

**Weather and Climate Information Services (WISER)**  
**Grant Application Template – WISER East Africa**



<b>Part 1: Proposal Summary – Not Scored Information Only</b>	
<b>Information</b>	<b>Detail</b>
Proposed Project Title	HIGH WAY – HIGH impact Weather LAke sYstem - a proposal framework for the lake Victoria region
Proposed Start Date	1 September 2017
Proposed Project length (months)	31 months (until March 2020)

<b>Part 2: Project Team – Not Scored Information Only</b>	
<b>Lead Person Details</b>	
Please state the details of the project lead and main contact	
<b>Information</b>	<b>Detail</b>
Last (family) name	Power
First (given) name	Mary
Title (Ms, Mr, Dr, etc.)	Ms
Institution name	World Meteorological Organization
Department	Director, Office for Resource Mobilization and Development Partnerships, Development and Regional Activities Department
Email address	<a href="mailto:mpower@wmo.int">mpower@wmo.int</a>
Webpage	<a href="http://www.wmo.int">www.wmo.int</a>
Phone number	+41 22 730 8003
Postal address	7bis de la Paix, CH-1211 Geneva 2, Switzerland
<b>Information</b>	<b>Detail</b>
Last (family) name	Gaudechoux
First (given) name	Jean-Paul
Title (Ms, Mr, Dr, etc.)	Mr
Institution name	World Meteorological Organization
Department	Senior Programme Manager, Office for Resource Mobilization and Development Partnerships, Development and Regional Activities Department
Email address	<a href="mailto:jpgaudechoux@wmo.int">jpgaudechoux@wmo.int</a>
Webpage	<a href="http://www.wmo.int">www.wmo.int</a>
Phone number	+41 22 730 8311
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<b>Details of proposed partners, contributors and counterparts</b> Please state the other proposed project partners, partners and contributors. Include information on expected flow of funds, clearly stating who will receive funds, and how procurement will be managed within the project.	
Name (s) and Institution(s)	<p><b><u>World Meteorological Organization (WMO)</u></b></p> <p>WMO will be responsible for the implementation of the project. Dr Paolo Ruti (Chief, World Weather Research Division) and the WMO Representative for Eastern and Southern Africa (expected to take office 1 Sep 2017) will provide technical coordination and expertise in relation to the meteorological and programmatic aspects of the Highway project and communicate with all stakeholders. WMO staff from relevant technical departments will also provide technical expertise as required.</p> <p><b><u>United Kingdom Met Office (UKMO)</u></b></p> <p>Mr George Gibson, International Development Manager will coordinate the UKMO inputs in the project.</p> <p><b><u>NATIONAL METEOROLOGICAL AND HYDROLOGICAL SERVICES IN EAST AFRICA:</u></b></p> <p><b>Burundi Meteorological Service (BMS)</b>                      Mr Godefroid Nshimirimana, Chief of Weather Forecasting will coordinate Highway activities for BMS.</p> <p><b>Kenya Meteorological Department (KMD)</b>                      Mr Ayub Shaka, Senior Assistant Director will coordinate Highway activities for KMD</p> <p><b>Rwanda Meteorological Service (Météo Rwanda)</b>                      Mr Anthony Twahirwa, Division Manager of Weather/Climate Services and application Division will coordinate Highway activities for Meteo Rwanda;</p> <p><b>Tanzania Meteorological Agency (TMA)</b>                      Dr Ladislaus Chang'a, Principal Meteorologist and Director of Research and Applied Meteorology will coordinate Highway activities for TMA.</p> <p><b>Uganda National Meteorological Authority (UNMA)</b>                      Mr Khalid Yakub Muwembe, Director of Forecasting Services, will coordinate Highway activities for UNMA.</p> <p><b><u>East African Community (EAC)</u></b></p> <p>The EAC Secretariat, through the Programme Manager for Meteorology, will coordinate and lead project activities in East Africa for the project and organize meetings to discuss progress and do the needed project reporting in collaboration with all project partners.</p>

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	<p><b>Lake Victoria Basin Commission (LVBC)</b></p> <p>Eng. Gerson Japhet Fumbuka - Maritime Transport Safety, from the Lake Victoria Basin Commission will coordinate the various interventions in terms of marine safety on the lake and communicate with other stakeholders.</p> <p>The funds for the project will be received and managed by the World Meteorological Organization and procurement will be done according to WMO Standard Rules and Procedures (<a href="http://public.wmo.int/en/about-us/procurement">http://public.wmo.int/en/about-us/procurement</a>).</p> <p>A multi-lateral Memorandum of Understanding will be signed by the project partners. Letters of Agreement, to facilitate the payment of specific activities by project partners will be signed in line with WMO procedures. The funds will flow from WMO to implementing partners in the region.</p> <p>N.B: Letters of intent have been signed by project partners and are attached to this proposal.</p>
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**Part 3: Project summary – Not Scored Information Only**

In simple terms, please describe your proposed activity in a way that it could be published to a general audience. Clearly set out what the project is aiming to achieve and how this will improve the generation, update and use of weather and climate services. **Maximum 250 words.**

The key desired impact of the Highway proposal is to increase use of weather information to improve resilience and reduce the loss of life and damage to property in the East African region. The output of the project will be that an increased number of a) NMHSs having access to new and improved EWS for decision making and b) households / institutions able to access and use the new / improved EWS. The project will address the lack of much needed in-situ observation and data availability, both for research and operational purposes. Innovative products will be developed, validated and implemented to improve the early warnings in the region. The key activities of Highway revolve around user engagement to understand and meet specific services needed through a co-production process. The users will be involved in the need analysis, the way products and services are packaged and distributed as well as provide feedback for improve. The aim is 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 approach would be to expand on existing projects to provide downscaled weather forecasts and severe weather warnings for communities and stakeholder groups in the East African region, such as the Multi Hazard Early Warning Services (MHEWS) project in Tanzania, Aircraft Meteorological Data Relay (AMDAR) implementation in Kenya as well as the Severe Weather Forecast Demonstration Project (SWFDP) for Eastern Africa, among others. At the end of the project a regional Early Warning System (EWS) should be in place which is accessible and operational and sustainable for all relevant users and based on a regionally agreed institutional framework.

A tabled output of the project structure and activities, including the two sub-projects:

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<p>Output 1: Established, effective institutional framework for the generation, uptake and use of an Early Warning System for the East African Region</p>	<p>Activity 1.1 Establishment of an integrated regional cooperation platform for EWS</p> <p>Activity 1.2 – Establishment of joint initiatives with relevant stakeholders (including producers and users) at national and regional level for EWS</p> <p>Activity 1.3 Establishment of a permanent institutional arrangement for the regional EWS</p>
<p>Output 2: Improved access to all operational data sources to support the generation and maintenance of Early Warning Services for the East African Region</p>	<p>Activity 2.1 – Modernization of infrastructure and basic systems to strengthen the EWS</p> <p>Activity 2.2 – Operational processing and visualization of all data sources and products</p> <p>Activity 2.3 – Mini field campaign to exploit and improve all existing data sources and products</p>
<p>Output 3: Strengthened integration between producers and users to develop innovative, accurate tailor-made EWS products through co-production for the East African region</p>	<p>Activity 3.1 – Innovative EWS tools co-produced for marine safety based on existing system in Tanzania to strengthen EWS on the Lake (Sub-project 1)</p> <p>Activity 3.2 – Number of new/improved co-produced EWS products validated and Standard Operating Procedures and Common Alert Protocol (CAP) developed</p> <p>Activity 3.3 – Sharing of knowledge to build research output capacity</p> <p>Activity 3.4 – Sharing of knowledge to enhance local post graduate capacity</p>
<p>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 a in the East African region</p>	<p>Activity 4.1 Effective communication of EWS to all possible users in languages and formats which are understood and can improve decision making (Sub project 2)</p> <p>Activity 4.2 Effective training to forecasters and technicians to use and maintain the new EWS tools to improve decision making and issue of warnings in a timely fashion</p> <p>Activity 4.3 Effective training and improved awareness of user communities to understand the new EWS tools to improve decision making</p>

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**Part 4: Rationale and fit with WISER Principles - 5% (Maximum 10 point score)**

Clearly and succinctly set out the rationale for the project explaining how it fits with WISER principles, identified user needs and international, regional or national strategies. The key issue that the project is aiming to address must be clearly stated. **Maximum 1000 words.**

Africa's development, climate and resilience agendas are inextricably linked. Statistics show that about 90% of all natural disasters on the continent are weather and climate driven<sup>1</sup>. Hydro-meteorological disasters that include floods, droughts, tropical cyclones, lightning strikes and landslides continue to cause heavy damages and loss of livelihoods and lives. With the advent of climate change, these disasters will likely only increase in frequency and intensity. The economic cost of recorded weather related disasters in Africa in the last 20 years is conservatively estimated at 10 Billion USD<sup>2</sup> given widespread under-reporting of losses. 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.

It is against this backdrop that the Highway project will address the need for 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 aims 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 NMHSs in East Africa, the Lake Victoria Basin Commission (LVBC) and the East African Community (EAC). The programme will be the driving force for triggering the Lake Victoria Basin into economic development. The table below shows how Highway outputs, outcome and Impact contributes to WISER's outputs, outcome and impact.

