MHEWS: Multi-hazard Early Warning System for Coastal Tanzania

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Aim of the project

The initial project aimed to co-develop and implement a five-day weather forecast that included a **Multi-hazard Early Warning System** (MHEWS) for Tanzania's coastal communities, particularly those engaged in maritime and fishery activities. Subsequent to the project, the Tanzanian Meteorological Agency (TMA) has successfully operationalised the service as one of its standard forecasting products. As of March 2019, TMA produces the five-day MHEWS forecast on a regular basis.

Dates

2016–2018

Countries

Tanzania

Alama za Athari			
Joto Kali:		Maporomoko ya Ardhi:	
Mvua Kubwa:		Upepo Mkali:	
Mafuriko:		Mawimbi Makubwa:	

New pictorial symbols were developed based on local needs. For instance, the symbol for 'strong winds' (*upepo mkali* in Swahili) consists of two bent-over palm trees. *(Source: Tanzania Meteorological Agency five-day forecast, 14 August 2018)*

Aim of co-production:

TMA and the Met Office collaborated to bring together different stakeholders with different aims during the exploration, development and production of the MHEWS.

- **Exploratory phase**: TMA's aim was to build awareness around the agency's general mandate, mission and services. The World Meteorological Organisation's Strategy for Service Delivery and its Implementation Plan was the approach adopted. This approach builds partnerships and common ground between the meteorological service and intermediary stakeholders. It also aligns with the Global Framework for Climate Services (GFCS), which ensures weather information reaches the most vulnerable people affected in Tanzania.
- **Design phase**: The aim of co-production shifted to ensuring that the information in the new forecast, and the way information is presented, would be accessible and relevant to targeted end-users.
- **Production phase (ongoing)**: The aim has shifted to improving dissemination of the new forecast. New co-production skills have also been employed to develop accessible and relevant sectoral advisories based on the seasonal forecast.

Context:

The MHEWS project originated from a recognition by TMA that they should take action in response to the Sendai agreement on Disaster Risk Reduction. A project between the Met Office and TMA under the WISER programme was funded to address the Sendai framework and the local need of vulnerable fisheries along the coasts and resulted in the MHEWS.

Who was involved and what were their roles?

The TMA is the producer of the MHEWS service. In collaboration with the Met Office, TMA sought to build partnerships and common ground with national ministries, such as the Disaster Management Department (in the Prime Minister's Office), the Ministry of Agriculture, Livestock and Fisheries, and the Ministry of Transport, which oversees aeronautical policy and regulations. Raising awareness of WCIS in Tanzania and the TMA's mandate was key to establishing common ground with these institutions. These ministries provided political legitimacy for the proposed sectoral, geographic, and temporal focus of the TMA's forecasting services and agreed to support the dissemination of the MHEWS.

During the exploration and development phase, the TMA and the Met Office engaged with a wider group of users and intermediaries through workshops. Users included fishermen, seaweed farmers and traders along the coast, but also several radio stations, which were targeted as the main intermediaries for communicating daily weather forecasts to coastal areas. Users contributed their knowledge on how coastal fishing, farming and trading groups understand and interact with extreme weather events and weather information. In collaboration with a professional communications officer, they also contributed to designing new pictorial symbols to represent hazards. An early version of MHEWS was test-run with a sample of end-users. The preceding co-production assisted in shifting the early warning system from a weather forecast to an impact-based forecast.

Further collaboration between the TMA and the Met Office integrated the MHEWS into the TMA's forecasting services through Standard Operating Procedures (SOPs).

What was co-produced?

- **A multi-hazard early warning system for coastal affected people engaged in fishing, farming and trading**: The MHEWS consists of a five-day forecast of hazards, including high temperatures, intense rainfall, flooding, strong winds, high waves and landslides. It presents the information in terms of pictorial symbols and colour-coded impact-based warnings rather than metric values, such as knots for wind and millimetres for rainfall.
- **Symbols for hazards**: Users identified the most important hazards and developed easily understood symbols for representing the hazards pictorially. For instance, a flood warning (*mafuriko* in Swahili) is represented by a partially submerged house and strong winds warning. *Upepo mkali* in Swahili is represented by palm trees that are bent over (see image).

