and time management for farmers. The developed drone prototype can irrigate six hectares in about 30 minutes, with its 10-litre capacity. It is eventually being expanded to between 20 and 40 litres (as development continues) with capability to spray up to 12 hectares in an hour. The next plan is to collaborate with farmers and institutions such as the RAB to scale up the innovation as technology could help improve agricultural yields while reducing labour costs and enabling more precise pesticide application.



Mr Happy Muyombano demonstrating his drone innovation project

In the health sector, Ms Prisca Nikuze, a prosthetics student at the University of Rwanda, with her team developed a “Smart In-Sole” device designed to detect early signs of diabetic foot complications, a condition that can lead to amputation if not addressed in time. Nikuze explained that many diabetic patients lose sensation in their feet due to reduced blood circulation, making it difficult to detect injuries that can later develop into severe wounds. The developed Smart in-soles device is equipped with sensors that monitor the condition of the foot and send information to both the patient and healthcare providers. This allows early intervention and reduces the risk of diabetic foot complications progressing to amputation.

Another innovation showcased at the event was developed by Mr. Elsa Rebayezu, founder of M-Tech, who created a Proactive Maintenance System for Industrial Electric Motors, that collects motor data in real time and sends alerts to technicians when anomalies are detected. The system is currently about 80 percent complete, uses sensors and cloud-based analytics to monitor the performance of industrial electric motors in real time, helping

prevent unexpected equipment failures that can disrupt production in factories and other industrial operations.

Mr Jean d’Amour Tubanambazi, founder of Damson Mushroom Farm Ltd, demonstrated a Damson Mushroom Monitoring Systems (DMMS) as a smart system that helps farmers to care and monitor their mushroom gardens automatically. The DMMS has been designed for a sustainable agribusiness specializing in mushroom farming organic production with integrated monitoring systems. In addition, Jean D’Amour trained a number youth and his company is supplying hotels and recycles crop waste into mushroom tubes in Western province of Rwanda. Mr. Jean d’Amour’s innovation shows a strong commitment to advancing smart agriculture and Rwanda’s broader tech ecosystems.



Innovators Mr. Elsa Rebayezu, Ms Prisca Nikuze and Jean D’Amour showcasing their projects

3. Strengthening national research and innovation ecosystem

Beyond supporting individual innovators, the RISA fund programme contributed to the strengthening Rwanda's broader research and innovation ecosystem. For examples, the NCST and UR received funding support to develop national technology transfer and commercialization strategy that guides how research outputs can be transformed into marketable products and ensures knowledge and technology transfer. During the Celebration on 4th March 2026, the Executive Secretary of NCST, Dr Eugene Mutimura, highlighted that NCST and UR received more than Rwf 700 million over time through the RISA programme to support development of required strategic documents that promote national R&I ecosystem and ensured that researchers and innovators are linked with private sector and industry to perform research that results into technological products and entrepreneurial results that's very critical to the national development. Dr Mutimura added that NCST has put in place frameworks that allow technology and knowledge transfer to happen more easily so that the needs of the market can meet the solutions developed by researchers.



Dr. Eugene Mutimura, Executive Secretary of NCST addressing the audience

According to Prof Damien Hanyurwimfura, Director of the African Center of Excellence in the Internet of Things (ACEIoT) at the University of Rwanda

and the RISA fund project lead at UR, the RISA fund programme strengthened research commercialization and entrepreneurship skills by bridging the gap between research and practical application. Since 2023, the UR-ACEIoT has received funding from the RISA fund programme that established an IoT and AI innovation hub to support researchers and students in transforming prototypes developed in university laboratories into market-ready products through collaboration with industry partners. The IoT and AI incubation hub has supported 60 innovative projects and enabled the development of 40 prototypes. In addition, more than 150 young innovators have been trained in IoT prototyping, entrepreneurship and commercialization to help them bring their ideas to market. The programme also provided seed funding of 14 promising projects and connected them with industry mentors to accelerate commercialization.



