What implications will climate change have for grassland and livestock in China?

Grasslands and livestock grazing are of great importance to China’s rural population and are particularly key in the provinces of Inner Mongolia and Ningxia, two of the pilot provinces for ACCD. To analyze these three key indicators to the resilience of China’s climate change impacts, the study examines the potential impacts of ACCD on livestock grazing and livestock grazing and livestock grazing.

The study includes a large dataset of 37 stations in Inner Mongolia, which included data from weather stations, climate stations, and livestock surveys collected from the National Environmental Monitoring and Ecological Research stations.

The ACCD approach suggests that adaptation policies and practices can be used to improve the resilience and sustainability of China’s livestock grazing systems. The studies also find that the ACCD approach can help to reduce the impacts of climate change on livestock grazing systems. The ACCD approach can be used to improve the resilience and sustainability of China’s livestock grazing systems.

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Climate change poses a serious risk to global food security and agriculture. However, climate change is not the only issue that affects food production. Various factors such as crop yields, weather conditions, and market demand also play crucial roles. In this context, the UN's Intergovernmental Panel on Climate Change (IPCC) has highlighted the need for a coordinated approach to adapt to and mitigate the effects of climate change.

The impacts of climate extreme events
Agriculture is one of the sectors most affected by natural hazards. Droughts, floods, low temperature and high-pressure situations create the most frequent hazards that affect China's agricultural sector. According to the data, 52% of the area affected by natural disasters is concentrated in this sector. Droughts are responsible for the largest direct economic losses, while floods and low temperature have caused the most significant changes in agricultural conditions.

Climate change impacts in China
Agriculture is of critical importance to China with 54% of its population living in rural areas. In 2005, the total increase in value of agricultural GDP was 2.7 billion yuan (336.7 billion US dollars), and this amounted to nearly 180 billion yuan (23.1 billion US dollars). Due to its size and geographical diversity, China experiences various types of climate change impacts and their transformational production and employment in sectors such as agriculture remain very important, ensuring that hundreds of millions of households are vulnerable to climate change impacts.

The research assesses the impacts on food production for the whole of China through new climate scenarios.

What are the implications of future climate change for crop production in China?
The impacts of climate change on crop production are significant. Climate change affects crop yields, which are critical for food security. Droughts were responsible for the loss of 26 million tonnes of grain between 1991 and 2000, causing dramatic economic losses.

How has warming affected agriculture in the last fifty years?
Climate change impacts vary with geography, and the results are particularly significant for China. As the climate has warmed over the last 50 years, the frequency and severity of extreme events have increased, affecting crop yields and agricultural productivity. The Adaptation to Change in Climate project is working to improve the development and adoption of climate change adaptation measures in China. To achieve this goal, it is important to conduct research on the potential impacts of climate change on agriculture and develop adaptation strategies.

What factors contribute to the accuracy of climate change predictions for crop yields?
Several factors contribute to the accuracy of climate change predictions for crop yields. These include:

1. **Crop and climate model integration**: The models used to predict crop yields need to be calibrated with climate data. This ensures that the models accurately reflect the impact of climate change on crop productivity.

2. **Historical climate data**: Historical climate data is used to train and validate the models. This ensures that the models can accurately predict crop yields under different climate regimes.

3. **Uncertainty in climate projections**: Climate projections are subject to uncertainty, which can affect the accuracy of crop yield predictions.

4. **Socio-economic factors**: Other socio-economic factors, such as land use, management practices, and market conditions, can also influence crop yields.

5. **Adaptation strategies**: The adoption of climate change adaptation strategies can mitigate the impacts of climate change on crop yields.

The research assesses the impacts on food production for the whole of China through new climate scenarios.
Climate change is a serious risk to global food security and agriculture. However, it can take more than one person to make a difference. In China, measures are being taken to address climate change and its impacts on agriculture and food production. This page discusses the impacts of climate change on agriculture, the adaptation strategies being used, and the potential for future climate change to affect crop production in China.

