

# A review of methods and approaches to assess climate change impacts on agriculture in Pakistan

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## Introduction

- ❑ The agricultural sector contributes 20% of GDP and employed 42% of the country's labor force
- ❑ However, the sustainability of agricultural sector in Pakistan is at risk due to climate change
- ❑ Increased variability of monsoon, increased risks of floods and droughts, severe water-stressed conditions → Food insecurity; Health risks
- ❑ Impacts are likely to be felt more in rural areas due to their overdependence on climate sensitive-agriculture
- ❑ Despite a vast literature on climate change impact assessments in agriculture, less evidences are available from Pakistan
- ❑ None of the studies has actually identified the research gaps in research on climate change and agriculture

## Objectives

Overall objective of the study is to systematically review the studies on climate change impact assessment in agricultural sector of Pakistan and to identify research gaps. Specific study objectives are given below:

- 1) examine the methods and approaches that have been used for impact assessments in Pakistan
- 2) explore the strengths and shortcoming of applied methodologies and approaches for impact assessments
- 3) assess the compatibility of applied approaches in Pakistan with those applied in other developing and developed countries
- 4) compare the results of different studies and its implication for local food security and rural livelihoods

## Methods

### Systematic review of literature

A systematic review of literature (1980-2017) regarding climate change impacts assessments in agriculture sector of Pakistan was conducted.



### Scope of study

Scale of study	Area/Country of focus	Methods used	Thematic focus
National to local	Pakistan, Punjab, KPK, Baluchistan, Sind, AJK, GB region	Mixed methods/ Quantitative	Vulnerability assessments; Impact studies; Exposure and sensitivity; Adaptation studies