Prof. Damien Hanyurwimfura, Director of the UR-ACEIoT addressing the audience

Moreover, Prof. Ignace Gatare, Principal of the College of Science and Technology at the University of Rwanda, said the programme aligns with the university's mission to encourage and prepare young innovators and researchers for real-world impact through the development of solutions that address real societal challenges for agriculture, health, nutrition and emerging technologies like AI and IoT.



Prof. Ignace Gatare, Principal, College of Science and Technology, UR addressing the audience

4. Conclusions and recommendations

Ms Grace Anyibu, Monitoring and Evaluation Advisor at the British High Commission, highlighted that the RISA-funded programme was designed to move research beyond academic settings and into practical use. The aim was to bring research from universities into tangible actions that work for society.

She noted that initiatives such as the Farm to Fork programme, which was developed at INES Ruhengeri, have supported agricultural innovations to improve crop yields and strengthen value chains. The programme also developed tools such as the Angel Investment Playbook, which was implemented at Catapult, designed to guide investors on how to support startups and help innovations scale to the market.



Ms Grace Anyibu speaking at the project close out event

As for the sustainability beyond the programme, Ms. Anyibu said that the supported projects and innovators will enable future innovators to keep developing solutions that contribute to Rwanda's economic growth and technological advancement.

Strengthening academia- private Sector partnership to optimize funding for commercialization of research and innovation Outputs

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1. Background

On December 12, 2025, a high-level dinner meeting was held at the Kigali Marriott Hotel, bringing together key stakeholders from the National Council for Science and Technology (NCST), the University of Rwanda (UR), and representatives from the Private Sector Federation (PSF). The meeting focused on a critical national prior-

ity: strengthening private sector engagement in the commercialization of research and innovation outputs. The event provided a unique platform for dialogue, collaboration, and the exploration of investment opportunities aimed at transforming promising research into viable business ventures that contribute to Rwanda's economic growth.

2. Showcasing Innovation with Market Potential



The evening began with an exhibition of innovative products developed through funded research projects. These innovations demonstrated strong potential for commercialization across priority sectors such

as agribusiness, health, energy, ICT, manufacturing, and environmental sustainability. The exhibition offered private sector leaders a first-hand look at locally developed solutions ready for scaling and market entry.





Exhibition of some productions ready to go to the markets

3. Strengthening Academia-Industry Linkages

In his welcome remarks, the Vice Chancellor of the University of Rwanda emphasized the importance of aligning academic research with industry needs. He highlighted that impactful research must respond to real market demands to drive economic transformation.



The Executive Secretary of NCST underscored the Government of Rwanda's commitment to science, technology, and innovation (STI) as a key engine for development. He noted that over 126 projects have already been funded with more than RWF 8 billion, some of which are now ready for commercialization. However, he pointed out a persistent

gap: innovators often lack access to affordable capital, limiting their ability to scale. To address this, NCST has initiated targeted funding for commercialization and is working with partners, including RSSB, to establish a dedicated R&D fund that will require strong private sector participation.

4. Insights from the Private Sector

The open discussion session provided valuable insights from private sector leaders. Participants emphasized the need for:

- Developing innovations that are competitive on both local and international markets

- Addressing real industry challenges to attract private investment
- Strengthening collaboration between researchers and businesses

It was also highlighted that support from the private sector does not always have to be financial. Access to production facilities, mentorship, and market networks can play a crucial role in advancing innovations.

5. Key Action Points for Moving Forward

The meeting concluded with several strategic action points to enhance collaboration and accelerate commercialization:

- **Increased participation of researchers in PSF exhibitions** to improve visibility and market engagement
- **Advocacy by PSF** to connect innovators with industry opportunities and resources
- **Mobilization of investors** through the PSF Business Research Center to support promising innovations
- **Establishment of collaboration platforms** linking academia and industry
- **Launch of targeted calls by NCST** addressing national challenges identified by the private sector



Interaction and exchange with participants

6. Looking Ahead

This engagement marks an important step toward building a vibrant innovation ecosystem in Rwanda; one where research outputs are not only gener-

ated but effectively translated into impactful, market-driven solutions.

