Partnership between climate and health officials boosts Tanzania's anti-malaria effort

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The ENACTS project has helped climate and health professionals in Tanzania to join forces – and streamline efforts to combat the deadly malaria parasite. This new approach is the result of intensive dialogue between agencies.

Introduction

In recent years, Tanzania has ramped up its efforts to make its weather and climate information more open and accessible – and so support national development. Chief among these efforts is Enhancing National Climate Services (ENACTS)[2], an initiative to "create a user-focused climate service" for decision-makers.

One of ENACTS' principal services is to depict climate information on online maps – called 'maprooms'. ENACTS presents temperature and rainfall data and allows users to zoom in on their geographic area and timeframe of interest.

The maprooms are aimed at making climate information more useful for professionals across economic sectors and to support policy decisions.
(see http://iridl.ldeo.columbia.edu/maproom/index.html and box, below).

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[2] https://iri.columbia.edu/resources/enacts/

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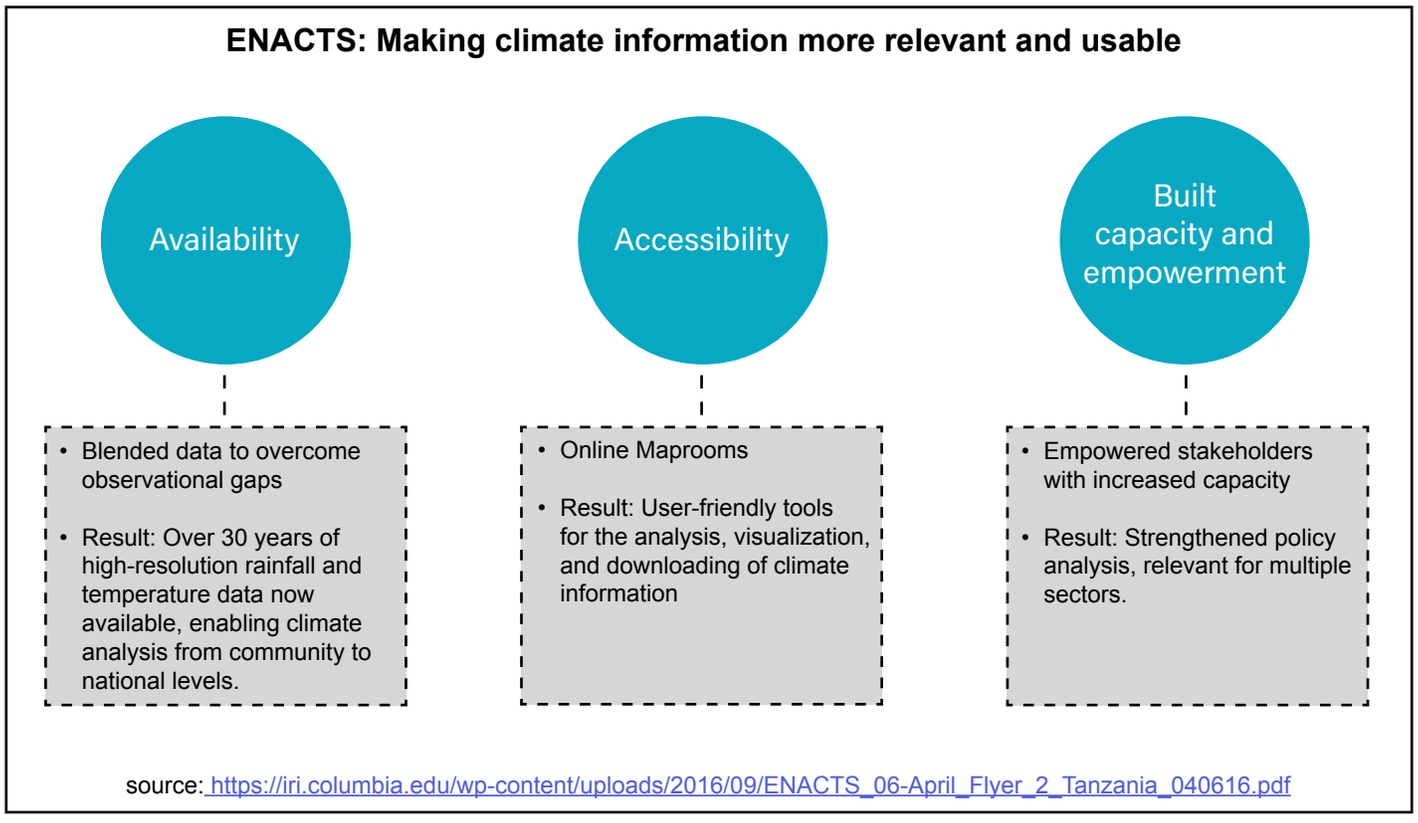


