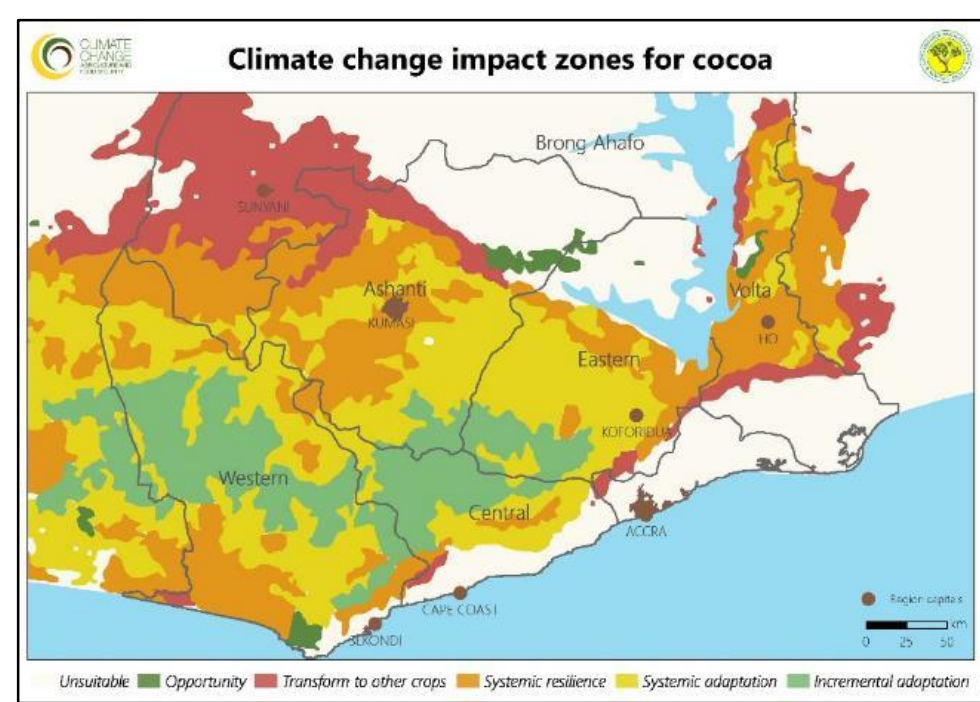


# Assessing the Needs for Different Climate Change Adaptation Strategies in Ghana's Cocoa Sector

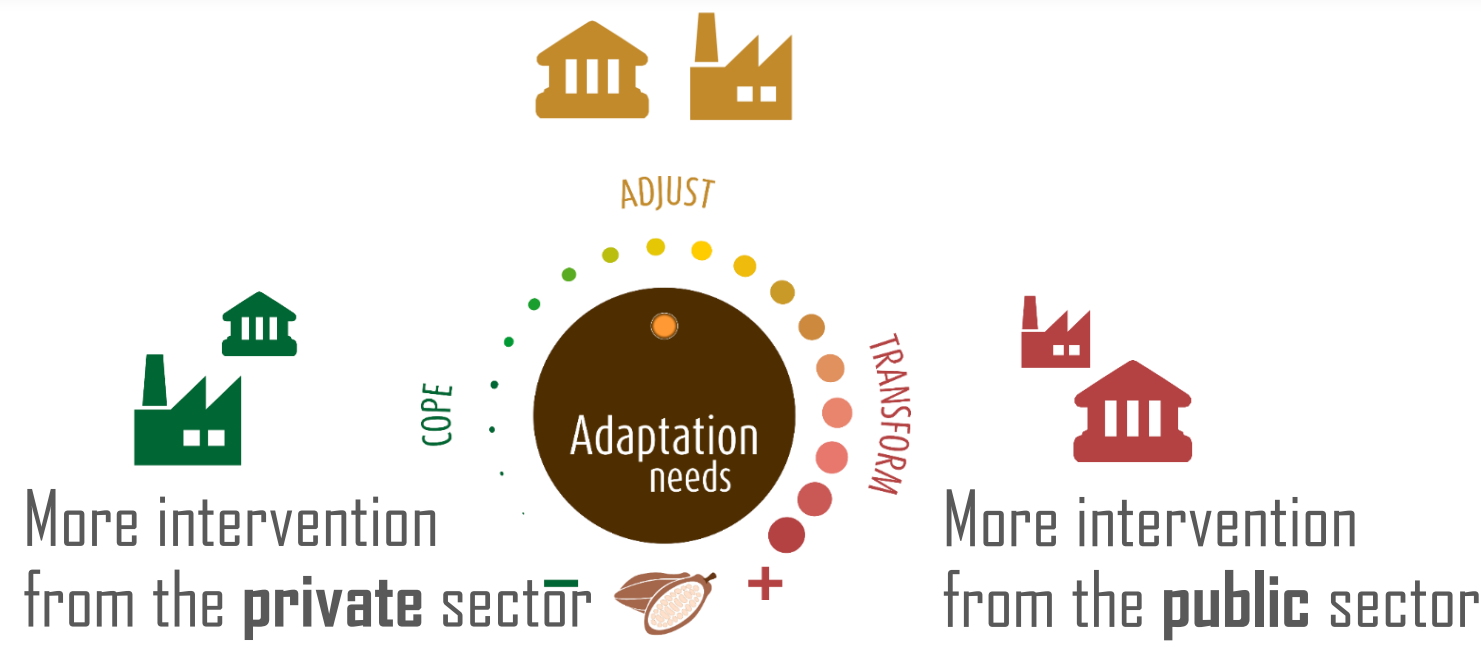
Christian Bunn<sup>1</sup>, Felix Schreyer<sup>1</sup>, Fabio Castro<sup>1</sup>, Mark Lundy<sup>1</sup>, Caitlin Corner-Doloff<sup>2</sup>

