



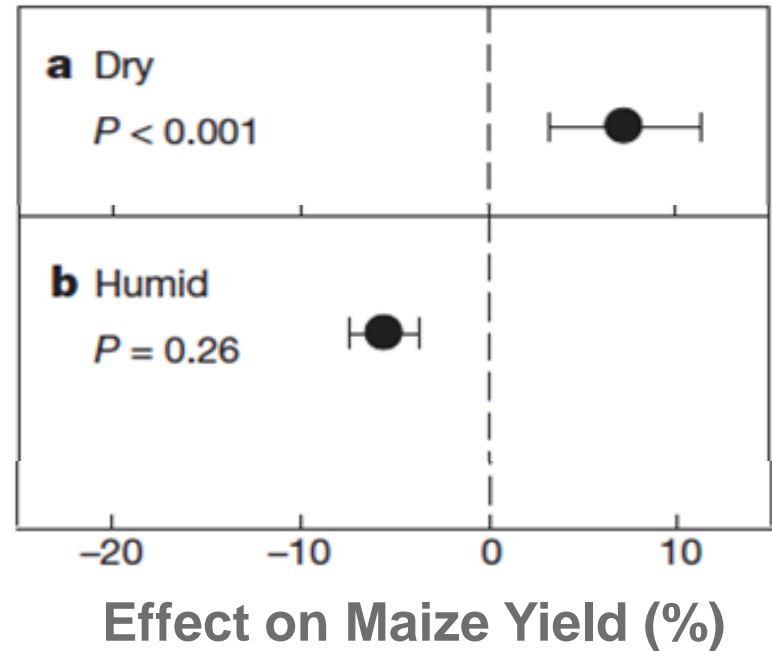
# Predicting the Performance of CSA Technologies under current and future conditions

*Christine Lamanna, Pete Steward, Roeland Kindt, and Todd Rosenstock*  
*October 8, 2019, Bali, Indonesia*





## Conservation Agriculture



Pittelkow et al. 2014

TECHNOLOGIES  
ARE CENTRAL  
TO CSA...

... BUT CONTEXT  
MATTERS

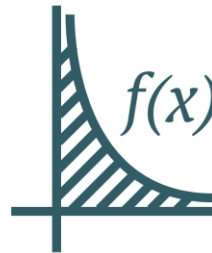
# HOW CAN WE PREDICT WHAT WORKS?

Not  
CSA

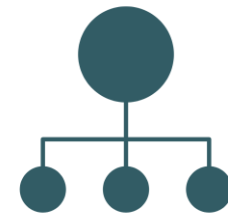
CSA



**1. Generate evidence**  
on performance across a  
range of contexts



**2. Model performance**  
as a function of context



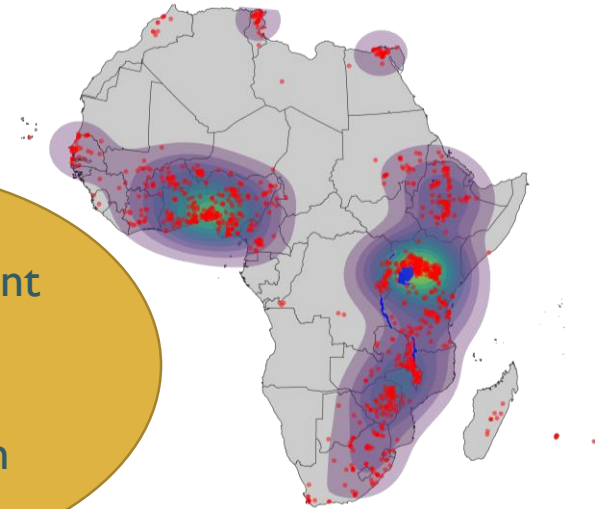
**3. Predict performance**  
in novel contexts