<u>WISER Impact</u>	<u>Highway Impact</u>
Increased use of weather and climate information and mainstreaming into development and sector policies, plans and programmes supports sustainable development in Africa.	Increased use of weather and information to improve resilience and reduce the loss of life and damage to property in the East African Region
<u>WISER Outcome</u>	<u>Highway Outcome</u>
<p><b>Outcome:</b> Increased use of reliable, co-produced and accessible weather and climate services based in better data, information, knowledge and tools informs national, sub-national and community level policy, planning and decision making in Africa.</p> <p><b>Intermediate outcome:</b> Improved access to weather and climate information at national, sub-national and community levels through strengthened capacity of and integration between NMHSs collaborators and users that promotes improved service development and delivery.</p>	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.

<sup>1</sup> CRED's Emergency Events Data Base

<sup>2</sup> [http://reliefweb.int/sites/reliefweb.int/files/resources/PAND\\_report.pdf](http://reliefweb.int/sites/reliefweb.int/files/resources/PAND_report.pdf)

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<u>WISER Outputs</u>	<u>Highway Outputs</u>
1. Strengthened enabling environment for the generation, uptake and use of weather and climate services to support development.	1. Established, effective institutional framework for an Early Warning System for the East African Region
2. Intellectual leadership in Africa built through innovative evidence generation and learning.	3. Strengthened integration between producers and users to develop innovative, accurate tailor-made EWS products through co-production for the East African Region (mainly through activities focused on Fellowships and knowledge transfer)
3. Improved data at historical, present and future timescales and better production systems to support the generation of weather and climate information and services	2. Improved access to all operational data sources to support the generation and maintenance of Early Warning Services for the East African Region
4. Strengthened global-regional-national networks and partnerships to support the imported generation, uptake and use of climate information.	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.
5. Strengthened capacity of and integration between producers, collaborators and users through co-production that promotes improved service development and delivery at national, sub-national and community levels through co-production.	3. Strengthened integration between producers and users to develop innovative, accurate tailor-made EWS products through co-production for the East African Region

Below are the WISER main components mapped to Highway activities:

**1. Improving the governance and enabling environment and stimulating demand for weather and climate services:** The establishment of Regional Early Warning System provides a step-change in improving the governance and enabling environment in the East African Community. This proposed framework will sensitize and educate both NMHSs and relevant stakeholders in the sub-region, as well as support existing networks and promote the use of EWS (as outlined in Output1). It will also serve as a framework where regional plans can be integration, show value for money (value in leveraging each country's expertise) and overtime be able to quantify the socio-economic value of more accurate and timely early warnings.

**2. Multi-disciplinary research to support co-design and co-development of weather and climate services for the region and strengthening regional climate science leadership:** This component directly links to Output 3 of the proposal which will support research activities to produce accurate tailor-made and co-designed EWS, in collaboration with weather and social sciences and users both in the developed and developing countries. Output 3 also promotes research, improved understanding, validation and verification of new innovative products and supports a Fellowship Programme expected to help increase the science and intellectual leadership in the continent.

**3. Supporting organisations and programmes to develop global-regional-national links to strengthen production, uptake and use of weather and climate information:** This component relates to the activities developed under Output 2 which aim to strengthen data access, flow and availabilities across all borders in the region. Output 2 provides with recommendation of enhanced infrastructures, which

will benefit the region.

**4. Strengthening and support to NMHSs, intermediaries and sector collaborators to increase uptake of reliable, co-produced and accessible weather and climate services:** This component directly links to Output 4 of the proposal which strengthens support to communicate EWS products to users in understandable and relevant ways to increase awareness and uptake for informed decision making. It is envisaged to include capacity building for NMHS leaders, forecasters and in particular, users. New communication channels will be explored and knowledge management and training will be improved – all with a view to ensuring the right services are received and appropriately actioned by the right users.

This project links to regional and sub-regional strategies:

**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 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.

The Integrated African Strategy<sup>3</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>4</sup> have prioritised the implementation of the proposed activities called out in this proposal, specifically, under Strategic Pillar 2.

**(SP2): 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 scientific and technological capacities to improve the delivery of tailored products and services to communities, with a view to enhancing agricultural production, minimising the spread of climate-sensitive diseases, improving water resources management and improving disaster response, among others. Relevant areas of action (being addresses in the Highway Proposal) 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 channelled 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

<sup>3</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>4</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)

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as forecasts, early warnings and advisories.

Furthermore, the Severe Weather Forecasting Development Project (SWFDP), the initiative being scaled-up in this proposal is also a Flagship Programme of AMCOMET. The Praia Ministerial Declaration<sup>5</sup> explicitly invited all Member States 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 also calls out for the improvement of meteorological service delivery at all levels and scales. 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 life and property, poverty alleviation and sustained livelihoods and economic growth.

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.

**Part 5: Evidence of Demand for the Project - 10% (Maximum 10 point score)**

Clearly set out evidence of demand for the project, including details of prior negotiations, studies, requests, meetings, stakeholder engagement etc. **Maximum 500 words.**

An assessment of global climate models' outputs (AR5-IPCC<sup>6</sup>) over eastern Africa suggests that by the end of the 21<sup>st</sup> century there will be a wetter climate with more intense wet seasons and less severe droughts during October-November-December (OND) and March-April-May (MAM). This indicates a potential increase in extreme events in the sub-region, which makes it all the more important to establish an appropriate Early Warning System as soon as possible to enable early action. An Early Warning System will be the foundation for future climate change adaptation measures.

The Lake Victoria Basin (LVB) is the lifeblood of East Africa supporting approximately 25% of the population. The people and economy heavily depends on rain-fed agriculture and fish industry in this basin. Lake Victoria supports Africa's largest inland fishery and produces about one million tons of fish annually, employs about 200,000 fishers and generates over US\$ 500 million annually in exports. There are over 30 million people who live near the coastline with 1,400 landing sites or beaches from which 50,000 boats operate. On average, 3,000-5,000 deaths occur each year due to navigation accidents caused by strong winds and waves. Collaterally, there are 8 dependents per death affecting 40,000 dependents each year, which compounds the poverty cycle. There are no regional, operational early warning systems to protect the health and safety of those navigating and exploiting the natural

<sup>5</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>6</sup> <https://www.ipcc.ch/report/ar5/>



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resources of the Lake Victoria Basin.

A recently conducted research,<sup>7</sup> with participation by meteorologists and sociologists from the Makerere University School of Public Health and the Fisheries Research Institute, concluded that that an **Early Warning System**, currently lacking, will help minimize disasters caused by weather and climate phenomena. The most hazardous weather elements cited in Lake Victoria include: strong winds resulting into high waves, frequent lightning during rain periods, heavy thundershowers and poor visibility.

Furthermore, a recent user-engagement study,<sup>8</sup> aimed at strengthening the Early Warning System in the Lake Victoria Basin, reports that thunderstorms generated on Lake Victoria cause damage to life and property in farming communities around the lake up to 100 km inland. The heavy rainfall associated with severe thunderstorms causes flooding, damages roads and causes traffic congestion in some of the large cities around the edge of the lake, particularly Kampala. High winds, lightning and hail associated with severe thunderstorms also cause loss of life and damage to property.

During a consultation meeting hosted by the East African Community (EAC) for Weather and climate Information SERvices (WISER) for Africa held in Arusha, Tanzania in April 2016, several ongoing and new initiatives for the East African region were presented, including the basic elements of the Highway Project. Representatives of the NMHSs from Uganda, Burundi, Tanzania, Kenya and Rwanda participated in the meeting, along with representatives from the Lake Victoria Basin Commission, East African Community, World Meteorological Organization, AMCOMET, UKMO and DFID. The meeting endorsed the initial regional and national proposals presented and requested all partners present to take the necessary steps to secure financial and technical support for the programmes presented, including enhancement of the Severe Weather Forecasting Demonstration Project (SWFDP) for East Africa.

**Part 6: Project Approach - 40% (Maximum 10 point score)**

This should clearly describe the proposed project outcome, outputs, activities, approach and methodology, and the way that the work will deliver improved weather and climate services and development impact. It should be based on the broad scope of work set out in the Terms of Reference. Project partners, counterparts and other stakeholders and their role in the project should be clearly identified. The projects approach to sustainability should specifically and clearly be set out. Key indicators for the project should be identified with quantitative targets. A logframe for the project should be completed in the standard format, including indicators and assumptions and a timeline setting out key activities, milestones and deliverables should be included. **Maximum 5000 words excluding logframe and timeline.**

There is a **need** for improved, accurate weather related early warning systems, which is co-produced between scientists and users, to prevent deaths and damage due to severe convection and strong winds on the lake and in the East African region.

The expected **outcome** of the Highway proposal is: Increased access to and use of co-designed and

<sup>7</sup> [http://www.newvision.co.ug/new\\_vision/news/1330126/5000-fishermen-die-lake-victoria-survey](http://www.newvision.co.ug/new_vision/news/1330126/5000-fishermen-die-lake-victoria-survey); research conducted March through May 2015

<sup>8</sup> *WISER Highway project proposal for strengthening the Early Warning Systems in the Lake Victoria Basin - Report and recommendations on user engagement initiatives, communication issues and partnerships*, Powell, September 2016

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sustainable early warning systems to inform regional, national, sub-national and community level planning and decision-making in the East African region.

The **Outcome Indicators** for the project are:

- Number of NMHSs accessing new/improved EWS for improved decision making; and
- Number of households and institutions able to access and use new/improved EWS information.

The expected **impact** of the project is an increased use of weather information to improve resilience and reduce the loss of life and damage to property supporting sustainable economic development in the East African region.

The **Impact Indicators** for the project are:

- Number of people with improved resilience resulting from the use of EWS; and
- Value of avoided losses due to use of climate information.

