United Nations
Educational, Scientific and
Cultural Organization

**CALL FOR CONSULTANCY**

**Development and/ or Strengthening Early Warning Systems in Southern Africa**

Consultant Firm/Consultant Contract

*Duration: 21* ***November 2020 – 20 April 2021***

## 1. Project Background

Early warning systems (EWS) have received increasing international attention and are now recognized as a critical component of national disaster risk management arrangements. This in turn enables saving lives and reduces losses from disastrous hazard events such as floods and droughts. The importance of EWS for disaster risk reduction has been repeatedly highlighted in major multilateral environmental agreements and action plans such as under the United Nations (UN) Framework Convention on Climate Change (UNFCCC), the UN Convention to Combat Desertification (UNCCD), the United Nations International Strategy for Disaster Reduction (UNISDR) and the 2015 Paris Agreement.

The Sub-Saharan countries have been lagging behind in the development of operational EWS at the national level, yet they are severely affected by El Niño and La Niña induced droughts and floods resulting in the loss of lives and properties, affecting also severely their already stressed economies. As climate change is increasing the frequency of water related hazards, the need for EWS becomes even more pressing.

Recent climate related disasters have been on the increase particularly in Southern Africa, exposing the government agencies' readiness to respond to these disasters. The natural disasters are expected to further increase in the following decades, since it is expected that climate change will increase the frequency and intensity of cyclones in the region.

UNESCO has been responding to the problem by assisting the national governments in member countries to develop Flood and Drought Monitors. Two flood and drought monitors have been developed for Mozambique and Zimbabwe that need further development and improvement to ensure effective monitoring and early warning of floods and droughts. Additional efforts are also required to set up adequate monitoring and early warning capacities in other Southern Africa Countries with the aim of developing national operational early warning systems that contribute to a regional coherent system. Particularly, novel forecasting techniques are required to provide foresight to extreme meteorological and hydrological events that are expected in the coming days and weeks, to allow for effective early warning. UNESCO therefor seeks to engage a consultancy to improve the developed monitors for Mozambique and Zimbabwe and develop a new monitor for Namibia.

The proposed flood and drought early warning system will be able to visualize precipitation, streamflow, and other meteorological data from historical, near-real-time, and forecast datasets. The monitor will allow to identify extreme rainfall and peak streamflow for floods, and low precipitation, soil moisture and streamflow conditions for drought, enabling authorities and local communities to closely follow and proactively act on potential hazards.

## 2. Specific Tasks

Under the overall authority of the Director of UNESCO Regional Office for Southern Africa and the direct supervision of the Prgramme Specialist for the Natural Science Sector, UNESCO seeks to engage the services of consultant(s) to develop new national Early Warning Systems for Namibia to monitor and alert on current and forecasted flood and drought hazards as well as improving the already developed EWS for Mozambique and Zimbabwe.

More specifically the consultant(s) should conduct the following activities:

i. Update and calibrate/validate the two developed monitors for Zimbabwe and Mozambique using local data sets provided by the hydrometeorological agencies
ii. Presentation of seasonal drought forecasts (1-6 months) as well as short-term (7 days) meteorological and hydrological conditions as a continuous timeseries from current to near future, displaying the uncertainty around the forecast
iii. Inclusion of forecast data for hydro-meteorological variables as point time series, visualizing historical conditions as percentiles
iv. Open access to monitoring and early warning information online in near-real time and short and medium term forecasts for Zimbabwe, Mozambique, and Namibia

## 3. Deliverables:

**1. Update and validation of the developed monitors for Zimbabwe and Mozambique**

The Flood and Drought Monitors for Zimbabwe and Mozambique have been launched in November 2019 and February 2020 respectively. From these workshops, a need was identified to integrate the seasonal drought forecasts (1-6 months) as well as short-term forecasts as a continuous timeseries from current to near future, displaying the uncertainty around the forecast, as well as to represent historical conditions as percentiles on all variables, to identify the deviation from normal. The monitors also need to become available in near-real time and have open access.

A clear need was also identified to bring the two monitors in line with the observed data series, to become more consistent with observed climate. Therefore, a calibration and validation is needed to make the best use of the available meteorological and hydrological station data in these countries, to correct the biases in the meteorological remote sensing inputs and to calibrate the hydrological model. Additionally, validation of the Monitor is required to identify its monitoring and forecast skill over key areas for both drought and flood events.

This activity involves a dialogue with the relevant national stakeholders, facilitated by UNESCO, and should include a (virtual) training of the respective stakeholders on the system and the demonstration of the improvements made by calibration.

**Deliverable 01**: Update and validation progress report of the Mozambique and Zimbabwe flood monitors and online open access to the monitors.

**Deliverable 02**: Online training on the calibrated Monitors for Zimbabwe and Mozambique.

**2. Developing of new online flood and drought monitoring and early system for Namibia**

Develop a stand-alone online system for each country that allows visualization of meteorological and hydrological variables. The first step will include the development of a high-resolution streamflow routing for the Monitors based on the recently released WorldDEM DTM at 5 km spatial resolution. This includes:

a. Develop routing files (download data, process into required formats and extract for pilot region).
b. Implement routing code for pilot region and test (interpolate runoff fields for historic period, run through routing code; compare to observed streamflow where available).
c. Development of the other high-resolution components of the system: meteorological forcings and model parameters, hydrometeorological forecasts, land cover aspects and soil data.

d. Integrate into system – and develop a stand-alone online system for each country that allows visualization of meteorological and hydrological variables, including:
    - Precipitation (mm)
    - Minimum and Maximum Temperature (Degrees C),
    - Wind (m/s)
    - Streamflow (m3/s)
    - Standardized Precipitation Index (-)
    - Normalized Difference Vegetation Index (-)
    - Soil moisture (%)
    - Meteorological and hydrological forecasts
e. Update client image files for the pilot region and bring up to real-time.
f. Integrate visualization capacity of station observations by:
    - Determining publicly available data sets for the countries.
    - Including the available historical station data as an additional data layer in the online monitoring system

**Deliverable 03**: Report on the implementation of the flood and drought monitoring and forecasting system for Namibia and online open access to the monitor
The representatives from the metrological departments as well as national water authorities and academia in the country shall be trained on the platform. Hence an online training will be held for each of the countries, facilitated by UNESCO, through its Open Learning Platform (https://openlearning.unesco.org/ ). This consists of a set of recorded presentations, as well as a live webinar to engage participants directly.

**Deliverable 04**: Online training material and webinar.

## 4. Duration

The contract will run from 21 November 2020 – 20 April 2021

## 5. How to apply

Interested parties may submit a cover letter and CVs together with a brief proposal and the budget, methodology and approach for the assignment, and a profile of experts who shall undetake the assignment to vacancies.harare@unesco.org

**Closing date for applications: 13 November 2020**
**UNESCO DOES NOT CHARGE A FEE AT ANY STAGE OF THE RECRUITMENT PROCESS.**

**UNESCO IS A NON-SMOKING ORGANIZATION**

**PLEASE NOTE THAT ONLY PRE-SELECTED CANDIDATES WILL BE CONTACTED.**