Bridging Risk Knowledge and Early Action: using conceptual risk models to advance impact-based early warning for floods and droughts in eastern Africa.

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Highlights

- Risk knowledge in all its dimensions can support impact-based early warning systems (IbEW)
- Different groups are characterized by different vulnerabilities, capacities and actionable early actions, all of which should contribute to IbEW information
- Conceptual models of risks can inform the design and implementation of IbEW

Read the full abstract →

Background:

Impact-based early warning (IbEW) aims to improve the efficacy of early warning systems by alerting about "*what the weather will do*", i.e. including information on actual impacts.
Capturing impacts in early warning means going beyond the hazards to incorporate information about **risks** in all their dimensions (hazards, exposures and vulnerabilities), including their complex interactions. This requires building a strong foundation of **risk knowledge**. Conceptual risk models such as **impact chains** are valuable tools for deepening and representing risk knowledge, and can be expanded to guide the design of IbEW, ensuring that it incorporates knowledge about people at risks and their capacities to implement necessary risk-reduction measures.

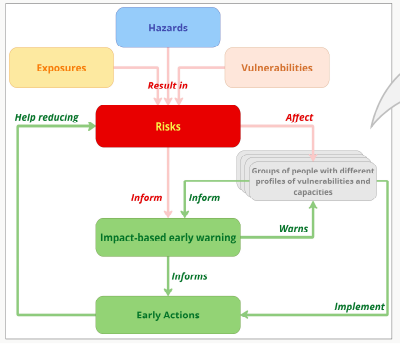
In the context of the EarlyWarning4IGAD project (funded by UNDRR and EU), we have constructed **impact chains** for multiple drought- and flood-related risks in the Kenya and Ethiopia, as a first step in the development and implementation of a novel IbEW methodology for the wider IGAD region (ongoing).

Risks analyzed:
- Risk of crop yield loss for rainfed farming systems due to drought *(shown here)*
- Risk of loss of livestock due to drought
- Risk of physical harm to people due to floods
- Risk of crop yield loss in rainfed systems due to floods

A conceptual framework for the role of risk knowledge in IbEW

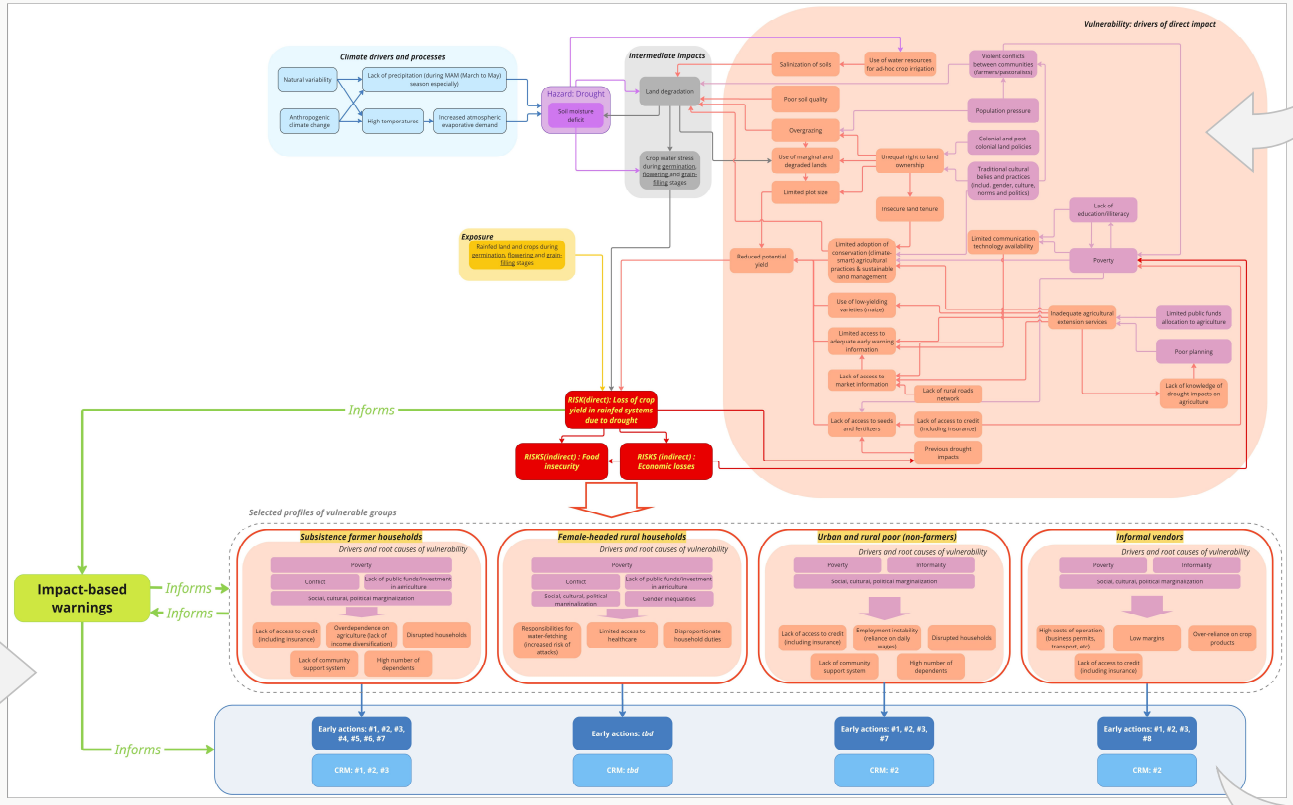
In the IbEW paradigm, risks (hazards, exposures, vulnerabilities) & impacts, early warning information and early actions are inextricably linked to each other. To ensure the IbEW reaches its goal of limiting impacts for people and systems, we need a conceptual framework to elucidate how each of these components interact with each other.