The outcomes of this meeting will inform a broader national workshop aimed at unlocking the full economic

potential of research and innovation. With continued collaboration between academia, government, and the private sector, Rwanda is well-positioned to foster a thriving, innovation-led economy driven by homegrown solutions.

Assessing Research Impact: Insights from NCST March 2026 M&E Field Visits

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Introduction

The National Council for Science and Technology (NCST) conducted Monitoring and Evaluation (M&E) activities to assess the progress and impact of selected funded research projects addressing national priorities in Rwanda. These projects span biodiversity valorization, climate change, health, and digital innovation. The "5Bs Products" project focuses on transforming indigenous biodiversity into innovative food and beverage products, while the "WALL" project investigates the impact of volcanic environments and climate change on human health through advanced modeling and field studies. The *Computer Vision Automated Fish Feed Monitoring* project led by Jesse Thornburg applies artificial intelligence and automation to improve aquaculture efficiency and food security. In parallel, the *IEWRS* project uses machine learning and integrated environmental and health data to develop a nationwide early warning system for climate-sensitive diseases. Together, these initiatives highlight Rwanda's commitment to leveraging science and innovation to address societal challenges and support sustainable development.

Project 1: Biodiversity, Beers, Bitters, Beverages, and a Bag of Crisps (5Bs Products) by Prof. Elias Bizuru

The project entitled "Biodiversity, Beers, Bitters, Beverages, and a Bag of Crisps (5Bs Products)" is hosted and implemented by the University of Rwanda, College of Science and Technology, Center of Excellence in Biodiversity and Natural Resource Management, in collaboration with Kweza Craft Brewery as the industry partner. The project is led

by Prof. Elias Bizuru, the Principal investigator. The purpose of the project is to develop prototype of natural flavor enhancers for both alcoholic and non-alcoholic beverages, including the isolation and selection of indigenous yeast strains for consistent fermentation in Ikigage production and to determine and establish appropriate preservation processes, along with a final yeast starter formulation for consistent use in Ikigage production. The research team

has already produced five aroma-based products derived from five indigenous plant species including *Mondia whitei*, *Rhamnus prinoides*, *Vernonia amygdalina*, *Combretum molle* and *Artemisia afra*, which have also been successfully tested. The research team requested support from NCST to advocate for locally produced flavors and aromas, which are difficult to recognize and license because they are not recorded in the CODEX global food databases



Prof. Bizuru updating on the project progress



Project 2: WALL: Evolution of the volcanic environment in western Rwanda with Climate Change: impact on health and mitigation by Prof. Catherine Meriaux

The project is hosted by the University of Rwanda, College of Science and Technology, East African Institute for Fundamental Research (an ICTP partner institute), under the grant scheme of 'Accelerating and Catalyzing Solutions for Climate Change's Impact on Health', co-funded by Bill and Melinda Gate Foundation and National Council for Science

and Technology (NCST). The purpose of the project is to study the impact of climate change on health via volcanic emissions, volcanic soil, and Landslide. First, the study on volcanic emissions aims to develop numerical models of



Prof. Catherine's photo with the NCST Monitoring & Evaluation Team at the University of Rwanda

volcanic plume (ash and gas) dispersion and deposition of Nyamuragira and Nyiragongo volcanoes. Preliminary data indicate that areas closest to the volcanoes may not always experience the highest levels of volcanic emissions.

