

# From Floods to Droughts: Economic and Agricultural Vulnerabilities

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## Introduction

Natural disasters can lead to significant loss of life, damage to infrastructure, displacement of communities, and long-term social and environmental challenges. They cause disruption in the economy and have a direct negative impact on property value, productivity, production, employment, and consumption, ultimately affecting the country's GDP.

Natural disasters can be grouped into two different categories: climatic and geologic disasters. Climatic disasters are floods, storms, and droughts. They are the result of atmospheric conditions. Earthquakes and volcanos are considered geologic disasters, resulting from changes in the earth. This article will focus on climatic disaster, particularly droughts and floods.

Climate change increases the probability of extreme climatic disasters. Extreme weather events or "tail events" become more frequent and increase in intensity. Simultaneously, economic losses and disruptions

stemming from natural disasters become more severe, affecting the short-term economic prosperity of the region (Hallegatte & Przyluski, 2010). The long-term economic impact varies by country and region and depends on various factors.

Given a certain production baseline, a natural disaster often leads to a temporary reduction. While recovery is possible, the economy is likely to remain permanently below its previous growth trajectory. This is due to the loss of physical and human capital, and interrupted economic growth (Ashizawa et al., 2022). Although the economy may recover above the baseline, it is debatable, and maybe even wrong, to see this economic shift as a benefit of the natural disaster.

## Outlook of the EU Agricultural Sector

Throughout history, significant food crises and famines have been caused due to extreme weather events. An increased frequency and intensity of these events is a challenge for regional food security. In the past, policy responses to food crises have often made the situation worse, such as during 2007-2008, when export embargoes and hoarding worsened food supply shortages (Carter et al., 2018). Thus, a resilient agriculture sector is important for mitigating the effects of a shock on food production and market stability.

The European agriculture sector faces some challenges in the short term. Geopolitical issues and their implications on trade, limited development on input costs (energy, fertilizer, and animal feed), and high producer prices are hurting their profitability. Further, there are mixed weather conditions for crop farming. Several parts of Northern Europe, including France and Spain,

face wet conditions, where rainfall is significantly above average, compromising the health of crops. Central and Eastern Europe, on the other hand, have reverse conditions with droughts, i.e., rain and water deficits. The affected regions are expected to report reduced yields for 2024 (EC, 2024).

In the medium term (2023 – 2035), there are a few uncertainties that impact the agriculture sector in Europe. The main two sources of uncertainty are macroeconomic conditions (e.g. oil prices and exchange rates) and yields deviating from their baseline trajectories. The uncertainty of yields comes from changing climate conditions. Years with favourable conditions will display high yields, while years with prolonged droughts and excessive rainfall can lead to crop failure. Further, by changing regional growing conditions, climate change benefits some areas while causing challenges for others (EC, 2023).

## Farmland and Water Scarcity

Droughts can be classified into several categories, each affecting the economy and society differently. Meteorological droughts, occur when rainfall levels drop significantly below average, while hydrological droughts result in reduced surface water flow and groundwater storage. Such conditions have consequences, not only for agriculture, but also for extractive industries, who are reliant on water. For example when using water to cool a factory. Ultimately, the socioeconomic impact of droughts becomes clear, as a region faces the compounded effects of water shortages, diminished productivity, and resource constraints. Negatively impacting the usable farmland and water storage systems.

Decreasing farmland and water scarcity will cause challenges due to pressure from climate change and increasing competition for arable land and water sources. Larger farms (over 100 ha) now dominate European agriculture, managing 52% of the arable farmland, while smaller farms are in decline. The number of total farms fell by 4.6 million (to 9.1 million) between 2005 and 2020. Crop farming dominates the sectors (58% of all EU farms), followed by livestock (22%) and mixed farms (19%) (EC, 2023).

The majority of damage and losses from drought conditions occur in agriculture, where crops and livestock are most affected. Other sectors that are reliant on water can experience disruptions as well. For example, in manufacturing, mining, and energy generation water is essential for the industrial process.

## Floods and Droughts on Agriculture

Floods rank among the most severe natural disasters in Europe in terms of death toll and economic loss. In 2023 alone, floods caused 22.5 billion USD in damages, of which only 3.7 billion USD were insured (Munich Re). Meanwhile, droughts are much less frequent but occur over longer periods, impacting the regional food production. They pose a serious risk to food supplies and production due to crop failures and water scarcity.

Factors such as water depth, inundation duration, and seasonality are driving the costs and damages. The agricultural sector is especially susceptible to suffer damages from floods and droughts. Crop and livestock production, along with capital assets like heavy machinery, are affected the most. Losses and costs from the agricultural sector spill over into other industries,

such as food processing, retail, and export. Among all economic sectors, only construction experiences growth right after a region is hit by a flood or wind related disaster (Djanibekov, 2024).

Further, during a drought, the agricultural sector is forced to specialize in its crop production. Crops that consume a lot of water and are not as heat-resistant as others, experience a reduction in yield and income, leading to reduced cultivation. Compared to the baseline scenario, the drought scenario results in significant economic losses. The loss gap between the two scenarios is driven by fluctuations in crop prices, costs, and yields during the drought season.

## Costs and Losses of Floods and Droughts

When accessing the costs of natural disasters, economists differentiate between direct and indirect losses. Direct losses refer to the immediate monetary consequences caused by natural disasters to assets owned by firms, households, and the public sector (Hallegatte & Przulski, 2010). These costs can be further divided into market and non-market losses.

Market losses refer to the reduction in traded goods and services. In agriculture, market losses include diminishing yields and damages to the production environment, such as soil degradation and infrastructure damage. These losses can be well observed and modelled, due to the extensive data collected by the insurance industry. Non-market losses, on the other hand, refer to health impacts, loss of life, and damage to natural or cultural assets. These are harder or impossible to measure and price.

Indirect losses result from the primary consequences

of the natural disaster. It is often used as an acronym for output losses, meaning damages to the economic productivity caused by the disaster. These cannot be priced precisely and include business interruption, reduction in productivity, and the impact of inadequate infrastructure and physical capital (e.g. machinery) (Hallegatte & Przulski, 2010). The affected household income and consumption level in communities also counts towards the indirect losses. A reduction in household consumption has further implications on other sectors (Ashizawa et al., 2022).

Unlike floods, droughts do not destroy physical capital. Further, there is a fundamental impact of droughts in developed and developing countries. In developed countries, droughts do not endanger lives and are only noticeable, if at all, through increased food prices and water shortages. With well-functioning institutions, the agriculture sector will be able to replace the crop and livestock loss. But there is a negative relationship between the quality of institutions and the negative economic impact of droughts.

In developing economies, droughts have more severe consequences for the agricultural sector. Livestock and crop loss are expensive and difficult to replace. Economies reliant on the agriculture sector are especially vulnerable and experience food shortages and famines (Popp, 2006). In addition, droughts trigger multiple market failures in several areas: production-based (reduced harvest), labour-based (declining employment opportunities and falling real wages), trade-based (market disruptions and declining terms of trade), and transfer-based (breakdown of informal safety nets, such as food and water aid).

Income seasonality, imperfect credit markets, incom-

plete insurance, storage and liquidity constraints make it difficult to smooth the consumption of food and non-food items. Droughts and floods increase the seasonality of income and food prices, due to crop losses and fluctuations in wages. In addition, droughts extend the lean season, further contributing to the food price volatility. Compared to other natural disasters, droughts are slow to develop but have long term impacts on food security.

## Conclusion

Both rich and poor countries alike are vulnerable to the economic consequences of natural disasters. The consequences on welfare, human and economic development, and growth vary, depending on the state of institutions in the country. Well-functioning institutions can help the country in the recovery phase and diminish the socioeconomic impact of the natural disaster.

Particularly, droughts are devastating to developing and economically weak nations, whereas other natural disasters such as floods are shocks. Droughts have a direct effect on growth through crop failure and livestock loss, and cause fundamental negative changes to the economy.

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