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METEOROLOGICAL  
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# EVALUATION REPORT HIGHWAY PROJECT ENGAGEMENT 2023—EPAS-01

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REPORT # 2024-03

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## LIST OF ACRONYMS AND ABBREVIATIONS

2030 Agenda	The 2030 Agenda for Sustainable Development
ACPC	African Climate Policy Center
ALP	Adaptation Learning Programme
AMA	Anti-Malaria Association
AMMA-2050	African Monsoon Multidisciplinary Analysis 2050
ASAL	Arid and Semi-Arid Land
ASDSP	Agricultural Sector Development Support Programme
AWS	Automatic Weather Station
BMUs	Beach Management Units
BRACED	Building Resilience and Adaptation to Climate Extremes and Disasters
CAN-U	Climate Action Network – Uganda
CARIAA	Collaborative Adaptation Research Initiative in Africa and Asia
CBA	Community-based Adaptation
CCAFS CGIAR	Research Program on Climate Change, Agriculture and Food Security
CDKN	Climate and Development Knowledge Network
CEH	Centre for Ecology and Hydrology
CFO	Central Forecast Office
CHWG	Climate and Health Working Group
CIAT	Center for Tropical Agriculture
CIRAD	Centre de Coopération Internationale en Recherche Agronomique pour le Développement
CNRST	Centre National de la Recherche Scientifique et Technologique
CONASUR	Conseil National de Secours d'Urgence et de Réhabilitation
CSAG	Climate System Analysis Group
DCCMS	Department of Climate Change and Meteorological Services
DFID	UK Government's Department for International Development
DRM	Disaster Risk Management
DRR	Disaster Risk Reduction
EAC	East African Community
EAT	East Africa Time
ECMWF	European Centre for Medium Range Weather Forecasts
ENACTS	Enhancing National Climate Services
EoP	End of Project
ESOKO	Digital solutions for agriculture
EWS	Early Warning System
FATHUM	Forecast for Anticipatory Humanitarian Action
FbF	Forecast-based Financing
FCDO	UK Government's Foreign, Commonwealth and Development Office
FCFA	Future Climate for Africa
FONERWA	Fund for Environment and Natural Resources for Rwanda
FRACTAL	Future Resilience for African Cities and Lands
FSNWG	Food Security and Nutrition Working Group
GFCS	Global Framework for Climate Services
GHACOF	Greater Horn of Africa Climate Outlook Forum
GRP	Global Resilience Partnership
HIGHWAY	HIGH Impact Weather LAke SYstem
HyCRISTAL	Integrating Hydro-Climate Science into Policy Decisions for Climate Resilient Infrastructure and Livelihoods in East Africa
ICF	International Climate Finance
ICPAC	IGAD Climate Prediction and Applications Centre
IGAD	Inter-governmental Authority on Development
IHI	Ifakara Health Institute
IMPALA	Improving Model Processes for African Climate
IMTR	Institute for Meteorological Training and Research
INGO	International Non-Governmental Organization
IRD	Institut de Recherche pour le Développement
IRI	International Research Institute for Climate and Society
IRRP	Integrated Resource and Resilience Planning
JADF	Joint Action Development Forums
KenGen	Kenya Electricity Generating Company

KCL	King's College London
KMD	Kenya Meteorological Department
KRCS	Kenya Red Cross Society
LVBC	Lake Victoria Basin Commission
LVFO	Lake Victoria Fisheries Organization
MECSS	Malaria Elimination Climate Surveillance Suite
M&E	Monitoring and Evaluation
MHEWS	Multi-Hazard Early Warning System
MoAIWD	Ministry of Agriculture, Irrigation and Water Development
NAADS	National Agricultural Advisory Services
NCAR	National Center for Atmospheric Research
NDMA	National Drought Management Authority
NGO	Non-Governmental Organization
NMCP	National Malaria Control Programme
NMHS	National Meteorological and Hydrological Services
NOAA	National Oceanic and Atmospheric Administration
ODI	Overseas Development Institute
PICSA	Participatory Integrated Climate Services
PIPA	Participatory Impact Pathways Analysis
PMI	President's Malaria Initiative
PRISE	Pathways to Resilience in Semi-arid Economies
PSA	Public Service Announcement
PSP	Participatory Scenario Planning
RAB	Rwanda Agriculture Board
RCCC	Red Cross Climate Centre
REACH	Improving Water Security for the Poor
RRA	Raising Risk Awareness
RWC	Regional WMO Integrated Global Observing System Centre
SCIPEA	Strengthening Climate Information Partnerships-East Africa
SDT	Service Development Team
SEB	Socio-Economic Benefits
SEI	Stockholm Environment Institute
SHEAR	Science for Humanitarian Emergencies and Resilience
SPI	Standardized Precipitation Index
SWAP	Severe Weather Alerts Project
SWFP	Severe Weather Forecasting Programme
SWFDP	Severe Weather Forecasting Development Project
TAHMO	Trans-Africa Hydro-Meteorological Observatory
TANESCO	Tanzania Electric Supply Company
TMA	Tanzania Meteorological Authority
UCT	University of Cape Town
UNEP	United Nations Environment Programme
UMFULA	Uncertainty Reduction in Models for Understanding Development Applications
UNFCCC	United Nations Framework Convention of Climate Change
UNMA	Uganda Meteorological Department
URN	Uganda Radio Network
USAID US	Agency for International Development
VCI	Vegetation Condition Index
WCI	Weather and Climate Information
WCIS	Weather and Climate Information Services
WFP	World Food Programme
WHO	World Health Organization
WISER	Weather and Climate Services for Africa
WMO	World Meteorological Organization
WWA	World Weather Attribution

## EXECUTIVE SUMMARY

### BACKGROUND & CONTEXT

#### **Summary of the project purpose, logic and structure**

This report presents the findings of the Ex-post evaluation of the "HIGH Impact Weather IAke sYstem (HIGHWAY) Project", implemented by the World Meteorological Organization (WMO) with a financing grant of GBP 3,190,452 provided by the UK Foreign, Commonwealth & Development Office (FCDO) – UK Aid, through the Weather and Climate Information Services for Africa (WISER) programme.

The overall HIGHWAY project objective was to increase access to and use of co-designed and sustainable early warning systems to inform regional, national, sub-national, and community-level planning and decision-making in the East African region and to improve early warning services for people living in the Lake Victoria region. Within the scope of this project, WMO has supported the East African countries Kenya, Tanzania, Uganda, and Rwanda to increase the use of weather information to improve resilience and reduce the loss of life and damage to property. The result of the project was the increased number of NMHSs having access to new and improved Early Warning Systems (EWS) for decision-making, as well as households and institutions able to access and use the new and improved EWS.

#### **Purpose, scope, and clients of the evaluation**

The purpose of the ex-post evaluation was to gain insights into the long-term effects and sustainability of the project, and to use the lessons learned and best practices to inform the development of future initiatives. The questions were designed using the WMO Evaluation Policy and applying the OECD/DAC evaluation criteria. These included relevance, coherence, effectiveness, efficiency, impact, and sustainability of project results. Additional dimensions were added during the evaluation inception phase in consultation with WMO: project design and gender consideration and mainstreaming. The evaluation assessed the impact and sustainability of the HIGHWAY Project, i.e., to what extent has the project increased the use of weather information to improve resilience and reduce the loss of life and damage to property in the East African region?

The key tasks of the Ex-post Evaluation of the HIGHWAY project were to: 1. Evaluate the extent to which the project has contributed to increased use of weather information in improving resilience and reducing the loss of life and damage to property in the East African Region. 2. Assess the effectiveness of the co-designed early warning systems in enhancing access to and utilization of information for regional, national, and community-level planning and decision-making. 3. Assess the impact and the sustainability of the project as well as any unintended consequences. 4. Provide lessons learned, good practices, and recommendations for further improvement and replication of similar initiatives in the future.

The evaluation covered all project interventions under the HIGHWAY project from 1 September 2017 to 31 March 2021. The gender dimension was considered a cross-cutting concern throughout the methodology, deliverables, and final report of the evaluation. The primary end-users of the evaluation findings are WMO, UK Aid, the East African NMHSs in

Uganda, Kenya, Tanzania, and Rwanda, and the project team and Partners. Secondary parties are other relevant project stakeholders using the evaluation results.

### **Methodology of evaluation**

Different evaluation tools were combined to ensure an evidence-based qualitative and quantitative assessment. The evaluator emphasized the cross-validation of data through triangulation and an assessment of the plausibility of the results obtained.

The methodological approach included a desk review, semi-structured individual interviews, semi-structured interviews of focus groups. Data was gathered from different sources, by different methods for each of the evaluation questions, and findings were triangulated to draw valid and reliable conclusions. Data was disaggregated, at a minimum, by sex and by other dimensions where available. Conclusions and recommendations were based on evaluation findings (deductive reasoning). The evaluation was conducted from September to December 2023 in close coordination with WMO's Internal Oversight Office and the National Hydro-Meteorological Offices in Uganda, Kenya, Tanzania, and Rwanda during the evaluation field mission, and resulted in the following findings, conclusions, and recommendations.

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## **MAIN FINDINGS AND CONCLUSIONS**

The main findings are in-keeping with the criteria as set out by the WMO Evaluation Policy and the OECD Evaluation criteria. The body of the evaluation report presents answers to all key evaluation questions, which represent the findings of this ex-post evaluation.

### **A. Strategic Relevance**

The HIGHWAY Project was highly relevant by contributing to the sustainable climate risk reduction strategic plan for the four Eastern African countries: Uganda, Kenya, Tanzania, and Rwanda. This was done through raising awareness, strengthening capacities, and creating an enabling environment for timely access to weather information in the form of an early warning system for building resilience in the fishermen communities (fisherfolk) and population around Lake Victoria.

The project was fully aligned with regional, national, and community-level planning and priorities, as it has contributed to the achievement of each country's national objectives regarding Climate Change Adaptation (CCA) and their obligations under the Paris Climate Change Agreement, and the Sendai Framework for Disaster Risk Reduction and the early warning systems, as well as the 2030 Sustainable Development Agenda.

The sixth EAC development strategy foresees enhancing the safety of navigation and efficient exploitation of natural resources on the lake and its basin by strengthening of meteorological services over Lake Victoria and enhancing disaster prevention and management capacities for sustainable development by strengthening meteorological early warning systems in the EAC region as one of its five pivotal meteorological priorities during the period from 2023 to 2024.

The HIGHWAY project was highly relevant in addressing the need to improve resilience and reduce the loss of life and damage to property in the East African Region.

It has created a collaboration between the four countries to issue a specific marine forecast for the Lake Victoria, that is shared with the relevant stakeholders two times per day.

The HIGHWAY project was designed in a participatory manner, and the needs of stakeholders and beneficiaries were taken into account in the project design and implementation.

This project addressed the objective and focal areas of the (FCDO) – UK Aid and UK Met Office, to assist the EAC countries in completing the Nationally Determined Contributions (NDCs) under the Paris Agreement, and it was fully aligned to its strategic priorities and objectives including poverty alleviation, economic development, and climate change.

The project relevance was highly aligned with WMO's mandate to facilitate worldwide cooperation in the design and delivery of meteorological services, foster the rapid exchange of meteorological information, advance the standardization of meteorological data, build cooperation between meteorological and hydrological services, encourage research and training in meteorology, and expand the use of meteorology to benefit food security and economic development. It is relevant to WMO's Strategic plans 2016-2019 and 2020-2023, and its corresponding Plans of Work (PoW).

## **B. Project Design**

HIGHWAY was a project ahead of its time. At its design phase, the project did not consider that the NMHSs in Kenya, Tanzania, Uganda, and Rwanda were not capacitated enough in 2017 to build a regional EWS. The design was relevant, but the expectations were ahead of its time when looking at the proposed indicators for Output 1 and 2 concerning the regional NMHSs collaboration. The overall project design is logical, coherent, and innovative in disaster risk reduction and mitigation and Climate Change and Adaptation (CCA) projects by creating a Regional Meteorological Early Warning Systems (EWS) for Lake Victoria in the East African Countries: Uganda, Kenya, Tanzania and Rwanda. The Project was identified and prepared through cooperation with diverse stakeholders. The Project Logical Framework with its outcome and outputs, as well as impact indicators were developed adequately (with measurable elements of the SMART indicators) and allowed for proper adaptive management and monitoring of project results. There was a Theory of Change (ToC) developed for this project.

## **C. Project Coherence**

The HIGHWAY Project met the expectations for both Internal and External Coherence. This project and its implementation are highly compatible with other Climate Change and Adaptation (CCA) instruments, initiatives, and legislation in Eastern African countries, and with a number of relevant national and regional projects and initiatives led or implemented by the World Meteorological Organization (WMO), like GCOS, WIGOS, HiWeather, HyVIC, CREWS East Africa etc. The criteria External Coherence has met expectations, as WMO has already established collaboration with numerous stakeholders and partners, such as the Eastern African Community (EAC).

The first Green Climate Fund (GCF) project proposal for upscaling the HIGHWAY Project was a product of this project.



WMO has encouraged the EAC countries: Kenya, Tanzania, Uganda, and Rwanda to establish collaboration with the GCF on implementation of the regional EWS for the four EACs within the frames of the Early Vision 2025 Strategy.

#### **D. Effectiveness**

The HIGHWAY project was highly effective and has exceeded expectations in the evaluation criterion effectiveness as a result of overall excellent project finalization and implementation. All four outputs were achieved by the time of project completion.

Project Output 1 was achieved by establishing an effective institutional framework for an Early Warning System for the East African Region for the four EAC countries: Uganda, Kenya, Tanzania, and Rwanda. It did so by creating numerous joint initiatives at regional, national, and subnational levels that support the delivery of a regional EWS.

Project Output 2 enhanced access to operational data sources crucial for Early Warning Services in the East African Region. Key achievements include the creation of the HIGHWAY Field Catalog (FC)<sup>1</sup>, assessment of upper air sounding stations in Nairobi, Lodwar, Dar Es Salaam, and Entebbe, and establishment of the EAC Regional WIGOS Center (RWC), co-hosted by the Kenya Meteorological Department (KMD) and Tanzania Meteorological Authority (TMA). The RWC facilitates metadata management of stations and addresses observation quality and availability issues in the region. Additionally, HIGHWAY contributed to capacity building for RWCs and NHMSs staff in the EAC sub-region.

In Project Output 3, producers and scientists were to develop innovative accurate data, methodologies, and tools to improve and verify the quality of an Early Warning System for the East African Region: Uganda, Kenya, Tanzania, and Rwanda were integrated. This was completed by creating numerous new and/or improved co-produced EWS forecasting tools and meteorological input products delivered to relevant producers.

Project Output 4 strengthened integration among producers, users, and intermediaries to develop improved EWS products accessible to Uganda, Kenya, Tanzania, and Rwanda. The UK Met Office produced the WISER Guidance on Equitable and Inclusive co-production for Weather and Climate Services<sup>2</sup>. Four operational products were delivered, including forecasts for Lake Kivu in Rwanda, IBEWS Kenyan product, and enhanced marine forecasts for Lake Victoria in Uganda, Kenya, and Tanzania. These forecasts, issued twice daily, benefited 1,605,139 individuals, with 214,877 direct and 1,390,262 indirect beneficiaries, surpassing the target of 10,000 direct and 40,000 indirect beneficiaries.

Considering the project's overperformance in delivering its four outputs, the achievement of outputs has exceeded expectations.

The achievement of project outcomes has exceeded expectations, as at project end, the total number of beneficiaries with improved resilience using the Early Warning Systems

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<sup>1</sup> <http://catalog.eol.ucar.edu/highway>

<sup>2</sup> <https://www.metoffice.gov.uk/binaries/content/assets/mohippo/pdf/international/wiser/wiser-co-production-guidance.pdf>

(EWS) in Kenya, Tanzania and Uganda was: 214,877 direct beneficiaries, and 1,390,262 indirect beneficiaries, making up a total number of 1,605,139 beneficiaries around the Lake Victoria to use the Marine Forecast and the EWS. Additionally, there were 21 government departments/ministries/institutions able to access/use new/improved EWS information in Uganda, Tanzania, Kenya, and Rwanda. The baseline target in the Logical Framework was that in the first stage with the EWS and communication efforts, access of EWS will have >1 million people, and more than 0.25 million people will use the EWS.