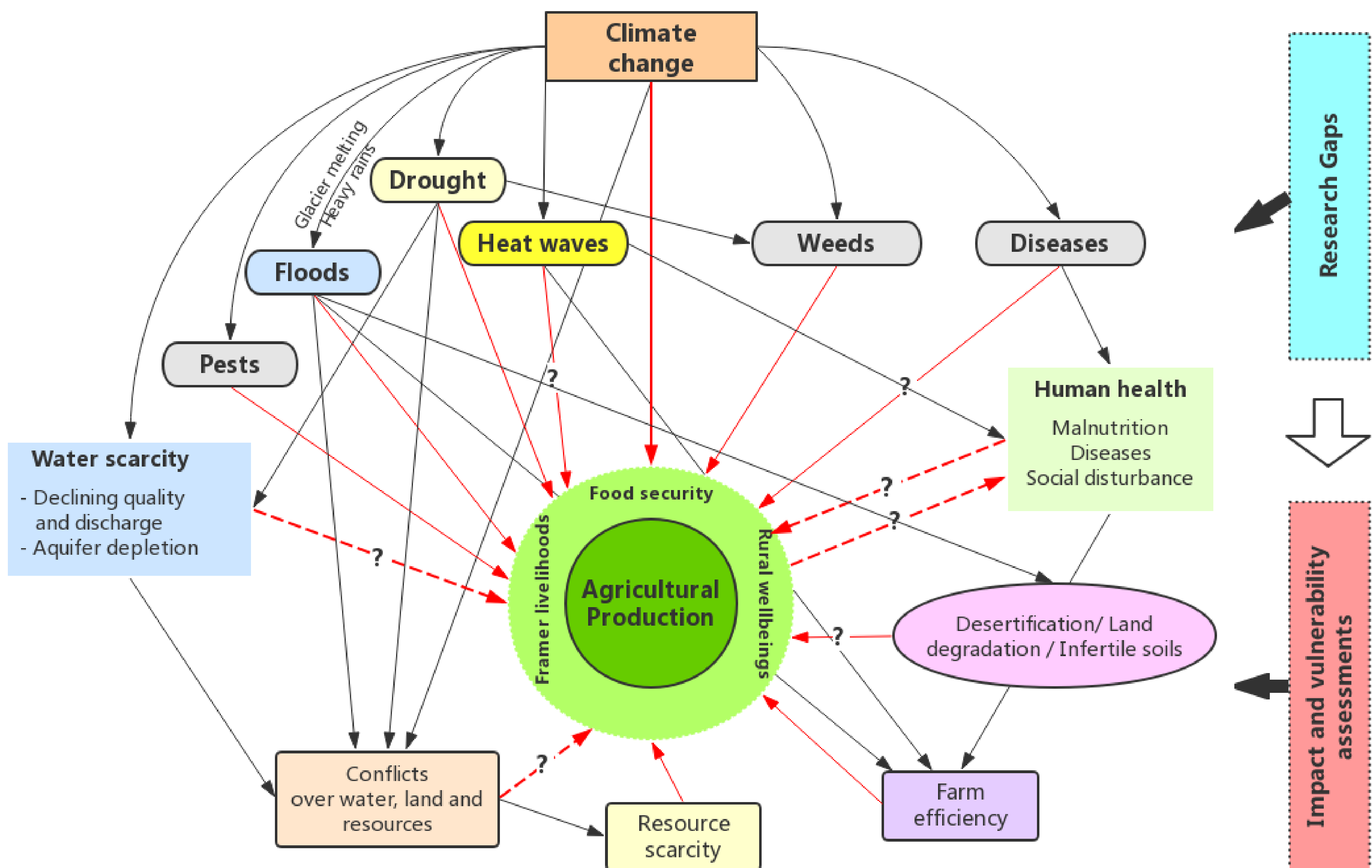


Fig 2. Multiple climate change impacts on agriculture in Pakistan

## Results

### Reviewed literature

- ❑ The findings of the study shows that mostly the work related to climate change impacts in Pakistan is available from gray literature (17) and local peer-reviewed journals (14), while only a few studies (15) were available from the international peer-reviewed literature.
- ❑ The focus of more than 75 of the selected studies was on Punjab province, which might be due to its huge importance in maintaining food security in the country.
- ❑ The literature on other provinces is largely in the gray literature.

### Methods used

- ❑ The study results show that 80% of the selected literature used production function approach to assess climate change impacts on the agriculture sector in Pakistan.

