Creating Impact through
"Translation of Climate Information within the Horn of Africa Drylands"

Fig 1: In-person participants at the D2E Side event on 21st February 2023

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Background

Translation of climate information to support decision-making process is important towards resilient building in rural communities. We present progress made by EU H22O Down2Earth(D2E) project in-terms of regional policy analysis supporting community adaptation, experiences and lessons learnt through community engagement, GHACOF translated water forecasts through DRYP model, and application of seasonal rainfall forecasts to trigger early action for droughts in East Africa. Participatory Scenario Planning (PSP) and GHACOF platforms are key dissemination and engagement platforms currently utilized by D2E project. The key outcome of the GHACOF63 about the March-April-May (MAM) 2023 season can be found at [GHACOF63_Statement_Final.pdf - Google Drive.]

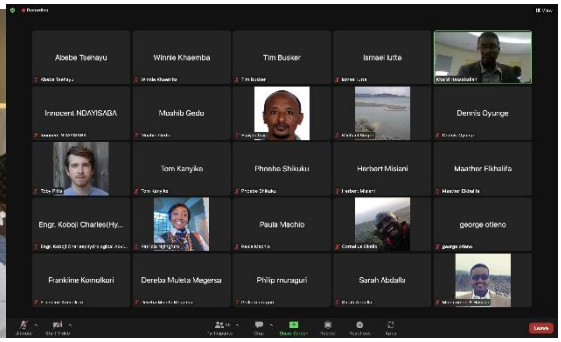

Fig 2: In-person participants at the D2E Side Event *Fig 3: Virtual participants at the D2E Side Event*

D2E continues to contribute to scientific knowledge through scientific reports, journal articles, monthly newsletters etc. A DOWN2EARTH Project Video with an overview of the project was presented giving insights into the workings of the various work packages. Key progress are highlighted in subsequent sections.

Complementarity between Scientific and Traditional Early warning Information is key

Down2Earth is working with communities in Kenya (Isiolo), Ethiopia and Somalia that directly bear the brunt of climate change impacts. In Isiolo, this is through Participatory Scenario Planning (PSP) to enhance decision making based on early warning information. PSP forum has been held where traditional forecasters and scientist interacted and presented their early warning information to support the community.

Using traditional sources of information; goat intestines and tossing of traditional leather shoes, the elders provide forecasts that is compared with scientific information derived from climate data. The scientific information from Isiolo County Meteorological Department is consistent with those from Traditional forecasts (i.e

forecasts from OND 2022 from both scientistic and traditional systems all pointed to a depressed rainfall season). This has provided much needed leveraging and complementarity for both sources. Through the PSPs, engagement with the community and uptake and use of climate information services has been improved. Pastoralist and other local users places more premium on traditional forecasting and local communication of climate information.