#### **E. Efficiency**

The project was efficient, i.e., it met expectations on the evaluation criteria: efficiency. The project was cost-effective (Efficiency of results delivered) during project implementation. All project partners have delivered much more than in their Terms of Reference (ToR) of their Service Agreements and/or MoUs. The project received a no-cost extension for one year due to the COVID-19 pandemic. However, this did not affect project efficiency. Final results from project management and financial management at the time of the evaluation suggest that the project has exceeded expectations in terms of efficiency.

#### **F. Impact**

A few key transformative effects were brought about by the project. These include the daily convening of all four NMHSs to discuss the meteorological and marine forecasts. This ex-post evaluation has concluded that the project is likely to sustain the intended impact of increased use of weather information to improve resilience and reduce the loss of life and damage to property in the East African region. The HIGHWAY Project contributed to a great extent to higher-level changes, as the regional nature of the project had a positive impact on transboundary disaster risk reduction through a daily convening meeting of all four NMHSs in order to discuss the meteorological and marine forecast, with a special focus on Lake Victoria's risky weather development.

It further contributed to building an early warning system, people, and environmental protection, and furthermore strengthened the link between environment and regional cooperation and security that characterized other FCDO (UK Aid) financed activities in the EAC region.

It is likely that in the future, the project will cause a continuation of positive benefits in terms of significance, transformative potential, scope, and time scale. The likelihood of increased use of weather information to improve resilience and reduce the loss of life and damage to property in the East African region due to using Marine Forecasting from UNMA, KMD, and TMA as an Early Warning System is very high and is efficient in saving lives around Lake Victoria in the fishing communities as well as economically viable. After reviewing the final results from project management and comparing them to the present situation three years after the project has ended during the field evaluation missions to Uganda, Kenya, and Tanzania, at the time of the ex-post evaluation, the project impact is considered as likely positive.

#### **G. Sustainability**

Overall, the sustainability rating for the HIGHWAY Project at the time of the ex-post evaluation is moderately likely, which means that there are moderate risks affecting the

financial dimension of sustainability. Financial resources for the continuation of building of a regional Early Warning System (EWS) are partially dependent on external financing. Hence, the financial sustainability is insecure. Socio-political sustainability is rated as likely, as there are slight risks to Socio-political Sustainability that are unlikely to happen. This is said bearing in mind the fact that there is a firm obligation under the Paris Climate Change Agreement to fulfill NDCs, and all EAC countries from this project are signatory parties to the Paris Climate Change Agreement. There are small risks that are affecting the institutional framework and governance sustainability as all institutional frameworks for Climate Change and Adaptation are put in place in the EAC countries, which causes Institutional Sustainability to be likely to continue. Environmental Sustainability is likely to be continued for the HIGHWAY Project, as project outputs and outcomes directly contribute to the implementation of the Paris Agreement adopted by the UNFCCC, and there are minimal environmental risks connected to sustainability that could be identified related to the HIGHWAY project that may jeopardize the sustainability of the outcomes. The HIGHWAY project work aimed and succeeded in safeguarding the environment and society directly through its work on environmental leadership in sustainable, resilient regional meteorological early warning systems with wide application by its beneficiaries and users of the Early Warning Systems (EWS) and the Marine Forecast around the Lake Victoria.

#### **H. Gender consideration and mainstreaming**

Overall, gender consideration and mainstreaming in the HIGHWAY project have not met expectations due to the failure to mainstream it from project design to its closure. However, two project management team members and one HIGHWAY focal point from TMA were women, and women were regularly present at the diverse Early Warning System (EWS) and meteorological pieces of training.

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#### **OVERALL PROJECT PERFORMANCE**

Overall, an ambitious effort was undertaken, and the HIGHWAY project produced quite a lot of good results. The project results can serve as a platform for future projects and programming support from the World Meteorological Organization (WMO) and other institutions.

HIGHWAY was highly relevant for WMO and UK Aid and has met national and East African (EA) regional priorities. The project met the expectations for coherence, as its implementation is highly compatible with other Climate Change and Adaptation (CCA) instruments, initiatives, and legislation in the EA countries.

By the project's completion, all four outputs were achieved. Due to excellent overall project finalization and implementation, HIGHWAY was a highly effective project that produced many useful meteorological products and early warning mechanisms in East Africa. The project was cost-effective and efficient in delivering results during implementation.

When aiming for an innovative project, the project planning and design phase need improvements and stakeholders' ownership. Gender was not considered and mainstreamed in this project.

The HIGHWAY project is likely to sustain the intended impact of increased use of weather information to improve resilience and reduce the loss of life and damage to property in the East African region. It contributed to a great extent to higher-level changes, as the regional nature of the project had a positive impact on transboundary disaster risk reduction through a daily convening meeting of all four NMHSs to discuss the meteorological and marine forecast, with a special focus on Lake Victoria's risky weather development. This project contributed to building an early warning system, people, and environmental protection, and strengthened the link between environment and regional cooperation and security that characterized other FCDO (UK Aid) financed activities in the EA region.

For the sustainability criteria, there are moderate risks affecting the financial resources for the continuation of building a regional Early Warning System (EWS), as this is partially dependent on external financing. Socio-political, institutional, and environmental sustainability are granted, as there is a firm obligation under the Paris Climate Change Agreement to fulfill Nationally Determined Contributions (NDCs). All EAC countries that have participated in this project are signatory parties to the latter.

**To conclude, based on the aggregated scoring across all evaluation criteria, the HIGHWAY project has exceeded performance expectations.**

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## RECOMMENDATIONS

Based on the findings several recommendations have emanated from the HIGHWAY project that will lead to further improvement of project design in the future and project sustainability. One of the major recommendations to WMO and the FCDO is to clearly define and lay out the project implementation process by assigning and explaining the roles of the project partners before the project approval process and the start of project implementation.

The following additional recommendations can be given, derived from the implementation of the HIGHWAY Project:

1. An Early Warning System (EWS) for a Region has to be cascaded down into more manageable components and supported by a strong commitment to higher management of NMHSs. There should be a collaboration between people working operationally in the forecasting mechanisms: radar—twinning training Mwanza—Uganda—Rwanda; AWS and Radio Sondes twinning training and knowledge sharing in order to build a strong functioning Regional EWS.
2. Met Offices (NMHSs) in the EAC countries should be very vocal and clear about their training, equipment, and maintenance needs. NMHSs should state their needs and requirements (like Radar Training and supercomputer training) and Budget them with approximation. The mechanism of needs identification should be established on two levels: 1. NMHSs should state their needs to Ministries and Institutions at higher instances at the National level, and 2. NMHSs should state their needs to WMO to support the capacity development needs.
3. Organize Train the Trainer sessions to enhance local expertise. Train the Trainer in Kenya or Tanzania should be conducted by African NMHS experts in their own region. The NMHS' experts should own the curriculum and try to see how to spread the

- knowledge throughout the whole country. More training, knowledge sharing, and strengthening capacities of the local Met Offices should be done and replicated. One way of providing this is through the hosting of Train the Trainers workshops.
4. The EAC meeting (African Ministerial Conferences) with Heads of Met Services should be used as a platform to host Project Steering Committee (PSC) meetings for advocacy, as the EAC is still the largest and most efficient platform for advocacy and has the highest convening power among NMHSs.
  5. Build strategic partnerships between NMHSs and the private sector to enhance product and service offerings and accelerate the digital transformation of hydro-meteorological services
  6. Integrate a change management expert as a change agent in the Beach Management Units (BMUs). The example should be taken from a BMU where the EWS really worked, and there have been no casualties in the last 6 years; Kyomba Beach in Homa Bay County in Kenya can be an example of a Best Practice. This approach should be replicated around Lake Victoria.
  7. Support regional resource mobilization that will benefit both the region and national entities for establishing a proper regional EWS for Lake Victoria. A proposal was drafted during HIGHWAY for the GCF or Adaptation Fund. WMO should provide NMHSs with the existing guidelines it has created in Mobilizing Climate Finance from GCF at the National Level.
  8. Women should be included in weather and forecast communication in Lake Victoria and use them to positively influence men to save lives.

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## LESSONS LEARNED

The following lessons were learned from the implementation of the HIGHWAY project:

1. Establishing a Regional Early Warning System (EWS) was a very ambitious goal of the HIGHWAY project as a Pioneering Initiative in the EAC countries. A Regional EWS requires committed Regional cooperation for the Sustainability of weather prediction around Lake Victoria, as Nowcasting of tropical weather is very difficult.
2. For the Regional cooperation between the EAC countries, synoptical, radar and other data sharing is necessary, and it should be agreed upon how that can be done. Top-down communication within the NMHSs is necessary, twinning projects are needed, and there are also connectivity challenges that need to be solved in advance.
3. Knowledge Transfer between the global North and global South is very important. It is very important to have highly skilled African Meteorologists and Scientists on the same level as global North Scientists and Meteorologists, and this can be achieved only through long twinning working projects. HIGHWAY did it well with the UK, through the High Crystal project as well as the GCRF African Swift project.
4. The key is to create high impact weather services to protect livelihoods from severe weather. Training and communication of beneficiaries and end-users are of utmost importance, but there should be enough budget for them. Funding for continued dialogue to co-design and co-discuss products and information is required, especially for grass-roots level training of BMUs and fisher communities.
5. The HIGHWAY project used two levels of ownership as an excellent way to enhance project ownership and execution within EAC: 1. Permanent Representatives in WMO - NMHSs Directors in the Project Steering Committee (PSC) in Project Management for the advocacy and political will, and 2. Focal Point for the Project for the operational

execution of the project. This was one of the Best Practices achieved during the HIGHWAY project.

6. Using WhatsApp helps fishing communities to receive weather forecast information in a timely manner. In return, forecast users also give immediate and spontaneous feedback, which aids verification. Bilingual reference guides, color codes and visual weather icons assist the rapid and accurate translation of weather forecast information universally and into local languages.
7. BMUs used the HIV life-saving training to Train the Fisher Folk to wear life jackets and use the Marine Weather Forecast to save and improve their lives in Kenya (Homa Bay BMUs). This approach should be replicated around Lake Victoria as Best in Class.

## 1. INTRODUCTION AND PROJECT BACKGROUND

The project “HIGH impact Weather LAke sYstem (HIGHWAY)”, hereinafter referred to as “the project” was funded by UK Aid by the UK Government’s Foreign, Commonwealth and Development Office (FCDO) through the Weather and Climate Information Services for Africa (WISER) programme through a grant agreement with GBP 3,190,452. The World Meteorological Organization (WMO) formed a partnership with UK’s FCDO and the UK Met Office to implement the HIGHWAY project. The project had the aim of establishing an Early Warning System (EWS) for the East African Region by working through mandated institutions from the international, regional, and national levels to ensure the Regional EWS is effective and sustainable. This project responded to the need to establish a regional Early Warning System (EWS) to prevent deaths and damage due to severe convection and strong winds on Lake Victoria and in the East African Region, which is accessible, operational, and sustainable for all relevant users and based on a regionally agreed institutional framework, which can be translated beyond these partner countries and into the wider developing world. This partnership aimed at strengthening collaboration that will increase the use of weather information to improve resilience and reduce the loss of life and damage to property in the East African region, especially around Lake Victoria.

The World Meteorological Organization (WMO) finished the implementation of the project financed by the UK Aid. The results of the Ex-Post Evaluation of the project will be used for measuring its impact and the level of achievement of the established project objectives. The project’s duration was from September 2017 and was completed in March 2021.

Africa's development, climate, and resilience agendas are inextricably linked, because about 90% of all natural disasters on the continent are weather and climate-driven<sup>3</sup>. The impacts of climate change exacerbate the increase in frequency and intensity of existing hydro-meteorological disasters that include floods, droughts, tropical cyclones, lightning strikes, and landslides. These natural hazards continue to cause heavy damage and loss of livelihoods and lives. With the advent of climate change, these disasters will likely only increase in frequency and intensity.

The main problem areas that the HIGH impact Weather LAke sYstem (HIGHWAY) project was designed to tackle are the following:

1. The economic cost of recorded weather-related disasters in Africa given the widespread under-reporting of losses, was conservatively estimated at 10 Billion USD<sup>4</sup> in the last 20 years.
2. Climate change alters weather patterns and causes an increased number of severe weather and extreme climate events, impacting heavily on the world’s poorest and most vulnerable communities.
3. Lack of much-needed in-situ observation and data availability, both for research and operational purposes.

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<sup>3</sup> CRED’s Emergency Events Data Base

<sup>4</sup> [https://reliefweb.int/sites/reliefweb.int/files/resources/PAND\\_report.pdf](https://reliefweb.int/sites/reliefweb.int/files/resources/PAND_report.pdf)

The project aimed to strengthen the capacity of countries and their meteorological services and authorities to have increased access to and use of co-designed and sustainable early warning systems to inform regional, national, sub-national, and community-level planning and decision-making in the East African Region.

The HIGHWAY outputs, outcome, and impact contributed to the large programme on Weather and Climate Information Services for Africa (WISER)'s outputs, outcome, and impact. The HIGHWAY project addressed the need for an improved, accurate early warning system, which is co-produced between scientists and users, to prevent deaths and damage due to severe convection and strong winds on Lake Victoria and in the East African Region. HIGHWAY aimed to establish a Regional Early Warning System (EWS) for the East Africa Region by working through mandated institutions from the international, regional, and national levels to ensure the Regional EWS is effective and sustainable. These institutions include the National Meteorological and Hydrological Services (NMHSs) in East Africa, the Lake Victoria Basin Commission (LVBC), and the East African Community (EAC).

Within the scope of this project, WMO supported the East African countries: Kenya, Tanzania, Uganda, and Rwanda to increase the use of weather information to improve resilience and reduce the loss of life and damage to property in the East African region. The result of the project was to have an increased number of NMHSs having access to new and improved EWS for decision-making, as well as households/institutions able to access and use the new / improved EWS.

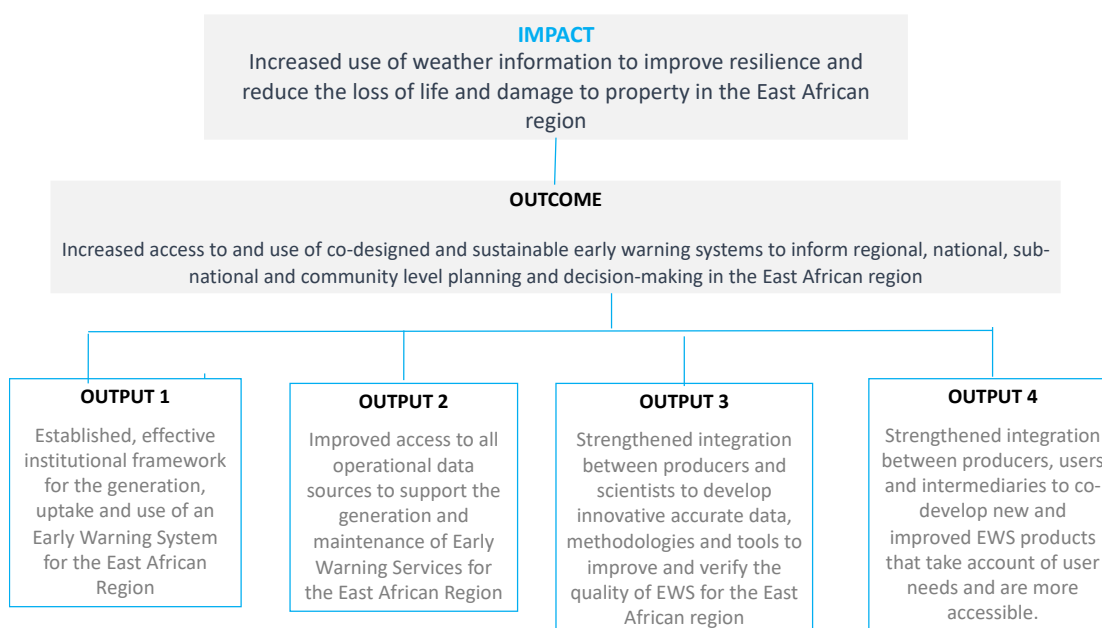
While the project intended to enhance the capacity of policymakers and stakeholders to analyze, plan, and respond to weather risks around the Lake Victoria through access to a new and improved Early Warning System, the main drive of the project was working directly with local communities at the local level to pilot user engagement to understand and meet specific services needed through a co-production process. The future users of the EWS were involved in the needs analysis, the way products and services were packaged and distributed as well as provided feedback for improvement of the EWSs. The aim was to provide regular weather forecasts and severe weather warnings for fishing boats and small transport vessels on Lake Victoria and dissemination of these bulletins widely in the East African region through local radio and/or mobile phones and provision of clear practical advice about how affected persons can protect themselves from the imminent threat or mitigate its impact.