ENACTS now operates in 13 African countries. It is led by National Meteorological and Hydrological Services and Regional Climate Centres with the support of the International Research Institute for Climate and Society at Columbia University and others.[3]

Filling gaps to provide the best possible climate data

Core to ENACTS' mission is the task of joining up global, national and local data. Nationally, meteorological agencies depend on weather stations to collect and report data, but sometimes historical records (the regular time series data needed to give a complete understanding of climate trends) have gaps. Or, data-collecting stations themselves can be thin on the ground due to a lack of resources.

Global meteorological services can provide more seamless data (from satellites or models) over time, but their data is 'coarser' in resolution and not always well ground-truthed. ENACTS creates a bridge by combining the best available global and local data to create high quality information for Tanzania and other ENACTS countries.[4]

In Tanzania, ENACTS is led by the Tanzania Meteorological Agency (TMA). In the early 2010s, ENACTS created a basic 'maproom' to showcase climate data for Tanzania according to district and locality, and combining the best available rainfall and temperature data.[5] Early efforts focused on communicating useful meteorological data to farmers, to inform planting and harvesting decisions.

Recognising the need for further development of ENACTS in Tanzania (and other countries in East Africa), since 2016, the WISER programme, funded by the UK Government's Department for International Development, has provided one of the funding streams to ENACTS-Tanzania.

[3] Thomson, M., A. Owusu, S. Thawer (forthcoming, 2019). 'Developing climate services for malaria surveillance and control in Tanzania' in WISER co-production manual.
[4] Thomson, M. et al (forthcoming, 2019).
[5] http://maproom.meteo.go.tz/maproom/

Where climate and health professionals meet: learning to speak each other's language

Climate information also has the potential to be of great use to public health professionals, because temperature and rainfall conditions affect the emergence and spread of diseases. However, as described by ENACTS scientists, there tends to be an 'impasse' or lack of mutual appreciation and collaboration between meteorologists and health professionals, unless active efforts are made to bring them together: "a comparative lack of demand from the health sector for climate services coupled with a lack of supply of relevant, actionable information (as there is often no clear demand)" say Dinku et al, 2014, in 'Leveraging climate information for effective malaria control in Tanzania'.[6]

In Tanzania, the mismatch was even more subtle, says Dr Madeleine Thomson, who has been involved with ENACTS since its inception: "A community of climate and health professionals had evolved in Tanzania over a number of years, fostered by several projects. However, this community tended to focus on longer-term climate change timescales: how temperature and rainfall are shifting over decades. As a consequence, this community had limited knowledge on how to incorporate weather and climate information in timeframes that would respond to operational, public health decisions."[7]

To address this gap, ENACTS-Tanzania organised training activities for health professionals and meteorological agency staff, to encourage both sides to meet the other's needs better:

- Meteorological agency staff trained health staff on how climate variations and changes occur at all timescales; they emphasised the importance of quality data and the value of ground observations.
- Health professionals explained what kinds of operational decisions they need to make.
- The groups explored how to connect climate information requests to the time scales and geographic scope of public health decisions.

ENACTS-Tanzania especially targeted participation by the National Malaria Control Programme. Climate and weather affect the occurrence and spread of malaria in two major ways: temperature affects the survival of the malaria parasite Plasmodium; while rainy conditions support larval growth of the mosquitos that carry it.

"When workshops were specific to malaria, the discussions were much more targeted to climate information that could deliver practical outcomes–such as historical time series and seasonal forecasts," said Dr Thomson.

