



# Climate Change Awareness into Action: The Case of Puerto Rican Farmers

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# Climate change is already affecting us...

- Nighttime temperatures have risen, as well as overall temperatures and days with extreme heat.
- No observed general reduction or increase in precipitation, but some regions of Puerto Rico, have experienced changes in annual, seasonal, and daily trends.
- There is observed sea-level rise, ocean acidification and increased surface temperature.



# ...and it will continue to affect us

- Temperatures, droughts, and heatwaves are expected to increase
- Rainfall patterns are expected to change, particularly a decrease in rain in various regions
- Stronger hurricanes will increase, as well as rains associated with them



# Minimum Temperature Changes for 2041-2060

Less Change

More Change

1.55 °F

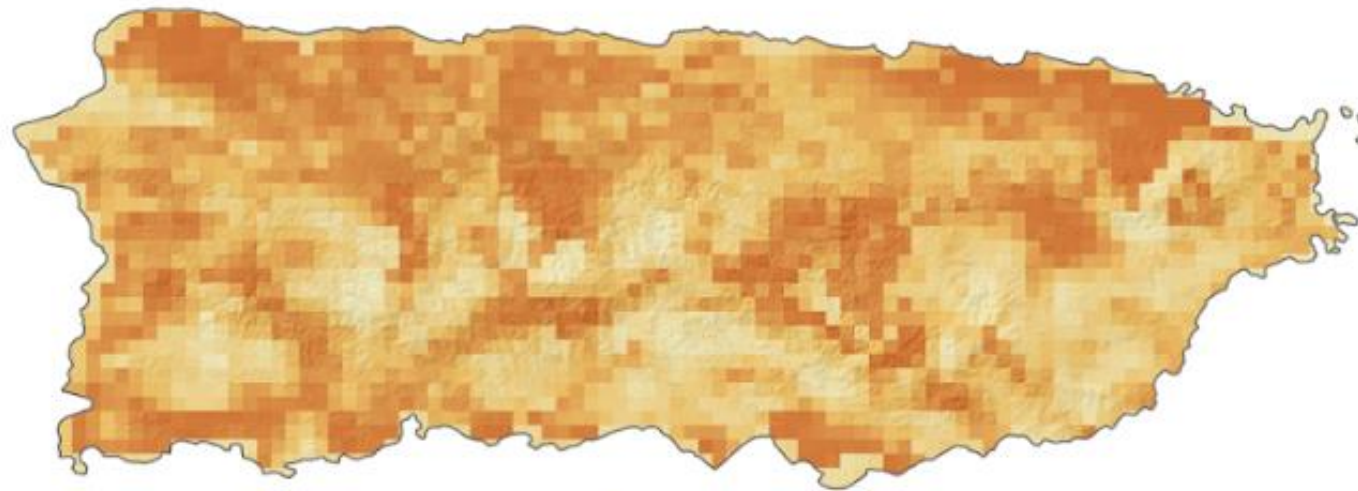
3.08 °F

0.86 °C

1.71 °C

The map shows one of the scenarios for changes in minimum temperature (in degrees). Minimum temperatures are defined as the lowest recorded in a period of time. More than 50 days are expected with unprecedented increases in minimum temperatures. Some years had more than 200 days with exceptionally high numbers for minimum temperatures.

## Puerto Rico



0 10 20 kilometers

Culebra



Vieques



0 5 10 kilometers

<sup>1</sup>Data collected from the Centre National de Recherches Météorologiques- (CNRM) Model applied by Bowden, J.H., Terando, A.J., Misra, V.; Wootten, A., Bhardwaj, A., Boyles, R., Gould W., Collazo, J.A. and Spero, T.L. (2020). High resolution dynamically downscaled rainfall and temperature projections for ecological life zones within Puerto Rico and for the U.S. Virgin Islands. International Journal of Climatology. 104606(3): 1-23. <https://doi.org/10.1002/>

Legal Limits, United States Census Bureau

Terrain (Hillshades): Continuously Updated Digital Elevation Model (CUDEM)

Figure prepared by: Loderay Bracero Marrero, Caribbean Climate Hub

Credit: Loderay I.M. Bracero Marrero, Geospatial  
Information Manager, USDA Caribbean Climate Hub

