**Summary for**

**Methodology of Localised Trigger Development**

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## 1. Introduction

Kasese district experience natural disasters such as floods, landslides. These hazards often happens after heavy rainfall events. However, data such as historical observed rainfall or river flows or river levels are quite limited or inaccessible.

Still an early warning system such as an IBF is necessary for Kasese district where local stakeholders can respond accordingly to their District Contingency Plan. This analysis aims to come up with a very simple threshold of a localised trigger for Kasese using available datasets and integrated to an IBF Portal for Kasese.

## 2. Methodology and results

### 2.1 Data availability

Measurement of rainfall data for Kasese District is freely available at <https://scg.zednet.co.za/>. In this data sources, the measurements are taken at 2 stations: Mutinda located a bit upstream of the River Mulyambuli, and Kalalama which is 2 km away toward downstream.



Figure 1 The two measurement stations in Kasese are marked with grey stars.

These stations observe live rainfall every 15 minutes and send the data to the portal. Rainfall measurements of these stations can be extracted from 15 December 2020. The data is recorded continuously and there is no gap or missing readings in between.

### 2.2 Threshold calculation

With this data, we extract two full years of data 2021 and 2022 for calculation. At each station daily cumulative rainfall can be summarised from 15-min interval rainfall. From this, it is simple to assess amount of rainfall throughout the years (see Figure 1 and 2).

Additionally, a few peaks of rainfall are visible in each station. For example highest peaks occurred around end of July, end of August 2021 and April 2022. It is feasible to choose a level of rainfall and set it as a simple threshold. different news and reports from various organisations have registered evidences of impacts of heavy rainfall on those dates.

With this combination, 60 mm for one-day rainfall can be argued as a reasonable threshold for a localised trigger in Kasese district.



Figure 2 Daily cumulative rainfall at Mutinda station in 2021 and 2022.



Figure 3 Daily cumulative rainfall at Kalalama station in 2021 and 2022.

### 2.3 Localised trigger set-up

For early warning, rainfall forecast is needed. Forecast data from European Centre for Medium Ranged Weather Forecast (ECMWF) is selected. The data is taken via Norwegian Meteorological Institute API (Met.no).

The forecast rainfall comes as gridded points covering the entire district. Each point contains forecast data up to 3 days ahead. An automated data process is set up to run this analysis on a daily basis. It is connected to the IBF Portal for Kasese. For each lead time, when forecasted rainfall at any of the points exceeds the above-defined threshold, the system shall we triggered and give an alert on the IBF Portal for Kasese.

The code for the pipeline can be found on github: <https://github.com/rodekruis/ibf-rainfall-trigger-kasese>

## 3. Limitations and Recommendations

Measured rainfall data is very limited in Kasese district. Only 2 years of data is freely available and analysed in this assessment. It is recommended that more historical data or more stations should be obtained and perform similar analysis in order to evaluate the threshold. On top of that, further methodology should be conducted such as Extreme Value analysis or Intensity-Duration-Frequency analysis to better understand rainfall patterns in Kasese. These analyses can also be done with reforecast data from ECMWF.