# I. GENERATE EVIDENCE

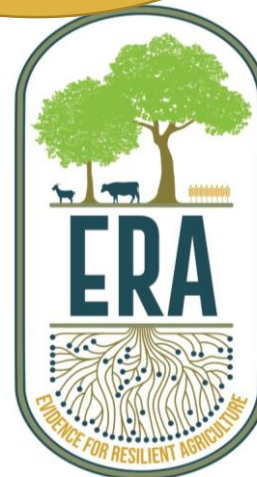
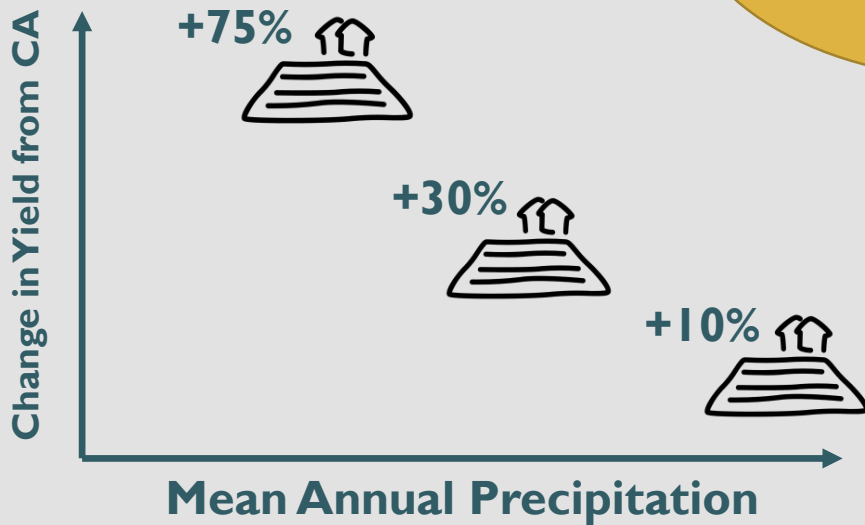
From on-farm experiments...



... to continental data



ERA Launch Event  
Wednesday  
17:00  
Hibiscus Room

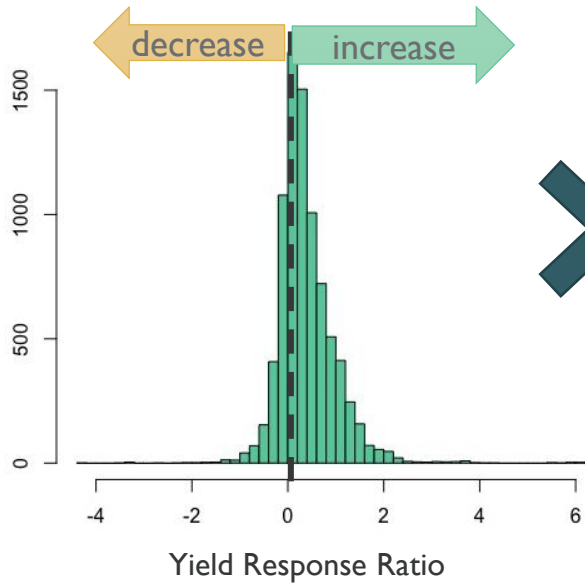


## ERA DATA

- **Systematic Review & Meta-Analysis** of Peer-Reviewed Agricultural Studies in Africa
- **>100 CSA Technologies**
- **>1400 studies**
- **> 75,000 data points**
- **<https://era.ccafs.cgiar.org>**

# 2. MODEL PERFORMANCE X CONTEXT

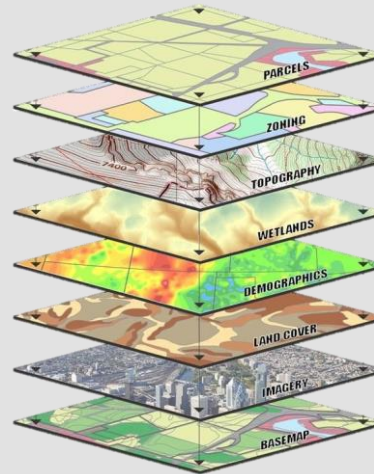
## Agricultural Data



### ERA:

- 10 CSA Practices
- Maize
- Change in Yield
- Suitable > 15% increase in yield

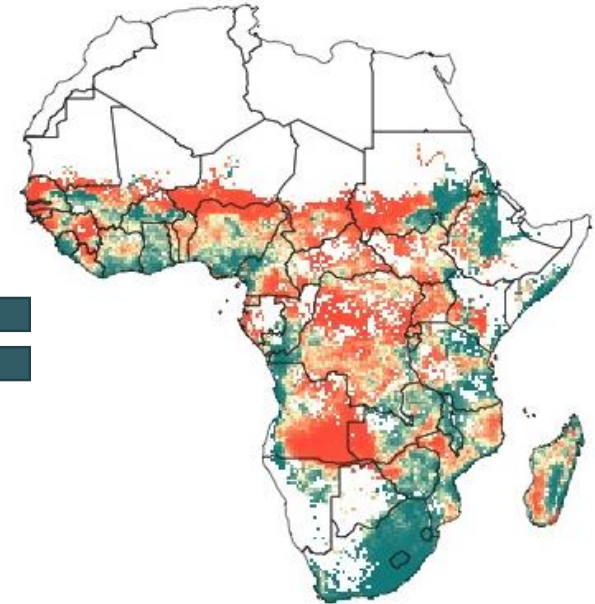
## Spatial Data



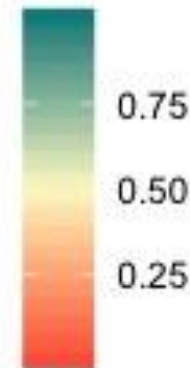
### AFRICLIM:

- Mean Annual Temperature
- Isothermality
- Maximum Temperature
- Mean Annual Precipitation
- Rainfall Seasonality
- Length of Dry Season
- Potential Evapotranspiration

=

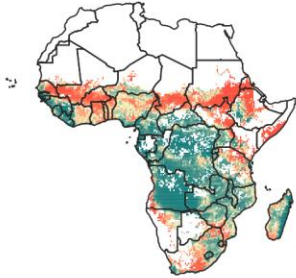


### Chance Suitable

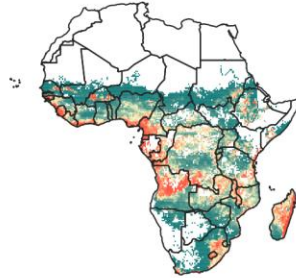


### 3. PREDICT FOR NOVEL CONTEXTS

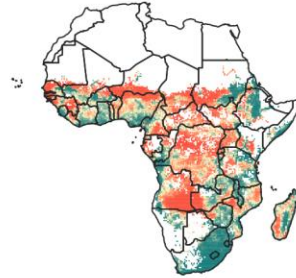
Crop.Residue



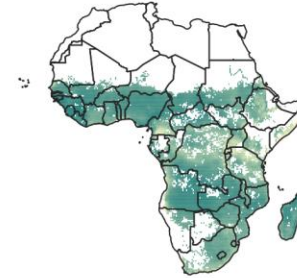
Crop.Rotation



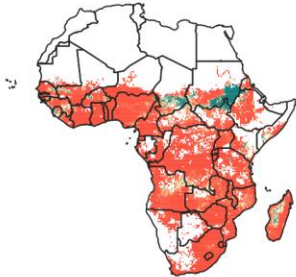
Green.Manure



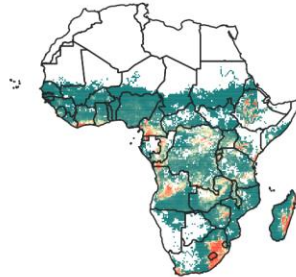
Inorganic.Fertilizer



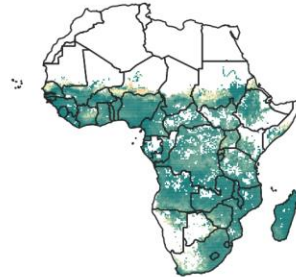
Intercropping



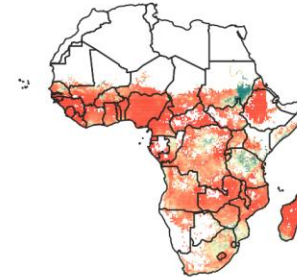
Mulch



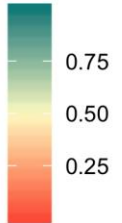
Organic.Fertilizer



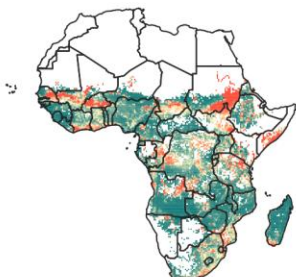
Reduced.Tillage



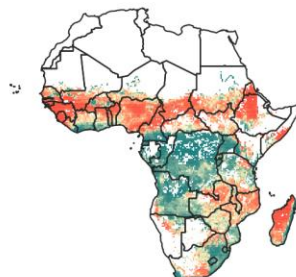
Chance Suitable



Tree.Management



Water.Harvesting



Technology Suitability  
Chance of >15% yield increase for  
Maize

Map of Uganda from compendium

*Northern Uganda is a “data desert” due to decades of conflict, but now hosts more than 1 million refugees who need climate-proofed agriculture*