Secondly, the study on volcanic soil focuses on testing soil and the climatic data, analyzing and identifying irritant volcanic soil particles associated with pododermatitis and recommending appropriate measures. Lastly, the project also examines the impact of climate change on health via Landslide. The research team has applied modelling approaches to identify areas prone to landslide. The results revealed that existing data do not fully capture all high-risk areas; however, simulation models have identified zones with significant susceptibility to landslides. Overall, the projects demonstrated encouraging progress, with three physical and Numerical Models developed: volcanic dispersion models, slope stability models and dynamic landslide models. However, during the M&E field visit, the research team reported that they have challenge of lack of climate change projection for the last 20 years by year in temperature and precipitation in Western Rwanda.

Project 3: Fish Farm Computer Vision for Feed Optimization and Tracking by Prof. Jesse Thornburg

The *Computer Vision Automated Fish Feed Monitoring* project, led by Prof. Jesse at Carnegie Mellon University Africa, aims to enhance aquaculture productivity and sustainability through the development of an intelligent system that integrates computer vision, automated feeding, and data analytics. The project focuses on designing and testing a prototype that uses cameras, micro-computers, and machine learning algorithms to monitor fish feeding behavior and optimize feed usage in real time. Key progress includes successful deployment and monitoring of a pilot system at a tilapia farm, as well as continuous training of computer vision models using field data. Challenges related to

image segmentation accuracy were addressed by integrating advanced deep learning techniques and improving image processing workflows. The project also emphasized capacity building by training local technicians to ensure effective system operation and troubleshooting. Moving forward, efforts

will concentrate on testing the fully integrated system, refining performance, and scaling its application to support climate-resilient and efficient aquaculture practices.

Project 4: Development of an Integrated Early Warning and Response



Presentation from Prof. Jesse and Prof. Tim on the progress of the Fish Farm Computer Vision for Feed Optimization and Tracking project

System (IEWRS) for health in the context of climate change in Rwanda led by Dr. Didier Ntwali

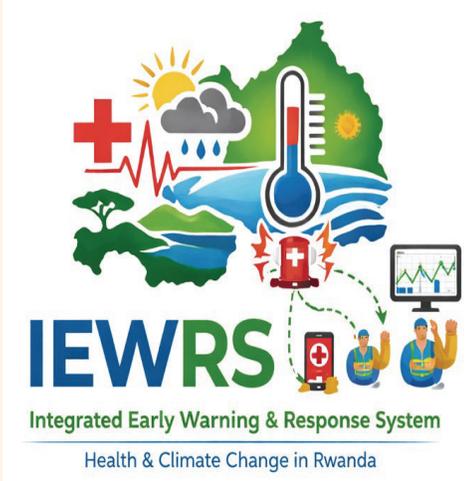
The *Integrated Early Warning and Response System (IEWRS)* project is a national research and innovation initiative in Rwanda designed to predict and respond to climate-sensitive diseases, including malaria, flu, pneumonia, and diarrhea, across all 416 sectors using advanced machine learning and inte-

grated environmental data. The project combines large-scale climate, satellite, and health datasets to analyze spatial and seasonal disease patterns, revealing strong correlations between disease incidence and factors such as temperature, rainfall, vegetation indices, and air pollutants. Building on these insights, the team has successfully developed robust predictive models (Random Forest, XGBoost, CatBoost) capable

of forecasting disease trends up to 12 months ahead, forming the backbone of a real-time early warning system. The system architecture integrates data ingestion pipelines, machine learning model management, and interactive dashboards to support data-driven de-

cision-making, early alerts, and rapid health response. Progress to date includes full data collection for climate variables, near-complete health datasets, development of predictive models, and ongoing platform implementation, alongside capacity building such

as PhD training and multi-institutional collaboration. Ultimately, IEWRS aims to strengthen Rwanda's resilience to climate-related health risks by enabling timely interventions, targeted resource allocation, and evidence-based public health strategies.



NCST Monitoring and Evaluation Team visiting the IEWRS project led by Dr. Didier Ntwali at Rwanda Space Agency