The project intended to demonstrate how a Regional Early Warning System (EWS) can be the driving force for triggering the Lake Victoria Basin economic development. Good practices and lessons generated were documented throughout project implementation to help inform effective programming on developing further Regional EWSs worldwide.

The details on project overview, outputs, outcomes, and impact, as well as the institutional context of the HIGHWAY Project and the project budget, can be found in the Inception Report for the Ex-Post Evaluation Report, as well as in Chapter 3: Project Assessment: Effectiveness and Efficiency.

The simplified HIGHWAY Project Logical Framework can be seen in Figure 1 below.





**Figure 1 HIGH impact Weather IAke sYstem (HIGHWAY) simplified Project Logical Framework (LogFrame)<sup>5</sup>**

## 2. INTRODUCTION TO THE EX-POST EVALUATION

According to the WMO Evaluation Policy (2023)<sup>6</sup>, which is in conformance with UNEG norms and UNEG standards<sup>7</sup>, and using the OECD/DAC criteria for evaluation, the Ex-Post evaluation has determined – according to the WMO’s Evaluation guidelines - the effectiveness, impact, and sustainability of the HIGHWAY project, prioritizing these aspects and placing them at the center of the evaluation, while minimizing emphasis on efficiency<sup>8</sup>. The evaluation has covered the design, implementation, and post-implementation phases of the project. It has encompassed the activities carried out at regional, national, and community levels within the East African Region. Detailed evaluation issues and key evaluation questions were listed in the Terms of Reference (ToRs) for this Ex-Post evaluation.

### EVALUATION SCOPE, PURPOSE, OBJECTIVES AND INTENDED USE

WMO was an Implementing Agency of the HIGHWAY project financed by FCDO, and in accordance with both WMO’s Evaluation Policies, has contracted a Senior Evaluation Expert to conduct an independent Final Ex-post evaluation of the project: "HIGH Impact Weather IAke sYstem (HIGHWAY) Project" in the period from 15 September 2023 to 31 December 2023. The evaluation was conducted in a hybrid way, i.e., partly remotely, and

<sup>5</sup> (Source: Project Document, 1 September 2017)

<sup>6</sup> [https://ane4bf-datap1.s3-eu-west-1.amazonaws.com/wmocms/s3fs-public/ckeditor/files/WMO\\_Evaluation\\_Policy\\_Jan\\_2023\\_-\\_Approved\\_0.pdf?NPVFifM06slAsi.3i\\_N1S2NqiQ6gduzT](https://ane4bf-datap1.s3-eu-west-1.amazonaws.com/wmocms/s3fs-public/ckeditor/files/WMO_Evaluation_Policy_Jan_2023_-_Approved_0.pdf?NPVFifM06slAsi.3i_N1S2NqiQ6gduzT)

<sup>7</sup> <https://www.unevaluation.org/document/detail/1914>

<sup>8</sup> Definition of each criterion is available at: <https://www.oecd.org/dac/evaluation/revise-evaluation-criteria-dec-2019.pdf>

there were field evaluation missions to three of the four targeted East African countries: Uganda, Kenya, and Tanzania.

The results of the ex-post evaluation of the Project were used for measuring the impact and the sustainability of the project and the level of achievement of the established project objectives to describe if the desired attributes of interventions were relevant to the context, coherent with other interventions, delivered results in an efficient way, and had positive impacts that last. The produced impact and the sustainability of the project were the most important evaluation criteria, as they could be well observed almost three years after project completion.

The purpose of the evaluation was to gain insights into the long-term effects and sustainability of the project and to use the lessons learned and best practices to inform the development of future initiatives.

The Evaluation had three additional purposes:

1. To support evidence-based policymaking and organizational effectiveness by informing planning, programming, budgeting, project design, implementation, and reporting,
2. To meet accountability requirements, and
3. To promote operational improvement, learning and knowledge sharing through results and lessons learned among the World Meteorological Organization (WMO), Foreign, Commonwealth & Development Office (FCDO) / UK Aid, United Kingdom Met Office (UKMO), National Meteorological and Hydrological Services (NMHSs) in the East African countries: Kenya Meteorological Department (KMD), Tanzania Meteorological Agency (TMA), Uganda National Meteorological Authority (UNMA), and Rwanda Meteorological Service (Météo Rwanda); East African Community (EAC).

This Ex-Post evaluation was also able to identify lessons of operational relevance for future formulation and implementation of similar projects. Recommendations relevant to WMO were also identified during the evaluation process.

The evaluator has provided an analysis of the attainment of the main objective and specific objectives under the one project outcome and four project outputs of the HIGH impact Weather IAke sYstem (HIGHWAY) project. Through the assessment, the evaluator has enabled the WMO, the UK Aid, NMHSs in East Africa, the East African Community (EAC), and other stakeholders and donors to:

1. Evaluate the extent to which the project has contributed to the increased use of weather information in improving resilience and reducing the loss of life and damage to property in the East African Region.
2. Assess the effectiveness of the co-designed early warning systems in enhancing access to and utilization of information for regional, national, and community-level planning and decision-making.
3. Assess the impact and the sustainability of the project as well as any unintended consequences.
4. Provide lessons learned, good practices and recommendations for further improvement and replication of similar initiatives in the future.

The **key strategic evaluation questions** of this Ex-Post Evaluation of the HIGHWAY project are:

1. To what extent did the co-designed early warning systems contribute to informed regional, national, and community-level planning and decision-making?
2. To what extent could the project approach be scaled up or effectively replicated in other contexts?
3. How effective was the project in increasing the use of weather information to improve resilience and reduce the loss of life and damage to property in the East African Region?
4. To what extent have the benefits and impacts of the project been sustained beyond its completion?
5. What mechanisms and strategies were put in place to ensure the long-term sustainability of the early warning systems and their integration into planning and decision-making processes?
6. Which factors or approaches contributed to or impaired the long-term sustainability of the project outputs and outcomes?
7. To what extent can positive change, if any, in the resilience of the East African region to extreme weather, climate, water, and other environmental events be attributed to the HIGHWAY Project?
8. What factors facilitated or hindered the Project from achieving these impacts?
9. Were there any unintended positive or negative consequences resulting from the project implementation?
10. What were the main factors contributing to these unintended consequences, and how were they addressed?
11. What are the recommendations for improving similar initiatives in the future?

All evaluation criteria were rated on a three-point scale as presented in Annex 1. The set of evaluation criteria is grouped into seven categories: (A) Relevance and Project Design; (B) Coherence; (C) Effectiveness, which comprises assessments of the availability of outputs, and achievement of outcomes; (D) Efficiency; (E) Likelihood of impact; (E) Sustainability; and (G) Gender Mainstreaming / Consideration.

A complete list of consulted documents for this Ex-Post Evaluation Report of the HIGH impact Weather IAke sYstem (HIGHWAY) Project is given in Annex 2.

A list of project stakeholders from the World Meteorological Organization (WMO) consulted for the Ex-Post Evaluation Report is given in Annex 3 of this Ex-Post Evaluation Report.

The Ex-Post evaluation report will be of interest to the following concerned stakeholders: World Meteorological Organization (WMO), UK Aid, United Kingdom Met Office (UKMO), National Meteorological and Hydrological Services in East Africa: Kenya Meteorological Department (KMD), Rwanda Meteorological Service (Météo Rwanda), Tanzania Meteorological Agency (TMA), Uganda National Meteorological Authority (UNMA); East African Community (EAC), all the stakeholders and beneficiaries of weather services and the early warning systems around Lake Victoria.

This subchapter presents a description of the proposed methodological approach containing the Ex-Post Evaluation approach, main elements, and data collection tools. It will further deepen into a description of the reporting and dissemination phase. The Evaluation Approach and Methodology, as well as the information sources, evaluation limitations, and its intended use, are explained in the Inception Report for the Ex-Post Evaluation Report.

### 3. PROJECT ASSESSMENT

#### STRATEGIC RELEVANCE

The assessment of project relevance takes into consideration the project's contribution to the achievement of national objectives regarding Climate Change and Adaptation (CCA) and their obligation under the United Nations Framework Convention on Climate Change (UNFCCC), signees of the Paris Climate Change Agreement, and further under the Sendai Framework for Disasters Risk Reduction (DRR) in the four Eastern African Community (EAC) countries: Uganda, Kenya, Tanzania, and Rwanda. Furthermore, the strategic priorities of the UK Foreign, Commonwealth & Development Office (FCDO) – UK Aid should be carefully considered, as well as the project's relevance to WMO's mandate.

Generally, in the period since the project was designed in September 2017 up to completion of its implementation in March 2021, the Project has remained throughout very relevant. This has been assessed through the review of documentation and interviews with the project stakeholders in all EAC countries that were part of this project.

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#### ALIGNMENT TO WMO'S STRATEGIC PLANS AND PLAN OF WORK

The project is fully in line with WMO's mandate, core competences and can benefit from WMO's comparative advantage as FCDO's Implementing Agency in the climate change and adaptation (CCA) domain, as well as with WMO's work in the East African Community (EAC) countries, especially with the Weather and Climate and Information Services for Africa (WISER) Programme. WMO provides world leadership and expertise in international cooperation in the delivery and use of high-quality, authoritative weather, climate, hydrological and related environmental services by its Members, to improve the well-being of all. WMO's vision is to see a world where all nations, especially the most vulnerable, are more resilient to the socio-economic consequences of extreme weather, climate, water, and other environmental events; and underpin their sustainable development through the best possible services, whether over land, at sea or in the air by the year 2030. WMO's mission and mandate is to facilitate worldwide cooperation in the design and delivery of meteorological services, foster the rapid exchange of meteorological information, advance the standardization of meteorological data, build cooperation between meteorological and hydrological services, encourage research and training in meteorology, and expand the use of meteorology to benefit other sectors such as aviation, shipping, agriculture and water management. WMO works on delivering transformational change for people and nature by enabling and facilitating provision of high-quality, authoritative weather, climate, hydrological and related environmental services. This Early Warning System (EWS), Disasters Risks Reduction (DRR) and Climate Change and Adaptation (CCA) project is part of the themes: climate, meteorology and environment (climate change and adaptation).

The HIGHWAY Project effectively delivered the design and co-production of early warnings that are systems that warn of impending hazards, allowing people to take action to reduce the societal and economic impact of natural hazards using a coordinated interdisciplinary approach spanning a wide range of physical and social sciences. After recognizing the importance of early warnings in reducing the negative impacts and losses resulting from natural hazards, the United Nations, through the World Meteorological Organization (WMO) as its leading implementer, has introduced the 'Early Warnings for All' initiative. It aims at ensuring that every person on Earth is protected by an early warning system by 2027. The project is highly relevant to both WMO's Strategic plans 2016-2019 and 2020-2023, and its corresponding Plans of Work (PoW).

The "HIGH Impact Weather IAke sYstem (HIGHWAY) Project" directly contributed to fulfilling the following WMO Long-term Goals (LG) and Strategic Objectives (SO):

- LG 1: Better serve societal needs:
  - The HIGHWAY project contributed 20% to strengthening national multihazard early warning/alert systems and extending reach to better enable effective response to associated risks.
  - An additional 20% contributed to broadening the provision of policy and decision-supporting climate information and services.
- LG: 2. Enhance Earth system observations and predictions:
  - The HIGHWAY Project has optimized the acquisition of Earth system observation data through the WMO Integrated Global Observing System (WIGOS) with 20% delivery; and
  - It has improved and increased access to, exchange, and management of current and past Earth system observation data and derived products through the WMO Information System (WIS) by a further 10%.
- LG: 4. Close the capacity gap:
  - The HIGHWAY project has addressed the needs of the targeted countries developing countries to enable them to provide and utilize essential weather, climate, hydrological, and related environmental services with 20% of its delivery; and
  - Scale-up effective partnerships for investment in sustainable and cost-efficient infrastructure and service delivery with 10%.

In addition, this project supported the achievement of the 2030 Agenda for Sustainable Development Goals (SDGs), in particular Goal 1 on No Poverty, Goal 2 for Zero Hunger, Goal 6 on Clean Water and Sanitation, Goal 8 on inclusive and sustainable economic growth, Goal 9 on building resilient and sustainable industry, innovation, and infrastructure, Goal 13 on Climate Action, and Goal 17 on building partnerships for the goals.

Overall, the project is highly relevant to WMO's mandate, Strategic Plans, Plans of Work, and strategic priorities.

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#### **ALIGNMENT TO DONOR / PARTNER STRATEGIC PRIORITIES**

The project aligns with the UK Foreign, Commonwealth & Development Office (FCDO)<sup>9</sup>– UK Aid's strategic priorities, benefiting EAC countries: Kenya, Tanzania, Rwanda, and Uganda. They can utilize early warning systems to overcome vulnerabilities and build resilience to climate shocks around Lake Victoria, achieving the SDGs and NDCs under the Paris Agreement. In line with the UK Government's 2021 integrated review of foreign, defense, security, and development policy, UK Aid focuses on Africa, with 52% of bilateral aid in 2020 spent there. Its objectives include poverty alleviation, economic development, girls' education, and climate change.

DFID's single departmental plan (SDP) sets strategic objectives (SOs) for 2017-18, structured around the four UK Aid Strategy objectives, with a fifth objective ensuring value for money and efficiency. Strategic Objective 2 (SO2) strengthens resilience and response to crises, with the HIGHWAY project financed within this framework. DFID leads in responding to humanitarian crises, improving resilience, and tackling climate change. It provides life-changing support, responds to famine risk, and enhances disaster coping capacity.

UK's science and technology work, in the case of HIGHWAY through the UK Met Office supporting WMO to implement HIGHWAY, has a strong focus on responding swiftly, flexibly, and generously to help people at the most difficult times in their lives, and to ensure a more effective global response to crises and disasters by the international system by improving the anticipation and management of risk. As can be seen in Figure 2, DFID's work under SO2 has contributed to the following Global Sustainable Development Goals (SDGs): SDG 1: No Poverty, SDG 2: Zero Hunger, SDG 3 Good Health and Well-being, SDG 5: Gender Equality, SDG 6: Clean Water and Sanitation, SDG 7: Affordable and Clean Energy, SDG 9: Industry, Innovation and Infrastructure, SDG 10: Reduced Inequalities, SDG 13: Climate Action, SDG 14: Life below Water, SDG 15: Life on Land, and SDG 17: Partnership for the Goals, amongst others.



**Figure 2 DFID's contribution under SO2: Strengthen Resilience and Response to Crises for the Global Sustainable Development Goals (SDGs)<sup>10</sup>**

The UK Met Office is a delivery partner on behalf of the UK government's Department for Science, Innovation and Technology (DSIT), and it is administering funding through their Weather and Climate Science for Service Partnership (WCSSP) programme. The WCSSP

<sup>9</sup> At the time of project design FCDO was Department for International Development (DFID)

<sup>10</sup> <https://assets.publishing.service.gov.uk/media/5bd045c640f0b604de423c6c/DFID-Annual-Report-Accounts-2017-18-amended-Oct18.pdf>, Page 29

programme has been developing a global network of partnerships that harness the weather and climate scientific expertise of the UK and partner countries to strengthen the weather and climate resilience of vulnerable communities around the world since 2014.