The Highway proposal will address this need and reach the desired outcome and impact, by working towards the following four outputs:

**Output 1 - Established, effective institutional framework for an Early Warning System for the East African Region:**

This output focusses on improving regional coordination and engagement to better assess user needs, from institutional to grass-roots level, to understand the economic value of improved EWS to these groups, and to determine concrete ways to fill existing gaps and develop new service streams. By sensitizing and educating all the stakeholders, the aim is to integrate the plans for a regional EWS into the strategies and plans on a regional, national and local scale. Monitoring of progress and value for money will happen through VfM and SEB processes. From the project's inception, a business plan will be developed (with relevant public and private partners) and will be continuously fine-tuned so that it is in place by the end of the project thereby ensuring the sustainability for the Regional EWS in East Africa.

**Activity 1.1 – Establishment of an integrated regional cooperation platform for EWS:** Building on the recommendation of the recent user-needs assessment report<sup>9</sup> and in collaboration with East African National Meteorological and Hydrological Services (NMHSs), the East African Community (EAC) and the Lake Victoria Basin Commission (LVBC); this activity will establish a regional cooperation platform to foster dialogue between relevant NMHS with a view to co-designing an Early Warning System to enhance basic and marine safety warnings and dissemination to various users in the region. To achieve these, it would be necessary to establish the Regional Cooperation Platform, define each institution's roles and responsibilities, propose data storing and sharing policies as well as reach agreement on which institution is best placed to host the Regional EWS. This will also begin the process of concretizing, through an agreement in place between partners, the resource sharing modalities for the Regional EWS.

*Output Indicator for Activity 1.1: Number of service agreements/MoUs in place (including data sharing policy). Target: 5*

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<sup>9</sup> WISER Highway project proposal for strengthening the Early Warning Systems in the Lake Victoria Basin - Report and recommendations on user engagement initiatives, communication issues and partnerships, Powell, September 2016

**Activity 1.2 – Establishment of joint initiatives with relevant stakeholders (including producers and users) at national and regional level for EWS:**

Building on the platform established in Activity 1.1 , this activity will foster dialogue between the regional platform for EWS and the relevant stakeholders with a view to understand user needs and to co-production of the needed tools and ways to communicate early warnings to enhance marine safety warnings and dissemination to as many as possible users in the region. Agreement needs to be reached on a color-coded system of severe weather alerts, common thresholds of triggering different types of alerts and zoning of Lake Victoria in terms of how to package services to be provided. To achieve these, relevant stakeholders at the global, national and regional level should commit (based on institution mandate, location and expertise) to participate in regional initiatives. Representatives from the World Meteorological Organization (WMO), AMCOMET, NMHS, UKMO, ministries of health, agriculture, disaster risk reduction and other relevant sectors will also be involved.

*Output Indicator for Activity 1.2: Number of joint initiatives at regional, national and sub-national level that support the enabling of the delivery of a regional EWS. Target: 4.*

**Activity 1.3 – Establishment of a permanent institutional arrangement for the regional EWS:**

This activity aims to ensure that a well-defined framework of cooperation for stakeholders is in place before the end of the Highway project to ensure the sustainability of the EWS in the sub-region. Although some collaboration exists, gaps, deficiencies and areas for improvement need to be identified and addressed. The engagement of an expert to collaborate with Core Project Partners to develop such a business plan for the regional EWS permanent institution, including defined or updated specification on how data is envisaged. This platform will also serve as a means for continuous feedback from users to improve on the mechanisms as well as the products and services developed. The plan will also explore synergies to foster collaboration and avoid duplication of effort.

*Output Indicator for Activity 1.3: Amount of public and private funds committed through the Business Plan for generation, uptake and use of EWS for the region. Target: 0.9 Million*

Output 1 will be led by EAC, in collaboration with the Project Core Partners and relevant institutions (Part 8).

**Output 2 – Improved access to all operational data sources to support the generation and maintenance of Early Warning Services for the East African Region:**

This aims to integrate and share existing data sources, leveraging on the WMO Integrated Global Observing System (WIGOS) Programme, which will improve access to all data in an operational observational network. Initially, this would be done through smaller investments to increase accessibility to already existing data sources. It will also include the development of a targeted mini-field campaign, to show the benefit of additional data sources for the purpose of EWS in the region. These will lead to strengthened data access, upgraded data flow, hardware and software to improve accessibility. The option to include and compare with additional data sources for EWS products will be explored in an effort to have the best possible data base available with improved use of equipment and technology. From this work, a recommendation for infrastructure enhancement to optimize EWS in the EA region will be produced.

**Activity 2.1 – Modernization of infrastructure and basic systems to strengthen the EWS**

A robust network of observing systems is the first link in the chain toward the provision of any weather or climate-related services. Without the continuous flow of observations enabled by the WMO Global

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Observing System (GOS), it is very difficult to issue weather predictions, watches and warnings or to monitor climate change. It would therefore be equally impossible to provide guidance related to mitigation or adaptation. The status of the GOS over most of Africa show a density that is significantly lower than over the rest of the world. This has a negative impact on the ability to monitor the local climate and provides an insufficient basis for issuing local watches and warnings. It is also a limiting factor for the quality of global numerical weather prediction (NWP) products generated by the major weather centers. This is important not only for the global community but also locally within Africa, since all weather prediction beyond the 2-3 day range is based on global NWP output.

This activity is critical to have a good understanding of the observations in the region, and to adequately plan where complementary observations are needed to maximize the use of data. Supporting the pre-operational phase of the Implementation of WIGOS in the sub-region would enable the following:

- Provide access to comprehensive, reliable and up to date station information for all six countries. The access would be open to all users worldwide, and would thus benefit the global community and all donor-funded efforts in terms of guiding their investment strategy;
- Improve real-time and historical monitoring of data delivery, an essential activity for troubleshooting and is expected to help substantially improve the performance of the existing network;
- Improve real-time and historical monitoring of data quality for the benefit of all users, both locally and globally,
- Provide Incident management support to ensure that data delivery and data quality problems are addressed and rectified as they occur; this is expected to lead to a substantial improvement in data quality with both direct (local) benefits and indirect benefits in terms of improved NWP guidance products and improved climate re-analyses.

These will be achieved through the engagement of Local Experts (potentially students from local universities or secondments from NMHSs in the Region), with counterparts in 5 target countries to coordinate activities at the proposed Regional WIGOS Centre in East Africa, the acquisition of equipment such as communications and data processing tools, reliable internet connection, a standard working station with meteorological data processing software.

*Output indicator for activity 2.1: Number of NMHS with new/upgraded data, hardware and technology suitable for the production of national and regional EWS. Target: 5*

**Activity 2.2 – Operational processing and visualization of all data sources and products:**

This activity will ensure that the Regional Early Warning System is fully operational. This includes capacity development to create an enabling operational environment for delivery of improved services, such as an improved capacity to receive, display, assimilate and use existing products, including satellite, radar and lightning data as well as NWP models. This will notably improve their capacity to fully exploit existing and new data sources and EWS products to issue forecasts and warnings. This will be achieved through the following:

- *Building and maintaining a reliable data communications infrastructure* (established in Activity 2.1) for the transmission, processing and display of high-quality, high frequency observations that are combined with frequently updating nowcasting products for inclusion into an EWS for the region;
- *Suitable software should be used to display* satellite, lightning, radar, NWP and other observation data on forecaster work stations in real time. New and innovative ways to use and

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display data operationally will be investigated, for example: LIDAR RADAR Open Software Environment (LROSE) - a National Science Foundation (NSF) backed project to develop common software for the LIDAR, RADAR and PROFILER community. It is based on collaborative, open source development, whereby the code would be freely available on the web. LROSE is a good cost-effective solution to ensure that the forecasters can display EWS products in order to issue timely warnings.

*Output indicator for activity 2.2: Number of NMHS (and RSMC) processing data to generate and visualize EWS data products operationally. Target: 5*

**Activity 2.3 – Mini field campaign to exploit and improve all existing data sources and products**

In this activity a mini-field campaign will be developed, leveraging on the WMO Integrated Global Observing System (WIGOS) Programme (Activity 2.1 and 2.2), which will improve the observational network (for both climate and weather communities) and add to the current data sources in the sub-region. The purpose of this activity is to improve the understanding and application of high-impact weather observations and prediction services in the sub-region, as defined by the users in Output 1. Additional observations will be assessed for their benefit for nowcasting and NWP as well as EWS, providing guidance for long-term investments in capital expenditure in permanent equipment.

In addition to the existing observations from NMHSs, there are other observation initiatives across the Lake Victoria region – from permanent observation deployments<sup>10</sup> to temporary equipment for science research.<sup>11</sup> Through Activity 2.1 and 2.2, this activity will link with and compliment these existing programmes as well as provide a coordinated structure for additional observations and data sharing which would be integrated into the regional data set, and eventually to the Global Telecommunications System. This will be achieved through the following:

- **Field Campaign Stakeholder Planning:** The main objective is to discuss and agree on the elements of the Field Campaign – coordinate with relevant NMHSs, international organizations (WMO, UKMO, NOAA, NCAR, among others) and other institutions and/or programmes (such as ICPAC and TAHMO) working in the region on how to best deploy new observations stations in terms of location and number of observations.
- **Purchase of additional observation stations and the necessary IT infrastructure for the efficient transfer and integration of new observational data.** There are two existing radiosonde stations in the region; the project will increase the frequency of ascents to 2 additional ascents per day for the duration of the Campaign.