"The process of co-defining needs and co-producing solutions was substantially focused on the needs of the malaria community and the capacity of TMA to provide services that they could use routinely. The International Research Institute for Climate and Society at Columbia University played an in-between role, helping to identify needs with National Malaria Control Programme and helping to build capacity at the TMA. Over time, the latter two agencies became more aware of each other's needs and capabilities and more confident in the relationship."[8]

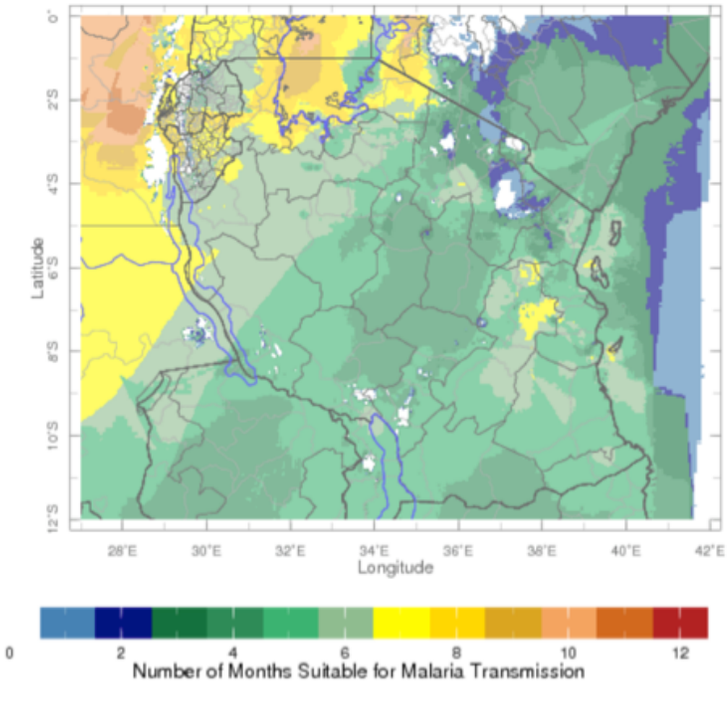
[6] https://www.researchgate.net/publication/260229963_Leveraging_the_Climate_for_Improved_Malaria_Control_in_Tanzania
[7] Thomson, M. (forthcoming, 2019). Case study in WISER co-production manual.
[8] Ibid.

A maproom to show when Tanzanian districts are most at risk of malaria

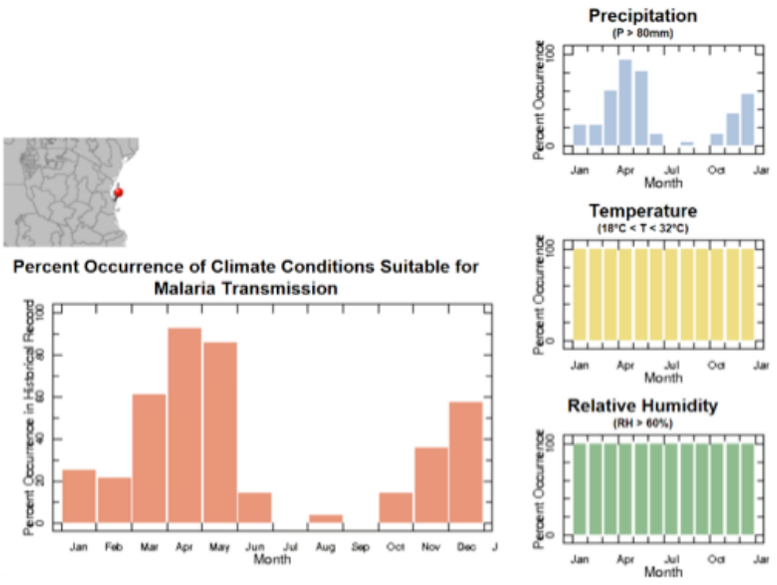
One of the major achievements was the creation of an online maproom that depicts when conditions are ripe for malaria to occur and spread. This maproom can be searched nationally, or for a region, district or single geographic location. The data visualisations can give public health professionals an idea of when and where there is high risk of a malaria epidemic – so that they can mobilise resources accordingly.

The maprooms present three different indices that reflect the risk of malaria:

1. **Seasonal Climatic Suitability for Malaria Transmission:** “Conditions are suitable for malaria when rainfall accumulation is greater than 80 mm, mean temperature is between 18°C and 32°C, and relative humidity is greater than 60%. All of these factors influence mosquito development as well as development of the Plasmodium [malaria] parasite itself within the mosquito vectors” (http://maproom.meteo.go.tz/maproom/Health/CSMT/index.html?resolution=.0375)
2. **Measures of vegetation:** “In some semi-arid regions of eastern Africa, precipitation has been found to have a 2-3 month lagged correlation with malaria incidence. Due to the lack of station data and because of the lagged nature of precipitation yielding lagged plant growth, vegetation indices have been used as a proxy measure to forecast malaria” (http://maproom.meteo.go.tz/maproom/Health/Malaria/NDVI/index.html?resolution=.0375)
3. **The ‘WASP index’:** “This plot shows the time series of 12-month Weighted Anomaly Standardization Precipitation (WASP) index relative to a baseline period. The purpose of this tool is to provide a simple visual means of relating averaged precipitation to a reference period of interest. Precipitation, especially in dry lands (warm semi-arid and desert fringe areas), is one of the factors responsible for creating the conditions which lead to the formation of sufficient surface water and moisture for mosquito breeding sites.” (http://maproom.meteo.go.tz/maproom/Health/WASP/index.html)



