Estimating the global potential of water harvesting from successful cases

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Evidence-based

WOCAT

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case studies

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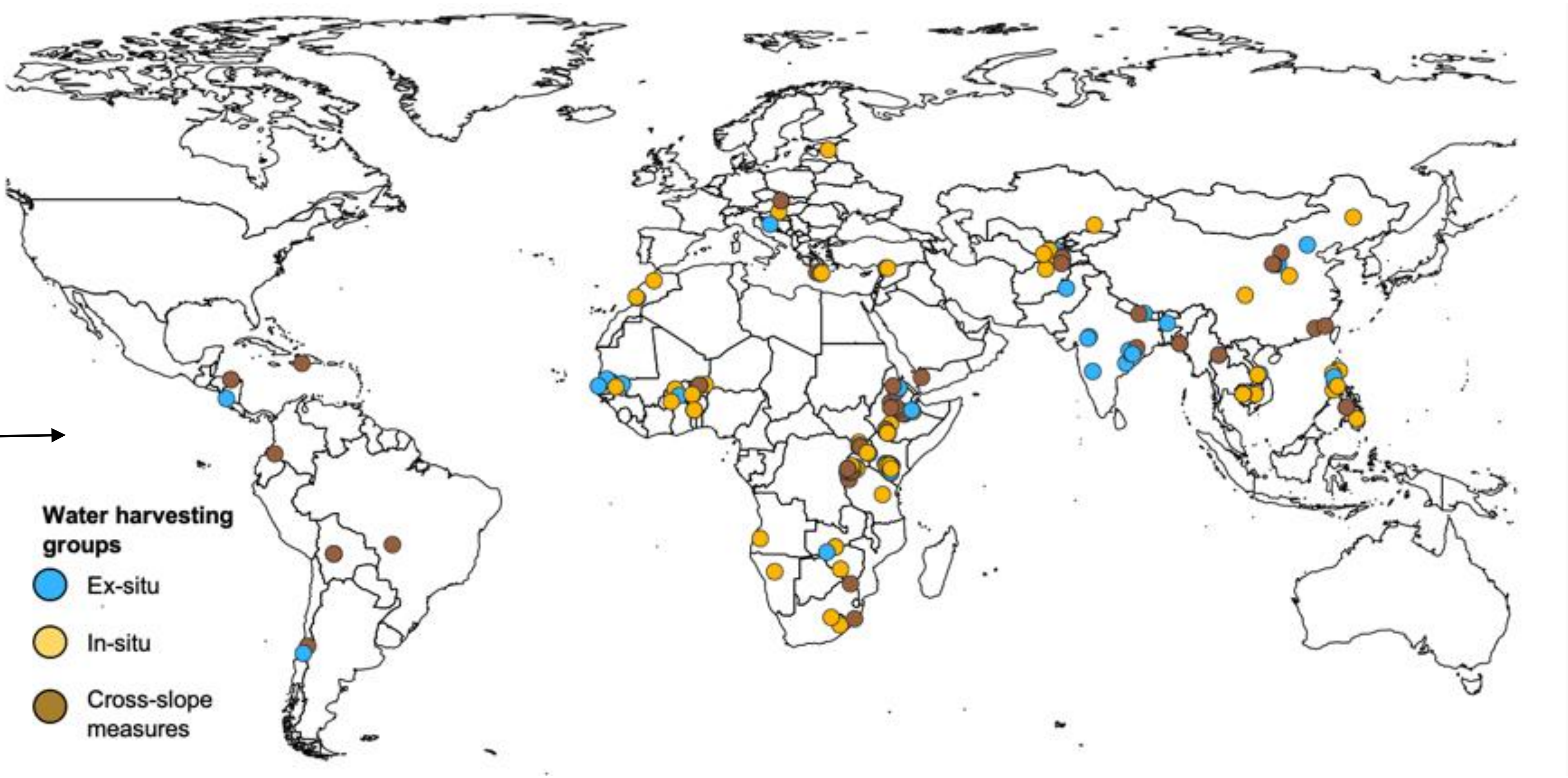

