

DEVELOPING MULTHAZARD TRIGGERS FOR ANTICIPATING EXTREME WEATHER EVENTS

MYANMAR RED CROSS SOCIETY - BUILDING ANTICIPATION CAPACITIES

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Heatwaves,
Droughts



Floods



Cyclones

Anticipation in Myanmar

- Myanmar is exposed and vulnerable to various hazards which cause serious humanitarian impacts and consequences, exacerbated by Climate Change.
- As many climate-related hazards can be forecasted, many humanitarian actions can be implemented in the window between a forecast and a disaster.
- Anticipation or Forecast-based Financing (FbF) is a system that automatically releases humanitarian funding based on reached forecasted triggers or danger levels, for the implementation of Early Actions, before the disaster strikes. This prevents suffering, use humanitarian funds more efficiently, contribute to community resilience, enhance preparedness and response, and make disaster risk management overall more effective.
- The Myanmar Red Cross is leading the development of a Forecast Based Financing system in country as part of the German Federal Foreign Office funded project "Building Anticipation Capacities in Myanmar".

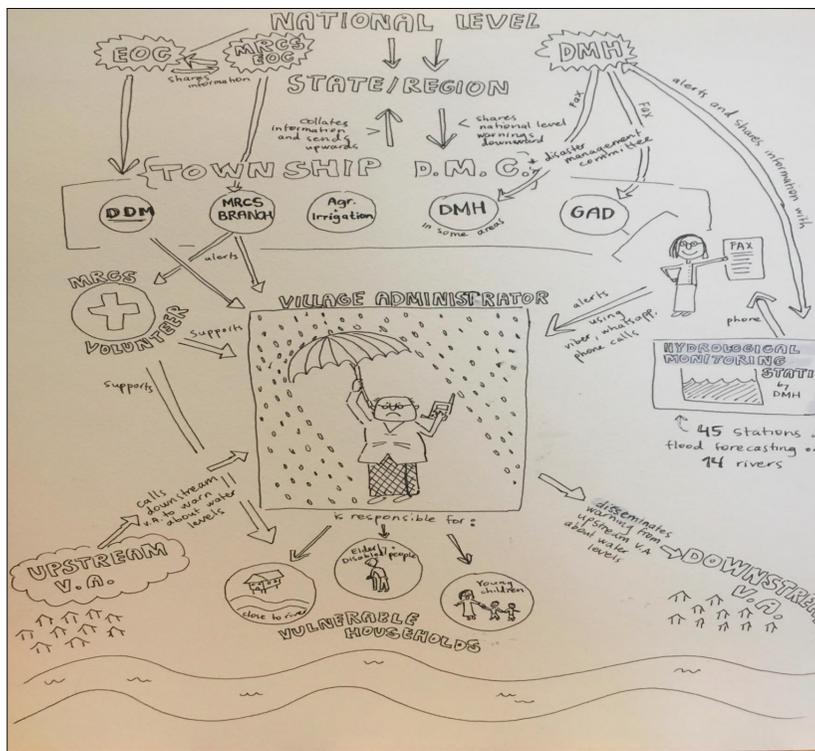
Early Action Protocol (EAP)

An approved Early Action Protocol (EAP) would allow MRCS to automatically receive funds to implement Early Actions ahead of a potential forecasted disaster, when triggers are reached, and thus alleviate human suffering.

Partnership Building (consultation with Gov Institutions and Partners)

- 2019 Conducting Scoping Study (joint-MRCS, IFRC, GRC, AmRC)
- 2020 Feasibility Study (joint-MRCS, IFRC, GRC, FRC, ECHO)
- Both studies were useful as tools to:
 - Raise awareness and increase understanding of FbA/ FbF among implementing partners and Government ministries
 - Have a structured approach to identifying priority hazards and effective early actions
 - Integrate FbA/FbF into the operational planning and strategic vision of MRCS

Early warning dissemination at different levels in Myanmar [1]



Available forecast information for the priority hazards [2]

Hazard	Forecast	Lead time	Skill/accuracy	Technical FBA Potential
River flood	Water-level forecasts from Hydrological Monitoring Stations under DMH	3 days	Unknown; but daily water level forecast verified. Skill exists	High
Cyclone	Initially produced by Indian Meteorological Department, disseminated and localised by DMH	2-3 days	Unknown for wind, storm surge and rainfall	Medium
Drought	DMH has a dedicated drought monitoring centre in Mandalay	No lead-time as no forecast; however, actions can be taken based on monitoring data	Unknown	Requires improvement in drought forecasting capacity but actions can be taken based on monitoring data
Heat waves / High temperatures	Disseminated by DMH	2 to 3 days	24 hour temperature forecast verified; skill score xx	Requires improvement in heat wave forecasting

Early action identification (consultation with urban communities)

- 2021 conducted Awareness Disseminations on FbF at Yangon and Mandalay (joint - MRCS, IFRC, GRC, FRC, ECHO)
- 42 Red Cross branches in Yangon and 7 Red Cross branches in Mandalay

Main findings:

- Identified most relevant hazards in urban areas: floods, heatwaves
- Multifactorial exposure factors in urban areas (living in slums or near the river, type of livelihoods: working under the sun, ...)
- Branches' existing capacities, including human resources, logistics.
- Potential Early Action/Anticipation in different townships. Cash based early actions flagged out as a potential effective anticipatory intervention.
- Sources of early warning/ Access to forecasts: Online, radio, TV, DMH (Department of Meteorology and Hydrology), Meteorological warnings from MRCS EOCs (Emergency Operations Center) Network.
- Branch preparedness and early actions (mainly monsoon season) are limited by funding (unearmarked private donations). Advocacy to access "early" financing mechanisms is needed.

Trigger Riverine Floods

Over the last years meteorological anomalies such as late monsoon onset, early monsoon withdrawal, increased monsoon strength are being recurrent in Myanmar

Data collection for Riverine Flood Early Warning

- Manual observation system (Manual gauge) for measuring the river stage.
- Observation time (three times per day) for normal case and hourly for severe case.
- The observers at the hydrological stations have to measure the river stage with potable staff before standard times (06:30, 12:30 and 18:30).
- Observation process:
 - Go to the gauge site
 - Put on the potable staff on the respective pile and read the level of water elevation
 - Fill up the river stage at field book and report to the main office or regional office of DMH.

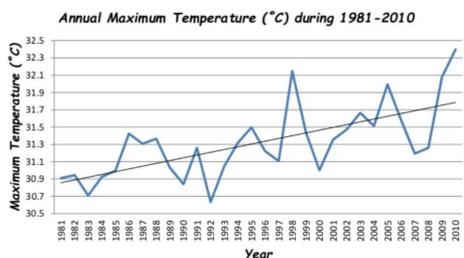
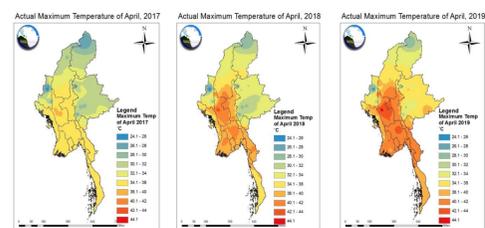
Riverine Flood Forecasting methods

- Daily Water level Forecast
 - River stage correlation method
 - Multiple Linear correlation method
 - Integrated flood analysis system – for research only
 - HBV model based on excel – for future
 - HMS model for Ayeyarwady and Sittoung rivers
- Seasonal Water level Forecast
 - Flood characteristic occurred in analogue years
 - Seasonal weather forecast
 - Comparison of current flow with the individual hydrograph for the last 10 years
 - Average flow of the last 10 years
 - Flood frequency analysis
 - ENSO forecast

Trigger Heatwaves

- Average daily temperatures in Myanmar increased by about 0.25°C per decade during the period 1981–2010, and daily maximum temperatures have risen at a slightly faster rate of 0.4°C per decade over the same period [3]

Maximum temperatures in Myanmar from April 2017 to April 2019 [4]



Developing a Heat Index forecast

- MRCS Working with local consultant to develop Heat Index forecast, with temperature and humidity data provided by DMH.

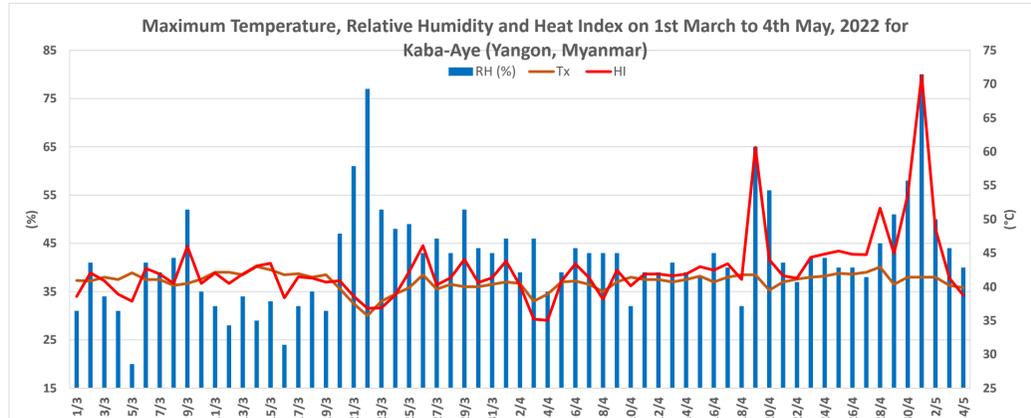
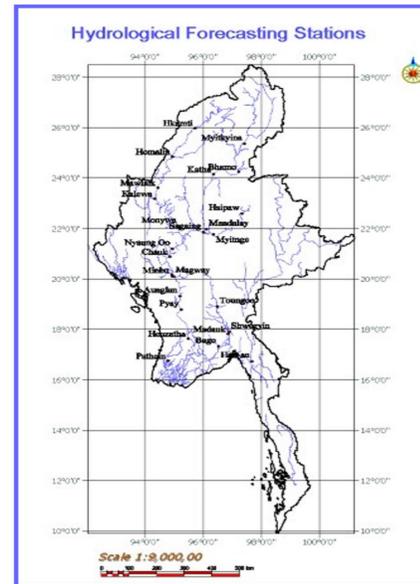
Heat Index (HI) = $c1 + c2T + c3R + c4TR + c5T^2 + c6R^2 + c7T^2R + c8TR^2 + c9T^2R^2$; Where,
 - HI: the heat index (in degrees F or C)
 - T: ambient temperature (in degrees F or C)
 - R: relative humidity (%)
 - c1 to c9: constants which depend on F or C



Early Action Simulation

- Objective: Early Action Protocol Heatwaves Myanmar
- Impact Survey: outdoor workers (usually migrant workers living in slums), livelihoods and health impact
- Cash Distribution in May 2022 during a heatwave: 200 HHs in slum setting (Hlaingtharya Township, Yangon) + Post distribution Monitoring Survey for assessing the action.

Phases	Preparedness	Readiness	Activation
Lead time	Before and during summer: January to May	10 days	3 days (stop mechanism)
Criteria		DMH, EOC	DMH, EOC
Activities	Coordination with Stakeholders, establishment of Activation Committee, monitoring heat wave forecast	Mobilize resources, volunteer trainings, community sensitization, selection of beneficiaries for cash distribution, establishment of feedback mechanism	Cash distribution + distribution of fan and leaflet



References

- Pichon et al., Scoping Study on Forecast-based Financing (FbF) in Myanmar, 2019.
- Pilli-Sihvola et al., Feasibility Assessment on Forecast-Based Action in the Republic of the Union of Myanmar, 2020.
- Climate Change impacts on health and livelihoods: Myanmar assessment. 2021. IFRC, Climate Center.
- DMH, Climate Change Events-in Myanmar and Future Scenarios, 2019.