<sup>1</sup> International Center for Tropical Agriculture (CIAT), Cali, Colombia; <sup>2</sup> Foreign Agricultural Service, USDA, Washington D.C., USA

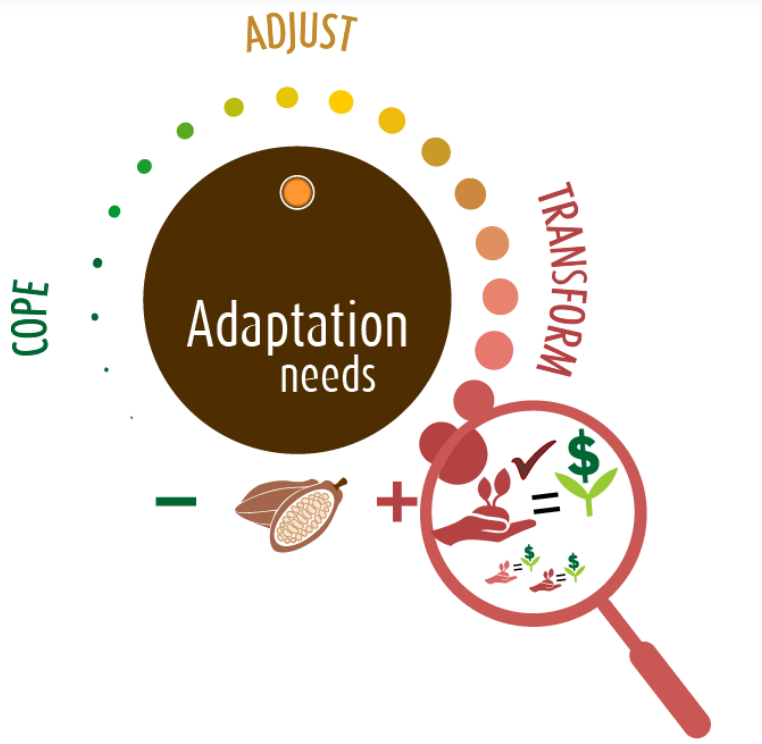
## Introduction



Several regional studies demonstrated drastic impacts of climate change on cocoa production in Ghana<sup>1</sup>