Initial analysis from the first field campaigns will provide a **recommendation guide and/or plan for the permanent installation of additional instrumentation in the East African region** to:

- Provide specific requirements for data to support prediction at longer-term timescales, to foster collaboration and coordination with any other ongoing programmes<sup>12</sup> focussing on other timescales;
- Provide clear recommendations for an inter-operable regional observation network, based on scientific, operational and value for money analysis, while also taking into consideration the best way to integrate non-traditional and third party observations to benefit EWS in the region; and
- Engage of a range of other project and programmes and development partners to promote

<sup>10</sup> Such as the Trans-African HydroMeteorological Observatory (TAHMO; <http://tahmo.org/>) and the Aircraft Meteorological Data Relay (AMDAR) Programmes; <https://www.wmo.int/pages/prog/www/GOS/ABO/AMDAR/>

<sup>11</sup> Such as HyCRISTAL; <http://www.futureclimateafrica.org/project/hycrystal>

<sup>12</sup> Such as the DFID funded Future Climate for Africa

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coordination of efforts and resources.

*Output indicator for activity 2.3: Number of additional types of observations added (Soundings, TAHMO, and AMDAR) and compared through a mini-field campaign to demonstrate the benefit of additional observations for EWS products. Target: 3.*

Output 2 will be led by WMO, in collaboration with the Project Core Partners and relevant institutions (Part 8).

**Output 3 – Strengthened integration between producers and users to develop innovative, accurate tailor-made EWS products through co-production for the East African region:**

This output will focus on the collaborations between weather and social sciences and users to research, co-produce and validate innovative tailor-made EWS products for the EA region. Research studies will improve understanding and validate the new techniques using all available data sources (from the Output 2). The research will be done in collaboration with local, African scientists and make provision for targeted post-graduate studies/fellowships. Standard Operation Procedures (SOP) and Common Alert Protocol (CAP) will be developed to ensure the standardization and maintenance of these systems. This will primarily be delivered through a sub-project in Tanzania.

**Activity 3.1 – Innovative EWS tools co-produced for marine safety based on existing system in Tanzania to strengthen EWS on the Lake (Sub-project 1)**

This activity will build on the Multi Hazard Early Warning Services (MHEWS) for Tanzania, through partnerships between TMA and the Met Office, which piloted an Early Warning Service for the coastal regions. The experiences from MHEWS-Tanzania will form the baseline for scaling-up this work to more end-users (e.g. people working on ferries on the lake) as well as other countries surrounding the lake, potentially Kenya. The goal of this sub-project is to enhance the early warning tools available for the Lake Victoria region, ensuring the best possible information is made available. This can be achieved through improved content and accuracy of early warnings to reach more than 140,000 fishermen, around 400,000 residents on islands and over 30 million residents (Kenya, 14M; Tanzania, 12M; Uganda, 4.5M). This activity will to East African forecasters.

Innovative research will underpin the advancement of NWP, radar (where possible), lightning and satellite products and ensure they are tailor-made for the Lake Victoria early warning services. A team of experts (potentially comprised of experts from NCAR, NOAA, UKMO and students from local universities) will develop NWP, satellite, radar and lightning data tools for EWS with the aim to provide accurate, co-designed early warnings for fishermen, small-scale ferry operators and ferry passengers and other users.

Potential innovative products to be developed under Activity 3.1 include:

- An assessment of model performance for typical weather situations through a real time NWP comparison website for both forecasters and scientists to view all the forecast models side by side. The purpose of the website will be to enable the forecasters to take part in the model performance comparisons and verification;
- Improved operational NWP models (using the observations from the field campaign) to answer questions such as:
  - What resolution is required to sufficiently represent processes?
  - What configurations of the model are most effective over the Lake Victoria basin region?
  - What is the impact of global driving models on regional model performance?
- Efficient exploitation of existing Satellite, radar and lightning products, including development

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of new applications, such as (but not limited to):

- Priority 1: New NWP tools to address the needs of end-users in terms of thunderstorms and wind forecasts using the optimal resolution.
- Priority 1: New nowcasting satellite-based products (from Nowcasting Satellite Application Facility) such as Rapid Developing Thunderstorm and Convective Rainfall Rate, which can track the more intense parts of thunderstorms and monitor rainfall intensity, respectively. These two products will address the identified needs for intense thunderstorm warnings and heavy rainfall.
- Priority 2: New NWP based products to forecast lightning, which will help anticipate where lightning can be expected in the sub-region as well as on the lake.

To achieve the goals in Activity 3.1, use of initial funding available will be maximized, but alternative avenues will be exploited for other stakeholders to participate, in particular those who have access and use of other funding mechanisms to complement existing efforts, which could include the following:

- The **National Science Foundation (NSF)** identifies and funds work at the frontiers of science and engineering, keeping close track of research world-wide. Discussions have been initiated with the **NSF** to use observation facilities (such as mobile radar, profilers and radiosondes) for the mini field campaign. **The possibility to investigate that NSF would provide facilities for the Highway project at a reduced or no cost can be considered.**
- The **National Centre for Atmospheric Research (NCAR)** supports the Global Learning and Observations to Benefit the Environment (GLOBE) Program. GLOBE is an international science and education program that provides students and the public worldwide with the opportunity to participate in data collection and the scientific process, and contribute meaningfully to our understanding of the Earth system and global environment. The program intends to install four 3D printed automatic weather stations (3D-PAWS) at schools in Kenya, one of which on the Rusinga Island in the Lake Victoria region, in collaboration with the Kenya Meteorological Department. Planning is also underway for the next phase of deployment at other schools in Kenya during 2017, including the instalment of a reference station, potentially co-located with a WMO AWS for comparison purposes. 3D-PAWS stations could fill in gaps in the network in Kenya. During the siting for the additional observations, discussions will take place with the 3D-PAWS team to consider siting stations at specific schools in those areas that also meet the Highway requirements. This as an example of specific, committed U.S. funds for weather-related research in this region. The potential collaboration with GLOBE on these efforts also represents an effort towards filling the observational gap and the long-term sustainability of the Project.
- UK Met Office in conjunction with the **Stony Brook University** is planning to install Automatic Weather Stations and water temperature sensors on boats on Lake Victoria for the purpose of obtaining climate data, and inputting into modelling efforts across the lake to enhance NWP and forecasting. A water temperature measurement is important for convective-scale forecasting, but the closest observation is currently on the coast. UK Met Office is currently exploring a number of possibilities with boats that traverse the Tanzanian and Ugandan waters of Lake Victoria. In addition, UK Met Office is working with the Kenya Meteorological Department (KMD) to make available data from two buoys based in the Lake at Kisumu.

*Output indicator for Activity 3.1: Number of new/improved co-produced EWS products delivered in line with Standard Operating Procedures (Sub-project: Marine safety, Tanzania). Target: 4*



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[Activity 3.2 – Number of new/improved co-produced EWS products validated and Standard Operating Procedures and Common Alert Protocol \(CAP\) developed.](#)

This activity will build on Activity 3.1 to validate the newly developed EWS products and provide the needed SOP to ensure understanding and maintenance of these for sustainable, operational accessibility. This will include:

- Various statistical techniques will be employed to evaluate and verify system performance and demonstrate the improvement in EWS. This will be done on case studies (using data from the mini-field campaign) initially, but also become operational at the NMHSs and in the East African Region.
- Continuous feedback from the users and near-real-time verification will be used to improve and maintain new products.
- Development of Standard Operating Procedures (SOP) for 1) the newly developed products; and 2) the data flow, including IT structures, to ensure proper maintenance and continuous operation of the system. Similar procedures to the WISER Quick Start project in Tanzania will be followed to document all operational procedure.
- Development of Common Alerting Protocol (CAP) to ensure that countries are able to code their warnings in the CAP format, which is a standard way of presenting warnings globally. This capacity to standardize the alerts will be an advantage for implementing countries, as warnings issued in this format easily understood by machines, enabling its automated transmission to sector-specific users, who can then filter the types of warnings relevant to their sector.

*Output indicator for Activity 3.2: Number of new/improved co-produced EWS products for marine safety delivered in line with Standard Operating Procedures and Common Alert Protocols (CAP). Target: 3*

[Activity 3.3 – Sharing of knowledge to build research output capacity](#)

This activity will ensure that scientific knowledge gained through the research activities during this project will be shared and feed into the national and international sciences community. Innovative research that will be part of Output 3, will be led by international experts in the field of nowcasting, early warning systems and validation, which will be an ideal opportunity to involve African scientists. Capacity can be enhanced to teach students how to present scientific results – both in written and oral presentations and link this to benefits to the community users. This will be done through:

- Publication of scientific papers and / or posters;
- Publications from Fellowships engaged in the project, involvement of local students from regional universities in the mini-field campaign,
- Presentations of results from the Project through various fora, including regional conferences such as AMCOMET.
- The knowledge can also be shared through various media channels, including website and other social media tools of all stakeholders.
- The work on socio-economic benefits and transformational change will also feed into the knowledge products.

*Output indicator for Activity 3.3: Number of research outputs on EWS. Target 4*

[Activity 3.4 – Sharing of knowledge to enhance local post graduate capacity](#)

This activity will build on the entire Output 3 to ensure that scientific knowledge gained during this project will be shared and provide post graduate students with topics for MSc and PhD under the leadership of international experts in the field of nowcasting, early warning systems and validation. This can be achieved through enrolled MSc and/or PhD students in the field of EWS. Experts in the field of EWS can act as mentors for post-graduate students.



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*Output indicator for Activity 3.4: Number of African scientists achieving post graduate qualifications, or similar, through collaboration and/or fellowships in the area of EWS. Target 3*

Output 3 will be led by TMA and UKMO, in collaboration with the Project Core Partners (Part 8).

