User needs for weather and climate services in Ghana

The African SWIFT project workshop *"How to support users' understanding and use of climate and weather services in Ghana*" took place in Accra on 8th – 9th November 2018. The workshop was the first in a series of national user need workshops to be held in SWIFT partner countries across Africa. It brought together over 35 practitioners, forecasters, academics, and decision makers from Ministries, National Meteorological and Hydrological Services (NMHSs), research institutions and non-governmental organisations. The workshop focused on:

- Identifying key meteorological hazards for different sectors.
- Exploring the potential for Impact Based Forecasting in Ghana.
- User-evaluation of current forecast provision with national and regional decision makers.
- Exploring how the communication of forecast products and tools could be improved.

Key lessons from the workshop can be grouped under five themes: Impact Based Forecasting, accessibility, communication, public and private collaboration and scientific development.

A. Impact Based Forecasting

Impact based forecasting combinesinformation about the severity of weather impacts with the likelihood of these impacts occuring to provide a measure of risk. This approach is recommended by the WMO. The UK Met Office's template for the development of Impact Based Forecasting systems is increasingly being adopted around the world.

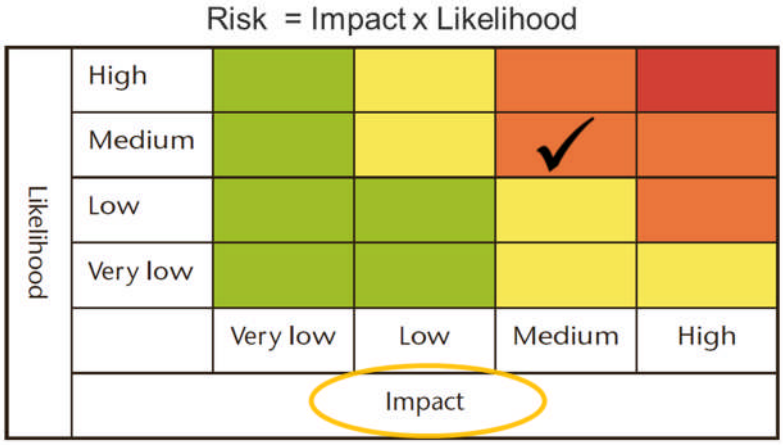

Figure 1. Example of impact based forecast produced using the Met Office template, which combines information about impact severity with likelihood of impact occurring.

- Exercises exploring the potential demand for Impact Based Forecasting in Ghana identified tropical rainstorms and droughts as the two high impact events that can severely affect socio-economic activities in terms of cost, people affected, environmental impact and reputational damage for key sectors (water, energy, agriculture, disaster risk management). The high

consensus across sectors regarding the impacts of tropical rainstorms, indicates that the development of Impact Based Forecasts for these events would be particularly useful.

- Forecasts and warnings that emphasise the consequences of weather events rather than meteorological conditions alone were identified as important, especially in public services. The need to better link forecasts to recommended actions was emphasised for both sector specific decision making and wider communication with the public.

B. Accessibility

- Forecasts are not currently provided in local languages. Providing translations and identifying platforms for dissemination (e.g. local radio broadcasts) will allow forecasts to reach a wider public audience.
- Limits on broadcasting time mean that forecasts are often short and cut off by other scheduled programmes before they have been completed. Increasing broadcasting time to enable forecasters to provide explanations about the likely local impacts of severe weather events could increase awareness of severe weather warnings. This may be achieved through more sponsorship to increase airtime for forecast broadcast.
- Smartphone ownership is increasing in Ghana. Weather apps therefore represent a new platform for communicating weather information. VODACOM Ghana has developed – and are currently test - an app to communicate flooding events. Such applications could be extended to a wider range of weather events and impacts. For those with basic mobile phones, SMS text messages could represent another potential means of forecast dissemination. Pathways to financing these initiatives need further exploration.