The Impacts of Climate Change on Agriculture

Climate change is affecting agriculture in various ways. Droughts, floods, extreme temperatures, and pests are just a few of the challenges faced by farmers around the world. In China, droughts and floods have had significant impacts on crop production, leading to decreased yields and increased food prices.

Adapting to Climate Change

To mitigate the impacts of climate change on agriculture, China is implementing a variety of adaptation strategies. These include improving irrigation systems, developing drought-resistant crop varieties, and implementing early warning systems to help farmers prepare for extreme weather events.

What are the Implications of Future Climate Change for Crop Production in China?

The Chinese Academy of Sciences (CAS) and the Chinese Academy of Agricultural Sciences (CAAS) are conducting research on the potential impacts of climate change on agriculture. Their findings suggest that changes in temperature, precipitation patterns, and extreme weather events could significantly affect crop yields and food security in China.

The research assesses the impacts on food production for the whole of China under new climate scenarios.

How has warming affected agriculture in the last fifty years?

Climate change means rising temperatures for China, and in terms of air temperature, the annual average is rising slightly faster than the global average. Most of the warming has happened in the last 30 years.

For agriculture, this has meant a lengthening of the growing season and less frosty days, and affected cropping systems and management practices. However, recent changes in weather patterns have led to challenges such as declining water availability and crop production variability across diverse agricultural conditions, crop types and the rapidly changing management and socio-economic conditions in China. ACCC research with farming communities in the provinces of Inner Mongolia and Ningxia aims to understand how recent warming and extreme climate events have affected farmers’ incomes and well-being.

What is the impact of climate change on crop yields in China?

Droughts were responsible for the loss of 26 million tonnes of grain between 1991 and 2000, causing dramatic economic losses.

What are the potential impacts of climate change that could affect China?

The potential impacts of climate change that could affect China include
- Increased drought and water scarcity
- More frequent and intense storms
- Changes in the timing and duration of the growing season
- Temperature extremes and heatwaves
- Sea level rise and coastal erosion

What are the key findings from the research?

- Wheat is more vulnerable than rice to climate change-induced crop failures
- Studies comparing crop yields in irrigated and non-irrigated fields indicate that climate change-induced crop failures could be a major threat to food security in China.
Climate change poses a serious risk to global food security and agriculture. However, climate change is not the only factor making the situation more pressing than ever. As identified in China’s First National Communication to the UNFCCC, published in 2004, increased temperatures are occurring faster than expected.

The impacts of climate extreme events

Agriculture is one of the sectors most affected by natural hazards. Droughts, floods, low temperature, and high temperature can affect agricultural production in China. The impacts of climate change and extreme weather events are permanent, and their effects can be far-reaching. Extreme events such as droughts and floods can devastate crops and livestock, leading to food shortages and price increases.

The Chinese Academy of Sciences (CAS) has been conducting research on climate change and agricultural resources. The CAS has identified several key areas where research is needed to improve crop and livestock productivity and reduce the impacts of climate change on food security.

What are the implications of future climate change for crop production in China?

As a leading AGC partner conducting research on climate change and agricultural resources, CAS is using government wisdom on climate science and their experiences to assess the impacts of climate change on crop production. While the overall scale of the impacts of climate change on agriculture in Northern China (which includes the ACCP Pilot provinces, Inner Mongolia, and Shaanxi) is significant, there is no clear trend in the impacts over time. It is important to note that the results of these studies are based on historical data and may not accurately predict future climate change impacts.

The Adaptation to Climate Change in China project is working to improve the development of policies and strategies to mitigate and adapt to climate change in China. This includes developing more climate-resilient crop and livestock varieties, as well as improving agricultural practices that can help farmers adapt to changing climate conditions.

The research assesses the impacts on food production for the whole of China under new climate scenarios.