**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 a in the East African region:**

This output will focus on the capacity building to NMHS leaders, forecasters and users. In each of these sectors different types of training/education is needed. On a managerial level, education would involve the understanding of the benefits of an EWS for the region and how to collaborate to establish and sustain this. For forecasters the capacity building would involve understanding of the improved and/new EWS tools/techniques to optimally use this for the issuing of warnings. For users training would involve understanding the meanings and how to change their decision making processes in an appropriate manner. New communication channels explored to reach as many households, communities, organizations and fishermen on the lake as possible. This will primarily be delivered through a sub-project in Uganda linking with existing initiative being undertaken by UNMA.

**Activity 4.1 Effective communication of EWS to all possible users in languages and formats which are understood and can improve decision making (Sub project 2)**

This activity will build on the existing German Federal Enterprise for International Cooperation (GIZ) and USAID funded Severe Weather Alerts Project (SWAP) and Mobile Weather Alert (MWA) in Uganda. This activity aims to re-establish regular forecasts and warnings, building on the SWAP and MWA initiatives, for the sub-region which would be broadcast through SMS, local radio and TV stations. Multi-Hazard Early Warnings (developed and co-produced in Output 3) would be built into the forecasts and updates. The partners would also train radio station staff on how to translate the forecast more accurately to the relevant languages in the sub-region.

This will be achieved through the following:

- The development of the content of SWAP forecasts and severe weather warnings that meet specific needs of users in Uganda and other East African countries;
- Dissemination of SWAP forecasts and severe weather warnings through radio and TV, including appropriate training to ensure access and uptake of forecasts in target communities and advising the public how to react to different types of severe weather warning and how to stay safe and mitigate the impact of the expected event. Activity will be implemented in collaboration with Action Aid, Uganda Radio Network and WMO Public Weather Service Programme.
- Development of a series of jingles in the appropriate national language, broadcasted by radio stations at the same time as early warnings, advising the public how to react to different types of severe weather warning and how to stay safe and mitigate the impact of the expected event. Activity will be implemented in collaboration with Action Aid, Uganda Radio Network and WMO Public Weather Service Programme.
- Engagement with relevant institutions and stakeholders to revive the Mobile Weather Alert initiative and continue the provision of weather forecasts and early warnings via text messages for fishermen. The forecasts could be updated to include information about wind direction and wave height; and

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*Output of Activity 4.1 Number of households/users able to access and use new/improved EWS information through different/relevant communication channels such as radio and/or SMS (MWA). Target: 500000/50000*

Activity 4.2 Effective training to forecasters and technicians to use and maintain the new EWS tools to improve decision making and issue of warnings in a timely fashion

Crucial to producing an enhanced EWS is the transfer of technology and technical training of forecasters and technicians (especially radar technicians) on maintenance of high-quality observations, data management, archival, display and more importantly the timely dissemination of products to the community, along with training on use of enhanced datasets and nowcasting techniques for nowcasting storm severity. This activity will link to WMO Public Weather Service (PWS) and Voluntary Cooperation Programme (VCP) to train forecasters on how to package the information (forecasts and warnings) in such a way that it is understood and trusted by the local users. This will be achieved through the following:

- Training of IT personnel (maintenance of infrastructure).
- Training desks, webinars and study material made available at the Regional Specialized Meteorological Centre (RSMC) in Kenya which links to the knowledge gained in Outputs 2 and 3. This will include appropriate training for forecasters to ensure access and uptake of forecasts and warnings by more users and other countries in the Lake Victoria Region.
- Training material will be provided online which can be downloaded from the SWFDP website, the knowledge sharing platform currently being developed under the WISER programme and the AMCOMET website, among others at any time. Training topics would include meteorology, early warning systems of EWS, technical maintenance of networks and data flow. SWFDP training events will be utilized for training of local forecasters, technicians and students.
- Continuous **feedback** from forecasters will be part of the process to feed into EWS.

*Output of Activity 4.2 Number of producers and forecasters trained in the development, maintenance, understanding and use of EWS. Target: 30*

Activity 4.3 Effective training and improved awareness of user communities to understand the new EWS tools to improve decision making

Public awareness of how this project benefits the East African community will be needed to enhance local knowledge and understanding of the project and its goals. Current mechanisms for communication will be explored and expanded to build upon any existing indigenous knowledge triggers for action with scientific evidence. It is envisaged that interaction with local NGO groups is needed to understand best way to reach the most vulnerable community groups and use at the most effective communications techniques. Practical training materials for community leaders will be put together and provided, but an effective feedback mechanism will also be introduced to service providers on utility of products and any recommendations for change.

The AMCOMET platform should also be leveraged to increase awareness of this initiative and the impact that it has on the community. This is particularly important to present to Ministers to advocate for increased national support for the National Meteorological and Hydrological Services. This activity can also link to WMO Public Weather Service (PWS) and Voluntary Cooperation Programme (VCP) to users. This will be achieved through the following:

- Training of users on how to understand the new EWS products and warnings and act on warnings. Participants would include sectoral extension services;
- Training desks, webinars and **study material made available online** which can be downloaded

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from the SWFDP website, the knowledge sharing platform currently being developed under the WISER programme and the AMCOMET website, among others at any time. Training topics would include meteorology, new/improved early warning systems of EWS, and their understanding for better decision making;

- Continuous **feedback** from end-users will be part of the process to feed into EWS.

*Output of Activity 4.3 Number of households/user communities trained in the development, co-production, understanding and use of EWS. Target: 40 000/10 000.*

Output 4 will be led by LVBC and Uganda, in collaboration with the Project Core Partners and relevant institutions (Part 8).

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Cross-cutting to the entire project will be **Socio-Economic Benefits and Value For Money** studies to monitor benefits and value of the EWS system: Engagement of a Team of Experts<sup>13</sup> to assess the socio-economic benefits and macro-level transformational impact of improved and better coordinated EWS services in the Lake Victoria basin. This study will explore both the benefits to users of an improved EWS platform (focusing on Value of Information), as well as the potential for economic gains related to regional integration (cost savings, delivery effectiveness). The study will be longitudinal across the project period, involving the establishment of a baseline, as well as an assessment of improvements to EWS delivery and management made under all Outputs (more details in Section 10).

Underlying to all of these activities is also a component which will address **outreach, raising awareness and compilation of lessons learnt**.

**Part 7: Project Interaction and Coordination - 5% (Maximum 10 point score)**

This should identify complementary programmes, projects and initiatives and set out how this project will coordinate and collaborate with them. This should include WISER and non-WISER funded projects. **(maximum 500 words)**

Highway will coordinate with and build on several existing initiatives currently being implemented or recently completed in the sub-region. Below is a non-exhaustive list of complementary projects and initiatives with whom Highway will be collaborating with. Details of engagement can be found on Part 8 of this proposal.

**Aircraft Meteorological Data Relay (AMDAR) Project in Kenya**

AMDAR utilizes aircraft's on board instruments and avionics systems to provide accurate meteorological measurements, such as altitude, air temperature, wind speed and wind direction. The Highway Project will use the available AMDAR data from the East African region as additional source of vertical profile data, normally very scarce, to better understand the interaction between different types of weather systems that influence the region (Output 2).

**Multi Hazard Early Warning Services (MHEWS) project in Tanzania**

This project aims to enhance the role, capacity and reputation of the Tanzania Meteorological Agency (TMA) through the development and delivery of a pilot Early Warning Service (EWS) for the coastal regions, thus strengthening Tanzania's preparedness and reducing the impacts of extreme weather. During the Highway project, the initiatives which were started for EWS in Tanzania will set the

<sup>13</sup> Experts will be hired according to WMO Policies and Procedures

foundation for the sub-project (Output 3) to enhance these early warning services to other countries in the region.

**Programme on Climate Information for Resilient Development in Africa (CIRDA)**

CIRDA's objective is to enable vulnerable countries in Africa (Benin, Burkina Faso, Liberia, Sierra Leone, Sao Tome and Principe, Ethiopia, the Gambia, Uganda, Tanzania, Malawi and Zambia) to strengthen national climate information systems as well as to benefit from regional coordination and draw upon a platform of knowledge management. The Highway project will build on and complement the CIRDA Programme by adding data accessibility and additional data sources to the GTS, which could also benefit climate studies and applications (Output 2).

**HyCRISTAL: Integrating Hydro-Climate Science into Policy decisions for Climate-Resilient infrastructure and livelihoods in East Africa**

The objective of HyCRISTAL, a Future Climate for Africa (FCFA) project, is to develop new understanding of climate change and its impacts in East Africa, while working with the region's decision-makers to manage water for a more climate-resilient future. HyCRISTAL has collated some limited data for Kampala and Kisumu regions from its partners and is making some new observations. The data collected from Highway can be made available for HyCRISTAL (for research) and other related climate projects (Output 2).

**HyVic**

The purpose of the Hydroclimate Project for Lake Victoria (HyVic) is to provide an understanding of the climate over the Lake Victoria Basin (LVB) and improve its predictability and projections to support decision making in the sub-region. The data collected from Highway can be made available for HyVic (for research) and other related climate projects (Output 2).

**Climate Research for Development (CR4D)**

The Climate Research for Development (CR4D) Agenda in Africa was launched to strengthen links between climate science research and climate information needs in support development planning in Africa. CR4D is an African-led initiative supported by partnership between African Climate Policy Centre (ACPC) of UN Economic Commission for Africa (UNECA), African Ministerial Conference on Meteorology (AMCOMET), World Meteorological Organization (WMO), and Global Framework for Climate Services (GFCS). An opportunity exists for a **wide data-sharing agreement for research purposes**, through CR4D, HyVic and HyCRISTAL, where there are already established links with universities, scientists, policy makers and practitioners in the East Africa region which be enhanced through the Highway Project (Output 2).