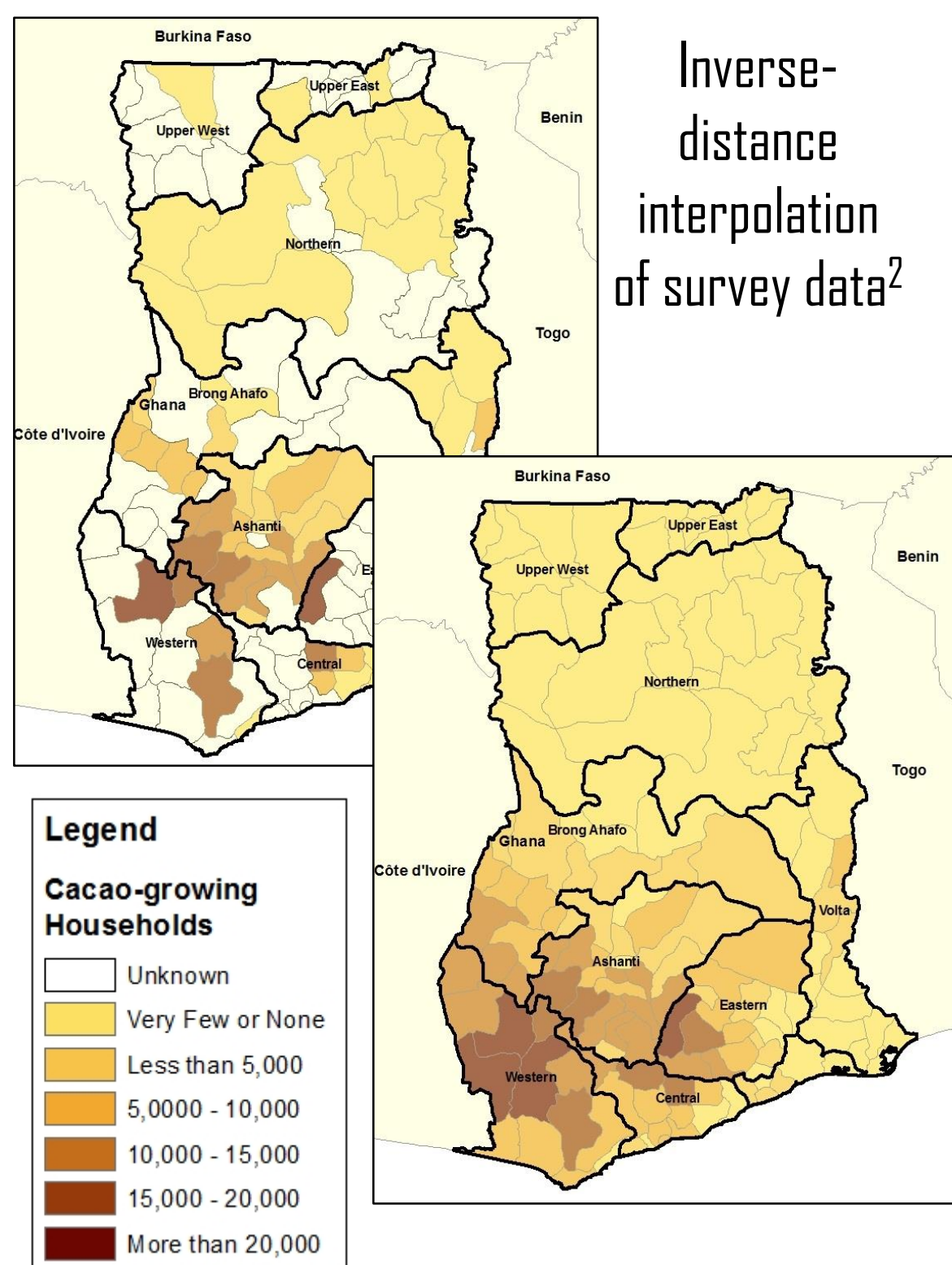
But who cares? Cocoa is the backbone of the rural economy in Ghana and contributes 3% to the GDP, yet not all production will be equally affected



Assessing the human and economic cost of potential climate change impacts can provide a benchmark for investments into adaptation.