# Maximum Temperature Changes for 2041-2060

Less Change

1.55 °F  
0.87 °C

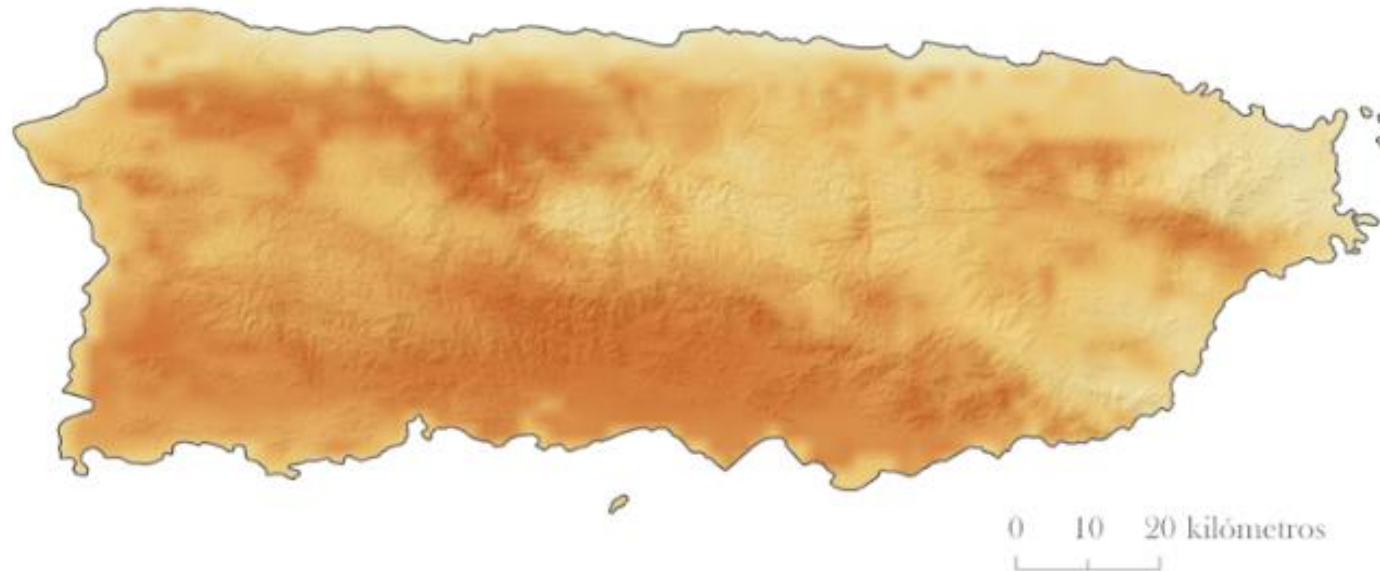
More change

3.08 °F  
1.71 °C

The map shows one of the scenarios for changes in maximum temperature (in degrees). Maximum temperatures are defined as the highest recorded in a period of time. More than 50 days are estimated with unprecedented temperature increases. Some years had more than 200 days with exceptional figures.



## Puerto Rico



Culebra

Vieques

0 5 10 kilometers

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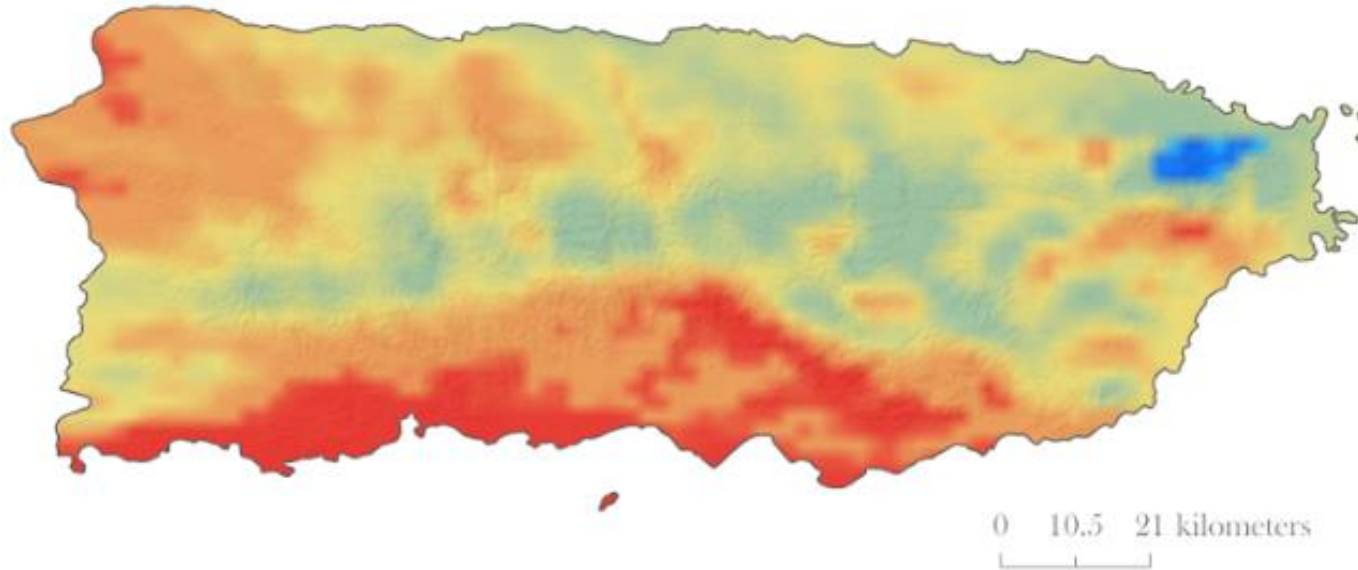
Credit: Loderay I.M. Bracero Marrero, Geospatial Information Manager, USDA Caribbean Climate Hub