The **WMO Integrated Global Observing System (WIGOS) Initiative** plays a critical role in the integration of existing and new observations in the sub-region. The WIGOS vision calls for an integrated, coordinated and comprehensive observing system to satisfy, in a cost-effective and sustained manner, the evolving observing requirements of Member States in delivering weather, climate, water and related environmental services. More importantly, WIGOS provides a framework for enabling the integration and optimized evolution of surface-, upper air and space-based observations.

As a complement to WIGOS, the **WMO Information System (WIS) Initiative** will provide a flexible framework for exchanging information on weather, climate and water that is essential to providing effective information and services to decision makers, weather dependant industry and users. The existing and additional data collected from Highway (also during the mini field campaign) can be made

available through WIS and WIGOS for weather and climate purposes (Output 2).

It should be noted that AMDAR, WIGOS, WIS and CR4D Initiatives are all Flagship Programmes of AMCOMET. Hence the interlinkages and complementarities articulated in the Integrated African Strategy on Meteorology (Weather and Climate Services) are being implemented as they have been originally envisioned within the AMCOMET framework – Africa delivering as one.

**Part 8: Project Management and Delivery - 20% (Maximum 10 point score)**

This should describe clearly how the project will be managed and delivered and what the key roles and responsibilities for each organisation/institution/individual are. Key individuals should be identified and a brief one paragraph pen portrait (max 200 words) provided. **(maximum 500 words excluding pen portraits)**

**A Project Steering Committee** will be established, comprised of representatives of core partners in the project, including the World Meteorological Organization, the UK Met Office, the National Meteorological and Hydrological Services in East Africa (Burundi, Kenya, Rwanda, Tanzania and Uganda), the East African Community and the Lake Victoria Basin Commission.



The Steering Committee will meet *every 6 months* and will be convened by the Regional Project Coordinator, including organization of quarterly *coordination meetings* via *teleconference* between Project Steering Committee members to ensure the smooth implementation of the Highway project.

This Steering Group will coordinate the progress of the project, involving relevant stakeholders when needed to:

- Share *good practice and promote continuous progress* of the project in the EA Region,
- *Oversee all output* of the project by facilitating the needed collaboration in the EA region to

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develop a successful, operational EWS in the region;

- Provide *guidance to ensure* that the work done, training provided as well as the scientific and technological achievements of Highway, are *supported and sustained by decision makers* and policy makers and users in a sustainable fashion.
- Use established platforms to promote the project's outcome.

**Output 1:**

EAC – lead regional coordination;

WMO – coordinate, facilitate collaboration and agreements (MoU);

NMHS – commit to goals of project and its operationalization and sustainability;

LVBC – Main link with Lake Victoria Basin user community; and

Other partners: Link with various communities and user groups as part of co-production process.

**Output 2:**

WMO (WIS/WIGOS) – lead modernization of data sources, infrastructure and maintenance in EA region

TAHMO – assist in supplementing data sources and their placements, comparisons here possible;

ICPAC – assist in placement of possible new data sources which could also serve as input to climate studies in the region;

WMO and UKMO experts – assist in planning and execution of mini field campaign;

NMHS - collaborate to co-produce best data coverage and accessibility for the region;

AMDAR – assist with supplementing data from AMDAR project for profiles; and

Other partners - Link with various communities and user groups as part of co-production process.

**Output 3:**

UKMO and TMA – leading the initiative surrounding innovative research for marine safety (building on MHEWS and WISER Quick start in Tanzania);

WMO WWRP – providing support (through members of Working Groups on Nowcasting and Mesoscale Research and Verification) for co-production and validation of new EWS tools;

NMHS – experts/forecasters from NMHS involved in co-production of new EWS tools;

Students from local universities – participating in the innovative research with the aim to achieve MSc or PhD post graduate qualifications; and

Other partners: Link with various communities and user groups as part of co-production process.

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**Output 4:**

LVBC and UMA (GIZ) – lead initiatives to validate, standardize and disseminate the new EWS, building on SWAP, MWA;

WMO SWFDP – will provide training opportunities for users;

WMO – PWS and VCP – will provide existing platforms for communication and training of users;

NMHS – will provide feedback on new tools and suggest improvements to be implemented;

URN – will provide radio coverage for EWS warnings;

UKMO – will provide expertise in validation and implementation of new EWS tools, including SOP and CAP; and

Other partners: Link with various communities and user groups as part of co-production process.

An **inception phase** of 6 months is planned for this project, which will be led by WMO, in collaboration with EAC and UKMO. The purpose of the Inception Phase will be to an agreed and clear vision for the project within the region, undertake key preliminary activities and based on these develop detailed implementation plans. In more detail, the following aspects will be addressed:

1. Further develop and agree a common the vision and scope of the project (with its boundaries) in the region. During this phase the relevant developers, users and stakeholders will reach common ground how to work towards implementing a regional Early Warning System as envisaged in previous plans and policies. The following outcomes are envisaged:
  - Launching the Regional EWS platform event - sharing the plan of the project with institutional stakeholders through the NMHS and EAC to determine which stakeholders should play a role in developing or streaming EWS information;
  - Getting the needed buy-in from the regional role players that a business plan needs to be developed for long term sustainability of the EWS. Regional role players should all understand the value and added benefits of a regionalized EWS;
  - In an effort to instigate the co-production of an EWS, a list of potential new products of EWS can be compiled which will fit into the strategic plans for the region.
2. Identify key requirements for a functional EWS in EA. Stakeholders will need to decide which requirements are most critical – hardware, software, data flow etc. The following outcomes are expected:
  - A survey of existing data, observations, technical / network capabilities etc. to identify the gaps and a plan of which can be supported by WISER (and possibly other initiatives);
  - A plan of where additional observations are needed for the mini field campaign.
3. Develop the preferred feasible solution for an operational EWS for the region:
  - Agreed preferred solution for EWS for LVB



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- Case study using NWP, lightning, radar and/or satellite data for one event to show the benefits for early warnings.
- 4. A common understanding of the cost, time schedule and risks associated with the project.
- An implementation plan for the project, including detailed plans for the next 12-18 months of the project proposed and accepted.
- All staffing, resourcing and partnership arrangement for the project in place.

**Project Core Partners:**

**World Meteorological Organization(WMO):**

Dr Paolo Ruti is an experienced scientist and science manager with strong leadership and relationship-building skills, currently working as chief of the World Weather Research Division at the World Meteorological Organization (UN). An international R&D specialist, he has a strong focus on strategic research planning of weather and climate related topics. Dr. Ruti also has extensive project development experience on climate services and on regional climate change (Africa and Mediterranean), acquired in several European research frameworks and in international scientific committees. Since receiving his PhD in Geophysics in 1996, he has led multiple international research activities, authored and co-authored over 60 peer reviewed papers.

**UK Met Office:**

George Gibson is an international development manager with 6 years of experience in the fields of international development and climate adaptation. This has granted him substantial experience in the planning, design, management, implementation, and monitoring & evaluation of international development projects and programmes. He currently leads the International Development Team's work in Kenya, including coordinating the delivery of a DFID funded multi-partner project seeking to improve the scope and access to forecasting services in that country. George joined the Met Office from the Environment Agency where he led projects supporting the adaptation of businesses and communities to the impacts of extreme weather and climate change. Prior to this he worked for DFID as a deputy humanitarian programme manager. This involved joining UK Government humanitarian responses, and leading a programme to improve the use of private sector products and expertise in disaster resilience and response. An excellent written and oral communicator, throughout his career George has led on numerous engagements with donors, NGOs, government departments and businesses, and has had a broad and varied experience of working alongside beneficiaries to develop user-led projects.

**Burundi Meteorological Service (BMS):**

Mr Godefroid Nshimirimana will coordinate HighWay activities for BMS. Mr Nshimirimana holds a BSc in Meteorology from the African School of Meteorology and Civil Aviation (EAMAC) and a Senior technician Diploma in Computer Science. He is currently the Chief of weather forecasting with responsibility to coordinate all activities related to the weather forecast and to organize Press conferences with the media. Other responsibilities include the use and interpretation of outputs of numerical models, production of the daily weather forecast for Southern Africa and West Africa, production of the special bulletin for the IFRC and the evaluation of the models and comparison between models (ARPEGE, ECMWF and UK Met Office). Mr Nshimirimana is also responsible for the maintenance and upkeep of equipment for receiving satellite imagery and other equipment installed at the Bujumbura International Airport.



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**Kenya Meteorological Department (KMD):**

Mr Ayub Shaka is a Kenya Meteorological Department Senior Assistant Director, with over 30 years working experience in various branches of the Department, focusing on dissemination and awareness creation of climate information services (CIS). He has vast experience in the region and has been instrumental in initiating projects that improve dissemination of CIS that is relevant to decision-making and planning at county level livelihoods. This involves developing livelihoods advisories and scenarios based on downscaled seasonal forecasts, among other decision support tools. He has also been involved in capacity building of national and regional meteorological services in communicating CIS to stakeholders in the most appropriate communication channels as well as served the Adaptation Consortium project as a CIS coordinator in the 5 ASAL project counties (Kitui, Makueni, Wajir, Garissa and Isiolo). He is currently involved in implementing a Weather and Climate Information Services for Africa (WISER) Western Kenya project whose objective is to enhance decentralised CIS for relevant for planning and decision making at county level through County Directors of Meteorological Services (CDMs) in the 4 project counties. The other objective is to support CDMs engage with county stakeholders and effectively discharge their services and increase the use of climate information to inform decision making from the household to administrative levels. He is a MEng. Graduate of UNESCO Institute of Hydrology and Engineering (IHE) - Delft Netherlands with specialization in Hydrology and Surface Water Resources Management. Mr Shaka holds a Bachelor of Science Degree in Meteorology from University of Nairobi.