In light of the above, the World Meteorological Organization (WMO) has signed a Grant Agreement with the Met Office as a Fund Manager for and on behalf of the Secretary of State for the Department for Business, Energy and Industrial Strategy of the United Kingdom and Northern Ireland in relations to the project titled: "HIGH Impact Weather LAke sYstem (HIGHWAY) Project - a proposal framework for the Lake Victoria region" on 29 September 2017 for an amount of GBP 3,190,452 pursuant to a grant made by the UK Foreign, Commonwealth & Development Office (FCDO) – UK Aid.

The HIGHWAY project is highly relevant to FCDO's – UK Aid's strategic priorities.

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#### RELEVANCE TO REGIONAL, SUB-REGIONAL AND NATIONAL ENVIRONMENTAL PRIORITIES

The HIGHWAY project has contributed to the achievement of national objectives regarding Climate Change Adaptation (CCA) and their obligations under the Paris Climate Change Agreement, the Sendai Framework for Disaster Risk Reduction, and the early warning systems, as well as the 2030 Sustainable Development Agenda.

The objective of using regional meteorological EWSs to help countries achieve the SDGs aligns well with the objectives of the UN and WMO itself.

The HIGHWAY project links to the following regional and sub-regional strategies:

1. **Regional Strategy:** AMCOMET, established in 2010, is a high-level policy mechanism for the development of Meteorology (Weather and Climate services) and its applications in Africa. It is the inter-governmental authority on Meteorology in Africa, which fosters political will to strengthen the National Meteorological and Hydrological Services (NMHSs) and enable them to fully perform their roles as fundamental components of the national development infrastructure and a major contributor to social and economic development on the continent. AMCOMET further serves as the platform through which sustainable development programmes specific to weather and climate services are harmonized and coordinated with all relevant stakeholders from the international to sub-national levels.
2. The Integrated African Strategy<sup>11</sup> on Meteorology (Weather and Climate Services), approved in October 2012 by Ministers Responsible for Meteorology and subsequently endorsed by the African Union Heads of State and Government in January 2013, is a policy document that positions weather and climate services as essential components in national and regional development frameworks and sustainable development in Africa, particularly in disaster risk reduction (DRR), poverty eradication efforts and strategies for climate change mitigation and adaptation. The Strategy and its complementary Implementation and Resource Mobilization Plan<sup>12</sup> have prioritized the implementation of the proposed activities called out in this proposal, specifically, under Strategic Pillar 2.

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<sup>11</sup> [http://www.wmo.int/amcomet/sites/default/files/field/doc/pages/amcomet-integrated-african-strategy-meteorology-13677\\_en.pdf](http://www.wmo.int/amcomet/sites/default/files/field/doc/pages/amcomet-integrated-african-strategy-meteorology-13677_en.pdf)

<sup>12</sup> [http://www.wmo.int/amcomet/sites/default/files/field/doc/events/doc.4.0\\_approved\\_implementation\\_and\\_rm\\_plan\\_en.pdf](http://www.wmo.int/amcomet/sites/default/files/field/doc/events/doc.4.0_approved_implementation_and_rm_plan_en.pdf)



3. **Strategic Pillar 2: Enhance the Production and Delivery of Weather and Climate Services for Sustainable Development:** Acknowledging that NMHSs are the main providers of weather and climate services in Africa, this pillar aims to improve the effectiveness and efficiency of the production and delivery of such services enabling appropriate responses to the changing needs of government, society, and sectoral users through suitable structures and working mechanisms. There is also an urgent need to strengthen NMHS's scientific and technological capacities to improve the delivery of tailored products and services to communities, enhance agricultural production, minimize the spread of climate-sensitive diseases, improve water resources management, and improve disaster response, among others. Relevant areas of action being addressed in the HIGHWAY project are:
- Enhance telecommunications systems, within and among the countries; including through the regional WMO Information Systems (WIS);
  - Ensure that the African meteorological weather requirements on satellite-derived products are channeled through the regional WMO Integrated Global Observing System (WIGOS); and
  - Improve channels of communication to enable prompt and informed decision-making, taking into consideration the highly perishable nature of most weather products such as forecasts, early warnings, and advisories.

Furthermore, the Severe Weather Forecasting Development Project (SWFDP) is an initiative being scaled up in this proposal is also a Flagship Programme of AMCOMET. The Praia Ministerial Declaration<sup>13</sup> explicitly invited all WMO Members and development partners to be involved in the project and make financial contributions to the SWFDP for the sustainability of the project. The Ministers further noted the commitment and tenacity shown by the NMHSs in the SWFDP project to demonstrate the feasibility and societal benefits accruing from this project for the region.

At the sub-regional, the Five-Year Meteorological Development Plan (2013-2018) of the East African Community (EAC) also calls for the improvement of meteorological service delivery at all levels and scales. Also, the sixth EAC development strategy<sup>14</sup> foresees:

1. Enhancing the safety of navigation and efficient exploitation of natural resources on the lake and its basin by strengthening meteorological services over Lake Victoria, and
2. Enhancing disaster prevention and management capacities for sustainable development by strengthening meteorological early warning systems in the EAC region as one of its five pivotal meteorological priorities during the period from 2023 to 2024.

Priorities identified in the Meteorological Development Plan include observing systems, telecommunications for data exchange, enhancement of Public Weather Services and improvements/establishment of Multi-Hazards Early Warning Systems in the sub-region to achieve the following goals: improve protection of lives and property, poverty alleviation and sustained livelihoods and economic growth.

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<sup>13</sup> [http://www.wmo.int/amcomet/sites/default/files/field/doc/events/doc\\_17\\_praia\\_ministerial\\_declaration\\_final\\_en.pdf](http://www.wmo.int/amcomet/sites/default/files/field/doc/events/doc_17_praia_ministerial_declaration_final_en.pdf)

<sup>14</sup> <https://www.eac.int/infrastructure/meteorology-sector>



Much of the current severe weather forecasting services are produced by the NMHSs under SWFDP. The HIGHWAY Project will build on the SWFDP framework by strengthening service provision and delivery through a holistic capacity development approach to enable better decision-making to a wider range of end-users, expanding the number of communities that can benefit from the Early Warning System (EWS).

Overall, the HIGHWAY Project is highly relevant to the national development, climate, early warning systems and disasters risk reduction priorities and strategies of the Governments of the EAC countries.

The project "HIGH Impact Weather LAke sYstem (HIGHWAY) Project" has contributed to the sustainable climate risk reduction strategic plan for the four Eastern African countries: Uganda, Kenya, Tanzania, and Rwanda through raising awareness, strengthening capacities and creating an enabling environment for timely access to weather information in form of an early warning system for building resilience in the fishermen communities (fisherfolk) and population around Lake Victoria.

The project was fully aligned with regional, national, and community-level planning and priorities, as it has contributed to the achievement of each country's national objectives regarding Climate Change Adaptation (CCA) and their obligations under the Paris Climate Change Agreement, and the Sendai Framework for Disaster Risk Reduction and the early warning systems, as well as the 2030 Sustainable Development Agenda.

The sixth EAC development strategy foresees enhancing the safety of navigation and efficient exploitation of natural resources on the lake and its basin by strengthening meteorological services over Lake Victoria and enhancing disaster prevention and management capacities for sustainable development by strengthening meteorological early warning systems in the EAC region as one of its five pivotal meteorological priorities during the period from 2023 to 2024.

The HIGHWAY project was highly relevant in addressing the need to improve resilience and reduce the loss of life and damage to property in the East African Region, as it has created a collaboration between the four countries to issue a specific marine forecast for the Lake Victoria, that is shared with the relevant stakeholders two times per day.

The HIGHWAY project was designed in a participatory manner and the needs of stakeholders and beneficiaries were taken into account in the project design and implementation.

This project addressed the objective and focal areas of the (FCDO) – UK Aid and UK Met Office, to assist the EAC countries in completing the Nationally Determined Contributions (NDCs) under the Paris Agreement, and it was fully aligned with its strategic priorities and objectives including poverty alleviation, economic development, and climate change.

The project relevance was highly aligned with WMO's mandate to facilitate worldwide cooperation in the design and delivery of meteorological services, foster the rapid exchange of meteorological information, advance the standardization of meteorological data, build cooperation between meteorological and hydrological services, encourage research and training in meteorology, and expand the use of meteorology to benefit food security and economic development. It is relevant to WMO's Strategic plans 2016-2019 and 2020-2023, and its corresponding Plans of Work (PoW).

**Overall, the project was highly relevant.**

## QUALITY OF PROJECT DESIGN

### PROJECT DESIGN

The assessment of project design assesses the adequateness of the project to clear thematically focused development objectives set by the WMO and FCDO - UK Aid, the attainment of which can be determined by a set of verifiable indicators. Projects are expected to be prepared in a participatory manner and with contributions of national stakeholders and/or target beneficiaries. The project followed the requirement to formulate the project based on the project logical framework approach.

The Project document has been prepared based on the results of various research and baseline studies, and diverse stakeholders were actively involved in the project design. The Project was very innovative using a regional approach in the early warning systems in the countries of the Eastern African Community (EAC) and there are no precedents of other similar initiatives or projects globally with such a thematic regional approach. HIGHWAY was a project ahead of its time, the project design did not consider that the National MHSs in Kenya, Tanzania, Uganda, and Rwanda were not capacitated enough in 2017 to build a regional EWS and therewith contained some unrealistic output indicators concerning the regional NMHSs collaboration for Output 1 and 2. The overall project design is relevant and developed with the strong participation of various stakeholders in project identification.

The Project Logical Framework (LogFrame) presented in Annex 5 with its outcome and outputs, and impact indicators are developed adequately, measured with SMART (Specific, Measurable, Achievable, Relevant, and Time-bound) indicators and they allow for proper adaptive management and monitoring of project results.

The evaluator has prepared the reconstructed Theory of Change (ToC) shown in Annex 6 for the Ex-Post Evaluation of the HIGH impact Weather IAke sYstem (HIGHWAY) Project based on the original ToC presented in Annex 5 and revised project documents and the project logical framework.

Details on the Theory of Change, project impact, outcome, and outputs can be found in the Inception Report for this Ex-Post Evaluation Report.

**The project design did not fully meet expectations,** because HIGHWAY was a project ahead of its time, and the design did not consider that the National MHSs in Kenya, Tanzania, Uganda and Rwanda were not capacitated enough in 2017 to build a regional EWS and therewith contained some unrealistic output indicators concerning the regional NMHSs collaboration for Output 1 and 2. The overall project design is relevant and innovative in disasters risks reduction and mitigation and Climate Change and Adaptation (CCA) by creating a Regional Meteorological Early Warning Systems (EWS) for the Lake Victoria in the East African Countries: Uganda, Kenya, Tanzania and Rwanda. The Project was identified and prepared through cooperation with diverse stakeholders. The Project Logical Framework with its outcome and outputs, as well as impact indicators were developed adequately (with measurable elements of the SMART

indicators) and allowed for proper adaptive management and monitoring of project results. There was a Theory of Change (ToC) developed for this project.

## COHERENCE

Coherence is the newest OECD/DAC Evaluation Criterion, and it serves to assess the compatibility of the intervention with other interventions in a country, sector, or institution, or how well the intervention/project fits in a closed system.

Coherence shows the extent to which the “HIGH Impact Weather LAke sYstem (HIGHWAY) Project” is consistent with other interventions (particularly policies) that support or undermine the intervention, and vice versa. It includes internal coherence and external coherence. In the case of the ex-post evaluation of the HIGHWAY project, the evaluation analyzed the internal coherence within the Eastern African countries, which is WMO’s role as a project implementation agency, and the external coherence, including complementarity, harmonization, and coordination with other projects and actors handling the issues of Early Warning Systems and Climate Change and Adaptation in Eastern Africa and worldwide.

For internal coherence, a number of relevant national and regional projects and initiatives led or implemented by the World Meteorological Organization (WMO) are ongoing in the Eastern African countries, including:

1. GCOS – The Global Climate Observation System (GCOS) is a WMO programme to promote the sharing of climate observation data. Under the HIGHWAY project, GCOS provided some time in kind for site visits, maintenance, advice, etc.;
2. WIGOS – The WMO Integrated Global Observing System (WIGOS) is a WMO programme to promote the sharing of weather observation data. During the HIGHWAY Project, Kenya Meteorology Department (KMD) and Tanzania Meteorological Authority (TMA) have both submitted proposals to host different aspects of WIGOS for the region (metadata and quality control respectively);
3. WMO VCP – The UK Voluntary Cooperation Programme (VCP) is run by the UK Met Office and provides Numerical Weather Prediction (NWP) data (from the 4.4km Tropical Africa model), boat observations, and contributions to Severe Weather Forecasting Programme (SWFP) training as well as support to Public Weather Service studios (graphics package and technical support);
4. HIWeather – A WMO project to promote cooperative international research to achieve a dramatic increase in resilience to high impact weather, worldwide, through improving forecasts for timescales of minutes to two weeks and enhancing their communication and utility in social, economic, and environmental applications; and
5. HyVIC – Hydroclimate Project for Lake Victoria Basin – A WMO World Climate Research Programme Regional Hydrological Programme to improve the understanding of the Lake Victoria hydrological and meteorological system for nowcasting, forecasting, and climate timescales.

For external coherence, there are few other relevant national and regional projects and initiatives led or implemented by the different institutions like the University of Leeds are ongoing in the Eastern African countries, including the HyCRISTAL Project, which is

integrating Hydro-Climate Science into Policy Decisions for Climate -Resilient Infrastructure and Livelihoods in East Africa – The project’s overarching goal was to develop a new understanding of East African climate variability and change, their impacts, and to work with regional decision makers to support effective long-term (5 to 40 year) decision-making in the face of a changing climate.

Other projects supporting the high external coherence of HIGHWAY include:

1. WISER Phase 2 projects – a number of projects are ongoing at the national level, as well as HIGHWAY at the regional level, that will benefit from this investment, particularly in terms of enhanced observations and improved NWP;
2. GCRF African SWIFT – Global Challenges Research Fund African Science for Weather Information and Forecasting Techniques Project – A UK government-funded project (through NERC) to improve weather forecasting across Kenya, Senegal, Nigeria, and Ghana. The project has been developing a ‘Hazardous Weather Testbed’ with which the implementing partners have interacted. The project is also seeking to develop an East Africa Forecasting Handbook that will support all forecasting in the region;
3. MNLVMCT – The Multinational Lake Victoria Maritime Communication and Transport Project (MNLVMCT) – An AfDB-funded project to establish a safety of life communications system for Lake Victoria. Whilst the regional element of this project has been delayed, national activities have been initiated and will benefit from the outcomes and outputs of HIGHWAY and progress towards the implementation of the Regional EWS Vision 2025; and
4. CREWS East Africa Project - A regional project in six East African Countries: Kenya, Tanzania, Uganda, Rwanda, Burundi, and South Sudan for Strengthening Hydro-Meteorological and Early Warning Services in the East Africa Region. The Climate Risk and Early Warning Systems (CREWS) East Africa is a US\$ 7,000,000 project, aiming to improve the Early Warning Services (EWS) in East Africa and develop the coverage of impact-based early warning services across Lake Victoria and surrounding communities to support the EAC EWS Vision 2025.

To demonstrate the coherence and flexibility of operations/interventions, the HIGHWAY project captured perspectives that were not covered previously in other projects, including partnerships and linkages, and to understand interventions within broader systems by producing the tailor-made Marine Weather Forecast with cooperation between the UK Met Office and the NMHSs in the EAC: the Kenya Meteorological Department (KMD), Tanzania Meteorological Agency (TMA), Uganda National Meteorological Authority (UNMA) co-production by pre-assessing the exact need of the fisher folk and the population using the early warning systems weather prediction around Lake Victoria.

Internal coherence addresses the synergies and interlinkages between the intervention and other interventions carried out by the same institution/government, as well as the consistency of the intervention with the relevant international norms and standards to which that institution/government adheres. Internal coherence of the HIGHWAY Project with all the Climate Change and Adaptation (CCA) mechanisms in the Eastern African countries and all the institutions. WMO has a broad network of actors in all the Eastern African countries, and it has a tradition of implementing numerous projects, and the HIGHWAY project has benefited a great deal from it. Aside from the traditional collaborations with the NHMSs’ Focal Points in the countries, there was a special collaboration with diverse County and Local level Fisheries Units, Beach Management Units

(BMUs), and NGOs/CSOs to improve economic development and save lives during fishing activities around the Lake Victoria. Internal coherence was built throughout the HIGHWAY project with the involvement of the National Hydro-Meteorological Services (NMHSs) in the Eastern African countries in co-producing the marine forecast for Lake Victoria.

