



Analysing crop vulnerability to droughts in Kenya - What future crop losses can be expected due to climate change?

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In East Africa, soil moisture and precipitation are already decreasing, and climate change will most likely augment the incidence of extreme climate events like hydro-meteorological droughts. Kenya has been subject to multiple droughts in the recent history, causing severe crop yield losses mounting up to KSh120billion damage. To predict the future impact of droughts on agricultural production by means of an emulator, we investigated the relation between historical hydro-meteorological conditions and crop yields. Physical crop vulnerability curves were established by combining a historical yield dataset with drought indices based on ISIMIP2a historical climate datasets. These indices, focussing on different parts of the hydro-meteorological system, were evaluated on their ability to identify the reported past agricultural drought disasters and their goodness of fit with past crop yield variations.

With this method, we could allocate part of the yield variation to droughts, enabling us to quantify the past yield loss due to this hazard. By analysing the changes in the frequency of the aforementioned drought conditions using ISIMIP 2b future climate datasets, we were able to make conservative predictions of the future agricultural drought risk. The applied method allows for estimating the future yield losses caused by droughts under a scenario without-technical-developments. Hence, the paper illustrates the need for and defines the scope of climate-smart agricultural adaptation measures in order to achieve future food security in Kenya.