**Rwanda Meteorological Service (Meteo Rwanda):**

Mr Anthony Twahirwa, Division Manager of Weather/Climate Services and application Division will coordinate Highway activities for Meteo Rwanda

**Tanzania Meteorological Agency (TMA):**

Dr Ladislaus Chang'a, Principal Meteorologist and Director of Research and Applied Meteorology will coordinate Highway activities for TMA, in particular Activity 1.2. Dr Ladislaus Chang'a is a Principal Meteorologist and the Director of Research and Applied Meteorology at Tanzania Meteorological Agency. He is also the IPCC Focal Point for Tanzania and a member of Expert Team on National Climate Monitoring Products of the Commission For Climatology, and part time Lecturer at the University of Dar es Salaam (Climatology, Meteorology and Climate Change). He is also involved in coordinating the activities of the Global Framework For Climate Services (GFCS) in Tanzania. His research interest includes Seasonal Climate Prediction, Climate Variability and Change, Biometeorology and Indigenous Knowledge in Weather and Climate Prediction and in Climate Change Adaptation.

**Uganda National Meteorological Authority (UNMA):**

Mr Khalid Yakub Muwembe, Director of Forecasting Services, will coordinate Highway activities for UNMA, in particular Activity 1.3. Mr Muwembe is a member of the Uganda Meteorological Society and United Kingdom Royal Meteorological Society. Mr Muwembe holds a Master of Science in Applied Meteorology and Climate with Management from the University of Reading, UK.

**East African Community (EAC):**

EAC is the regional intergovernmental organization which plays a key role in facilitating cooperation between the Kenya, Tanzania, Uganda, Rwanda and Burundi. It also has an established Meteorological Data Policy and has adopted a five-year Meteorological Strategy and Development Plan which runs from

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2013 to 2018. EAC will have a central role in the project with regards to coordination at the regional level, and in particular for the operationalization of Early Warning Systems in Eastern Africa.

**Lake Victoria Basin Commission (LVBC):**

The East African Community established the Lake Victoria Basin Commission formerly known as the Lake Victoria Development Programme in 2001, as a mechanism for coordinating the various interventions on the Lake and its Basin; and serving as a centre for promotion of investments and information sharing among the various stakeholders. The programme is the driving force for turning the Lake Victoria Basin into a real economic growth zone.

Gerson Japhet Fumbika is a Maritime Transport Safety and Security Officer for the EAC, based within the LVBC. Its main areas of work include improvement of the maritime transport safety and security in East African region for the maritime laws and regulations, search and rescue, maritime communication, aids to navigation, hydrography, meteorology, oil spill prevention and ports and harbours. Mr Fumbika holds a Master's Degree in Maritime Safety and Environmental Protection from the World Maritime University.

**Other Potential Partners:**

- **ICPAC:** (IGAD Climate Prediction and Applications Centre): ICPAC's objectives are to provide timely climate early warning information and support specific sector applications for the mitigation of the impacts of climate variability and change for poverty alleviation, management of environment and sustainable development, to improve the technical capacity of producers and users of climatic information, in order to enhance the use of climate monitoring and forecasting products in climate risk management and environment management, to develop an improved, proactive, timely, broad-based system of information/product dissemination and feedback, at both sub-regional and national scales through national partners, to expand climate knowledge base and applications within the sub-region in order to facilitate informed decision making on climate risk related issues; and to maintain quality controlled databases and information systems required for risk/vulnerability assessment, mapping and general support to the national/ regional climate risk reduction strategies.
- **Regional Specialized Meteorological Centre-Nairobi:** – focal point for training events and EA SWFDP region
- **Regional Forecasting Support Centre-Dar Es Salaam:** (for Lake Victoria basin) - focal point for marine aspects in LVB
- **GIZ (Gesellschaft für Internationale Zusammenarbeit):** GIZ can be an essential strategic partner in Uganda for the Highway user engagement initiative in the country. The main focus of GIZ's project activities is on strengthening the capacity of institutions – such as UNMA and the Ministry of Water Resources and the Environment, rather than working directly with grass roots communities. GIZ can potentially support Highway to identify other sources of financial support to enable the expansion of the identified activities as well as to facilitate partnerships, in particular with local NGOs to support the uptake and user of forecasts and warnings to save lives and livelihoods in the East African Community.
- **The Trans-African HydroMeteorological Observatory (TAHMO):** TAHMO aims to develop a vast network of weather stations across Africa. Current and historic weather data is important for agricultural, climate monitoring, and many hydro-meteorological applications. TAHMO is very

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interested in supporting Highway by providing automatic reporting weather stations with no moving parts. They already have extensive station installations across East Africa, with stations operating in Uganda, Kenya, Tanzania, the Central African Republic, and soon to be installed in Zambia, Rwanda and Ethiopia. **TAHMO also leads a consortium of five companies** and not-for-profit organisations which are seeking to develop weather observation networks and weather information services in Uganda and other countries in East Africa, including Kenya and Tanzania. The consortium calls itself the Global Resilience Partnership. It has received funding from USAID, The Rockefeller Foundation and SIDA. Its members are: TAHMO, Earth Networks, Human Network International, Climate Change Adaptation Innovation (CHAI) and Centres for Lightning and Electromagnetics (ACLE). A good understanding of how this partnership will effectively collaborate with East African NMHSs is needed to ensure a win-win relationship for all stakeholders. Highway presents an opportunity for TAHMO to cultivate and enhance its relationship with NMHSs in the East African Community with a view to supporting the sustainability of the full value chain in the provision of weather and climate services – i.e. from installation of observations to the development and implementation of revenue sharing services – for the benefit of African communities.

- **Uganda Radio Network (URN):** URN supplies news, radio programming and journalism training to 93 radio stations across Uganda. It has the potential to disseminate forecasts and warnings, and in collaboration with UNMA, to train radio stations how to adequately disseminate forecasts to ensure end-user uptake and action. URN already has experience in training partner radio stations in response to specific client needs. Training is delivered by senior and experienced URN journalists and producers.
- **ActionAid:** ActionAid has project activities in both the slum areas of Kampala (Uganda), where it promotes livelihoods and measures to control the impact of flooding, and in Kalangala, where it is supporting a switch to alternative livelihoods to fishing. ActionAid also supports one of the two local radio stations, making it ideally placed to support and / or conduct community engagement activities, in particular for the proposed SWAP development project. It would be a good fit in terms of geographic and strategic focus and offers an opportunity to train grass roots communities to develop appropriate responses to severe weather warnings.
- **Oxfam:** Oxfam has a well-established presence in all three countries that share Lake Victoria, but the main focus of its project activities in Kenya and Uganda are away from the Lake's basin area. The Tanzanian country office has expressed interest in partnering with WMO to deliver Highway, and build on their programmes involving communities along the shore of Lake Victoria, in particular through user-engagement activities.
- **Kenya / Tanzania / Uganda National Network of Beach Management Units (BMUs):** BMUs are fishermen, fish traders and processors and other people who provide support services for the fishing industry in the Lake Victoria Region. The BMUs are linked to the Fisheries Department and have a specific remit to regulate fishing and implement fisheries policy on behalf of the government. The BMU system has been in existence for more than 20 years in Kenya, Tanzania and Uganda. In each country, the BMUs are organised into a national network and at a regional level into an East African network. There are 433 BMUs, but not all of them are active and operational.
- **Kenya Marine Fisheries Resources Institute (KEMFRI):** KEMFRI conducts research into the oceanography and environmental health of Lake Victoria. This includes the measurement of water temperatures and currents. In 2013, in a joint venture with KMD, KEMFRI anchored two buoys in the Kenyan sector of Lake Victoria to take real time water temperature readings and make meteorological observations, which unfortunately are no longer operational. KEMFRI also

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has two research institutes in Lake Victoria

- **Tanzania Fisheries Research Institute (TAFIRI):** TAFIRI aims to promote, conduct and manage fisheries research and consultancy for sustainable development of fisheries in Tanzania. It has a research centre on Lake Victoria in Mwanza.
- **Ministry of Agriculture Livestock and Fisheries:** The Ministry's Regional Office in Mwanza disseminates the Sengerema district daily forecast by SMS to about 100 people, including 47 ward councillors. It also posts TMA early warning messages on its website.
- **Surface and Marine Transport Regulatory Authority (SUMATRA):** Para-statal organisation charged with the regulation of marine and overland transport. Its responsibilities include marine safety and search and rescue. SUMATRA has offices in **Mwanza, Bukoba** and **Musoma**.
- **Tanzania Ports Authority (TPA):** TPA manages five main ports on Lake Victoria, namely, Mwanza, Bukoba, Kemono Bay, Musoma, and Nansio. TPA Port offices receive the Lake Victoria daily marine weather forecast from TMA and relay it by VHF radio to ships leaving the port. All registered ships and ferries in Tanzanian waters are required by law to have a functioning VHF two-way radio on board
- **Uganda National Fisheries Resources Research Institute (NaFIRRI):** NaFIRRI is based in Jinja and operated several research vessels on Lake Victoria. UNMA was exploring plans to install two currently unused water temperature monitoring devices on two of these ships
- **National Lake Rescue Institute (NLRI):** NLRI is a non-profit organization founded in 2002 that makes cheap lifejackets for fishermen, runs Zodiacs with outboard motors as search and rescue boats from a series of lifeboat stations
- **Lake Victoria Fisheries Organisation (LVFO):** LVFO is a specialized Institution of the EAC with the mandate to coordinate the management of the fisheries resources of Lake Victoria for sustainable development and utilization, and to spearhead aquaculture development in the Basin. The organization was established in 1994. The LVFO aims to foster cooperation amongst the member states, harmonize national measures for the sustainable utilization of the living resources of Lake Victoria and develop and adopt conservation and management measures.

