

## Climate change in the North China Plain: smallholder farmer perceptions and adaptations in Quzhou County, Hebei province

David Chen, Joann K. Whalen\*

\*Corresponding author: joann.whalen@mcgill.ca

*Climate Research 69: 261–273 (2016)*

Table S1. Demographics of smallholder farmers interviewed in Quzhou County, North China Plain

Total $n = 37$	Median	Mean
Age	59	58.05
Years of education	6	5.59
People in Household	6	6.16
People Actively participating in agriculture	2	2.37
Area of cultivated land ( <i>mu</i> )*	10	12.1

\*The unit used to measure land size in China, *mu*, is equal to 667m<sup>2</sup>, or 1/15 of a hectare.

Table S2. Crops under cultivation in 2014 compared to 1980s by smallholder farmers interviewed in Quzhou County, North China Plain

Main Crop Cultivated 2014	%	Main Crop Cultivated 1980s	%
Wheat/Corn	94.6	Wheat/Corn	29.7
Watermelon	2.7	Cotton	67.6
Tree nursery	2.7	Millet	2.7

Table S3. Income sources in 2014 compared to 1980s of smallholder farmers surveyed in Quzhou County, North China Plain

Income 2014	% Respondents	Percentage of contribution of non-crop income to total income
100% Crops	56.8	-
Off-Farm work + Crops	40.5	50 - 80
Livestock + Crops	2.7	10
Income 1980s		
100% from Crops	86.5	-
Off-Farm work + Crops	2.7	50
Livestock + Crops	10.8	10 - 33

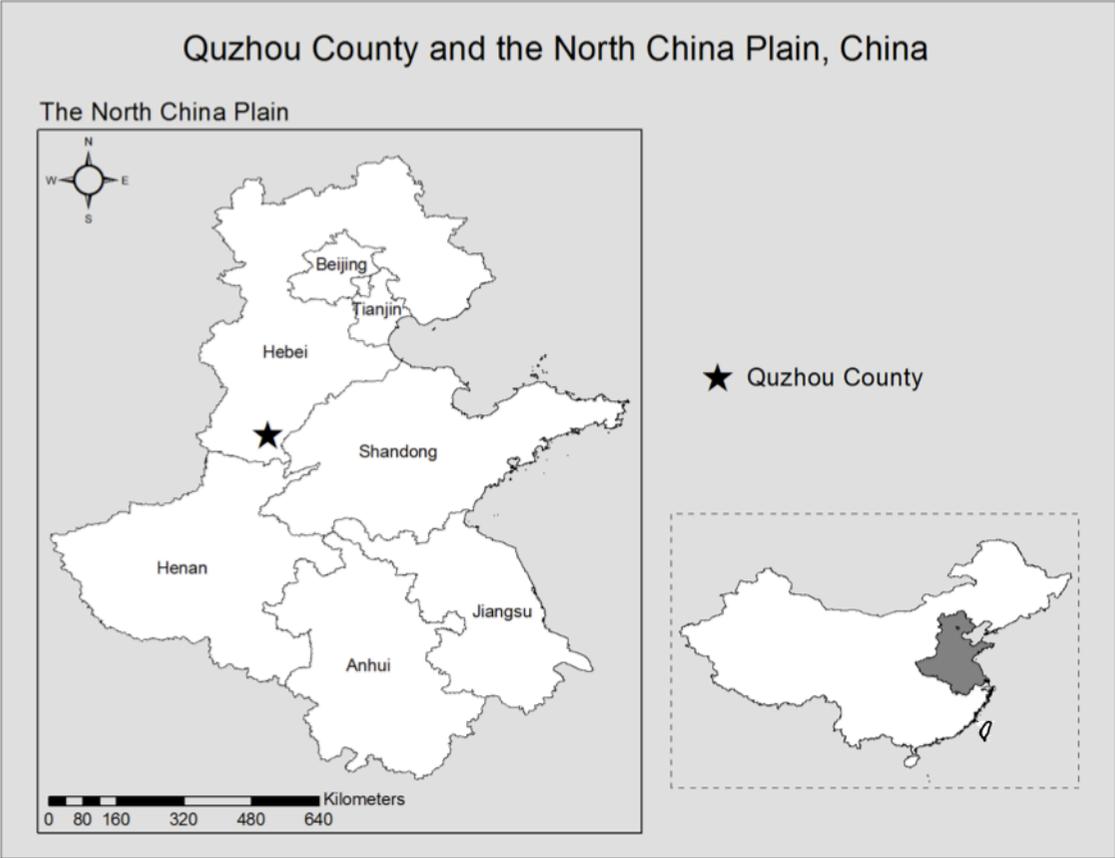


Fig. S1. Location of the North China Plain within mainland China in inset box, with star at Quzhou County where smallholder farmers were surveyed