Evidence-based

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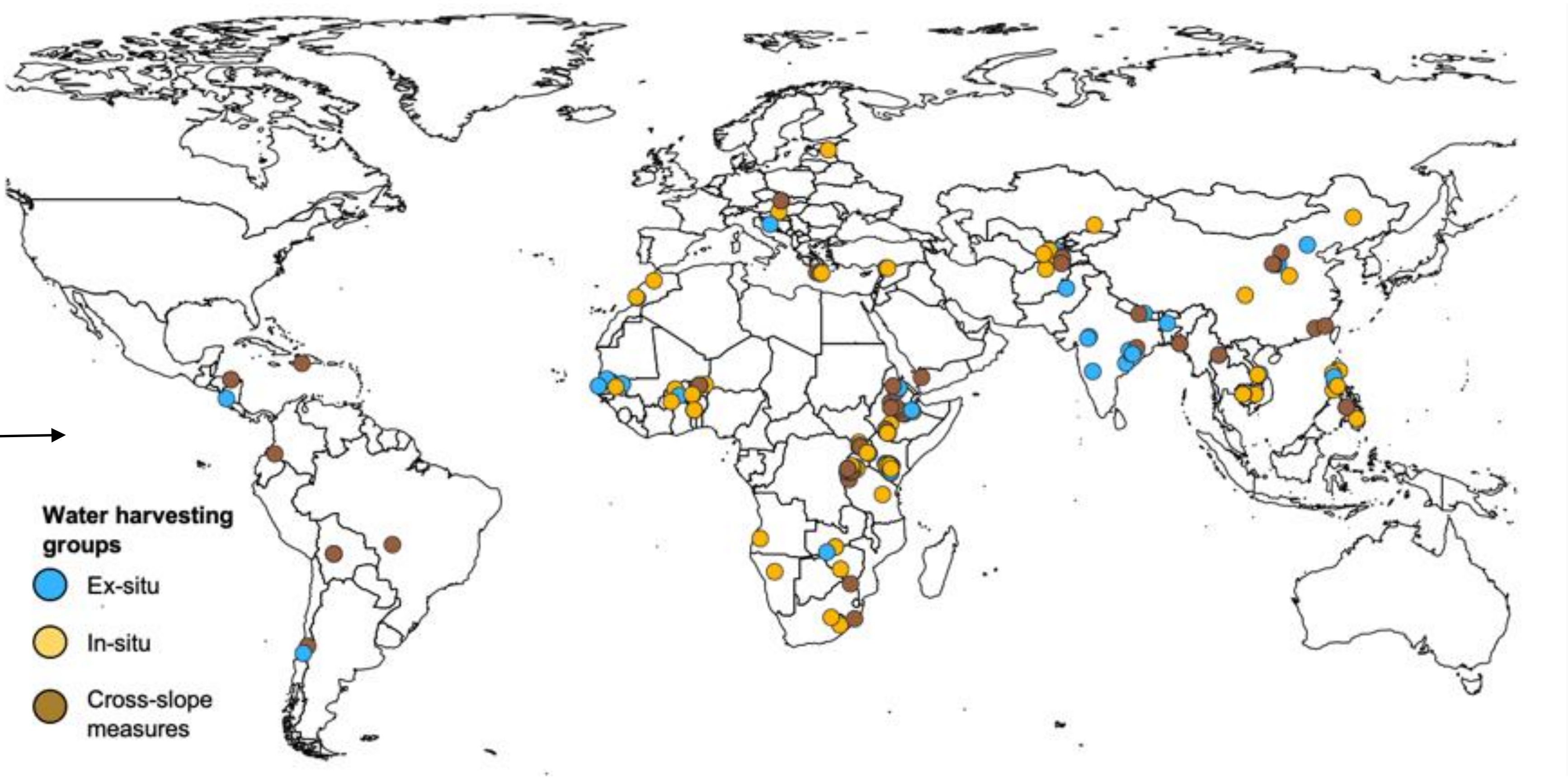
case studies