**Part 9: Monitoring, Evaluation and Learning - 10% (Maximum 10 point score)**

Clearly describe the approach proposed for the monitoring and evaluation and learning aspects of the project. Clearly state what WISER outputs and indicators the project will contribute to. In particular, set out how progress against the project outcome and outputs will be captured and reported. Any specific studies and research around monitoring and evaluation aspects should be detailed. An outline of knowledge and learning materials that the project will produce should be included. **(maximum 1000 words)**

The Highway project will make use of the established Monitoring and Evaluation Process<sup>14</sup> used at the WMO as well as the Project Monitoring, Evaluation and Learning Guidance developed under WISER. This will ensure that the Highway Project extracts relevant information from ongoing activities for programmatic fine-tuning, reorientation and future planning during the implementation phase. This continuous Monitoring, Evaluation and Learning process would ensure that the project is aligned with the WISER programme results, milestones and targets, provide opportunities for lesson learning to improve decision making and project implementation as well as ensure project reporting in a systematic

<sup>14</sup> [https://www.wmo.int/pages/about/monitoring\\_evaluation\\_en.html](https://www.wmo.int/pages/about/monitoring_evaluation_en.html)

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manner.

The Programme Steering Committee will meet every 6 months to evaluate the progress and highlights of the project as outlined in the Log Frame and timeline of this project. Evaluation reports will be made available to all programme stakeholders and partners.

**Measuring project outcomes, outputs and impacts** - As described in Part 6 of the proposal and defined in the Project Logframe, the project will have a single aim for which a major impact has been defined as: *Increased use of weather information to improve resilience and reduce the loss of life and damage to property in the East African region.* This impact will be measured by two impact indicators:

- a) Number of people with improved resilience resulting from the use of EWS
- b) Value of avoided losses due to use of early warning information.

The project will have one major 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.* This will be measured by 3 outcome indicators:

1. Number of NMHSs accessing new/improved EWS for improved decision making
2. Number of households able to access/use new/improved EWS information
3. Number of government departments/ministries/institutions able to access/use new/improved EWS information.

As evident in the Logframe, for each indicator a measure has been proposed and a baseline established against which the measure can be compared and assessed. Based on the improvement measured against the baseline of each indicator, either a qualitative or quantitative assessment will be possible to make. The analysis of these indicator assessments will provide a means for measuring the overall project outcomes, outputs and impacts.

**Part 10: Economic and Financial Rationale/Value for Money - 10% (Maximum 10 point score)**

Clearly set out the economic (value for money) and financial rationale for investments in the project and proposals for demonstrating value for money during implementation **(maximum 1000 words)**

Early warning systems have low costs and high benefits, with the latter arising from reduced fatalities and injuries (non-market effects) and reduced losses and economic costs (market effects). A review of the socio-economic benefits of EWS has found that these interventions have high benefit to cost ratios, with values of ~5:1 being typical, though these do not include lake EWS. An indicative analysis of the current impacts on the lake, versus the costs of implementing Highway, indicates that the project should demonstrate positive benefit to cost ratios and low input costs to outputs – high return on investment.

The project will address value for money issues in line with the WISER VfM/SEB framework and guidance, based around the Economy, Efficiency and Effectiveness (3 Es approach). This will be addressed by (a) minimising costs through the use of cost benchmarking (b) understanding the socio-economic benefits (SEB) and maximising returns for beneficiaries (c) promoting the transformational benefits of the intervention at a policy/institutional level transformational analysis, and (d) ensuring

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that VFM considerations are reflected in the logframe and M&E processes.

Cost benchmarking involves exploring the unit costs for a given input, output or outcome, with the aim of minimising costs required to achieve each stage. During the inception stage the project will develop an overall cost benchmarking approach for the project including inputs costs and costs per output and outcome. Input costs will be minimised through:

- *Ensuring Effective Procurement approaches:* Overhead costs will be minimised through direct contracting in region where appropriate for the programme. Competitive bidding and procurement will be used as standard for contracts according to WMO procedures and agreed modalities with the Fund Manager/DFID;
- *Unit costs* (staff, service provider and equipment costs) will be reviewed to ensure that they are consistent with expected pricing benchmarks. The data will be collated and provided to DFID to assist with the design and monitoring of other WISER projects and similar DFID met services interventions. The precise type of data that will be tracked and collated will be agreed during the inception stage and once work/procurement plans are finalised;
- *Leveraging existing platforms:* Where possible, existing platforms will be used where appropriate for the purposes of integration and systems development. These often existing, free access platforms or data sets which will allow the programme to leverage existing capacity and resources into the regional mechanism. The programme will document the use of such third party platforms to demonstrate the added value incorporated into systems design and development.

In addition, benchmarking efficiency and effectiveness will be tracked through work on socio-economic benefits and transformational impact. These aspects will primarily be addressed by undertaking studies of the socio-economic benefits of enhanced EWS (both in terms of avoided loss of life/injury and wider economic benefits) as well as the transformational benefits of a regional platform.

This study will create a quantitative and qualitative baseline for current climate impacts and assess the potential socio-economic benefits associated with use of enhanced EWS and weather services from a risk reduction perspective. The latter will include some analysis of the information chain between producers and end-users and the losses (i.e. the drop off in the communication and response). This is important in looking at where to invest along the weather value chain, i.e. whether more focus is needed on forecast reliability, communication to end-users, or capacity building and training to ensure they use the information and reduce risks through informed decision making. The study will take advantage of user engagement activities to investigate the value of information directly with specific user groups (e.g. ferry operators). The SEB study will also assess the extent to which innovations and new products developed (resulting in more specific risk-oriented modelling and longer term warning) improve socio-economic outcomes. Ex-post monitoring will be undertaken to look at the actual benefits realised as a result of the intervention.

The SEB study will be used to inform the work on transformational impact and to build the business case for regional integration. Currently, it seems that there will be some political economy challenges involved in persuading national meteorological services and related institutional bodies to engage pro-actively on a regional EWS mechanism. As a result, a clear business case will need to be developed, including an analysis of the costs and benefits associated with such an effort. The project will therefore review and develop the financial and economic case for regional integration of EWS in the LV region. This will include an

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assessment of potential efficiency gains (reductions in cost from sharing of data, platforms and resources), and the potential financial benefits over time (opportunity for improved revenue streams and appropriate business models). It will also incorporate insights into the potential socio-economic gains associated with improved outcomes for users and lake communities (see SEB study) in so far as these have implications for budget institutions (e.g. disaster response, social protection). This study will be used to underpin the initial agreement of institutional mandates, and to generate political support for the integration process and mechanism development as the project progresses.

This study (together with a review of progress towards regional integration) will form the basis of a transformation case study, which will also include a review of policy influencing, private sector mobilisation and wider met services institutional development within the research and academic community.

VFM issues around effectiveness are captured at impact and outcome level in the logframe, with a particular focus on user reach, leverage of additional resources, and transformational impact. Further cost effectiveness analysis (e.g. cost per outcome) may be undertaken where appropriate.

**Part 11: Project Risks – Not scored for Information Only**

This should include a summary risk table, including proposed mitigation if possible.

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<b>Risk No.</b>	<b>Description</b>	<b>Likelihood</b>	<b>Severity</b>	<b>Mitigation</b>
Output 1: Established, effective institutional framework for an Early Warning System for the East African Region	The political and security situation remains stable allowing community-level actions to be carried out. EA countries are willing to collaborate to share information in order to develop EWS for the region. Users willing to share their needs and provide continued feedback Mechanisms provided for feedback and comments will be used by all relevant parties	Medium	Medium	Improving communication tools with end users, additional meetings
Output 2 Improved access to all operational data sources to support the generation and maintenance of Early Warning Services for the East African Region	Different data sources can be combined to enhance the data network and sufficient hardware/software can be added to make this accessible. TAHMO (and others) willing to share data.	Low	Medium	Pre engagement to secure collaboration. WMO and EAC will encourage participating NMHSs to share data
Output 3 Strengthened integration between producers and users to develop innovative, accurate tailor-made EWS products through co-production for the East African region	Data from output 2 available, including additional data from field campaign. Experts available and able to convert tools for this region and able to validate the benefits. MSc/PhD students interested in topics of this project and able to complete studies	Low	Medium	WMO has a large pool of experts to be used Using existing capacity of one of the three main NMHSs
Output 4 Improved methods and strengthened capacity for communication and	Training sessions can be held and material provided to all the sectors where capacity needs to be built. Users will have enough	Low	Medium	WMO could provide additional support for training Pre engagement to secure



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promoting understanding and use of EWS products with relevant producers, technicians, forecasters intermediaries and users in a in the East African region	confidence/trust to use the new EWS tools. SMS networks and radio channels available to disseminate EWS			collaboration
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