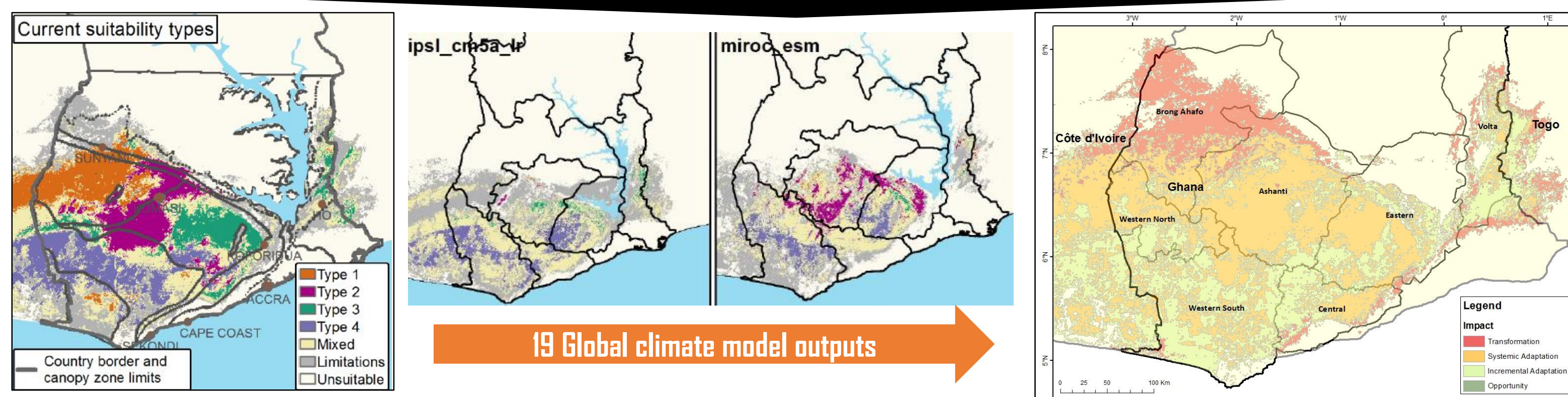
## Data and Methods

### Cocoa households in Ghana



Inverse-distance interpolation of survey data<sup>2</sup>

### Climate change damage scenarios

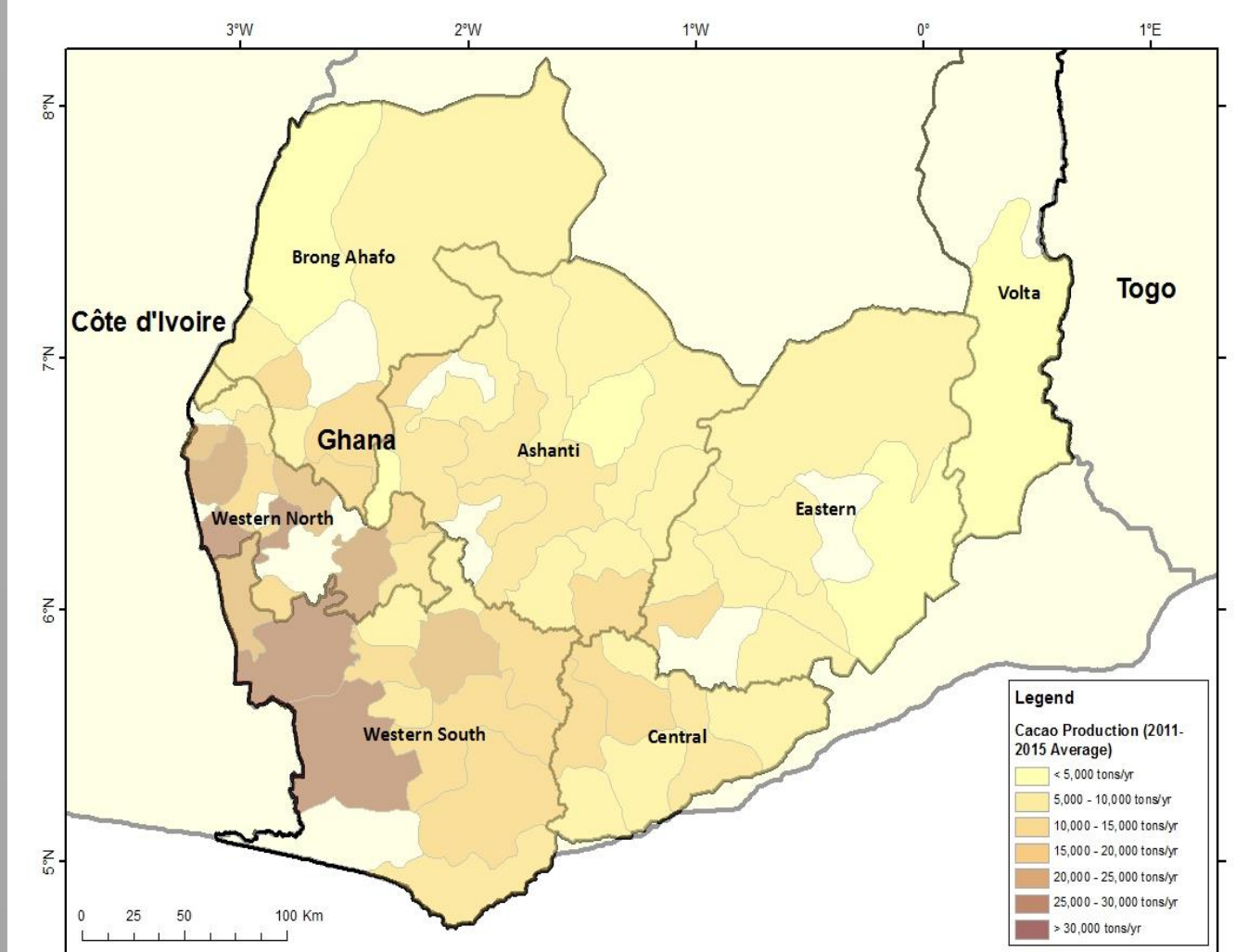


Determining climate impact gradient<sup>3</sup> based on suitability change and damage scenarios:

1. **Transformation** (suitable → unsuitable): Losses of 60%/80%/100% of cacao income
2. **Systemic Adaptation** (change suitable climate zone): Losses of 20%/40%/60%
3. **Incremental Adaptation** (same suitable climate zone): Losses of 10%/15%/20%
4. **Opportunity** (unsuitable → suitable): Opportunity cost of 500 kg/ha on 20%/35%/50% of area

Total of 19 climate scenarios x 3 impact scenarios x 3 adaptive capacity scenarios  
= 171 scenarios in total, assumed equally likely