C. Communication

- False alarms of high impact weather that does not materialise into impacts and difficulties in communicating forecast updates (e.g. failure to inform users and the general public when warnings are no longer in place), were identified as barriers to trust in weather information. This is consistent with work in other countries, which shows that developing effective strategies for communicating forecast uncertainty are important for maintaining trust. In a Ghanaian context the communication of spatial uncertainty was identified as a particular challenge (e.g. where not all locations within an area covered by a storm warning are directly affected by the event). Likewise, effective strategies for communicating uncertainty regarding the onset and cessation dates for the rainy season, and why these change across lead times, were identified as being of particular importance to farmers in northern Ghana in particular.
- Current text-based forecasts contain some which are difficult for non-specialists to understand elements (e.g. scientific terminology, tercile probabilities). A desire for more forecast visualisations (e.g. for the daily forecast) was expressed by a number of participants. This

underscores a need to develop and directly test communication formats with Ghanaian users to ensure that they are both appropriately understood and decision relevant.

- Wherever possible forecasts should be location specific, especially during extreme weather events like heavy rainfall and strong winds. This would enable individuals and communities to be better prepared for impacts. For flooding, greater location specificity could be achieved by integrating a hydrodynamic model with forecasts to estimate the extent of flooding.

D. Public and private sector collaboration

- Challenges in disseminating forecast information through national media channels (e.g. forecasts being pre-empted by other broadcasts), were highlighted by representatives of the Ghana Meteorological Agency (GMet). This demonstrates a need for reinforced collaboration between GMet, the Ministry of Communication, National Broadcasters and the Network of Community and Private Radio Stations, to raise awareness on the importance of weather and climate information to the public.
- Users from the health and disaster risk management sectors highlighted a need for forecasts to support epidemic preparedness and response (e.g. seasonal forecast to anticipate when and where vector borne diseases may occur). Stronger collaborations between GMet and the Ministry of Health are needed to better understand the interactions between weather and infectious disease, and work towards developing disease impact indices.
- To improve the provision of weather information services to the public and achieve Sustainable Development Goals, climate services need to be mainstreamed into the National Development agenda through GMet collaborating more closely with the Environmental Protection Agency.
- The provision of forecast services to the private sector by GMet was identified as an area for development and potential income generation. GMet should identify the main service users in the private sector and approach them directly to market their services. Such clients include users in the oil and gas industries, large-scale agro industrial companies, insurance, aviation and shipping.

E. Scientific Development

- There is a need to strengthen the capacity of GMet personnel to handle more complex scientific tasks required for impact based forecasting. This capacity building should include learning to code in different programming languages, training on the use of high performance computing (HPC) facilities, and greater provision of HPC to NMSs from international donors.
- Forecasters should combine traditional and scientific knowledge to improve forecasts information. For example, local community stakeholders and climate scientists from NMHSs should come together before the onset of the rainy season to use local knowledge to contextualise forecasts and create appropriate suite of adaptation measures for the local communities.

- Capacity building of development officers in the rural areas will increase their ability to interpret forecasts and deliver the right information to farmers. For this to be successful, there is need for reinforced collaboration between GMet and the Ministry of Food and Agriculture to design the training needs of the development officers.

Next steps for addressing the weather and climate needs for Ghana users

- Ghanaian decision makers who participated in this event expressed support for warnings that highlight the potential impacts of severe weather and a clear interest in Impact Based Forecasting approaches for tropical rainstorms. Further exploration of this by GMet and Met Office will be supported through SWIFT.
- Feedback on current public facing short-term and seasonal forecast communications indicates that users find some elements challenging to understand and relate to decisions. A preference for more visual communications was also expressed. SWIFT will draw on this feedback in developing and testing forecast communication formats with users in Ghana.
- The data captured during this national workshop will directly inform the development of user-needs surveys to be conducted with district and local scale decision makers in Northern Ghana.
- The outputs of this workshop will inform training exercises around user needs at the July 2019 Summer School to be hosted at KNUST, building capacity amongst early career scientists to elicit and address the needs of forecast users.

African SWIFT aims to deliver a step change in African weather forecasting capability from hourly to seasonal timescales, and to build research capability to continue forecasting improvements in Africa. The teams work with forecast users across sectors to tailor the delivery of weather forecasts to improve the response to high-impact and extreme weather events, and to increase resilience through the integration of weather prediction into strategies for response to climate change. African SWIFT is funded by UK Research and Innovation Global Challenges Research Fund.