Flood Impacts on Agricultural Production - A Global Analysis

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Globally, flood risk accounts for about a third of all losses due to natural hazards. Several models have been developed to assess flood risk globally, mainly focusing on damage to buildings, particularly in urban areas. However, floods also cause hardship in rural areas due to their impacts on agricultural productivity. According to the FAO, crop production in the period 2003 to 2013 was the most affected agricultural sector by natural hazards in developing countries and about 60% of the damages are attributed to floods.

If agricultural flood impacts are considered in the assessments, they are usually limited to local and regional analyses or flood prone areas are only overlaid with arable land. We address this gap by developing a model to assess the impacts of river floods on agricultural production at a global scale. In this study, we combine data of monthly flood inundation with a spatially explicit dataset on irrigated and rain fed crop areas and calculate potential crop yield using the LPJmL model. We assess the flood affected yield for four major crops: maize, cereals, rice and soybeans for the period 1960 to 1999, by analyzing for each crop which areas were inundated during the flood events.

Our approach allows to identify global hotspot areas of flood affected agriculture. Preliminarily results show that examples for this can particularly be found for West Africa's agricultural production, a region that strongly relies on its own food production and which has frequently been affected by flooding.