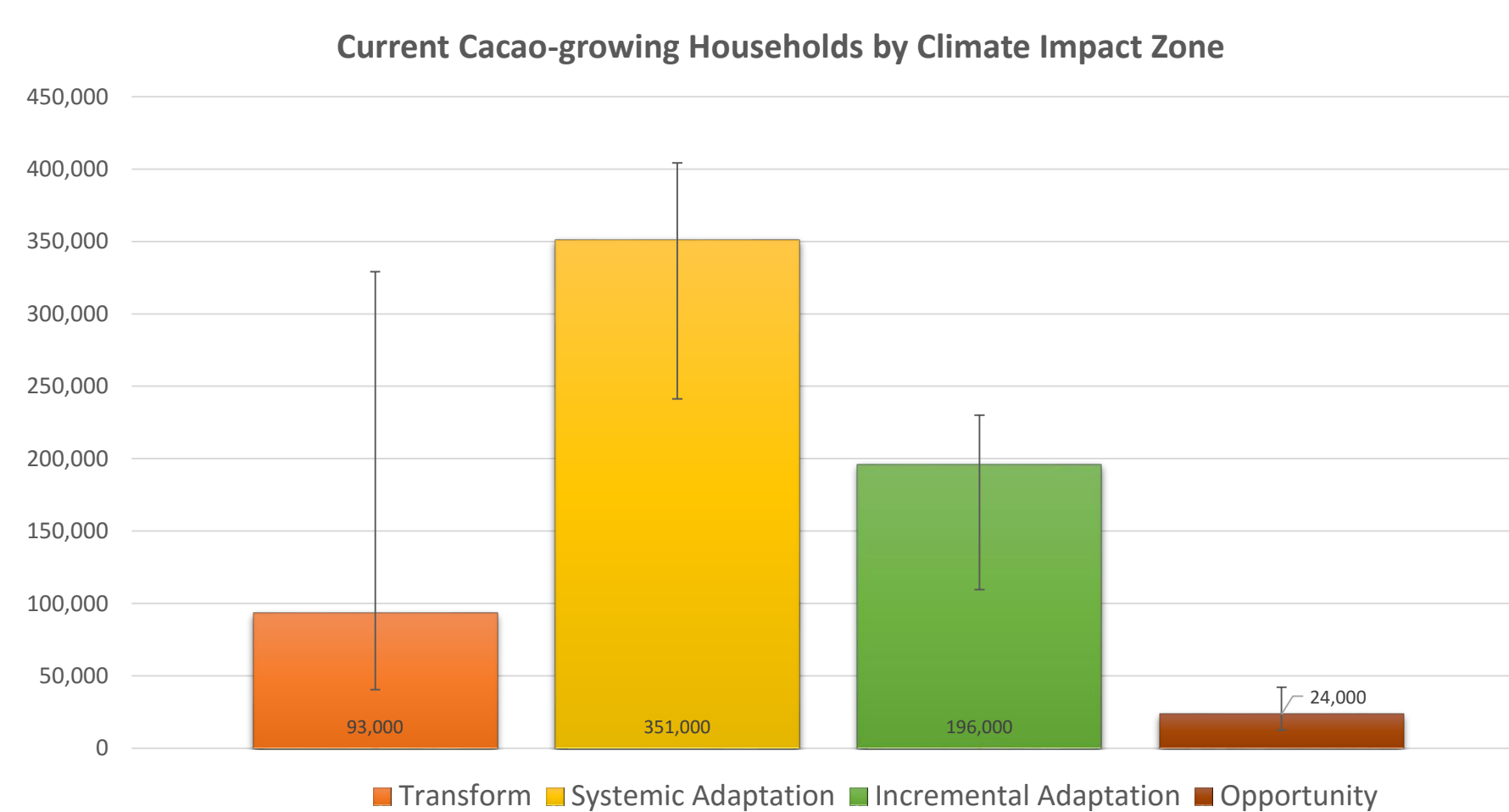
### Cocoa production in Ghana



Subnational distribution provided by the Ghana Cocoa Board (COCOBOD)  
Total production from 1981-2015 for each cocoa collection district