The maproom screenshot, shows when – for different areas of Tanzania - rainfall accumulation is greater than 80 mm, mean temperature is between 18°C and 32°C, and relative humidity is greater than 60%: these conditions, combined, promote the incidence and spread of malaria.



This image shows the specific months during which these conditions present a high risk of malaria in the vicinity of the capital, Dar Es Salaam. Users can click on any specific geo-location on the map of Tanzania to obtain an equivalent read-out for that location.[9]

Maprooms help decision-makers to do things differently

The ENACTS Maproom services were integrated into Tanzania's malaria control programme planning – a major step forward. In September 2015, the World Meteorological Organization issued a global alert forecasting an El Niño event. El Niños are associated with heavier-than-normal rainfall in parts of Tanzania, which in turn increases the likelihood of malaria transmission through mosquitos. Following the alert, Tanzania's National Malaria Control Programme and partners established a task force to plan for possible health responses.

With the help of historical data from the ENACTS Maprooms, they found that the north-west third of Tanzania (lake zone) was likely to be most affected by rainfall and/or temperature changes during the El Niño. The task force identified the possibility of an abnormal increase in malaria cases in this area in January-February 2016.

Based on this information, the National Malaria Control Programme ordered buffer stocks to be sent to the medical stores of the region and undertook a communication campaign to alert the local population to the increased malaria risk. While it was not possible to ascertain the impact of the actions in terms of changes in illness and mortality, the National Malaria Control Programme reported that the process was useful in terms of streamlining their preparations for the season.

More broadly, the National Malaria Control Programme incorporated climate information into its National Malaria Transmission Surveillance System. "Climate information, together with parasitological and entomological variables, is expected to inform malaria control partners about the intensity of transmission and its variations in space and time," said Dr Thomson. "They can then use this information to select appropriate disease control packages to improve efficiency, effectiveness, equity and economy of interventions."

Now the focus is on long term sustainability of the ENACTS programme in Tanzania: both in terms of the capacity of meteorologists – and the deeper strengthening of relationships between the climate and health professionals. For instance, a Memorandum of Understanding between the Meteorological Agency and Health Department is now being developed. New challenges have however emerged in recent years. In particular the data sharing policies of the Tanzanian Government have become more restrictive, countering drive for a more open approach by the TMA.

[9] Tanzania health maproom (landing page): http://maproom.meteo.go.tz/maproom/Health/

UK government support through WISER has been important as part of a multi-donor funding stream to ENACTS-Tanzania. One of WISER's most significant contributions has been to strengthen the IGAD Climate Prediction and Application Centre (ICPAC, a regional centre of excellence based in Nairobi) to provide ongoing support to the TMA. This includes bolstering ICPAC's capacity as a knowledge and learning hub for the whole east Africa region, with improved IT/computing capacity and increased staff skills in consulting the users of climate services about their information needs.[10] Technical support to the Government of Tanzania from Columbia University will be replaced by technical support from ICPAC as part of this investment in East Africa region.

Where could the TMA go with climate service provision in the future? "Mechanisms for engagement [with climate service users] have been well received; however, we need to move from business as usual scenario and be more proactive and innovative on how we engage with our users," said spokesman Ladislaus Chang'a.[11] "A user engagement strategy is the core of our work and the work is more user driven. We are broadening engagement on the different sectors. [Now] we are looking for user champions and stakeholder champions". Following the successful application of climate information to the agriculture and health sectors, he added, there could next be a role for marine and fishery champions to use and apply climate information in their work.

[10] https://www.metoffice.gov.uk/about-us/what/working-with-other-organisations/international/projects/wiser/icpac-support

[11] Quoted in the workshop report of the technical exchange on climate maprooms: https://www.climatelinks.org/sites/default/files/asset/document/2017_CSRD_Technical-_Exchange-National-Climate-Maprooms.pdf