Evidence-based

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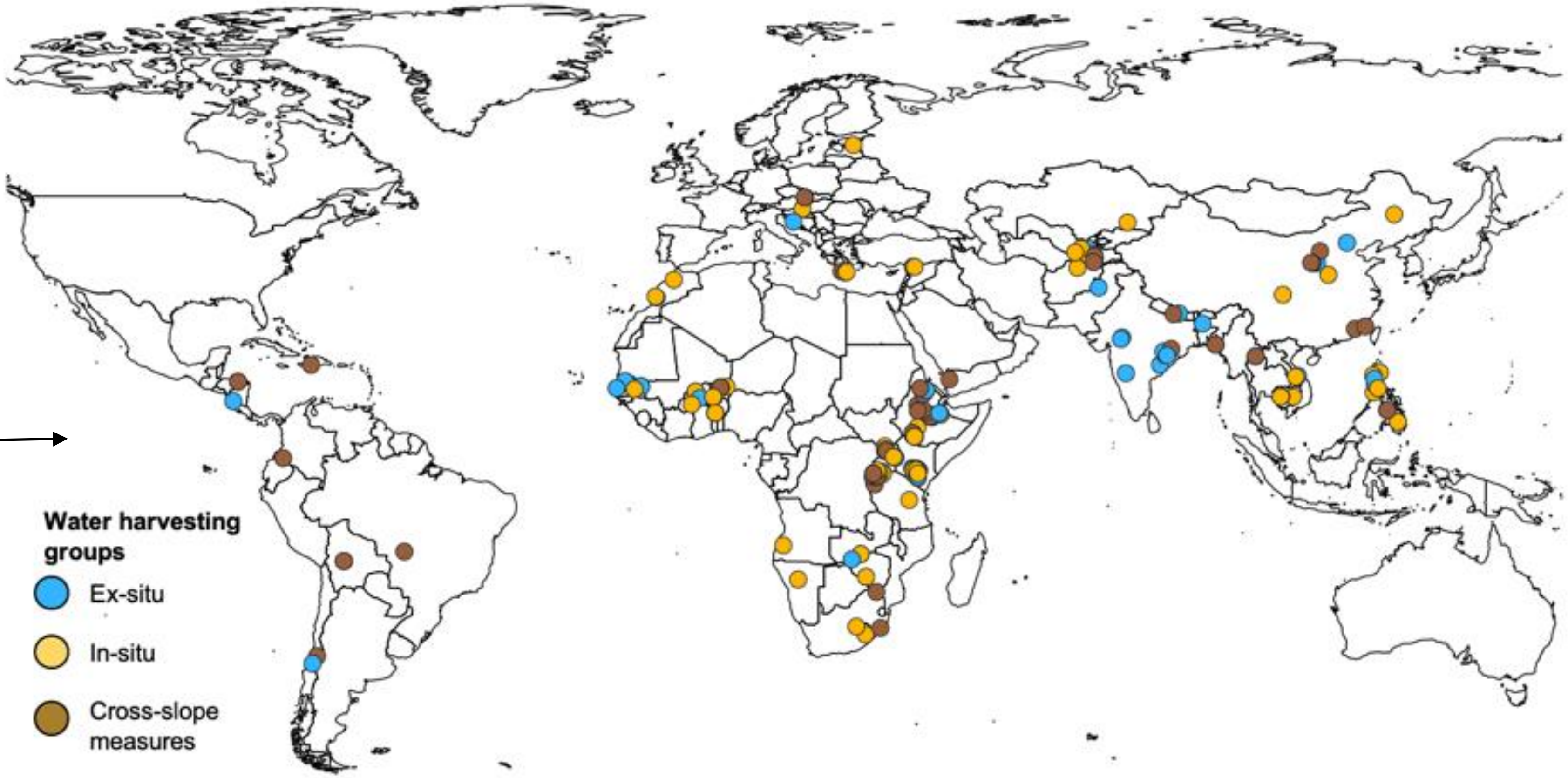
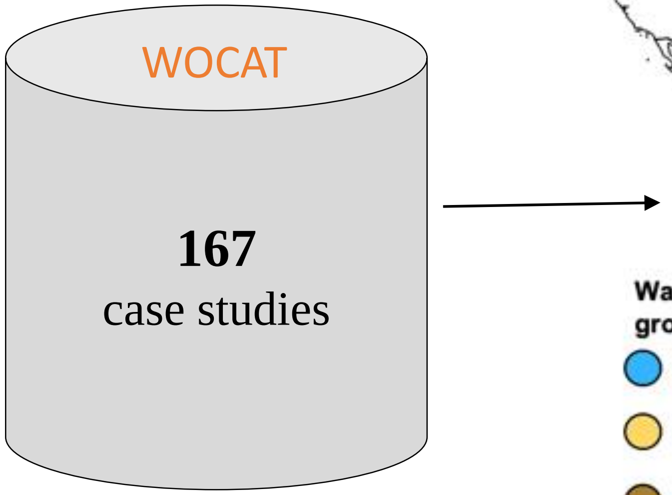
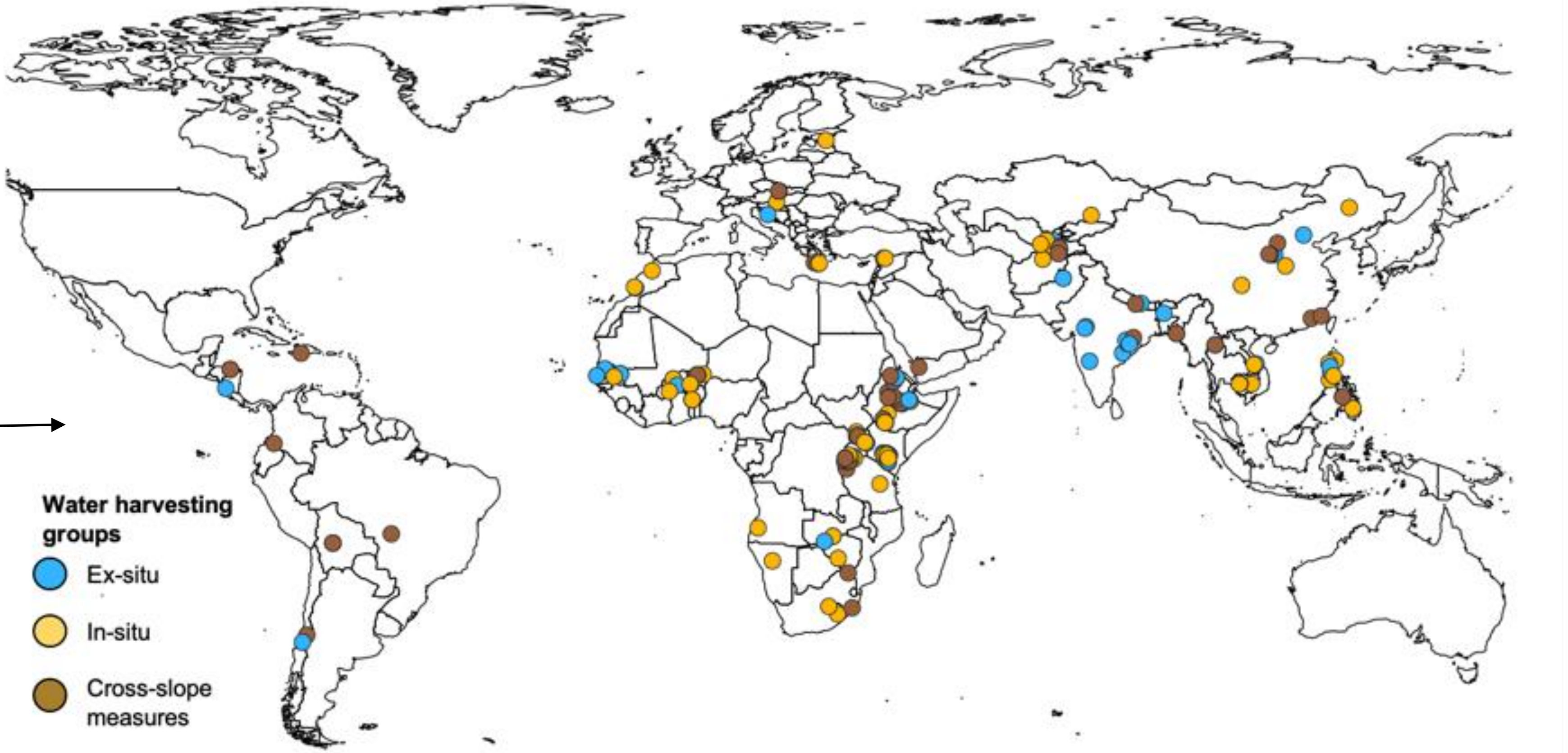
case studies