# Rainfall Changes for 2041-2060



The map shows changes in rainfall by percentage. On average, it is estimated a reduction of rainfall of -25% in Puerto Rico and a reduction of rainfall of -12% in the US Virgin Islands. The models estimate a higher decrease of rainfall than an increase.

## Puerto Rico



Culebra



Vieques



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A photograph of a rural landscape. In the foreground, there is a dry, brown field with a simple fence made of wooden posts and wire. A large, leafy tree stands on the left side of the field. In the background, there are rolling hills covered in sparse vegetation. The sky is overcast and grey. Several power lines run across the top of the image. The text "What do Puerto Rican farmers think about climate change? How climate change awareness translates to action?" is overlaid in white, serif font on the right side of the image.

What do Puerto Rican  
farmers think about climate  
change? How climate  
change awareness translates  
to action?



Farmer characteristics: small, commercial, avg 57 acres, most farms < 100 acres, majority diversified/specialty crops (USDA CENSUS, 2018)



Finca El Reverdecer, Facebook, 2021



Josco Bravo, Facebook, 2021



El Vocero, 2021



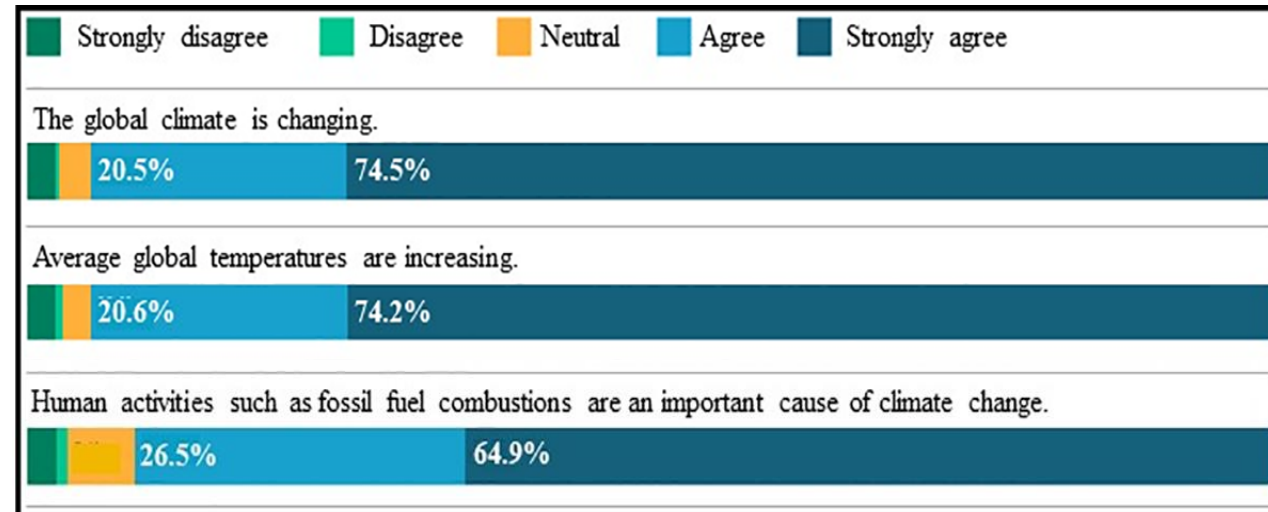
Sabrosia PR, 2019



# What do Puerto Rican farmers think about climate change?

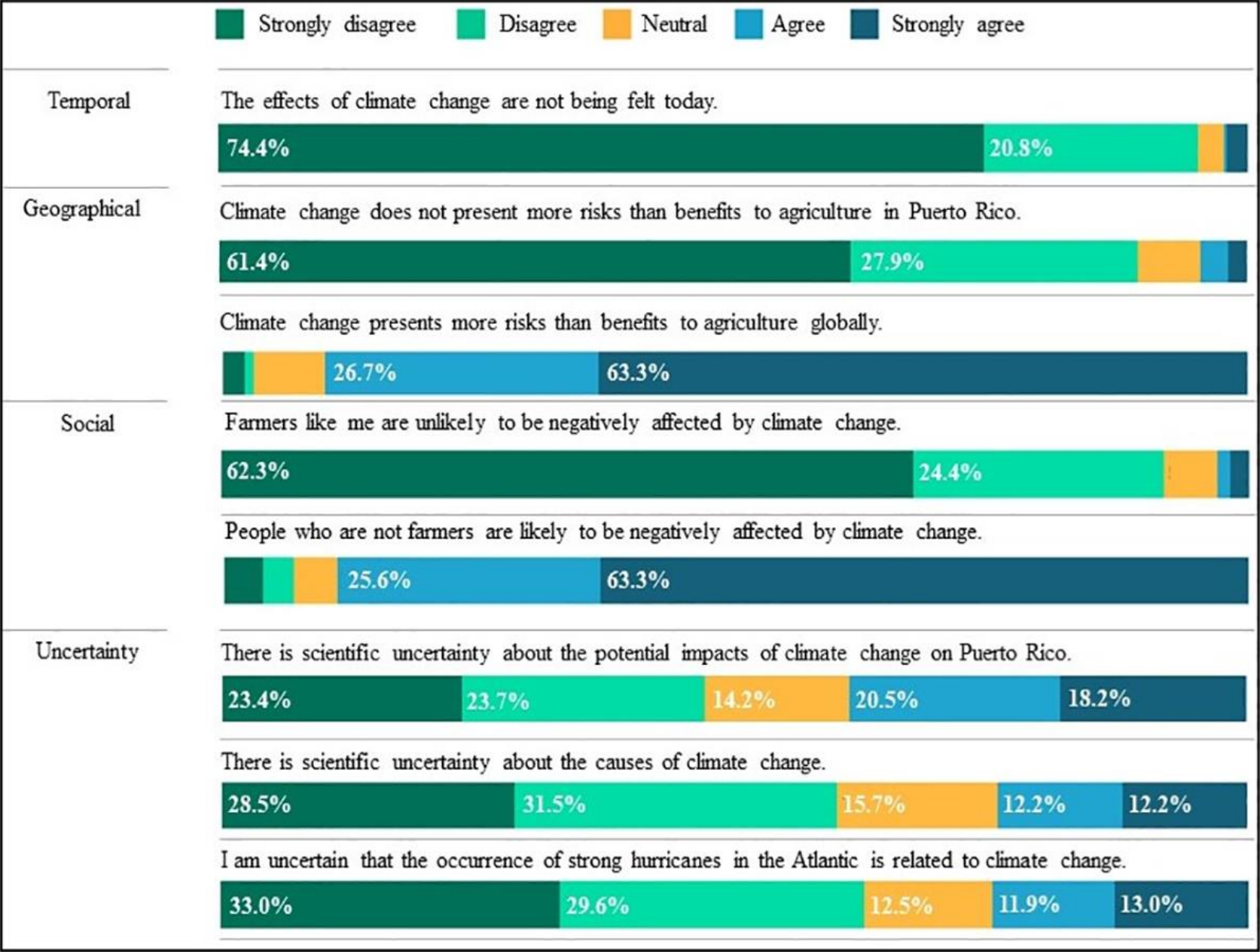
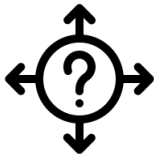


Puerto Rican farmers recognize climate change as a local and global issue. (N = 405; 87% response rate)