## Results

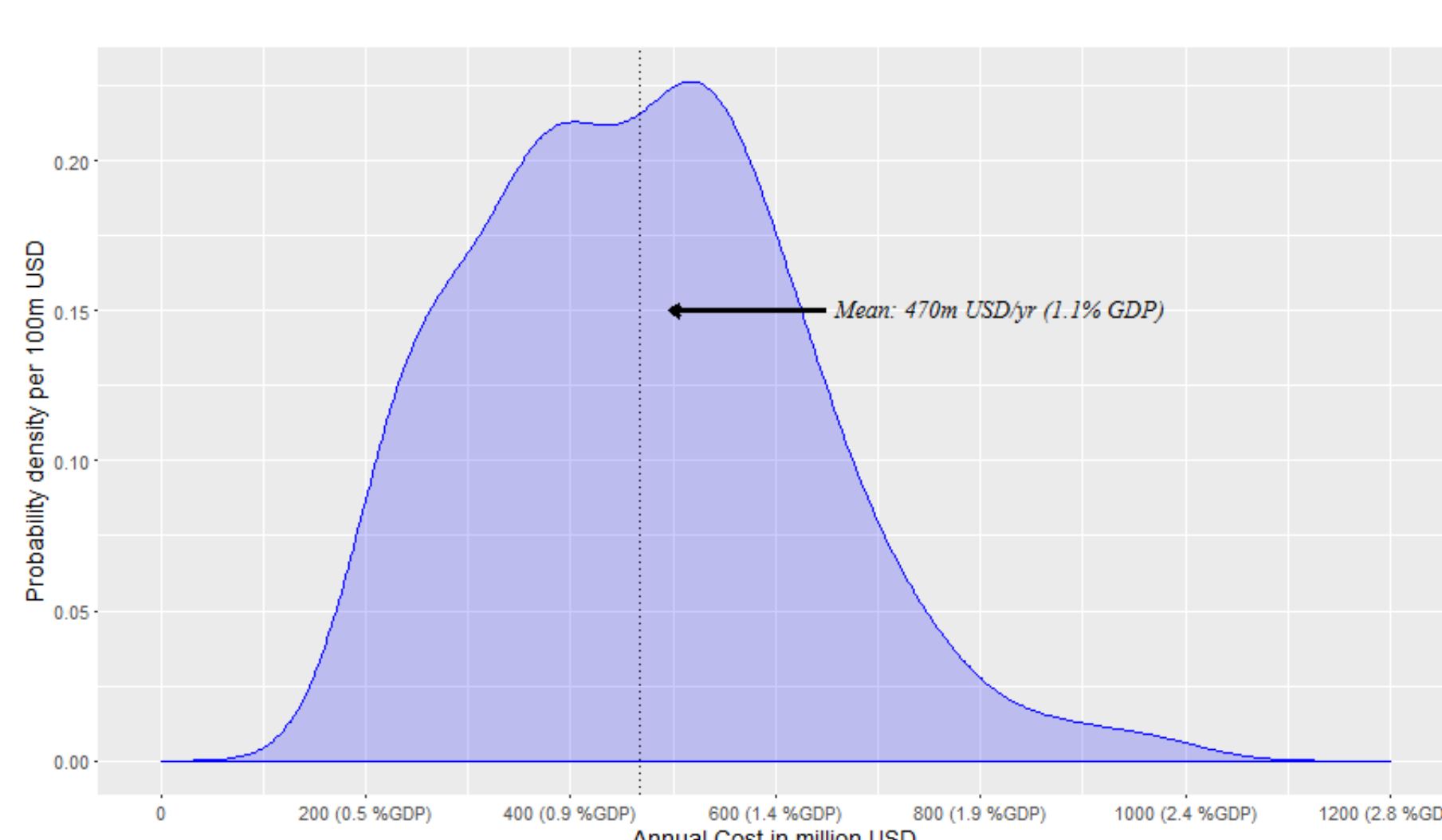
### Affected cocoa households



Number of current (2010) cacao-growing households in Ghana per climate impact zone. The colored bars show the median of the 19 climate scenarios. The error bars denote the 90% range.

- 93,000 households that will need income alternatives
- 351,000 households with high adaptation needs
- 196,000 households with low adaptation needs
- High downside risk

