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Earth Observation, Early Warning System and Sendai Nexus for Disaster Risk Reduction in the Horn of Africa

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Objective

Review the Sendai Framework to identify scopes for earth observation to improve early warning systems for disaster risk management.

Methods

a) Content analysis of the 'Sendai Framework for Disaster Risk Reduction 2005-2015'; and
b) Two-day Stakeholders' Workshop.

Drought impact on water sources in Garissa County with woman trying to get out of drying dangerous pit. ©Nelson Mutanda

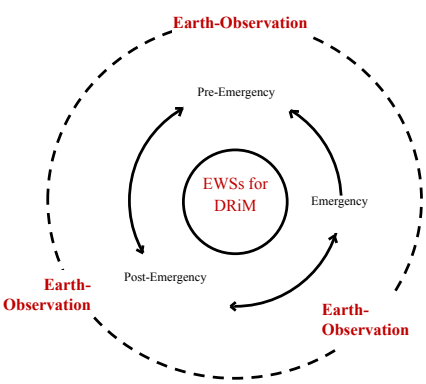
Background

The greater Horn of Africa region has a population of over 300,000 and well over 70% of the population earn their living from agriculture (farming and pastoralism), which is mostly rain-fed. Due to the high regional climate variability (and climate change), drought is a recurrent phenomenon and often triggers famine. Drought is a slow onset natural phenomenon and with appropriate early-warning and early-action the impacts can be significantly reduced, which is very clear from historical data on droughts that have occurred in the region. The droughts of 1983/4 and 2010/11 are comparable in terms of rainfall deficiencies but are quite different in terms of their impacts on livestock and human casualties. Some argue that this is due to the enhanced capacity of the governments and communities to mitigate and respond to drought disasters and the close comparison between countries also reveals a difference in the magnitude of impacts under similar drought conditions mainly due to a difference in disaster risk management and disaster governance. We posit earth observation tools can further assist in mitigating the effect of droughts by developing capacity of the early warning systems.

Traditional/local early warning information being gathered (gleaned from a goat's entrails) for integration with conventional national meteorological seasonal forecast during a PSP meeting in Turkana, Kenya MAM season 2017. The slaughtering (above left) and the entrails (above right). © Sophie Haines, 2017

Interdisciplinary Research Team

In order to develop such an early warning system, this projects brings together researcher and experts from various disciplines (communication, risk analysis, physics, computer sciences, economics), but also from the industry and Non-governmental organisations.



Findings

Earth observation can support the Sendai Framework for Disaster Risk Reduction's Priorities for Actions (especially Priority 1 and 3). We propose a number of recommendations for future research in this area and have developed a charter to initiate these actions.

Priority 1: Understanding Disaster Risk

- "To develop, periodically update and disseminate, as appropriate, location-based disaster risk information, including risk maps […] using, geospatial information technology" (UN, 2015: 24c).
- "To promote real time access to reliable data, make use of space and in situ information, including geographic information systems (GIS) […]" (UN, 2015: 24f).
- "To promote and enhance […] communications and geospatial and space-based technologies and related services; maintain and strengthen in situ and remotely-sensed earth and climate observations […]" (UN, 2015: 25c).

Priority 3: Investing in Disaster Risk Reduction for Resilience

- "To promote the mainstreaming of disaster risk assessment, mapping and […] the identification of areas that are safe for human settlement […]" (UN, 2015: 30g).

Recommendations

- Earth observation (EO) products coupled with geospatial information processing capabilities can provide base layers to generate early warning indicators and thresholds with wide area coverage and precise location of disaster risks prone areas.
- The capability to continuously observe an area of interest can facilitate monitoring the evolution of disaster risks to provide early warning information for early action, which can significantly reduce the impacts of disasters through understanding the onset & processes of disaster risks.
- With high temporal resolution of some of the EO products like daily MODIS imagery, it is possible to inform DRR efforts through customised early warning system (EWS) at a national level (Kenya).
- Risk information needs to be packaged in different ways for different groups of stakeholders from community to policy level actors to take the necessary preventive measures well in time before the disaster strikes or during the onset of disasters in some cases like drought.
- Use of Participatory Scenario Planning (PSP) (http://www.careclimatechange.org/files/adaptation/ALP_PSP_Brief.pdf). This generally involves a multi-stakeholder platform bringing together local/traditional and conventional scientific knowledge to develop and disseminate relevant location-specific climate early warning information essential for responding to the challenge of climate hazards.
- Hazard maps coupled with location of human settlements can help to generate risk maps which in turn can help to put in place the necessary preventive measures to avoid the loss of life and property to disasters.
- In addition to the above, we need research to understand the role that earth observation tools can play in the decision making processes for the entire cycle of disaster risk management (DRiM see diagram on the left).

A charter is provided to initiate action in order to realise Sendai's Priorities (key examples):

24c and 30g: Number of countries that have location-based disaster risk information, including disaster risk maps using geospatial information technology.

25g: Number of countries that have dissemination channels (print, ICT, word of mouth alike) at local or national levels for risk information.

25g: Number of countries that actively seek to make early warnings people centred.

30g: Number of countries that have mainstreamed disaster risk assessment in developmental programmes (such as health, education, residential housing).

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