External coherence considers the consistency of the intervention with other actors' interventions in the same context. This includes complementarity, harmonization, and co-ordination with others, and the extent to which the intervention is adding value while avoiding duplication of effort. Based on the results of the HIGHWAY project, it was intended to build external coherence by WMO advising the EAC and its members: Kenya, Tanzania, Uganda, and Rwanda to collaborate with one of the most important actors in the field of large environmental and climate change and adaptation grants and credit lines donors worldwide the Green Climate Fund (GCF) by preparing a first draft project proposal for implementation of the Early Vision 2025 Strategy for a regional EWS for the EACs. Within external coherence, there was a particular collaboration and high coherence on the regional level with the Eastern African Community, which has its Headquarters in Arusha.

The project made a strong effort throughout the implementation to align and create Synergies with other interventions to increase efficiency, effectiveness, and sustainability of results, especially in the collaboration within the regional capacity building workshop trainings on weather prediction, forecasting, and nowcasting, radar use, early warning systems and disasters risk reduction with Eastern African countries.

The complementarity with other relevant existing interventions has exceeded the expectations, as there was an excellent collaboration with complementary initiatives on a global scale.

**The HIGHWAY Project met the expectations for both Internal<sup>15</sup> and External<sup>16</sup> Coherence.** This project and its implementation are highly compatible with other Climate Change and Adaptation (CCA) instruments, initiatives, and legislation in Eastern African countries, and with a number of relevant national and regional projects and initiatives led or implemented by the World Meteorological Organization (WMO), like GCOS, WIGOS, HiWeather, HyVIC, CREWS East Africa, etc. The criteria External Coherence has met expectations, as WMO has already established collaboration with numerous stakeholders and partners such as the Eastern African Community (EAC). The first GCF project proposal for upscaling the HIGHWAY Project was a product of this project. WMO has encouraged the EAC countries: Kenya, Tanzania, Uganda, and Rwanda to establish collaboration with the Green Climate Fund (GCF) on the implementation of the regional EWS for the four EACs within the frames of the Early Vision 2025 Strategy.

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<sup>15</sup> Internal coherence addresses the synergies and interlinkages between the intervention and other interventions carried out by the same institution/government, as well as the consistency of the intervention with the relevant international norms and standards to which that institution/government adheres.

<sup>16</sup> External coherence considers the consistency of the intervention with other actors' interventions in the same context. This includes complementarity, harmonization and co-ordination with others, and the extent to which the intervention is adding value while avoiding duplication of effort.

## EFFECTIVENESS

Project effectiveness assesses to what extent the project outcomes, outputs, and long-term project objectives have been achieved.

This section focuses on the Project's effectiveness through the full course of project implementation, which means, the extent to which the Project has achieved its end results in terms of stated outputs and short- to medium-term outcomes, including global environmental benefits and replication effects. Furthermore, this chapter contains the targets, overall results achieved by the end of the Project, and global environment objectives achieved by the Project.

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### AVAILABILITY OF OUTPUTS

The project managed to deliver all its outputs with excellent quality. The foundational knowledge both in capacity within partners and through the publication of various high-quality products, publications, and reports is useful not only for the four East African countries: Uganda, Tanzania, Kenya, and Rwanda for which the HIGHWAY- HIGH impact Weather IAke sYstem - a proposal framework for the lake Victoria region project was designed, but they can be replicated also for all the developing countries worldwide to increase the use of weather information to improve resilience and reduce the loss of life and damage to property in the lake regions.

Generally, the WMO Project has achieved the expected outputs and outcomes stated in the original Project Document in 2017 though having concluded it one year behind the original schedule due to the Covid-19 pandemic (there was a one-year project non-cost extension). The main achievements on output level by the time of the Ex-post Evaluation of the HIGHWAY Project are given in Annex 8. Details on the availability of outputs and the achievements of the output indicators can be found in Annex 12 of this ex-post evaluation report.

The availability of project outputs has exceeded expectations.

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#### PROJECT OUTPUT 1: ESTABLISHED, EFFECTIVE INSTITUTIONAL FRAMEWORK FOR AN EARLY WARNING SYSTEM FOR THE EAST AFRICAN REGION.

This output was achieved. It focused on establishing an effective institutional framework for an Early Warning System for the East African Region for the four EAC countries: Uganda, Kenya, Tanzania, and Rwanda through creating numerous joint initiatives at regional, national, and sub-national levels that support the enabling of the delivery of a regional EWS. There were 7 letters of Agreement / Service Agreements / MoUs /Implementing Arrangement signed between the WMO and its project partners: TMA, KMD, UNMA through ActionAid Uganda, Météo Rwanda, NCAR, UK Met Office, and TAHMO. As a result, a Business Plan for the EWS was developed and an EAC regional Early Warnings System (EWS) Vision 2025 for all six East African Community countries: Uganda, Kenya, Tanzania, Rwanda, Burundi, and South Sudan was developed and endorsed. The fund-raising possibilities for implementation of the EAC EWS Strategy 2025 were explored.

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**PROJECT OUTPUT 2: IMPROVED ACCESS TO ALL OPERATIONAL DATA SOURCES TO SUPPORT THE GENERATION AND MAINTENANCE OF EARLY WARNING SERVICES FOR THE EAST AFRICAN REGION**

Output 2 was achieved. It focused on improved access to all operational data sources to support the generation and maintenance of Early Warning Services for the East African Region with the following main activities: NCAR worked with the Mwanza radar engineer to optimize radar scanning and data archival. TAHMO and 3D-PAWS surface stations and EarthNetworks lightning data were provided for free during the Field Campaign (FC). NCAR archived all FC data, including satellite, radar, EarthNetworks lightning, radar, radiosonde, surface station data, and UKMO NWP fields. NCAR CIDD display installed at TMA CFO for visualization of Mwanza radar data. NCAR created the HIGHWAY Field Catalog website of FC images.<sup>17</sup>

Field Catalog provides images of radar, satellite, lightning, surface stations, and radiosondes, along with UKMO NWP fields. A HIGHWAY Awareness Campaign was held at TMA with briefings on HIGHWAY and the FC, where 20 media venues attended.

Observation gap analysis and gap mitigation recommendations were done. Preventive maintenance of observation stations in Kenya, Uganda, and Tanzania and spare parts for AWS stations in Kenya, Uganda, and Tanzania. Installation of 14 3D-PAWS in Kenya and Uganda and associated capacity building. There was an increased reporting temporal resolution (from 3 to 1 hour) to GTS of four KMD manual stations in LVB.

Assessment of upper air sounding stations in Nairobi, Lodwar, Dar Es Salaam, and Entebbe was done.

Nairobi and Lodwar upper air stations were upgraded and reported to GTS; Dar Es Salaam station was partly rehabilitated, and Entebbe station improved.

MODE-S devices were installed in major airports in HIGHWAY countries.

EAC Regional WIGOS Center (RWC) co-hosted by KMD and TMA and capacity building of RWCs and NHMSs staff in the EAC sub-region was established.

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**PROJECT OUTPUT 3: STRENGTHENED INTEGRATION BETWEEN PRODUCERS AND SCIENTISTS TO DEVELOP INNOVATIVE ACCURATE DATA, METHODOLOGIES, AND TOOLS TO IMPROVE AND VERIFY THE QUALITY OF EWS FOR THE EAST AFRICAN REGION.**

This output was achieved. It focused on science and the integration between producers and scientists to develop innovative accurate data, methodologies, and tools to improve and verify the quality of an Early Warning System for the East African Region for the four EAC countries: Uganda, Kenya, Tanzania, and Rwanda through creating numerous new and/or improved co-produced EWS forecasting tools and meteorological input products delivered to relevant producers. NMHS can access the UKMO 4km Unified East Africa model via different web portals like the RDT (Rapid Development Thunderstorm); Near-Cast product, and Convective Rain Rates (CRR) products. Also, 5 research papers and 9 conference presentations as research outputs, products, and reports on EWS were produced by the University of Leeds, WMO, UK Met Officer, NCAR, NOAA, and the NMHSs:

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<sup>17</sup> <http://catalog.eol.ucar.edu/highway>



TMA, UNMA, KMD, and Météo Rwanda. In order to fortify the science and knowledge exchange between the global North and the global South, many African scientists were enrolled and/or achieved postgraduate qualifications through collaboration and/or fellowships in the area of EWS.

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**PROJECT OUTPUT 4: STRENGTHENED INTEGRATION BETWEEN PRODUCERS, USERS, AND INTERMEDIARIES TO CO-DEVELOP NEW AND IMPROVED EWS PRODUCTS THAT TAKE ACCOUNT OF USER NEEDS AND ARE MORE ACCESSIBLE.**

Output 4 was achieved. It focused on strengthening the integration between producers, users, and intermediaries to co-develop new and improved EWS products that take account of user needs and are more accessible for the East African Community (EAC) countries: Uganda, Kenya, Tanzania, and Rwanda. The UK Met Office produced the WISER Guidance on Equitable and Inclusive co-production for Weather and Climate Services.<sup>18</sup>

There were four products operational to enhance EWS by the end of the project that are shared per WhatsApp Group with numerous project beneficiaries: Rwanda: Forecast and early warning for Lake Kivu; Kenya: IBEWS Kenyan product complete and delivered in March 2019. Enhanced marine forecast and early warning for Lake Victoria; Uganda: Enhanced marine forecast and early warning for Lake Victoria, color-coded flags on fishermen landing site and early warning information on notice boards at BMU sites over the lake shore; and Uganda: Enhanced marine forecast and early warning for Lake Victoria, color-coded flags on fishermen landing site and early warning information on notice boards at BMU sites over the lake shore. All of the marine forecasts are being issued two times a day: late in the evening (around 0 am) and at noon.

The project achieved five communication links for EWS: Radio in Kenya and Uganda (dissemination in local languages); WhatsApp messages for Kenya and Uganda; Warning color-coded flags on landing sites of LVB in Kenya and Uganda; Guide to interpreting weather forecasts in Uganda; and Notice boards at some beach management units in Kenya and Uganda.

Around 40 forecasters and 400 intermediaries were trained by project closure.

For the number of users/households receiving the EWS, the baseline was 0, and the target was 10,000 direct and 40,000 indirect beneficiaries. In the end, the total beneficiaries with improved resilience using the Early Warning Systems (EWS) in Kenya, Tanzania, and Uganda were: 214,877 direct beneficiaries, and 1,390,262 indirect beneficiaries, and the total number of beneficiaries was 1,605,139.

Overall, the availability and achievement of the four outputs exceeded expectations. Especially, Outputs 1 and 3 have surpassed expectations.

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**ACHIEVEMENT OF PROJECT OUTCOMES**

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<sup>18</sup> <https://www.metoffice.gov.uk/binaries/content/assets/mohippo/pdf/international/wiser/wiser-co-production-guidance.pdf>.



The achievement of the project's outcomes was evaluated based on the reconstructed ToC's causal pathways between outputs and outcomes, and the key evaluation questions from the evaluation matrix as they can be found in Annex 4 of this Ex-post evaluation Report.

Indeed, the total number of beneficiaries with improved resilience using the Early Warning Systems (EWS) in Kenya, Tanzania, and Uganda was: 214,877 direct beneficiaries, and 1,390,262 indirect beneficiaries, and the total number of beneficiaries was 1,605,139.

Details on achievements per project outcome and its time-bound indicators and targets can be found in Annex 9.

The achievement of project outcomes is rated as exceeding expectations.

This project had only one Project Outcome: "Increased access to and use of co-designed and sustainable early warning systems to inform regional, national, sub-national and community-level planning and decision-making in the East African region" and all four project outputs followed the causal logical pathway to serve to fulfill the only project outcome.

The first outcome indicator was the number of NMHSs accessing new/improved EWS for improved decision-making. The target was to produce 3-5 NMHSs accessing new/improved EWS for improved decision-making. The four NMHSs (KMD, TMA, UNMA, and Météo Rwanda) were able to access the Met Office 4-km high-resolution East Africa unified model, Rapid Development Thunderstorms (RDT), and Convective Rain Rates (CRR) products. A regional EWS Standard Operating Procedure (SOP) for disseminating the Regional Impact Based Early Warning System (RIBEWS) products to the NMHSs has been developed during the RIBEWS-1 and 2 workshops at Project Closure in March 2021.

The second outcome indicator for this outcome was the number of households able to access/use new/improved EWS information. The target was that in the first stage, EWS and communication efforts should access and be used by >1 million / 0.25 million people. At project end, the total number of beneficiaries with improved resilience using the Early Warning Systems (EWS) in Kenya, Tanzania, and Uganda was: 214,877 direct beneficiaries, and 1,390,262 indirect beneficiaries, making up a total number of 1,605,139 beneficiaries around Lake Victoria to use the Marine Forecast and the EWS.

The third outcome indicator was the number of government departments/ministries/institutions able to access/use new/improved EWS information, with a target to reach 3 government departments/ministries/institutions able to access/use new/improved EWS information. At project closure in March 2021, there were 21 government departments/ministries/institutions able to access/use new/improved EWS information. These are the following:

1. Uganda (6): UNMA; Ministry of Works and Transport; Ministry of Agriculture, Animal Industry and Fisheries; Ministry of Defense; Ministry of Internal Affairs-Marine Police; Office of Disaster and Preparedness (OPM) in Prime Minister's Office.;
2. Kenya (6): Kenya Fisheries Services, Kisumu; Ministry of Agriculture and Livestock; Homa Bay County Government; Siaya County Government; Migori County Government; Disaster Management of Central and County Governments.;

3. Tanzania (4): TMA; District Executive Directors of Muleba and Sengerema who incorporate the Disaster Agencies in Districts; Tanzania Fisheries Department.; and
4. Rwanda (4): Météo Rwanda; District Disaster Management Office (DDMO); SEDIMAC Sector Disaster Management Council; Rwanda fisheries associations; Police and Army Marine regiments.

Generally, the Project has achieved the expected outputs and outcomes as they were stated in the original Project Document in 2017. The project has ended one year behind the original schedule due to the Covid-19 pandemic with one non-cost extension.

The achievement of project outcomes has exceeded expectations.

**The HIGHWAY project was highly effective and exceeded expectations in the evaluation criterion of effectiveness** due to its overall excellent finalization and implementation. The status of the main outputs at the time of the evaluation was:

***Project Output 1 was achieved.***

It focused on establishing an effective institutional framework for an Early Warning System (EWS) for the East African Region, encompassing Uganda, Kenya, Tanzania, and Rwanda. It involved creating joint initiatives at regional, national, and sub-national levels to enable the delivery of a regional EWS. Key milestones included the development of a Business Plan in 2018, endorsement of the EAC regional EWS Vision 2025 in June 2019, and finalization of a concept note for its implementation. Additionally, agreements were signed with various partners, leading to the development of a comprehensive Business Plan and EWS Vision 2025 for all six East African Community countries, including Burundi and South Sudan. The project also explored fundraising opportunities to support the implementation of the EAC EWS Strategy 2025.

***Project Output 2 was achieved.***

Output 2 focused on improved access to operational data sources for Early Warning Services in the East African Region. Key activities included optimizing radar scanning and data archival in Mwanza with NCAR, providing TAHMO and 3D-PAWS surface stations and EarthNetworks lightning data during the Field Campaign (FC), and archiving all FC data by NCAR. Additionally, a HIGHWAY Field Catalog website was created to provide images of radar, satellite, lightning, surface stations, and radiosondes. A HIGHWAY Awareness Campaign was conducted at TMA, attended by 20 media outlets. The project also involved observation gap analysis, preventive maintenance of observation stations, installation of 14 3D-PAWS in Kenya and Uganda, and upgrading upper air sounding stations in Nairobi, Lodwar, Dar Es Salaam, and Entebbe. Major airports in HIGHWAY countries received MODE-S devices, and the EAC Regional WIGOS Center was established, co-hosted by KMD and TMA. Four NMHSs were equipped with new hardware and technology, and Regional WIGOS Centers were established to manage metadata on stations and address observation quality and availability issues.