Evidence-based





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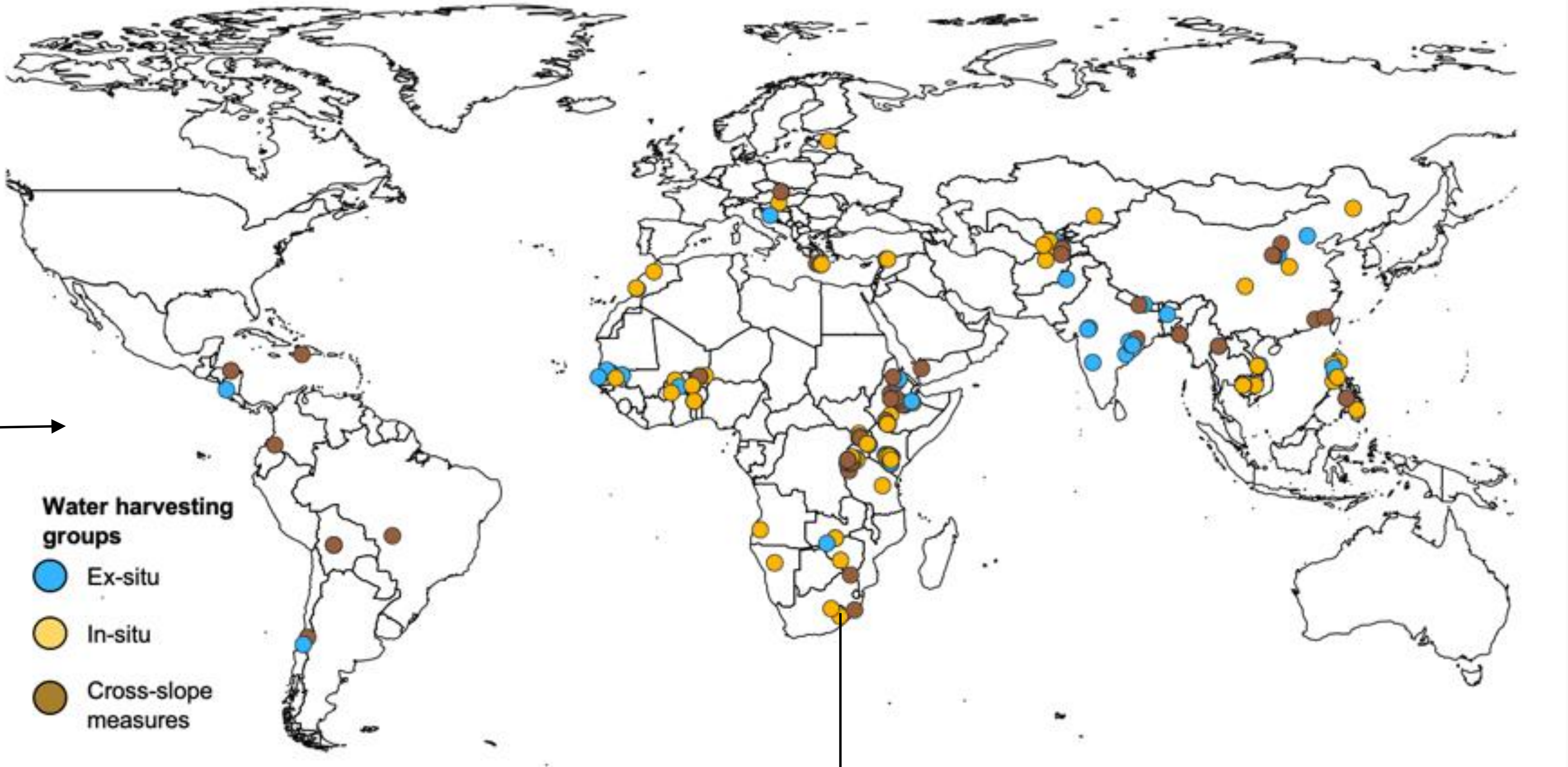