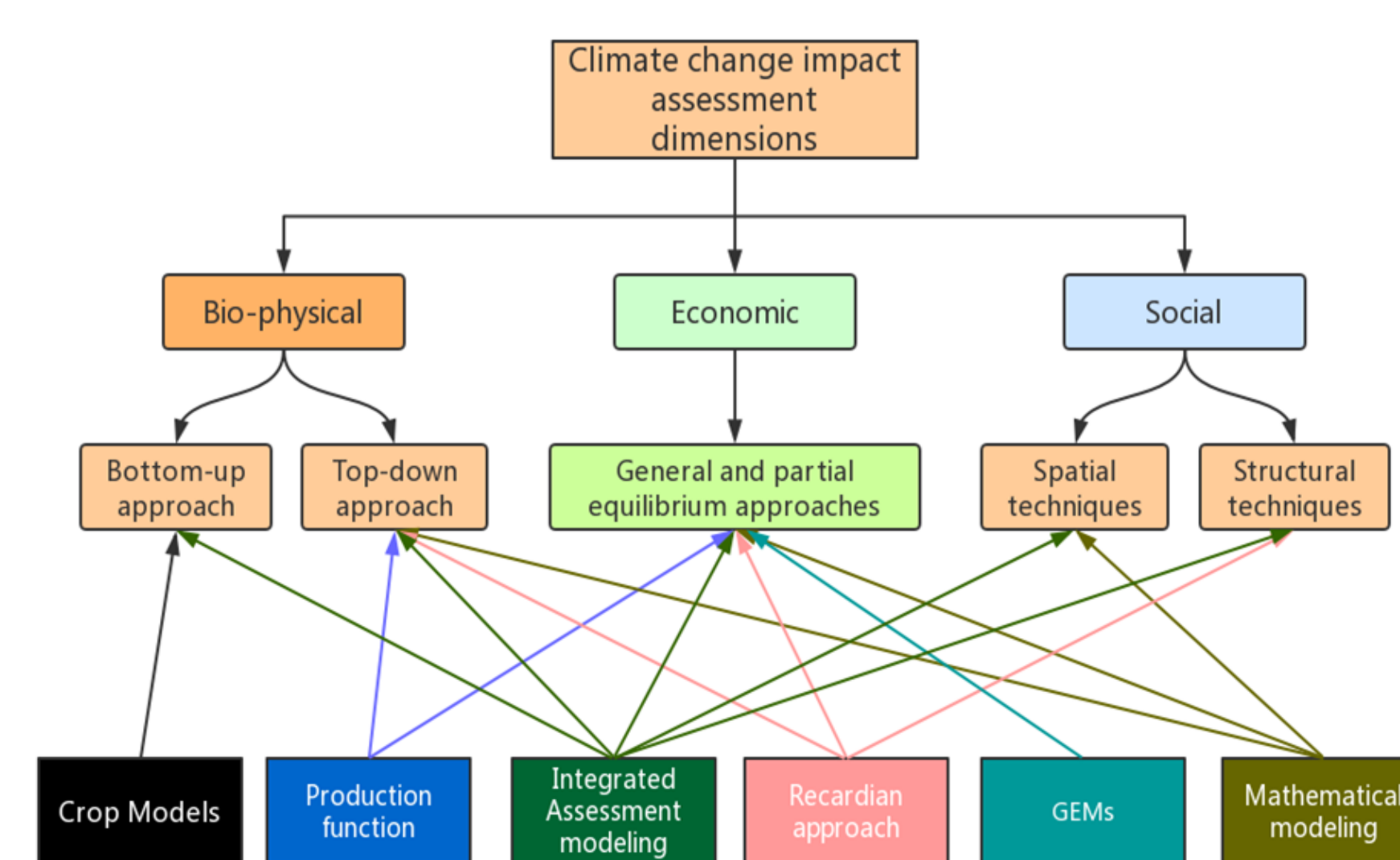


Fig. 3. Review of methods used for impact assessments

### Research focus

- ❑ The major focus of most of the studies was on food crops rather than commercial or minor crops.
- ❑ Exceptionally few studied explored climate change interactions with oilseed crops through experiments
- ❑ Literature focusing on climate change impacts on livestock was very rare

## Climate change impacts

Some of the key findings of the reviewed studies are given below;

- ❑ Climate change is significantly affecting the crop yields particularly of wheat and rice in arid and semi-arid regions [1].
- ❑ Climate change has resulted in increase in food prices and decrease in farm returns [2].
- ❑ Wheat crop was found more sensitive to change in temperature at sowing time with 7% decline in crop yield [3]
- ❑ Climate change could negatively affect future crop and livestock production and farm returns. It could make 57–71% of the farmers highly vulnerable by 2069 if farmers use the same farm management tools [4]

## Conclusions

- ❑ Impacts on food crops are clearly evident of their vulnerability to climate change
- ❑ More research is required to assess accurate impacts on climate change on minor-crops and non-crop sectors (livestock and fisheries)
- ❑ Most of the studies used old techniques (with many drawbacks) rather than integrated approaches
- ❑ More evidences are required to investigate climate change impacts on rain-fed and subsistence agriculture in Northern and Southern Pakistan
- ❑ Need to enhance research capacity regarding the use of new and innovative methods for impact assessments in agricultural sector

## References

- [1] Ali et al., 2017. Climate Change and Its Impact on the Yield of Major Food Crops.. Foods, 6; [2] Abid et al., 2016. Climate Change vulnerability, adaptation and risk perceptions in Punjab. Sci. Tot. Env., 547; [3] Janjua et al., Impact of Climate Change on Wheat Production... The PDR [4] Zhu et al., 2013. Climate change impacts and adaptation options for water and food in Pakistan...Water international, 38.

**Acknowledgement:** Authors of this study are thankful to the Higher Education Commission of Pakistan for travel grant to present this work at this forum.