Figure 2: Comparison of simulated and observed wheat yield in the past 20 years in Beijing, China. Data source: Beijing Academy of Agricultural Sciences (Beijing, ACCS), Technical Reports (2010).
Implications for adaptation planning

The ACCD approach supports evidence-based adaptation policies by providing more accurate and accessible data on the impacts, risks and uncertainties of climate change. The research highlighted in this paper shows that the threat climate change poses to agriculture in China, but the research is also providing useful insights, case studies and evaluation of response and strategies. Extreme events may be as big a problem in the future as it is now, and it is likely to become more important in the long run. Preliminary results show that:

- Adjusting crop planting structure, changing sowing time and planting new crop varieties are feasible adaptation options.
- The differences of the effects of adaptation options are significant in space and time.
- It is necessary to study and disseminate integrated adaptation technologies for agriculture. Further work will help entry points in these pathways can be used to define adaptation scenarios.
- For the agricultural components of the work ACCD is developing approaches to identify and prioritize agriculture adaptation technologies. Preliminary studies have shown that human adaptation measures contribute more to increases in food production. Based on technology progress, there is great potential for increasing food production. To utilize these technologies, they can be identified and sustainably improved.

Main sources of this Brief

The second edition of this Brief was produced in June 2012.


Other references cited


What implications will climate change have for greenhouse and livestock in China?

Grain and livestock growing are of great significance to China’s rural population and are particularly key in the provinces of Inner Mongolia and Ningxia, two of the pilot provinces for ACCD. To enable appropriate three key indicators to the shifts of climate change, ACCD researchers are developing models to simulate the future productivity and how the climate would be affected with different management practices. The work involves establishing data, crop, soil and climate database and also collecting socio-economic data.

The data include: agricultural phenology data and yield distribution of 37 stations in Inner Mongolia, nationwide data of wheat yield data gathered by the China Meteorological Administration, agricultural observations and surveys data (research collaboration with Chinese network and literature, grassland areas per county and socio-economic data per county.

Changes in biologically productive areas have been analyzed and the grassland biomass in Inner Mongolia has been calculated using the MARS Model. It was found that the gross biomass has decreased during the 1990s in eastern and northern Inner Mongolia, whereas the gross biomass is increasing in the south.

The agricultural productivity by North China was estimated using three different future scenarios, depending on the degree of climate change projected by various models (see Table 1). It was found that there is no change of grassland biologival distribution pattern under the different scenario and different decades. By 2080 under A2 emissions growth scenario would increase slightly in Northeast China and TIBET and decreases in Northeast China and TIBET and decreases in Northeast China and TIBET.

Key messages

- Annual average temperature in China has risen significantly during the past century, and this trend will continue in the future. This warming is causing a growing number of extreme climate events and economic losses.

- The effects of extreme climate events have been increasingly severe in recent years, and it is likely that they will continue to be a major challenge in the future. Various measures are needed to adapt to these changes and reduce their impacts.

- A comprehensive approach to adaptation planning is needed to address the impacts of climate change on agriculture. This includes identifying and prioritizing adaptation technologies, developing adaptation strategies and implementing effective adaptation measures.
The Adapting to Climate Change in China project is an innovative policy research project, supporting China’s response to the impacts of climate change and developing adaptation options. This project provides valuable information on climate change and its implications for China, which is relevant for both domestic and international policymakers. The project’s findings can inform the development of policies and strategies to address climate change and its impacts, contributing to the global effort to mitigate and adapt to climate change.

Key Research Areas:

- Understanding past and future impacts of climate change
- Agriculture: implications for adaptation planning

Key Messages:

- Annual average air temperature in China has risen significantly over the past century.
- China is committed to achieving carbon neutrality by 2060, aiming to peak carbon emissions before 2030.
- China’s renewable energy sector has been growing rapidly, with a significant increase in solar and wind power installations.
- China’s policies focus on promoting energy efficiency and reducing emissions across various sectors, including transportation and industry.

About the ACCDC Project:

The Adapting to Climate Change in China project (ACCDC) is an innovative policy research project, supporting China’s response to the impacts of climate change and developing adaptation options. ACCDC provides valuable information on climate change and its implications for China, which is relevant for both domestic and international policymakers. The project’s findings can inform the development of policies and strategies to address climate change and its impacts, contributing to the global effort to mitigate and adapt to climate change.

Main sources of this Brief: