Caught between extremes: Understanding compound risk during drought-to-flood events in the Horn of Africa

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Motivation

Despite the large economic losses and causalities, cascading drought-to-flood events are rarely studied. Impacts are still often attributed to drought or flood, thus failing to take into account the mechanisms that arise from the interaction between these extreme events and with them and the society. Droughts and floods are caused by extremes of the same hydrological cycle and hence are correlated by dynamic feedbacks, strongly interlinked with human processes. These interactions increase in complexity in fragile contexts, where internal ethnic conflicts, unstable governments, and high levels of poverty could affect the hydrosocial system.

Results & Discussion

1. Events timeline from 2016 to 2018

- Poor rainy season: Oct-Dec 2016
- Election: Oct-Dec 2017
- Landslides: Damas, fekara/overfall
- Flooding: March-April 2018
- Droughts: 2018

2. Heatmaps: drivers & impacts

- Identification of physical drivers, floods, and social-economic, conflict, politics, industrial events
- Events timeline from 2016 to 2018
- National emergencies in 2016-2018

3. Interactions between risk components (physical and societal system)

The 2016-2018 humanitarian crisis was the result of multiple interacting physical and societal events; Compound mechanisms of same interactions change over time and space according to socio-economic and topographic characteristics; Coping mechanisms/response to a hazard may lead to an increase in vulnerability and exposure to other hazards.

Conclusion

- Heavy rain after the drought alleviated impacts only in certain areas.
- Prolonged government election and the new-government structure exacerbated drought-related impacts.
- Increased exposure and vulnerability to floods due to some drought response/adaptation measures.
- Reinforcing mechanisms between Drought, Migration, and Conflict.
- Drought and flood have the highest number of correlations with the experienced impacts.
- Heavy rain resulted in alleviating interactions that helped to restore water resources.

Objectives & Methods

Research Objective:

Investigate spatiotemporal interrelations between risk components across the societal and physical systems in a fragile context, during cascading drought-to-flood events

Identification of physical drivers, floods, and social-economic, conflict, politics, industrial events

EVENT TIMELINE

- Election
- Landslides
- Flooding

IMPACT CALENDAR

- Aggravating the impacts
- Allowing the impacts

COPING MECHANISMS

- Short-term measures
- Long-term mechanisms

Kenya

National emergencies in 2016-2018

Compound mechanisms can increase or decrease disaster risk;