The framework we developed shows how IbEW needs to be informed by risks on one side, but also by the profiles of vulnerabilities and capacities of different at-risk groups, as they need to understand, have access and have the capacity to act upon IbEW information.



Impact chain for the risk of crop yield loss for rainfed farming systems due to drought in Kenya

Each risk is defined by specific drivers, root causes, and a complex set of interactions, which can be represented through "impact chains" conceptual models. In the example below, drivers of *climate* & *hazard* (e.g. precipitation deficit, high temperatures, soil moisture deficit), *exposure* (croplands and crop phonologies), *vulnerability* (including outcomes of land management practices) all interact to create the *direct risk* of crop yield loss. Based on this first level of knowledge, relevant information can be selected to create *impact-based warnings*. However, different *groups* might experience impacts differently or suffer more from cascading, *indirect risks*: effective warnings should also reflect these, and be tailored to each group's needs and capacities. Finally, warnings for each group also include *early actions* and *comprehensive risk management* measures that the group can perform or be assisted with. For Kenya rainfed farming systems, this risk knowledge approach served as blueprint for a novel IbEW methodology.



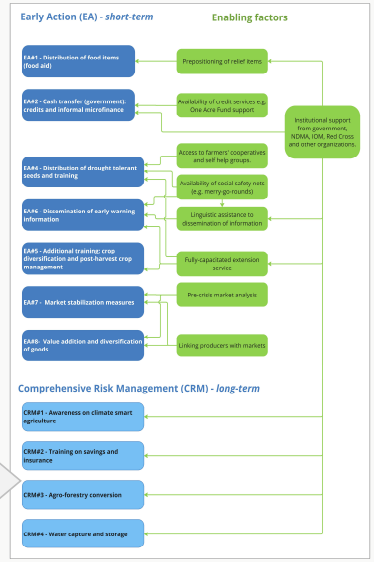
Methods

Impact chains for all risks where built through stakeholder consultations (February 2024) and integrated by extensive literature review.

Impact chains stakeholders co-creation session (Naivaisha, Kenya, 15-16 February 2024)

From risk knowledge to risk reduction

We identified a number of possible early actions and comprehensive risk management practices connected to this risk and to these groups. Importantly, we also highlight what *enabling factors* need to be in place for these measures to be effective.



Outlook

- Conceptual models to explore how IbEW can be designed to support specific risk profiles: **women & girls, people with disabilities, internally displaced persons**
- **Upscaling** of methodology (including conceptual models) to the wider IGAD region
- Improve the actionability of risk knowledge by including specific **early actions**

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UNDRR UN Office for Disaster Risk Reduction

Learn more about the EW4IGAD project at EGU25!
Thalheimer et al., "Towards actionable impact-based early warning for floods and droughts in the Greater Horn of Africa" (EGU25-16937, NH10) **→ *Thursday, 01 May, 17:30–17:40, Room 1.31/32***

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