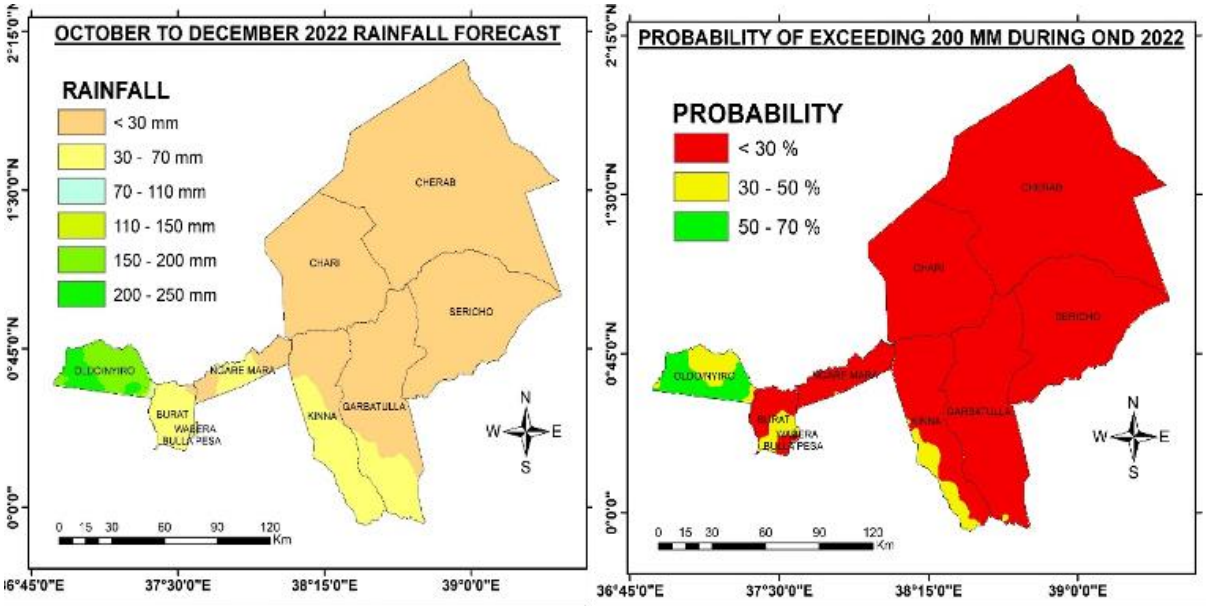

Fig 4: The October-December 2022 scientific rainfall forecast(mm) and probability of exceedance for 200mm useful for crop farming and Livestock. The scientific Information is generated by Isiolo County Meteorological Department

Fig 5: The goat intestine(left) and tossing of leather shoes(right) by traditional forecasters. The shoe is a traditionally leather made from cowhide. The forecaster throws the shoes on the ground repeatedly (thrice or four times) in order to confirm the message and thereby reduce uncertainties.

"Over time, our engagement with community has revealed the need to strengthen the existing locally available early warning systems and dissemination channels as a boost to uptake of early warning information for multi-level decision making and resilience in community"

Harmonization of the two processes could potentially contribute towards improved uptake of climate information. This eventually will support resilience building amongst the community including the full inclusion of livestock and pastoral issues in policy considering traditional knowledge as a key pillar.

Adaptation, water and food security policies for adaptation in the Eastern Africa region need to be strengthened.

A look at climate adaptation, food security and water policies in Eastern Africa, through a policy analysis undertaken using the policy triangle approach revealed a number of key policy messages. Firstly, inadequate resources to finance Eastern Africa countries Nationally Determined Contributions (NDCs) owing to the fact that all NDCs largely anticipate international finance for over 80% of stated budgets. Second, water policies are faced with an enforcement gap both in policy content and in practice. Thirdly, food security policies, even though detailed and highlighting some of the key issues facing the region and with strategies to adapt to climate change thus with a high overall rating, fail to focus comprehensively on livestock which is a main form of livelihood for a large land area at 75% and a significant percentage of the population.