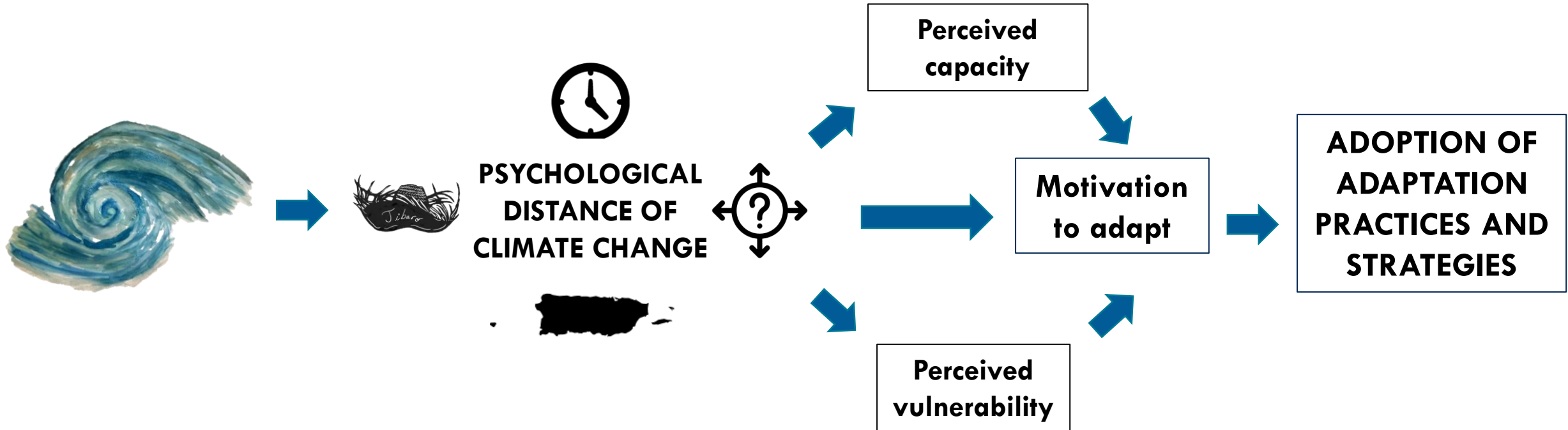


Farmers have broad awareness of impacts across multiple time frames, geographies, and social constructs.





A structural equation model that examined the extent to which Puerto Rican farmers' adoption of agricultural practices to prepare for future events after Hurricane Maria relates to adaptation perceptions as a function of their psychological distance of climate change.





# How climate change awareness translates to action?

- Neither reported experience with past extreme weather events, nor the reported damages effected by Maria (direct experience) were linked to farmers' climate change perceptions.
- Awareness of climate change and its impacts was not linked to actual adoption of new adaptation strategies after Hurricane Maria.
- Might we be reaching a climate change belief threshold?





Obstacles to farm recovery were related to (N = 401):