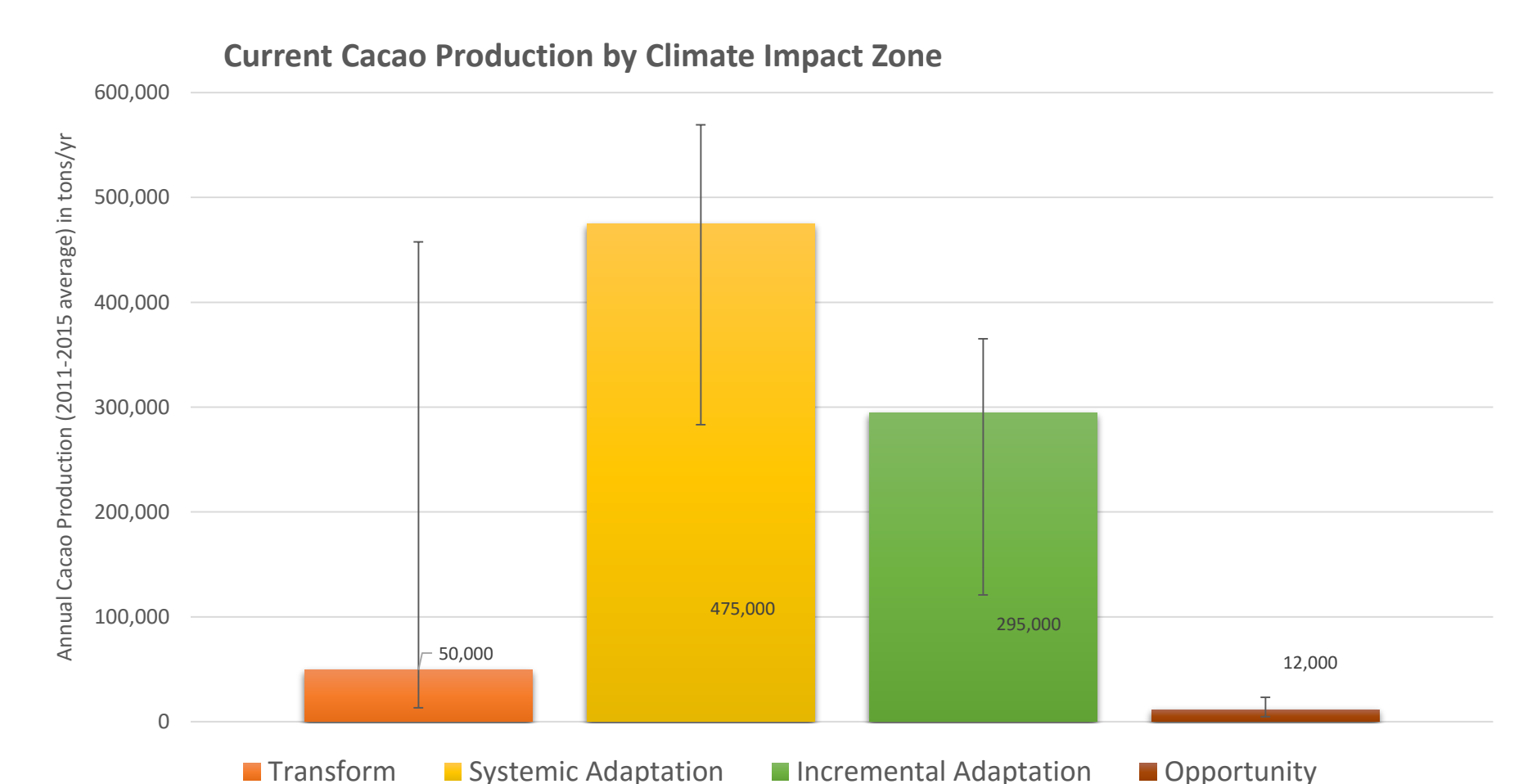
### Potential economic damages



Total cost of inaction estimate as probability distribution over the 171 scenarios in million USD per year and as loss of % real GDP (2010 price base year).

- 470m USD/year which corresponds to 1.1% of current real GDP.
- The 90% range is 230m-740m USD equivalent to 0.5-1.8% of GDP
- High downside risk

### Affected cocoa production



Annual Cacao Production (2011-2015 average) of Ghana per climate impact zone. The colored bars show the median of the 19 climate scenarios. The error bars denote the 90% range.

- 50,000 tons that will be lost
- 475,000 tons with serious threats
- 295,000 tons with low threats
- High downside risk

## Conclusions

- Cocoa can still be cultivated under a changing climate in the 2050s in most of the current cacao-growing regions in Ghana
- Well-directed adaptation effort is needed to avert climate-induced productivity losses
- A key problem is that as far as we know there are no models, neither physiological nor statistic, that can simulate realistic cacao bean yields for Ghana
- The cost estimate is based on current production and prices, although demand and also production will most likely grow in the future
- Without adaptation the rural economy in Ghana will lose large shares of income**

## Literature

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## Acknowledgements

This work was implemented as part of the CGIAR Research Program on Climate Change, Agriculture and Food Security (CCAFS), which is carried out with support from CGIAR Fund Donors and through bilateral funding agreements. For details please visit <https://ccafs.cgiar.org/donors>. The views expressed in this document cannot be taken to reflect the official opinions of these organizations.

Contact: [cbunn@cgiar.org](mailto:cbunn@cgiar.org)