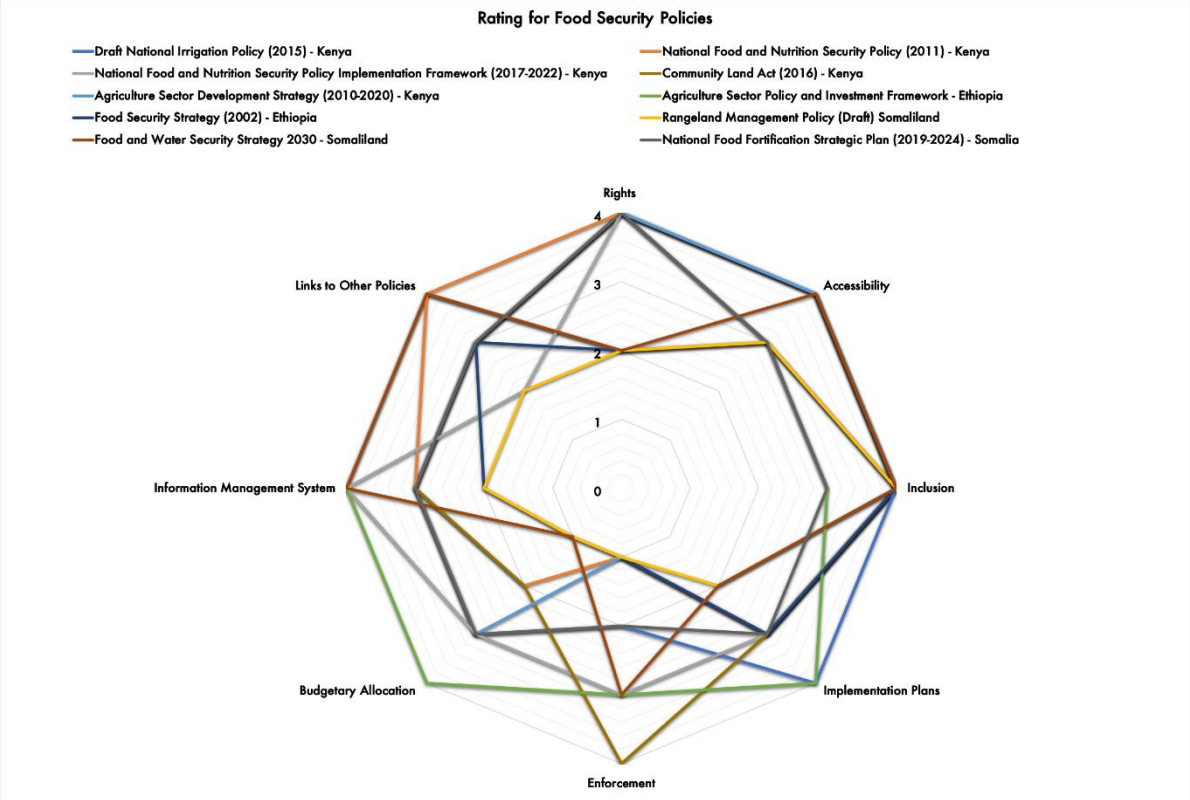

Fig 6: The rating for food security policies in Ethiopia, Kenya and Somalia. The figure shows the various elements rated and the average scores for the policies listed in the figure.

To be able to support policymakers, scientific information is imperative such as that on water availability in terms of soil moisture, streamflow and groundwater. This is discussed further below.

The DRYP hydrological forecast model experimental layers on the East Africa Hazards Watch provide necessary information for users on early warning.

In order to anticipate the impacts of seasonal forecasts and climate projections on water scarcity and food insecurity across HAD, a regional model is needed that captures the critical dryland processes that separately contribute to water availability. D2E, has developed a drylands-specific hydrological model (DRYP). Experimental layers on the East Africa Hazards Watch of ICPAC presents the different components of the water balance for the basin under the heading 'Water Security'. The water forecasts include; soil moisture, potential groundwater recharge, water requirement satisfaction index (WRSI), actual evapotranspiration and number of days of extreme streamflow. This leads us to another interesting aspect of the work as below.

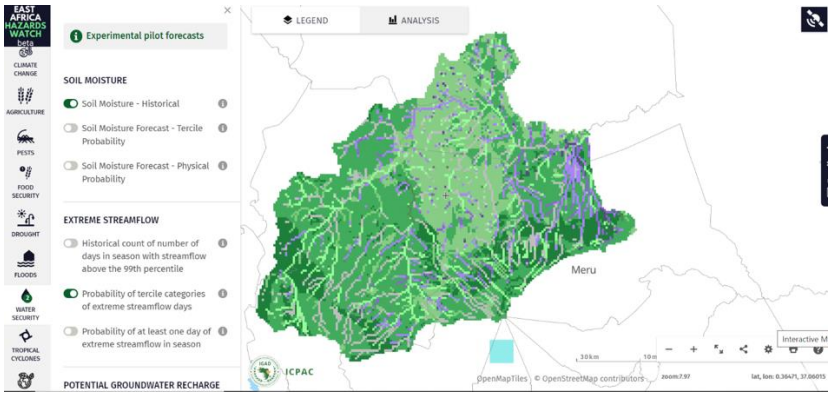

Fig 7: DRYP model experimental layers on the East Africa Hazards Watch of ICPAC

Scientific foundation to trigger early action is the next Frontier to climate forecasting in the region

To leverage early action, it is crucial that forecasts are translated to tailor-made triggers for early action and that these triggers are evaluated. Using the Potential Economic Value Theory, we translate the seasonal forecasts from ECMWF's long-range forecasting system (SEAS5) to concrete action triggers ahead of the rainy seasons (Fig.8). The novelty of this approach is its ability to be directly used on-the-ground by decision-makers considering early actions. Decision-makers need to determine the costs and benefits of the early action they want to trigger (the so-called "cost-loss ratio"), after which they see if their action generates value on the long-term. They can also see which probability threshold can best be used to trigger this action, which in this case are the 10%, 33% or 66% probability thresholds on lower tercile rainfall.