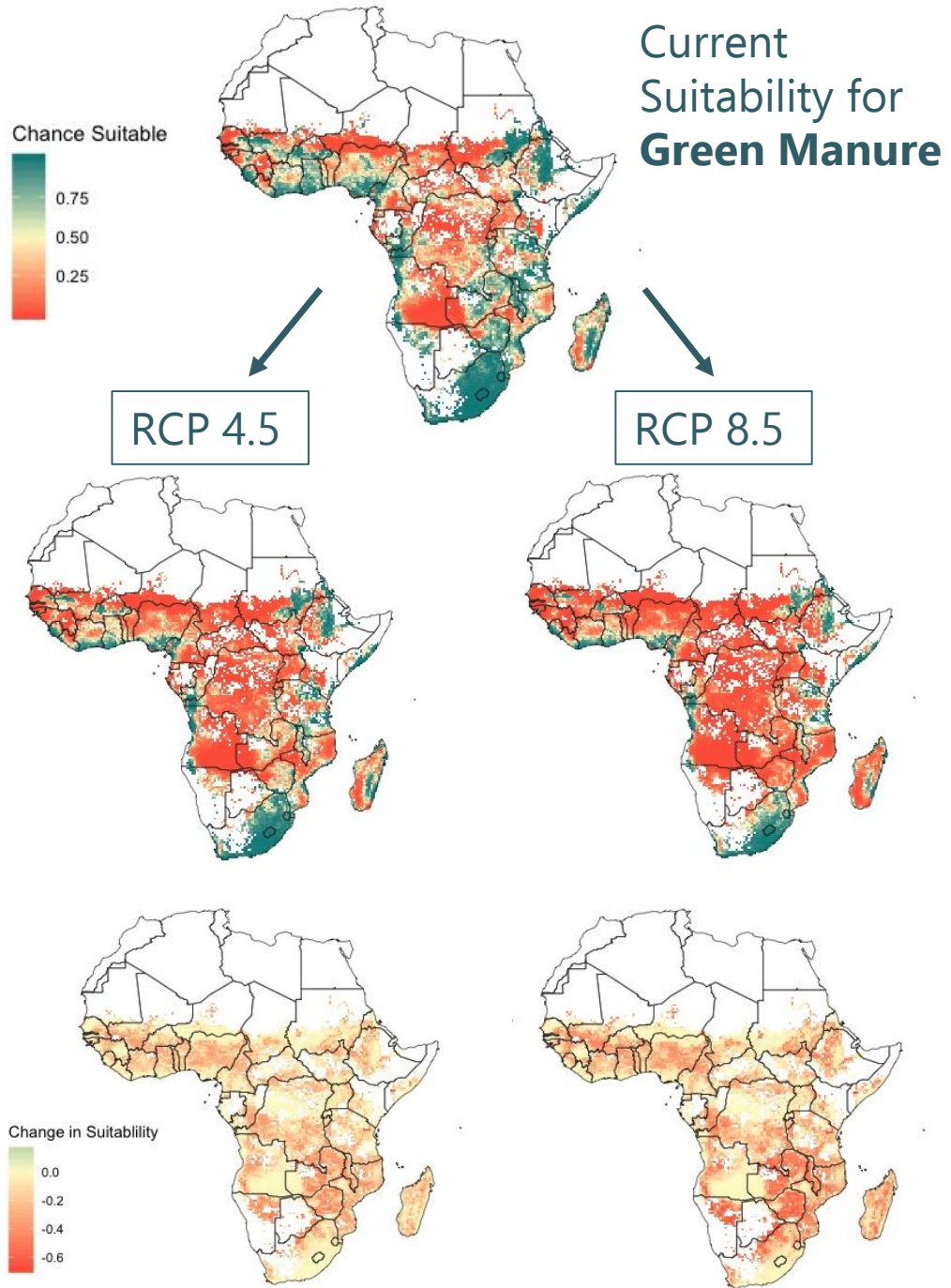
Example suitability maps

PREDICTING  
FOR NOVEL  
CONTEXTS



C. Watson (ICRAF)

# PLANNING FOR CLIMATE CHANGE





# PLANNING FOR CLIMATE CHANGE

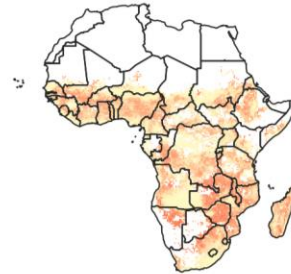
**Crop.Residue**



**Crop.Rotation**



**Green.Manure**



**Inorganic.Fertilizer**



**Intercropping**



**Mulch**



**Organic.Fertilizer**



**Reduced.Tillage**



Change in Suitability

0.5  
0.0  
-0.5

**Tree.Management**



**Water.Harvesting**



Change in Technology Suitability  
2085 vs. 2000  
RCP 8.5

# CONCLUSION SLIDE



RESEARCH PROGRAM ON  
Climate Change,  
Agriculture and  
Food Security



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