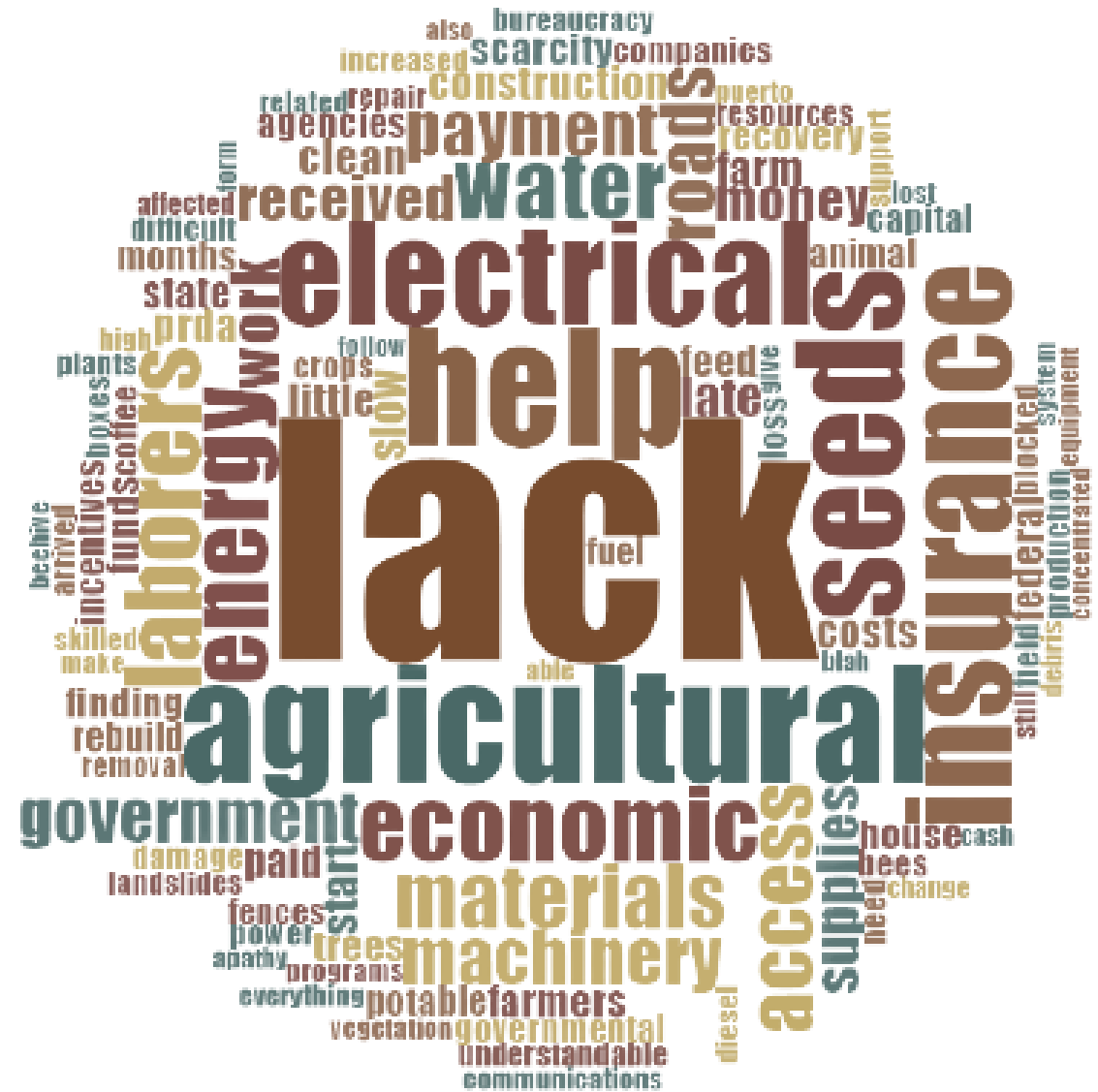
27% institutions

26% economic

## 26% materials and tech

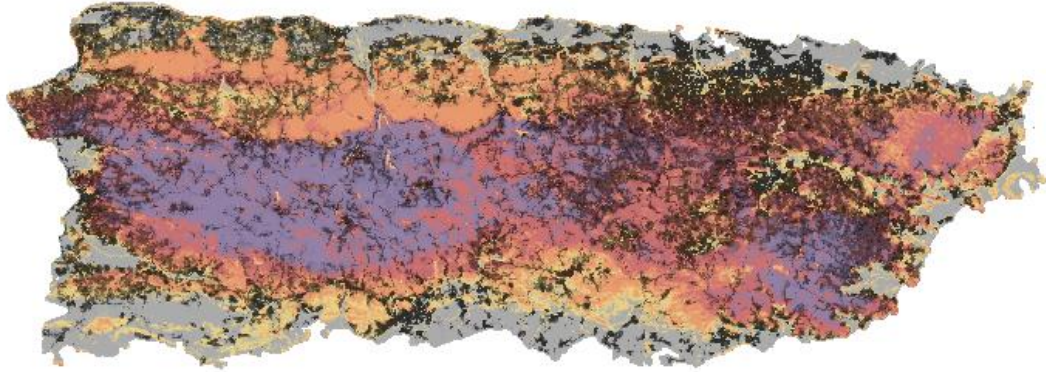
23% ag resources

# Actual and intended adoption of adaptation practices were linked mostly to structural factors






A 1/3 of Puerto Ricans live in areas of high to extreme landslide susceptibility



Farmers in focus groups expressed concern about climate change, in relation to high precipitation and landslide risks.








Climate change awareness and perceptions do not exist in a void.

- Better understand coupled local and federal policies in relation to climate adaptation.
- Develop strategies and interventions that strengthen adaptive capacity.



A scenic landscape featuring a large, leafy green tree in the middle ground. In the foreground, there is a field with various plants, including a bush of yellow flowers and a large bush of red flowers. The background consists of rolling green hills under a cloudy sky. Several power lines are visible in the upper part of the image.

**Muchas gracias a las  
agricultoras y a los  
agricultores que  
participaron en los  
estudios**



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