Socio-economic impacts				
Crop production	decreased	✓	increased	Quantity before SLM: 60 Quantity after SLM: 80 Technology reduce flood and lower lands doesnt effect by floods
irrigation water availability	decreased	✓	increased	Quantity before SLM: 20 Quantity after SLM: 25 Increasing under ground water by applying technology
farm income	decreased	✓	increased	Quantity before SLM: 0 Quantity after SLM: 50 Cultivation of cash crop in the terraces (farm income from uplands)

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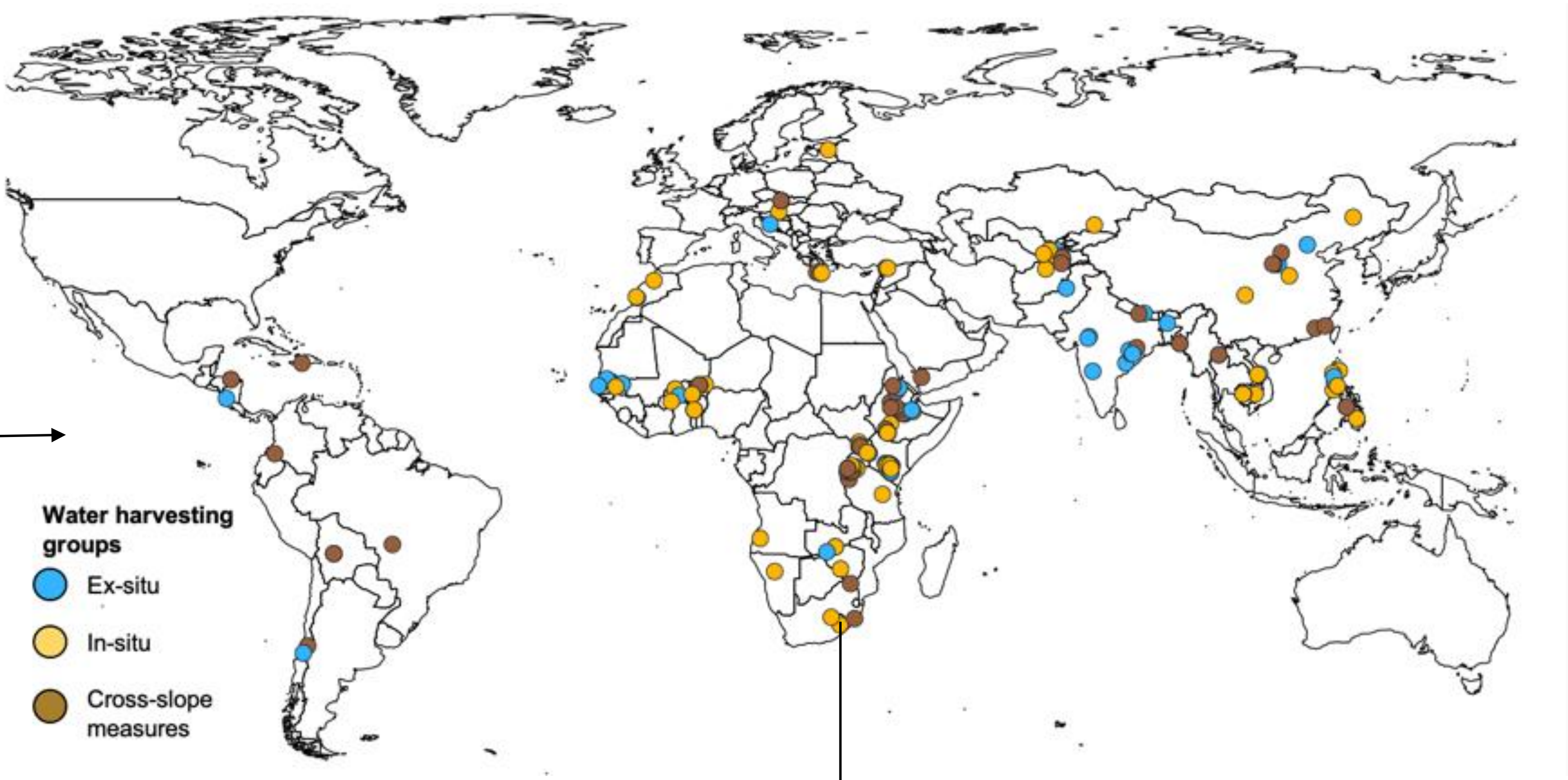

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Assumption:

The increase in crop production of a case study can be replicated in areas with **similar social-ecological conditions**