Benefits of the co-production approach

- Multi-stakeholder workshops to co-develop MHEWS increased the TMA's knowledge of what end-users want from the service and how users would like to receive the information so that it can be accessed and used. The workshops also increased TMA's facilitation skills to host multi-stakeholder discussions.
- High-level partnership-building meetings with national ministries raised the awareness of weather and climate information services and the value of the TMA. It also supported political buy-in and support from national ministries to communicate the MHEWS.
- Including radio stations in multi-stakeholder workshops, and hosting dedicated training session for journalists alongside these workshops, increased the capacity of radio stations to report on weather forecasts, particularly impact-based forecasts.
- Hosting a multi-stakeholder workshop alongside the National Climate Outlook Forums increased the capacity of sectoral experts to interpret weather forecasts in terms of sectoral impacts.
- Employing co-production, in general, contributed to the TMA's implementation of the GFCS, and expanded the network of intermediaries that receive the MHEWS and the channels through which the TMA and intermediaries can reach end-users.

How was co-production done?

Different stakeholders were engaged in different ways to build partnerships, and explore and develop a MHEWS. The MHEWS project used the World Meteorological Organisation's Service Delivery and Implementation Plan as a framework, based on global best practice.

Identify key actors and build partnerships

Actors and partnerships were identified over the course of many years of implementing of the GFCS. Through high-level meetings and presentations, the noted stakeholders were engaged to raise general awareness on the TMA's services and mandate.

Co-explore need; co-develop solutions

The TMA hosted several multi-stakeholder workshops in partnership with the Met Office. These workshops brought together users, government, NGOs, and radio stations. The workshops:

- identified the most important hazards;
- developed better ways to communicate hazards to users;
- improved the capacity of the TMA and disseminators to communicate the MHEWS; and
- tested and reviewed early drafts of the MHEWS.

Between workshops, the TMA and the Met Office worked together closely to develop Standard Operating Procedures for producing the MHEWS.

Co-deliver solutions

The TMA is solely responsible for producing the MHEWS, but collaborates with intermediaries to improve the dissemination of the forecast. Twice a year, in February and September, the TMA presents the seasonal forecasts at the National Climate Outlook Forums. Most notably, the TMA has used these as forums to promote impact-based forecasting as well as co-production as a methodology. Recently, the TMA has co-produced advisory statements with sectoral experts and extension officers based on their expertise and the seasonal forecast.

Evaluate

To date, no co-production has been employed to evaluate the MHEWS.

Lessons to learn from:

- **Framework for a clear approach:** The development and implementation of a National Framework for Climate Services provides a clear process for national meteorological services through which to expand their capacity to deliver new and improved climate services, utilising co-production approaches.
- **Build capacity:** The process of building institutional capacity to operationalise new and improved weather and climate information services, particularly impact-based forecasting, can take from several years to decades. Utilising co-production approaches not only supports individual project delivery, but wider institution building.
- **Assess the feasibility of co-prodution**: Prior to engaging in co-production processes for a pilot project, a careful assessment needs to be done by the NMHS and core partners to ensure that there is sufficient resources for the NMHS to operationalise the project in a sustained manner. Otherwise, investment in co-production processes, which can be costly, could have very limited impact after the project.

REFERENCES

World Meteorological Organisation. (2014) *Implementation plan of the global framework for climate services*. Switzerland: WMO. (http://www.wmo.int/gfcs/sites/default/files/implementation-plan//GFCS-IMPLEMENTATION-PLAN-FINAL-14211_en.pdf).

World Meteorological Organisation. (2018) *Step-by-step guidelines for establishing a national framework for climate services*. Switzerland: WMO. (https://library.wmo.int/doc_num.php?explnum_id=4335).

World Meteorological Organisation. (2015) *WMO Guidelines on Multi-hazard Impact-based Forecast and Warning Services*. Switzerland:WMO. (https://www.wmo.int/pages/prog/www/DPFS/Meetings/ET-OWFPS_Montreal2016/documents/WMOGuidelinesonMulti-hazardImpact-basedForecastandWarningServices.pdf)

World Meteorological Organisation.(2014) *The WMO Strategy for Service Delivery and Its Implementation Plan*. Switzerland: WMO. – (https://www.wmo.int/pages/prog/amp/pwsp/documents/WMO-SSD-1129_en.pdf)