***Project Output 3 was achieved.***

This output focused on the integration between producers and scientists to develop innovative accurate data, methodologies, and tools to improve and verify the quality of an Early Warning System for the East African Region: Uganda, Kenya, Tanzania,

and Rwanda through creating numerous new and/or improved co-produced EWS forecasting tools and meteorological input products delivered to relevant producers. NMHS can access the UKMO 4km Unified East Africa model via different web portals like the RDT (Rapid Development Thunderstorm); Near-Cast product, and Convective Rain Rates (CRR) products. Also, instead of the planned minimum of 2 research outputs, achieved were: 5 research papers and 9 conference presentations as research outputs, products, and reports on EWS were produced by the University of Leeds, WMO, UK Met Officer, NCAR, NOAA and the NMHSs: TMA, UNMA, KMD and Météo Rwanda. To fortify the science and knowledge exchange between the global North and the global South, many African scientists were enrolled and/or achieved postgraduate qualifications through collaboration and/or fellowships in EWS.

***Project Output 4 was achieved.***

Output 4 focused on enhancing the integration among producers, users, and intermediaries to develop and improve Early Warning System (EWS) products for the East African Community (EAC) countries: Uganda, Kenya, Tanzania, and Rwanda. The UK Met Office produced the WISER Guidance on Equitable and Inclusive co-production for Weather and Climate Services. Operational products were delivered, including a forecast and early warning for Lake Kivu in Rwanda, an enhanced marine forecast and early warning for Lake Victoria in Kenya, and an enhanced marine forecast and early warning for Lake Victoria in Uganda. Communication links for EWS were established, including radio broadcasts and WhatsApp messages in Kenya and Uganda, warning color-coded flags at landing sites in the Lake Victoria Basin (LVB), and notice boards at beach management units in Kenya and Uganda. Training was provided to 40 forecasters and 400 intermediaries, and the project exceeded its target by benefiting 1,605,139 individuals in Kenya, Tanzania, and Uganda.

Considering the project's performance in delivering its four outputs, **the availability and achievement of these outputs have exceeded expectations.**

**The achievement of project outcomes has exceeded expectations,** as at project end, the total number of beneficiaries with improved resilience using the Early Warning Systems (EWS) in Kenya, Tanzania, and Uganda was: 214,877 direct beneficiaries, and 1,390,262 indirect beneficiaries, making up a total number of 1,605,139 beneficiaries around the Lake Victoria to use the Marine Forecast and the EWS. Additionally, there were 21 government departments/ministries/institutions able to access/use new/improved EWS information in Uganda, Tanzania, Kenya, and Rwanda. The baseline target in the LogFrame was that in the first stage with the EWS and communication efforts, access to EWS will have >1 million people, and more than 0.25 million people will use the EWS.

## EFFICIENCY

The assessment of efficiency should determine whether the project is being implemented in a cost-effective manner and represents the most economical option. It needs to consider if the project was delayed, and if so, whether the delay affects cost-effectiveness. Efficiency also considers the adequacy of contributions of governments as well as the national executing agency for project implementation.

This subchapter gives an overview of the extent to which the Project has produced the results (outputs and outcomes) within the expected time frame.

The progress of the project was assessed against the existing LogFrame and corresponding targets and indicators. The submitted quarterly and annual progress reports indicated the progress against the planned timeline of targets. Although the project was delayed using a non-cost extension by one year due to the Covid-19 pandemic, this never negatively affected the project performance.

The HIGHWAY Project was funded by the UK Foreign, Commonwealth & Development Office (FCDO) – UK Aid, through the Weather and Climate Information SERVICES for Africa (WISER) programme with a grant of GBP 3,190,452 from 1 September 2017 to 31 March 2021.

Table 1 below depicts the breakdown of the Project budget at the time of project inception on 31 October 2017.

Budget for HighWay - High impact Weather IAke sYstem - a proposal framework for the lake Victoria region						
				USD	GBP	Rollup By Component
				Exchange Rate 0.78	<b>TOTAL</b>	<b>GBP 3,190,452</b>
Output 1	Established, effective institutional framework for an Early Warning System for the East African region				Sub Total 1	GBP 452,400
Output 2	Improved access to all operational data sources to support the generation and maintenance of Early Warning Services for the East African Region				Sub Total 2	GBP 742,560
Output 3	Strengthened integration between producers and users to develop innovative, accurate tailor-made EWS products through co-production for the East African region				Sub Total 3	GBP 791,700
Output 4	Improved methods and strengthened capacity for communication and promoting understanding and use of EWS products with relevant producers, technicians, forecasters intermediaries and users in the East African region				Sub Total 4	GBP 542,100
Programme management (PM) - 5	Programme Management for the Operationalization of the Regional Early Warning System in the Eastern Africa				Sub Total 5	GBP 438,360
Management Costs and Fees					Sub Total	GBP 223,332
		Project Support Costs (7%)				GBP 223,332

**Table 1 Total Project Budget for the HIGH impact Weather IAke sYstem (HIGHWAY) Project<sup>19</sup>**

Annex 14 shows the corresponding expenditures as in the final official financial statement that was delivered to the donor. **From funds available amounting to GBP 3,088,303, the expenditures were GBP 2,997,300, and the balance as of 31 March for the project was GBP 91,003.** The data was taken from the WISER HIGHWAY Project Expenditures, AMCOMET Trust Fund, Weather and Climate Information Services for Africa (WISER), HIGHWAY Project (5501-5505), Final Statement of Income and Expenditure, for the period from 1 September 2017 to 31 March 2021.

<sup>19</sup> WISER HIGHWAY Project Budget\_31 October 2017

Expenditures for Direct Costs were GBP 654,982 entailing project personnel costs and travel.

Out of the total project budget, Output 1 spent GBP 429,731, where the main activity was the development and endorsement of the Business Plan for the EAC regional Early Warnings System (EWS) Vision 2025 for all six East African Community countries: Uganda, Kenya, Tanzania, Rwanda, Burundi and South Sudan. For Output 2 there were costs of GBP 576,549, and the main activities were connected to NCAR, TAHMO, and the UK Met Office. The amount of GBP 481,749 was spent on Output 3 on creating numerous new and/or improved co-produced EWS forecasting tools and meteorological input products delivered to relevant producers, 5 research papers, and 9 conference presentations. Project Output 4 was the largest with GBP 637,551, where the budget was spent on training around 40 forecasters and 4,000 intermediaries, as well as UK Met Office's production of the WISER Guidance on Equitable and Inclusive co-production for Weather and Climate Services.<sup>20</sup>

Additionally, the four products operational as Marine Forecasts to enhance EWS by the end of the project are shared per WhatsApp Group with numerous project beneficiaries in Uganda, Kenya, Tanzania, and Rwanda. The EWS reached 1,605,139 beneficiaries around Lake Victoria.

The Project Support Costs (PSC) for all the Outputs were GBP 216,737.

### **The most economical option for the demonstrated project solution**

The cost-effectiveness of the Project has been assessed through the perception of the stakeholders interviewed and is assessed as being good. There were no similar regional projects implemented to enable a comparison.

All subcontractors for all the outputs have delivered beyond their responsibilities in the ToRs of their Service Agreements and/or MoUs.

### **No-cost project extensions due to Covid-19 Pandemic**

It should be noted that due to the Covid-19 Pandemic, the Project was granted a no-cost extension, prolonging its duration by an extra year. However, as the pandemic constituted a force majeure event affecting projects worldwide, this extension cannot be attributed to inefficiencies within the Project Management Team. Importantly, these extensions did not result in additional costs to the project, a crucial factor in assessing efficiency. Thus, the project's efficiency was not compromised by the extensions. Moreover, this did not compromise the project's sustainability. On the contrary, several delayed activities were completed during this period, enhancing both the effectiveness and efficiency of the WMO HIGHWAY Project.

The evaluation has concluded that the project was efficient, i.e., it met expectations on the evaluation criteria: efficiency. The project was cost-effective (Efficiency of results delivered) during project implementation. The project was funded by the UK Foreign,

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<sup>20</sup> <https://www.metoffice.gov.uk/binaries/content/assets/mohippo/pdf/international/wiser/wiser-co-production-guidance.pdf>

Commonwealth & Development Office (FCDO) – UK Aid, through the Weather and Climate Information SERVICES for Africa (WISER) programme with a grant of GBP 3,190,452 from 1 September 2017 to 31 March 2021. All project partners have delivered much more than in their Terms of Reference (ToR) of their Service Agreements and/or MoUs. The project received a no-cost extension for one year due to the Covid-19 pandemic, however, this did not affect project efficiency. Final results from project management and financial management at the time of the evaluation suggest that the project has **exceeded expectations in terms of efficiency**.

## IMPACT

Impact is being measured by the extent to which the HIGHWAY Project focused on higher-level changes, like the adverse effects of climate change that is worsening the weather in the Lake Victoria regions with dangerous more sudden weather changes. That is why the increased use of weather information in the form of a Marine Forecast and Early Warning System is so important to improve resilience and reduce the loss of life and damage to property in the East African region around the lake in terms of significance, transformative potential, scope, or time scale.

Impacts (also known as Long-term outcomes) involve proof or reasonable evidence that a change in condition has occurred. In this ex-post evaluation report, a positive change in the economic, social, and value-for-money well-being of the target audience (beneficiaries around Lake Victoria) based on the project's long-term objective (IMPACT) was sought and found. As with intermediate-term outcomes, long-term outcomes most often occur as the result of sustained engagement with the target audience.

Based on the articulation of long-lasting effects in the reconstructed ToC, the Ex-post Evaluation assessed there to be a reasonable likelihood of actualizing the intended positive impacts.

The Ex-post evaluation did not find that the project resulted in any unintended negative effects—for example, vulnerable groups including those living with disabilities and/or women and children were not disproportionately affected by the project. In contrast, the project increases resilience resulting from the use of EWS and includes vulnerable groups, women and youth.

The project has served as a catalyst, promoting the scaling up of Early Warning Systems as a means to mitigate disaster risks, thereby contributing to long-lasting impacts of Sustainable Development and fulfilling the objectives of the UN Agenda 2030.

This project's impact was planned to be: "Increased use of weather information to improve resilience and reduce the loss of life and damage to property in the East African region". The only one outcome: "Increased access to and use of co-designed and sustainable early warning systems to inform regional, national, sub-national and community-level planning and decision-making in the East African region" and all four project outputs followed the causal logical pathway to serve to accomplish the likelihood of impact. The impact and the impact indicators achievements are presented in Annex 10.

The first impact indicator for this outcome was the number of people with improved resilience resulting from the use of EWS. According to the reports of the Monitoring, Evaluation, and Learning (MEL) around 4 million people should have improved resilience.

In the end, this number proved to be too high, as there are 5.4 million people that live around Lake Victoria in total. Finally, the total beneficiaries with improved resilience using the Early Warning Systems (EWS) in Kenya, Tanzania, and Uganda was: 214,877 direct beneficiaries, and 1,390,262 indirect beneficiaries, and the total number of beneficiaries was 1,605,139.

The second impact indicator was the value of avoided losses due to the use of early warning information. The target was to produce reports from Value for Money (VfM) / Socio-Economic Benefits (SEB) reports that prove that a decrease in loss of life is evident. At the project end, both the Value for Money (VfM) and Socio-Economic Benefits (SEB) studies were finalized and brought evidence of a decrease in loss of life. The SEB study showed that there was a 30% fall in weather-related deaths between 2019 and 2020, and 312 people were saved each year by using the twice-a-day produced Marine Forecast with 70% forecast accuracy from the Kenya Meteorological Department (KMD), Tanzania Meteorological Agency (TMA), Uganda National Meteorological Authority (UNMA), broadcasted on more than 20 radio stations around Lake Victoria. The Value for Money Study suggested that US\$ 44 million per year is being generated in economic benefits to the fishing communities since the Early Warning System through the Marine Forecast prepared by UNMA, TMA, and KMD is active and running.

Generally, the Project has achieved the expected outputs and outcomes as they were stated in the original Project Document in 2017. The project has ended two years behind the original schedule due to the Covid-19 pandemic.

Ultimately, WMO and all its partners aim to bring about benefits to the environment and human well-being. This project has likely impact statements that reflect such long-lasting or broad-based changes. This Ex-Post Evaluation assessed the Project's likelihood to make a substantive contribution to the long-lasting changes represented by the SDGs and/or the intermediate-level results reflected in WMO's Expected Accomplishments and the strategic priorities of funding partner(s), and its contribution is considered likely. As this is an Ex-Post Evaluation, during the evaluation field missions in Uganda, Kenya, and Tanzania, the evaluator has witnessed the lasting effect of the long-term changes considering the increased use of weather information to improve resilience and reduce the loss of life and damage to property in the East African region.

The regional nature of the project had a positive impact on transboundary disasters risk reduction, early warning system, people and environmental protection, and strengthened the link between environment and regional cooperation and security that characterized other FCDO (UK Aid) financed activities in the EAC region, bringing therewith continuation of positive benefits.

The likelihood of the project to make a substantive contribution to the long-lasting changes represented by the SDGs, and/or the intermediate-level results reflected in WMO's and FCDO's (UK Aid's) expected accomplishments and the strategic priorities of funding partners, i.e., the Likelihood of Impact is considered as likely.

This ex-post evaluation has concluded that the **project is likely to sustain the intended impact** of increased use of weather information to improve resilience and reduce the loss of life and damage to property in the East African region. The HIGHWAY Project contributed to a high extent on higher-level changes, as the regional nature of the project had a positive impact on transboundary disasters risk reduction through a daily convening meeting of all four NMHSs in order to discuss the meteorological and



marine forecast, with a special focus on Lake Victoria's risky weather development. It further contributed to building an early warning system, people and environmental protection, and further strengthened the link between environment and regional cooperation and security that characterized other FCDO (UK Aid) financed activities in the EAC region. It is likely that in the future, the project will cause a continuation of positive benefits, in terms of significance, transformative potential, scope, and time scale. The likelihood of increased use of weather information to improve resilience and reduce the loss of life and damage to property in the East African region due to using Marine Forecasting from UNMA, KMD, and TMA as an Early Warning System is very high and is efficient in saving lives around Lake Victoria in the fishing communities as well as economically viable. After reviewing the final results from project management and comparing them to the present situation three years after the project has ended during the field evaluation missions to Uganda, Kenya, and Tanzania, at the time of the ex-post evaluation, the **project impact is considered as likely positive.**

## SUSTAINABILITY

The assessment of the sustainability of project outcomes at the time of the Ex-Post Evaluation should explain how the risks to project outcomes will affect the continuation of benefits after the HIGHWAY Project ends, including both exogenous and endogenous risks. An Ex-Post Evaluation is a perfect opportunity to assess how sustainable was the project, especially three years after its completion date. Based on WMO's and UNEG's evaluation policies and procedures, the overall rating for sustainability cannot be higher than the lowest rating for any of the individual components. Therefore, the overall sustainability rating for the HIGHWAY Project at the time of the Ex-Post Evaluation is **moderately likely, which means that there are moderate risks affecting sustainability.** This assessment is taking into consideration two moderate risks after the project ends, namely the Institutional framework and governance risks, and the Financial risks.

However, it has to be mentioned that the HIGHWAY Project will likely have significant positive and sustainable impacts on the Climate Change, Adaptation, and Mitigation practices in the East African countries: Uganda, Tanzania, Kenya, and Rwanda beyond the duration of the Project. The HIGHWAY project was able to show that if the Marine Forecast is used by the fisher communities around Lake Victoria, and if the Early Warning Systems (EWSs) are being used, there are great levels of economic/financial, environmental, and socio-political benefits to be expected out of it. Additionally, it is expected that the HIGHWAY project will have an impact on the EAC Countries' Governments' willingness to work on building a Regional Early Warning System for Lake Victoria in the frames of the Disasters Risk Reduction Programmes, using sharing of synoptical, radar and all kinds of available weather forecast and nowcast information, and to secure finance through big financing institutions like the Green Climate Fund (GCF), the Adaptation Fund, AfDB, the World Bank etc. for these types of projects. Therefore, this project can be seen as a pioneering project that will enable replication of the Early Warning System practices in other African or developing countries in the future.