Social-ecological perspective

11 social-ecological datasets

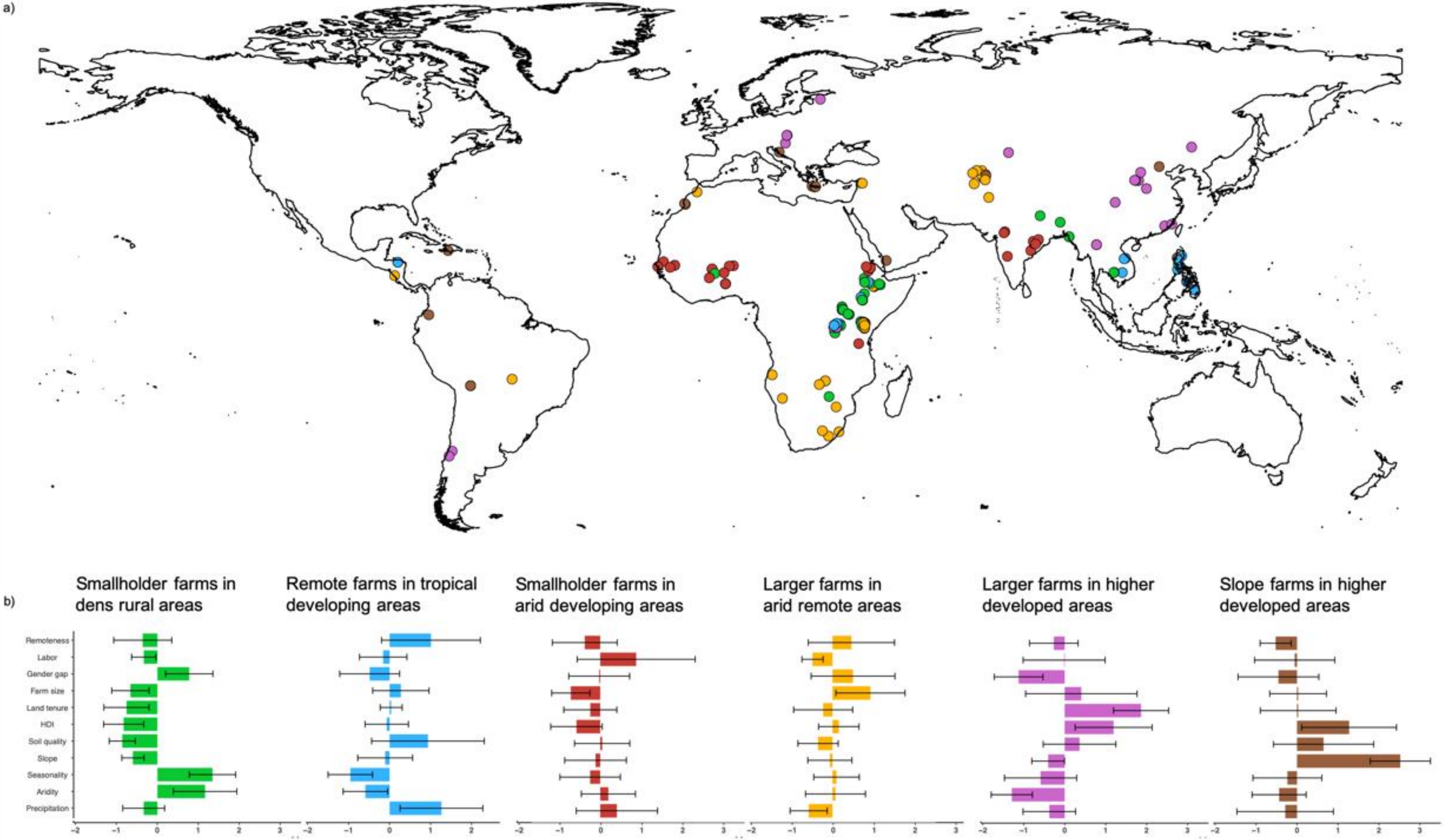
- Precipitation
- Seasonality
- Aridity
- Slope
- Soil quality
- Farm size
- Land tenure
- Remoteness (market)
- Agricultural labor
- Human Development Index
- Gender inequality