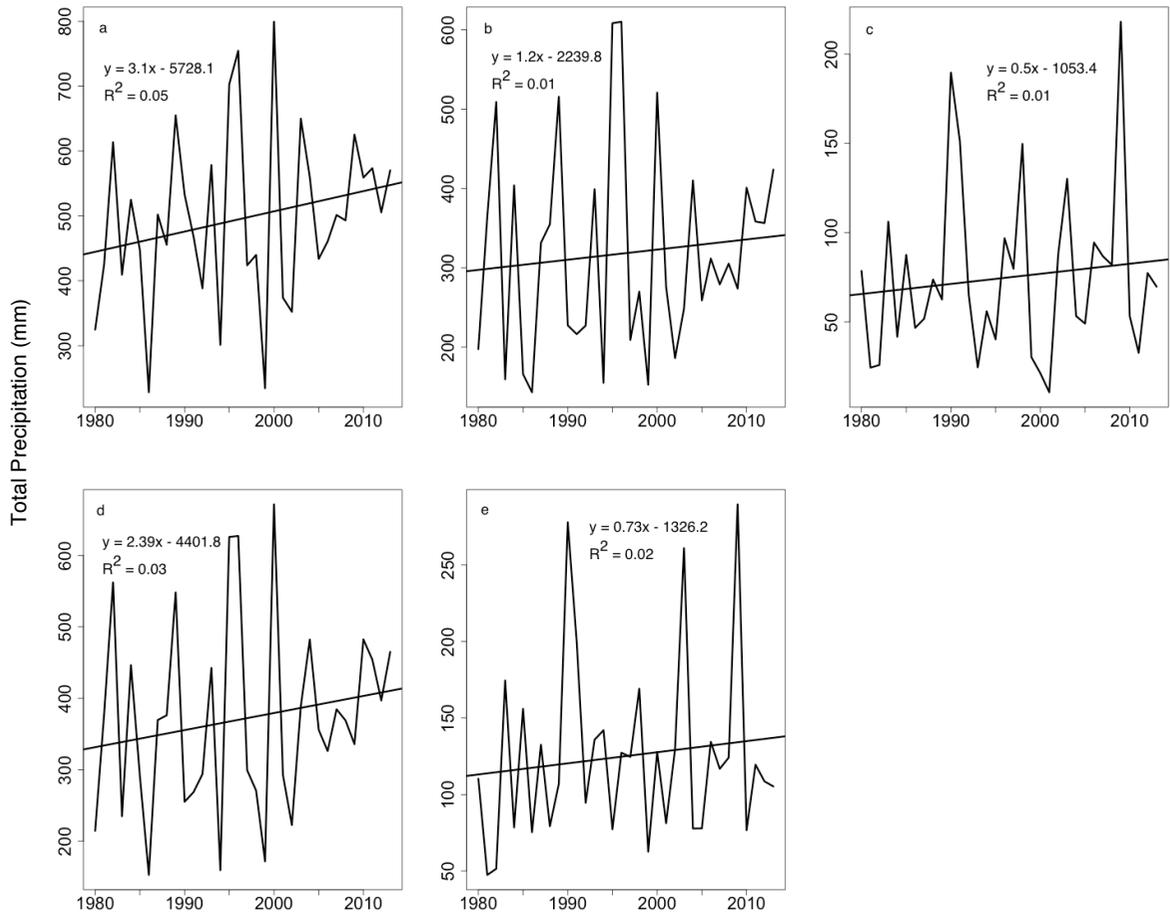


Fig. S2. Least-squares regression of total precipitation measured at Xingtai weather station through time by year (1980-2014), regression line tested by Student's-*t* against slope of line equal to 0. None of the regressions pass the threshold for significance at  $\alpha = 0.95$ . a) total precipitation b) total summer rainfall (June, July, August) c) total spring rainfall (March, April, May) d) total maize growing season rainfall (June to August inclusive) e) total winter wheat growing season rainfall (September to May inclusive)

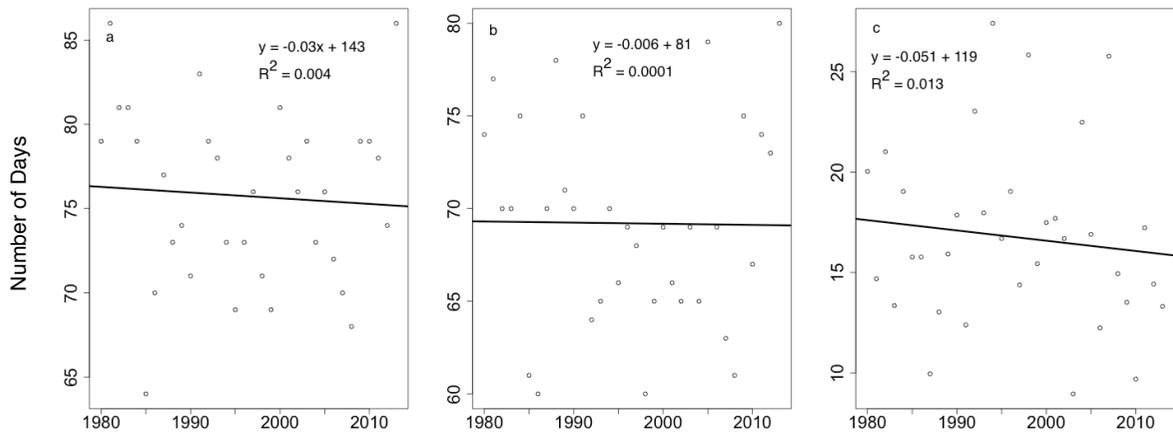


Fig. S3. Number of days per year where climatic variable measured at Xingtai weather station exceeded the standard deviation for that year over time (1980-2014): a measure of whether these variables are becoming more variable over time. a) daily average temperature b) daily maximum temperature c) total yearly precipitation