Furthermore, there are additional benefits due to building local capacities in the Governments and National Meteorological and Hydrological Services (NMHSs) in East Africa and the local Governments and Beach Management Units (BMUs) to allow for future projects identification and design and supportive legislation. The public and private sector could implement Early Warning System projects within and beyond the frames of the Early



Warning Vision 2025 for East Africa along the supportive legislation to fulfill NDCs under the Paris Agreement for the EAC countries.

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### SOCIO-POLITICAL SUSTAINABILITY

The HIGHWAY Project made intensive capacity-building efforts which are likely to be sustained for those participants in the meteorological trainings organized by WMO, UK Met Office, NCAR, NOAA, and others from the public sector who have stayed in their position (or moved on to similar positions) within the National Meteorological and Hydrological Services (NMHSs) in Uganda, Tanzania, Kenya, and Rwanda: Kenya Meteorological Department (KMD), Tanzania Meteorological Agency (TMA), Uganda National Meteorological Authority (UNMA), and Rwanda Meteorological Service (Météo Rwanda), East African Community (EAC), local governments, Beach Management Units around Lake Victoria in Uganda, Kenya, and Tanzania, etc.

One of the biggest successes of the project is the building of effective partnerships and professional relationships among the actors working in Meteorology, Climate Service, Early Warning systems, and Disaster Risk Reduction in the EAC countries, and this will likely continue to function as a network.

The country ownership in terms of the championship (resulting from this increased capacity) sits mostly within the Ministries of Environmental Protection, Ministries of Energy and Infrastructure in the National Meteorological and Hydrological Services (NMHSs) of each of the EAC countries. Likely, the socio-political sustainability for establishing a regional Early Warning System - HIGH Impact Weather IAke sYstem (HIGHWAY) and Strengthening of the Regional Meteorological Early Warning System in the Lake Victoria Basin will be secured in the future, as it is an obligation under the Paris Climate Change Agreement to fulfill the Nationally Determined Contributions (NDCs).

Given the reasons above, the Socio-political sustainability is rated as **likely, as there are minimal risks to the socio-political sustainability**, as it is an obligation under the Paris Climate Change Agreement to fulfill NDCs, and all EAC countries from this project are signatory parties to the Paris Climate Change Agreement.

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### FINANCIAL SUSTAINABILITY

The Project was able to achieve a lot of outputs with very limited financial resources. This was a product of a resilient working team with a support structure based on a strong partnership of stakeholders, especially for organizing and conducting the diverse trainings for participants from the four EAC countries and preparing the various research papers and studies with large sets of population.

There are two moderate financial risks to sustainability:

1. Financial risks associated with the sustainability of the fundraising mechanisms for setting up a regional Early Warning System (EWS) around Lake Victoria in the EAC countries, i.e., if the countries are not able to finance the regional EWS.
2. The Governments of the EAC countries: Uganda, Tanzania, Kenya, and Rwanda that were part of the Project must be convinced of the negative effects that climate change will have in the future to worsen the weather around Lake Victoria and be willing to commit resources for establishing a regional EWS and fruitful

cooperation instead of competition between each other, and therewith to Adapt and Mitigate the devastating consequences of Climate Change.

With the above said, **there are moderate risks that affect this dimension of sustainability, which leads to moderately likely** sustainability of financial risks if the countries are not able to finance the regional Early Warning System for the EAC countries. Financial resources for the continuation of building of a regional Early Warning System (EWS) are partially dependent on external financing, hence the financial sustainability is insecure.

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#### INSTITUTIONAL SUSTAINABILITY

The Project was a best practice example of how partnerships were created, a good network, and good results sharing on various platforms and training.

The institutional framework on Climate Change and Adaptation (CCA) in the EAC countries is very strong as they all are parties to the United Nations Framework Convention on Climate Change (UNFCCC) and signees of the Paris Climate Change Agreement.

There are no governance risks to Climate Change and Adaptation and Disasters Risks Reduction policies in the EAC countries, as the National Communications as part of UNFCCC and the Paris Agreement have all shown concrete evidence that the countries in the region are highly exposed and highly sensitive to climate change.

Future project ownership by the Governments of the EAC countries would help alleviate some of the institutional framework risks.

There are slight risks that are affecting the institutional framework and governance sustainability as all institutional frameworks for Climate Change and Adaptation are put in place in the EAC countries, **which causes this sustainability to be likely.**

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#### ENVIRONMENTAL SUSTAINABILITY

Project outputs and outcomes directly contribute to the implementation of the Paris Agreement adopted by the UNFCCC, as well as to the Long-term Goals (LG) and Strategic Objectives (SO) of WMO: LG: 1. Better serve societal needs, LG: 2. Enhance Earth system observations and predictions; and LG: 4. Close the capacity gap.

The WMO Project: "HIGH Impact Weather IAke sYstem (HIGHWAY) Project" contributed to the following PoW outcomes<sup>21</sup>:

1. Strengthen national multihazard early warning/alert systems and extend reach to better enable effective response to the associated risks,
2. Broaden the provision of policy and decision-supporting climate information and services,
3. Optimize the acquisition of Earth system observation data through the WMO Integrated Global Observing System (WIGOS),

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<sup>21</sup> Project Revision Nr. 3

4. Improve and increase access to, exchange, and management of current and past Earth system observation data and derived products through the WMO Information System (WIS),
5. Address the needs of developing countries to enable them to provide and utilize essential weather, climate, hydrological, and related environmental services, and
6. Scale up effective partnerships for investment in sustainable and cost-efficient infrastructure and service delivery.

There was no environmental and social safeguards screening done in the project design phase. However, the project aimed to safeguard the environment and society directly through its work on environmental leadership in building sustainable, resilient regional meteorological early warning systems with wide application throughout the lake users.

Environmental sustainability is likely to be continued for the HIGHWAY Project, as project outputs and outcomes directly contribute to the implementation of the Paris Agreement adopted by the UNFCCC, and there are no environmental risks connected to sustainability that could be identified related to the HIGHWAY project that may jeopardize the sustainability of the outcomes. The HIGHWAY project work aimed to safeguard the environment and society directly through its work on environmental leadership in sustainable, resilient regional meteorological early warning systems with wide application by its beneficiaries and users of the EWS and the Marine Forecast around Lake Victoria.

Overall, the **sustainability rating for the HIGHWAY Project at the time of the ex-post evaluation is moderately likely, which means that there are moderate risks affecting the financial dimension of sustainability.** Financial resources for the continuation of building of a regional Early Warning System (EWS) are partially dependent on external financing, hence the financial sustainability is insecure. Socio-political sustainability is rated as **likely, as there are slight risks to Socio-political Sustainability that are unlikely to happen.** This is said bearing in mind the fact that there is a firm obligation under the Paris Climate Change Agreement to fulfill NDCs, and all EAC countries from this project are signatory parties to the Paris Climate Change Agreement. There are small risks that are affecting the institutional framework and governance sustainability as all institutional frameworks for Climate Change and Adaptation are put in place in the EAC countries, **which causes Institutional Sustainability to be likely to continue. Environmental Sustainability is likely** to be continued for the HIGHWAY Project, as project outputs and outcomes directly contribute to the implementation of the Paris Agreement adopted by the UNFCCC, and there are minimal environmental risks connected to sustainability that could be identified related to the HIGHWAY project that may jeopardize the sustainability of the outcomes. The HIGHWAY project work aimed and succeeded in safeguarding the environment and society directly through its work on environmental leadership in sustainable, resilient regional meteorological early warning systems with wide application by its beneficiaries and users of the Early Warning Systems (EWS) and the Marine Forecast around the Lake Victoria.

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## PROJECT MANAGEMENT

The World Meteorological Organization (WMO) implemented the project through delivering the planned outputs and achievement of the expected outcomes and impact. WMO was executing the project in collaboration with the UK Met Office, NCAR, NOAA, and the respective NMHSs in the four Eastern African countries: Kenya, Tanzania, Uganda, and Rwanda.

WMO's project management method provides a structured framework to manage the project from its beginning until closure and also ensures that the project achieves its objectives. The implementing agency used a project cycle management method together with a logical framework (LogFrame) matrix to design, implement, monitor and control, and evaluate projects. The activities covered by this project have been implemented between 2017 and 2021 by the WMO, with the support of the WMO regional office for Eastern Africa in Nairobi, Kenya. Contracts and agreements with service providers adhered to WMO policies and procedures. There were slight delays in the transfer of funds to subcontractors.

The Project and its approach promoted local ownership by the EAC countries and capacity building using a combination of innovative tools for meteorological forecasting, nowcasting, radar trainings, and co-production in the design of Early Warning Systems for the Lake Victoria Region, with the UK Met Office delivery of training and capacity building to ensure knowledge sharing for all four East African countries.

The WMO Project Management Team in Geneva was responsible for carrying efficient out day-to-day management of the very diverse and complex regional project that was spread throughout four completely different project components in four East African countries. However, there were many oscillations in the project management team, changing the implementation approach throughout project implementation. In the project inception, a specific HIGHWAY Project manager was hired locally in Kenya, who worked along with a project officer of the WMO Nairobi Office. Later, the same was released, and there was a project manager hired in WMO Geneva, mainly because of the huge administrative and reporting donor (FCDO) requirements. All these changes and restructuring led to communication gaps within the project management teams. However, even though there were considerable challenges during project implementation, the project management must be commended for its work on such a complex project implemented in four very different countries and comprising so many diverse themes from Meteorology, Climatology, Forecasting, Science, Programming Law, and Environment.

The Monitoring, Evaluation, Reporting, and Learning (MERL) started rather late in the project, after two years of its implementation. There was no budgeted monitoring plan for this project. Nevertheless, once the Inception report was done and the MERL methodology developed, the project was reflexive and adaptive in its management approach and took into consideration the changing circumstances based on its monitoring framework. The reporting was also used for results-based management. The MERL component has culminated with the three Climate Resilience Studies for Uganda, Tanzania, and Kenya for the HIGHWAY Project, which, using complex methods have calculated the total direct and indirect number of beneficiaries with improved resilience using the Early Warning Systems (EWS) in Kenya, Tanzania and Uganda.

Overall, during project implementation, the project management has been effective and efficient.

**In view of the above, Project Management is rated as not fully meeting expectations,** as there were many personnel fluctuations during project implementation that have caused communication gaps. The main monitoring, evaluation and learning reports were completed with great detail, but there was no budgeted monitoring plan.

## GENDER MAINSTREAMING / CONSIDERATION

Gender mainstreaming includes an assessment of the extent to which socio-economic benefits delivered by the project include consideration of gender dimensions. This has been assessed through interviews and desk review of reporting of the gender balance in beneficiaries and the perception of gender balance, as well as the extent to which gender was considered during the design and implementation of the project.

Gender was not considered in the project and there were no gender-disaggregated indicators neither in the project's logical framework nor in the monitoring, evaluation, and learning reports and the climate resilience studies. The trainings list did not include disaggregated information on the gender of its participants; however, women were regularly present at diverse NMHSs trainings. As demonstrated in Figure 3, women from the four EAC countries were regular participants in the trainings. It has to be noted that out of 560 employees at the Tanzanian Meteorological Authority (TMA), 160 are women, making them almost 30% of all employees.



**Figure 3 Women participation in the Météo Rwanda and Met Office HIGHWAY Regional Workshop**

**(Regional Impact Based Early Warning System (RIBEWS) Workshop held in Kigali, from Left to Right; Ms. Alphonsie (Météo -Rwanda), Ms. Sabiha (TMA), M. from UNMA, Hannah X. (KMD))**

When WMO is considering the design of a further EWS project, the first thing to be done is just to identify the different socio-economic groups that stand to benefit from the project (i.e., EWS), assessing the numbers of marginalized users who benefit. Secondly, distributional weights should be used to adjust explicitly for distributional impacts in the



benefit analysis and cost-benefit analysis.<sup>22</sup> Benefits to lower income households are weighted more heavily than those in higher income households. For HIGHWAY, there was no information on the users that have benefited from the project disaggregated by gender, and subsequently from the regional EWS, not collected, as well as the numbers of users in different income groups and marginalized groups. This should have included tracking by income level and gender.

For this analysis, a distributional and gender analysis has not been undertaken. However, there are specific groups that are targeted that are relevant. For example, there are many females employed in fish drying and processing, especially in handling the largest fish catch – daga as shown on Figure 4, which is dried in the sun, a job done exclusively by women. Furthermore, many females are boat owners shown in Figure 5.



**Figure 4 Women drying silver fish (daga) in Rarieda, Siaya, Lake Victoria, Kenya**



**Figure 5 Women boat owners and fish traders in Kalangala, Ssesse Islands, Lake Victoria, Uganda**

There were also great benefits to small boat travelers, i.e., the lake island population, which regularly include altogether men, women and children shown in Figure 6, and have also included lower income groups (than the mainland in the respective countries).

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<sup>22</sup> Report: “The Socio-Economic Benefits of the HIGHWAY project”, Page 22



**Figure 6 Children, together with the women are one of the most vulnerable populations on Lake Victoria**

**(Photo left: Kalangala, Sesse Islands, Uganda; Photo middle: Siaya landing site Rarieda, Kenya, Photo right: Passengers climbing the Ferry Boat in Homa Bay, Kenya)**

The project management team consisted of a more gender-balanced ratio with two women being the project coordinators and a Monitoring, Evaluation, Reporting and Learning (MERL) expert.

It must be noted that the fisheries sector is traditionally dominated by men globally. In addition, there is also a generally low level of application of gender practices in disasters risk reduction management in the East African countries. It should be considered to include women in the weather communication, therewith the user engagement of women can be strengthened. More women should be included in the workshops done with the Beach Management Units (BMUs). Women should be positively influencing men, thereby limiting the risk-taking behavior of men. They can be used to help save lives and communicate better the weather forecast within the fishing communities.

There are no systemic barriers to equal access to resources and services for women and men in place in the East African countries: Uganda, Tanzania, Kenya, and Rwanda. There are also no obstacles to the participation of women in decision-making processes at the household level and public and to the realization of women's rights.

ActionAid in Uganda has worked with the Uganda National Meteorological Authority (UNMA) since 2005 on the collection of meteorological data and the dissemination of weather information. The NGO's new strategy for Uganda was adopted in January 2018, and it focuses its development work on four main priority areas:

1. Community resilience to climate change
2. Governance and democracy
3. Gender and women's rights
4. Youth participation in policy processes and economic empowerment

ActionAid Uganda has worked closely with fishing communities in the Ssesse Islands for several years<sup>23</sup>. Along with UNMA, it helped to set up one of the two local radio stations

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<sup>23</sup> WISER HIGHWAY: Recommendations for user engagement initiatives in Uganda and Tanzania, Page 32

in the Ssesse Islands - Kalangala Community Radio. ActionAid programmes in Kalangala have also included:

1. The procurement and operation of an ambulance boat for isolated island communities in the Ssesse Islands, and
2. Support for boarding houses in primary schools for children from small islands where there is no local school.

ActionAid implements its programmes in Kalangala District through a partnership with several local community-based organizations, of which the largest is Kafophan: <http://kafophan.org/> , an organization that helps people living with HIV/AIDS (HIV/AIDS is a major problem in the fishing communities of Uganda and around lake Victoria in Kenya and Tanzania as well. The HIV prevalence rate in the Ssesse Islands is about 16-18% - nearly three times the national average in Uganda of 6.5%).

To conclude, gender was not mainstreamed and not considered specifically as one of the key cross-cutting issues in the HIGHWAY project, beginning from the project design and throughout its project implementation. However, two project management team members were women, and one HIGHWAY focal point person in Tanzania was a woman as well. Consequently, gender consideration and mainstreaming in the HIGHWAY project has not met the expectations.

Overall, **gender consideration and mainstreaming in the HIGHWAY project has not met the expectations**, due to failure to mainstream it from project design to its closure. However, two project management team members, and one HIGHWAY focal point from TMA were women, and women were regularly present at the diverse Early Warning System (EWS) and meteorological trainings.



## **RATING FOR ATTAINMENT OF PROJECT OBJECTIVES AND RESULTS**

The project has exceeded expectations

The project has met expectations

The project did not meet expectations

## **RATINGS ON SUSTAINABILITY**

### **Likely (L)**

There are no risks affecting this dimension of sustainability.

### **Moderately Likely (ML):**

There are moderate risks that affect this dimension of sustainability.

### **Moderately Unlikely (MU):**

There are significant risks that affect this dimension of sustainability.

### **Unlikely (U):**

There are severe risks that affect this dimension of sustainability.

## 4. MAIN FINDINGS, RECOMMENDATIONS AND LESSONS LEARNED

### MAIN FINDINGS AND CONCLUSIONS

The HIGHWAY project: “HIGH Impact Weather LAke sYstem (HIGHWAY) Project” has exceeded expectations. This results from its high strategic relevance to created live-saving Early Warning Systems as a mechanism of Disasters Risk Reduction in the frames of the countries’ obligations under the Paris Agreement on Climate Change and Adaptation. This was one of the top priorities of the Governments of the East African Community (EAC) countries: Uganda, Kenya, Tanzania, and Rwanda, facing few implementation challenges in project management, and monitoring and reporting. Furthermore, it results from the excellent project implementation despite facing the difficulties in working conditions under the Covid-19 pandemics that delayed project completion for one year. The Project was solidly conceptualized, innovative, and overly ambitious. It was a pioneering project bringing up the topic of Regional Early Warning System (EWS) in East Africa.

HIGHWAY was a great project, spread through the whole chain of mereological services, from science to R&D, forecasting, nowcasting, co-production of a regional Early Warning System (EWS). It has built strong partnerships between WMO, UK Met Office, EAC, and National Meteorological and Hydrological Services (NMHSs) in the EAC countries: Tanzania, Kenya, Uganda and Rwanda and end-users: Beach Management Units (BMUs), fisher communities and people living around Lake Victoria on meteorology, climatology, R&D, and co-production.

For the first time the HIGHWAY project has piloted and showcased how hazardous weather co-production (between science and beneficiaries) and early warning systems function around a great lake like the Lake Victoria in Africa.

HIGHWAY was a complex and ambitious project, with many multidisciplinary themes. It tried to tackle so many meteorological, climatological, and scientific aspects and themes into one project, and it was spread extremely thinly for the outputs it was going to achieve. HIGHWAY was a project ahead of its time, the national MHSs were not capacitated enough in 2017 to build a regional Early Warning System (EWS), which is different in 2023 when HIGHWAY contributed to sustainably build capacities in Uganda, Kenya, Tanzania and Rwanda to enable them to work on a regional EWS, and not only to collaborate on issuing a national Marine Weather Forecast for Lake Victoria that they share between each other twice a day.

The project management has displayed flexibility and effectiveness in reaching highly satisfactory results, with strong facilitation particularly in establishing partnerships with the following organizations: UK Foreign, Commonwealth & Development Office (FCDO) - UK Aid; UK Met Office; East African Community (EAC); National Meteorological and Hydrological Services (NMHSs): Kenya Meteorological Department (KMD), Tanzania Meteorological Agency (TMA), Uganda National Meteorological Authority (UNMA), and Rwanda Meteorological Service (Météo Rwanda); National Center for Atmospheric Research (NCAR); University of Leeds; The Trans-African Hydro-Meteorological Observatory (TAHMO); National Oceanic and Atmospheric Administration (NOAA); South African NGO: South South North; and Beach Management Units (BMUs) around Lake Victoria. The Service Agreements / MoUs between the above-mentioned partners and

WMO was a necessary step to successful project implementation because of the broad scope and multidisciplinary regional project implemented in four countries of East Africa: Tanzania, Kenya, Uganda, and Rwanda.

The country ownership in terms of championship (resulting from this increased capacity) sits mostly within the Ministries of Environmental Protection, Ministries of Energy, and Infrastructure, more specifically in the National Meteorological and Hydrological Services (NMHSs): Kenya Meteorological Department (KMD), Tanzania Meteorological Agency (TMA), Uganda National Meteorological Authority (UNMA), and Rwanda Meteorological Service (Météo Rwanda). It is likely that the socio-political sustainability for establishing a regional Early Warning System (EWS) will be secured in the future, as it is an obligation under the Paris Agreement to fulfill the NDCs. All four EAC project countries are signatory parties to the Paris Climate Change Agreement.

The Project has good prospects to sustain its impact and long-term objective to increased use of weather information to improve resilience and reduce the loss of life and damage to property in the East African region countries while raising awareness, strengthening capacities, and creating an enabling environment for creating a Regional Early Warning System (EWS) around the Lake Victoria as planned in the Project Document.

The project delivered products of excellent quality, which are highly useful for application and for building of knowledge base and solid databases on meteorology, synoptical data, EWS in the EAC countries. The general objectives, outcomes and outputs as prevised in the original Project Document have been met.

Overall, the project was highly effective in the light of overall excellent project finalization and implementation. Project Output 1, 3 and 4 were overachieved.

Output 1 resulted in creation of a Business Plan for the EWS and an EAC regional Early Warnings System (EWS) Vision 2025 for all six East African community countries: Uganda, Kenya, Tanzania, Rwanda, Burundi, and South Sudan was developed and endorsed. The fund-raising possibilities for implementation of the EAC EWS Strategy 2024 were explored. Output 2 had numerous important regional collaboration initiatives, to name a few: NCAR performed Radar Trainings in Tanzania, Uganda, and Rwanda, and created HIGHWAY Field Catalog website of FC images.<sup>24</sup>

TAHMO and 3D-PAWS surface stations and EarthNetworks lightning data were provided for free during Field Campaign (FC); NCAR archived all FC data, including satellite, radar, EarthNetworks lightning, radar, radiosonde, surface station data, and UKMO NWP fields; Assessment of upper air sounding stations in Nairobi, Lodwar, Dar Es Salaam and Entebbe was done; EAC Regional WIGOS Center (RWC) co-hosted by KMD and TMA and capacity building of RWCs and NHMSs staff in the EAC sub-region was established.

The third output focused on science and the integration between producers and scientists to develop innovative accurate data, methodologies, and tools to improve and verify the quality of an Early Warning System for the East African Region for the four EAC countries: Uganda, Kenya, Tanzania and Rwanda through creating numerous new and / or improved

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<sup>24</sup> <http://catalog.eol.ucar.edu/highway>.

co-produced EWS forecasting tools and meteorological input products delivered to relevant producers. NMHSs are able to access the UKMO 4km Unified East Africa model via different web portals like the RDT (Rapid Development Thunderstorm); Near-Cast product, and Convective Rain Rates (CRR) products. Furthermore, 5 research papers and 9 conference presentations as research outputs, products, and reports on EWS were produced by University of Leeds, WMO, UK Met Officer, NCAR, NOAA and the NMHSs: TMA, UNMA, KMD and Météo Rwanda.

Project Output 4 was significantly overachieved by focusing on strengthening the integration between producers, users, and intermediaries to co-develop and co-produce new and improved EWS products that take account of user needs and are more accessible for the East African community (EAC) countries: Uganda, Kenya, Tanzania, and Rwanda. The UK Met Office produced the WISER Guidance on Equitable and Inclusive co-production for Weather and Climate Services.<sup>25</sup>

There were four Marine Weather Forecast products operational to enhance EWS by the end of the project that are shared per WhatsApp Group with numerous project beneficiaries - for Rwanda: Forecast and early warning for Lake Kivu; Kenya: IBEWS Kenyan product complete and delivered in March 2019. Enhanced marine forecast and early warning for Lake Victoria; Uganda: Enhanced marine forecast and early warning for Lake Victoria, color-coded flags on fishermen landing site and early warning information on notice boards at BMU sites over the lake shore; and Uganda: Enhanced marine forecast and early warning for Lake Victoria, color-coded flags on fishermen landing site and early warning information on notice boards at BMU sites over the lake shore. All of the marine forecasts are being issued two times a day: late in the evening (around 12 am - midnight) and at noon. The project achieved five communication links for EWS: Radio in Kenya and Uganda (dissemination in local languages); WhatsApp messages for Kenya and Uganda; Warning color-coded flags on landing sites of LVB in Kenya and Uganda; Guide to interpreting weather forecasts in Uganda; and Notice boards at some beach management units in Kenya and Uganda. Around 40 forecasters and 400 intermediaries were trained by project closure.

At the end, total beneficiaries with improved resilience using the Early Warning Systems (EWS) in Kenya, Tanzania and Uganda were: 214,877 direct beneficiaries, and 1,390,262 indirect beneficiaries, and the total number of beneficiaries was 1,605,139. Additionally, there were 21 government departments/ministries/institutions able to access/use new/improved EWS information in Uganda, Tanzania, Kenya, and Rwanda.

The project was highly efficient, it has ensured to produce cost-effectiveness (Efficiency of results delivered) during project implementation. The project was financed funded by the UK Foreign, Commonwealth & Development Office (FCDO) – UK Aid, through the Weather and Climate Information SERVICES for Africa (WISER) programme with a grant of GBP 3,190,452 from 1 September 2017 to 31 March 2021. The project was generally perceived as cost-effective. All project partners have delivered much more than in their Terms of Reference (ToR) of their Service Agreements and / or MoUs. The project lived

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<sup>25</sup> <https://www.metoffice.gov.uk/binaries/content/assets/mohippo/pdf/international/wiser/wiser-co-production-guidance.pdf>

through one non-cost extension of one year due to the Covid-19 pandemics, however they did not affect project efficiency.

The project is fully relevant to local and national climate change adaptation, and strategies of the Governments of the EAC countries, to FCDO's strategic priorities and objectives and to WMO's mandate. The project has contributed to the sustainable climate risk reduction for the four Eastern African countries: Uganda, Kenya, Tanzania, and Rwanda while raising awareness, strengthening capacities and creating an enabling environment for timely access to weather information in form of an early warning system for building resilience in the fishermen communities (fisherfolk) and population around Lake Victoria.

The HIGHWAY project possessed both the Internal and External Coherence as it was highly compatible with other Climate Change and Adaptation (CCA) instruments, initiatives, and legislatives in the Eastern African countries, and with number of relevant national and regional projects and initiatives led or implemented by the World Meteorological Organization (WMO), like: GCOS, WIGOS, HiWeather, HyVIC, CREWS East Africa etc.

Finally, the HIGHWAY project has a clear value-added and potential for replicability: the Marine Weather Forecast and all the meteorological trainings were very successful in gathering diverse public sector officials from diverse NMHSs to build capacities in their countries on Early Warning Systems and resilience on Disaster Risks Management. This model of Marine Weather Forecast and meteorological trainings can be replicated anywhere around the world. In summary, this well-managed project laid a strong foundation of knowledge that the EAC countries can take and further build on effectively.

It is evident that the Project is very likely to stay relevant and sustainable taken that it will be worked further on the financial, socio-political and the sustainability of the institutional framework and governance.

Overall, the WMO – UK Aid project "HIGH Impact Weather IAke sYstem (HIGHWAY)" has exceeded expectations.

## RECOMMENDATIONS

Based on the ex-post evaluation and the findings several recommendations have emanated from the HIGHWAY project that will lead to further improvement of project design in the future and project sustainability. One of the major recommendations to WMO and the FCDO is to clearly define and lay out the project implementation process by assigning and explaining the roles of the project partners before the project approval process and the start of project implementation.

The following are additional recommendations can be given that derive from the implementation of the HIGHWAY Project:

1. An Early Warning System (EWS) for a Region has to be cascaded down into more manageable components and supported by a strong commitment to higher management of NMHSs. There should be a collaboration between people working operationally in the forecasting mechanisms: radar—twinning training Mwanza—Uganda—Rwanda; AWS and Radio Sondes twinning training and knowledge sharing in order to build a strong functioning Regional EWS.

2. Met Offices (NMHSs) in the EAC countries should be very vocal and clear about their training, equipment, and maintenance needs. NMHSs should state their needs and requirements (like Radar Training and supercomputer training) and Budget them with approximation. The mechanism of needs identification should be established on two levels:
  - NMHSs should state their needs to Ministries and Institutions at higher instances at the National level, and
  - NMHSs should state their needs to WMO to support the capacity development needs.
3. Train the Trainer should be organized to Increase in-region and in-country expertise. Train the Trainer in Kenya or Tanzania should be conducted by African NMHS experts in their own region. The NMHS' experts should own the curriculum and try to see how to spread the knowledge throughout the whole country. More training, knowledge sharing, and strengthening capacities of the local Met Offices should be done and replicated. One way of providing this is through the hosting of Train the Trainers workshops.
4. The EAC meeting (African Ministerial Conferences) with Heads of Met Services should be used as a platform to host Project Steering Committee (PSC) meetings for advocacy, as the EAC is still the largest and most efficient platform for advocacy and has the highest convening power among NMHSs.
5. Build strategic partnerships between NMHSs and the private sector to enhance product and service offerings and accelerate the digital transformation of hydro-meteorological services.
6. Integrate a change management expert as a change agent in the Beach Management Units (BMUs). The example should be taken from a BMU where the EWS really worked, and there have been no casualties in the last 6 years; Kyomba Beach in Homa Bay County in Kenya can be an example of a Best Practice. This approach should be replicated around Lake Victoria.
7. Support regional resource mobilization that will benefit both the region and national entities for establishing a proper regional EWS for Lake Victoria. A proposal was drafted during HIGHWAY for the GCF or Adaptation Fund. WMO should provide NMHSs with the existing guidelines it has created in Mobilizing Climate Finance from GCF at the National Level.
8. Women should be included in weather and forecast communication in Lake Victoria and use them to positively influence men to save lives.

## LESSONS LEARNED

Lessons learned are used to combine any insights gained during the project that can be usefully applied in future projects. Capturing lessons learned from the project implementation is of extreme importance, as it may result in more effective and efficient future rollout of project activities and organizational learning. Seizing lessons learned and turning that hindsight into best practices will achieve far greater long-term project success, which can be captured and possibly replicated within WMO and broader.

The following lessons were learned from the implementation of the HIGHWAY project:

1. Establishing a Regional Early Warning System (EWS) was a very ambitious goal of the HIGHWAY project as a Pioneering Initiative in the EAC countries. A Regional

- EWS requires committed Regional cooperation for the Sustainability of weather prediction around Lake Victoria, as Nowcasting of tropical weather is very difficult.
2. For the Regional cooperation between the EAC countries, synoptical, radar and other data sharing is necessary, and it should be agreed upon how that can be done. Top-down communication within the NMHSs is necessary, twinning projects are needed, and there are also connectivity challenges that need to be solved in advance.
  3. Knowledge Transfer between the global North and global South is very important. It is very important to have highly skilled African Meteorologists and Scientists on the same level as global North Scientists and Meteorologists, and this can be achieved only through long twinning working projects. HIGHWAY did it well with the UK, through the High Crystal project as well as the GCRF African Swift project.
  4. The key is to create high impact weather services to protect livelihoods from severe weather. Training and communication of beneficiaries and end-users are of utmost importance, but there should be enough budget for them. Funding for continued dialogue to co-design and co-discuss products and information is required, especially for grass-roots level training of BMUs and fisher communities.
  5. The HIGHWAY project used two levels of ownership as an excellent way to enhance project ownership and execution within EAC:
    - Permanent Representatives in WMO - NMHSs Directors in the Project Steering Committee (PSC) in Project Management for the advocacy and political will, and
    - Focal Point for the Project for the operational execution of the project. This was one of the Best Practices achieved during the HIGHWAY project.
  6. Using WhatsApp helps fishing communities to receive weather forecast information in a timely manner. In return, forecast users also give immediate and spontaneous feedback, which aids verification. Bilingual reference guides, color codes and visual weather icons assist the rapid and accurate translation of weather forecast information universally and into local languages.
  7. BMUs used the HIV life-saving training to Train the Fisher Folk to wear life jackets and use the Marine Weather Forecast to save and improve their lives in Kenya (Homa Bay BMUs). This approach should be replicated around Lake Victoria as Best in Class.