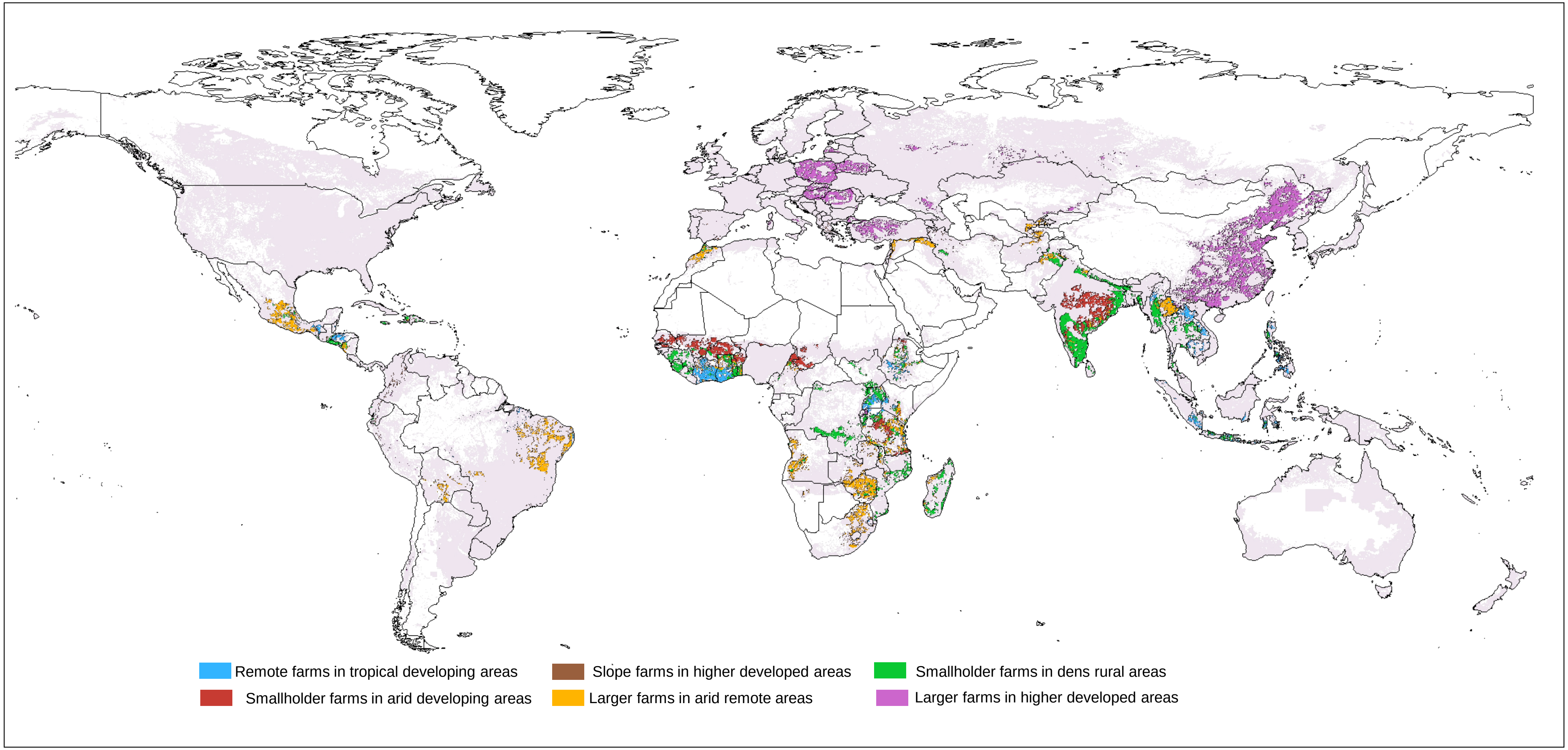
Climate

Land

Socio-economic

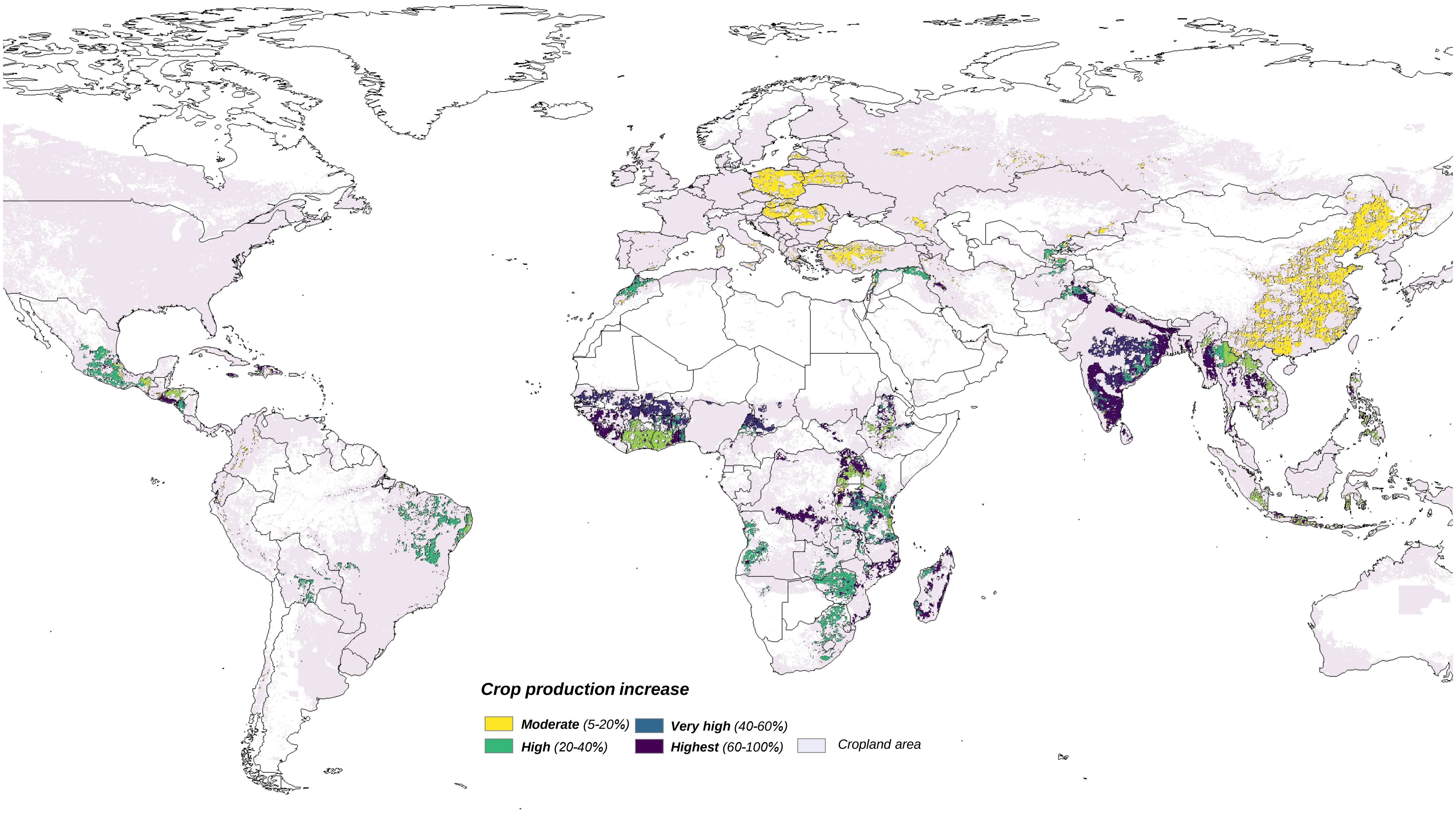
Results


a)
b)
Smallholder farms in dens rural areas
Remote farms in tropical developing areas
Smallholder farms in arid developing areas
Larger farms in arid remote areas