## Interview Question Catalogue

### Climate Change in the North China Plain:

#### Farmer Perceptions and Adaptations

#### Survey Questionnaire – English Version

Code	Field	Date	Start time	End Time	Interviewer	Note Taker

#### *I. Background Information*

Age	Gender	Location of main land	Number of years lived in village	Years of Education	Number of people in household	Number of main family members involved with agriculture

#### *II. Agricultural Background*

Cropping area (mu)	Main crop today, by area	Main crop today, by revenue	How long? for both area and revenue	Main crop 30 years ago, by area	Main Crop 30 years ago, by revenue	Tillage practice (Rotary Y/N?)

1. If you changed your main crop in the past 30 years, why?
2. Today, what is the most important thing your (main crop) needs to grow well?
3. (30 years ago, was it the same?)
4. (Today, rank the following things according to how important they are for your (main crop) to grow well? 1 is the most important and 5 is the least important.)

Labour	
Irrigation	
Rainfall & Temperature	
Fertilizer	
Seeds	
Other	
All are equally important	

5. 30 years ago, rank the following things according to how important they are for your (main crop) to grow well? 1 is the most important and 5 is the least important)

Labour	
Irrigation	
Rainfall	
Fertilizer	
Temperature	
Other	
All are equally important	

### ***III. Farmer Incomes***

What percentage of your income comes from these economic activities?

Activity	Today (%)	30 years ago (%)
Cash crops (wheat, corn)		
Horticulture		
Animals/livestock		
Off-farm job		

**IV. Disasters**

1. What kinds of agricultural disasters have happened in this area?
- 2.
3. In recent years, which agricultural disaster happens most often? When did these happen? Which one was most damaging to your crops?

Disaster (in list of most often)	When	Most Damaging

Disasters: 1 = drought, 2 = flood, 3 = hail, 4 = frost, 5 = other\_\_\_\_\_

4. 30 years ago, which one happened most often, and was most damaging to your crops?

Disaster (in list of most often)	When	Most Damaging

Disasters: 1 = 干旱drought, 2 = 洪水flood, 3 = 冰雹 hail, 4 = 霜 frost, 5 = 其他other\_\_\_\_\_

**V. Weather**

source of information	Trust	Useful

Source: 1= Telephone; 2= TV; 3= Internet; 4=Radio; 5= Other People; 6= Other  
Trust and Useful: 1=yes; 2=No

1. If Useful=1, how do you use this information?
2. Do you feel any changes in the weather now compared to 30 years ago?

## ***VI. Temperature and Rainfall***

1. Has the number of hot days stayed the same, increased, or declined over the last 30 years? (please explain) *0=same; 1=increased; 2=declined*
2. If changed, what impact did this have on your farming?
3. What adjustments in your farming, if any, have you made to these long-term shifts in temperature? Please list below.
4. Do you remember any years that were particularly hot? cold? How did this affect your farming?
5. Which month is most important for your main crop in terms of temperature? Have you noticed any change in this month's temperature in the past 30 years?
6. Has the amount of rainfall stayed the same, increased, or declined over the last 30 years? *0=same; 1=increased; 2=declined*
7. If changed, what impact did this have on your farming?
8. What adjustments, in your farming, if any, have you made to these long-term shifts in rainfall? Please list below.
9. Which month is most important for your main crop in terms of rainfall? Have you noticed any change in this month's rainfall in the past 30 years? What changes?
10. Do you remember any years that were particularly wet? dry? How did this affect your farming?
11. What are the greatest weather-related risks you face? Have these changed or stayed constant over the past 30 years?

**VII. Future Aspirations**

1. In the face of a changing climate, which of these measures have you considered, or would consider in the future? What is stopping you if you have not applied them?

9.1 Would you	9.2 Reason	9.3 Blockage (key)
1. change crop variety		
2. build a water-harvesting scheme		
3. implement soil conservation techniques		
4. buy insurance		
6. irrigate more		
7. change from crop to livestock		
8. reduce number of livestock		
9. Change tillage practice		
10. find off-farm job		
11. lease your land		
12. Other		

1. Where do you want to work in the future? What about your children (if applicable)?

2. Where do you want to live in the future? What about your children (if applicable)?

**VII. Other Comments**

Adapted From:

Gbetibouo, G. A. (2009). Understanding farmers' perceptions and adaptations to climate change and variability: The case of the Limpopo Basin, South Africa (Vol. 849). Intl Food Policy Res Inst.

Hageback, J., & Sundberg, J. (2002). Climate variations in relation to local scale land use and farmers perception of climate in Danangou watershed on the Loess Plateau, China. Earth Sciences Centre, Göteborg University B, 335, 62.