Therefore, such analysis provides a scientific foundation needed to leverage early action. This work on economic value of forecasts points to the future of forecasting in the region. This approach will potentially yield much impact on ICPAC GHACOF forecasts when operationalized.

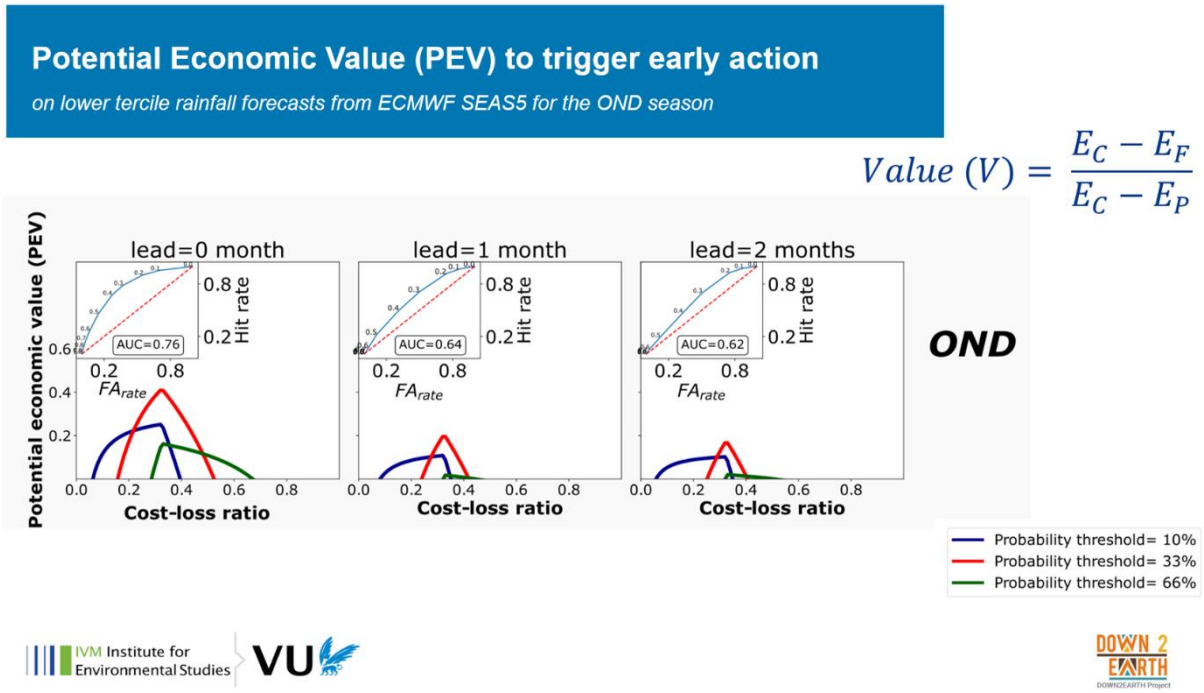

Figure 8: ROC curves (including ROC-AUC skill scores) and PEV for ECMWF SEAS5 forecasts for the MAM season (top) and the OND season (bottom) averaged over the HoA region, with lead times of zero, one and two months. Different probability thresholds (10%, 33% and 66%) to trigger action are displayed. The C/L ratio is derived from the action costs C and potential damage L.

Conclusion

The drought frequency and magnitude continue to increase, efforts to develop water forecasts for ground water resource mitigation should be sustained. In doing this, user-centric approaches discussed above should be heightened to ensure that information generated can be used to support early action and contribute to adaptation to climate change. Multi-sectoral collaboration with communities ensures that early warning information from both (i.e. traditional and scientific sources) forms part of integral decision making processes and adaptation for resilience building. D2E project has held series of engagements with multi sectors from water, disaster risk management, climate scientists where over 50 stake-holders involved enhancing project output.

For more information, please check out the Down2Earth Project Website and https://papers.ssrn.com/sol3/papers.cfm?abstract_id=4247666a pre-print of the Potential Economic Value to trigger early action.a pre-print of the Potential Economic Value to trigger early action.