Larger farms in higher developed areas
Slope farms in higher developed areas
Remoteness
Labor
Gender gap
Farm size
Land tenure
HDI
Soil quality
Slope
Seasonality
Aridity
Precipitation
-2
-1
0
1
2
3

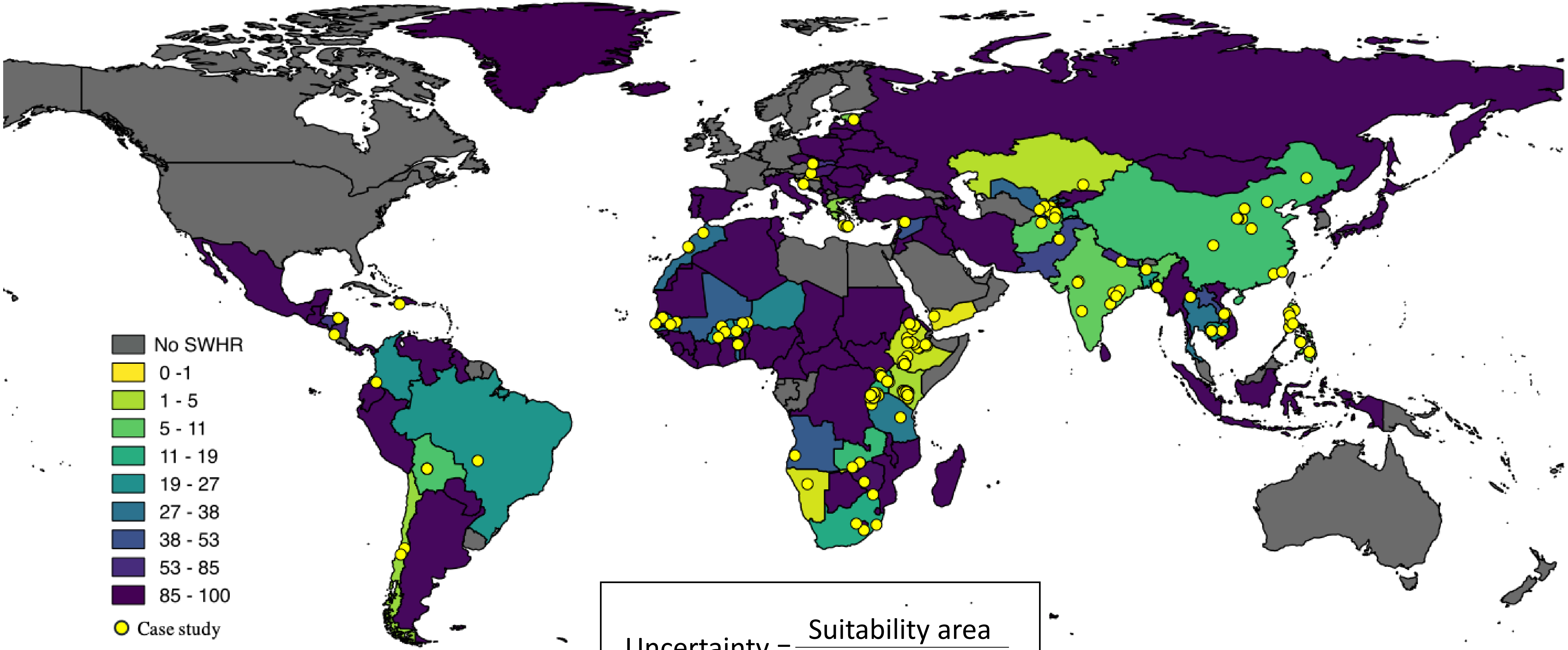


Social-ecological regions for the transferability of WH case studies

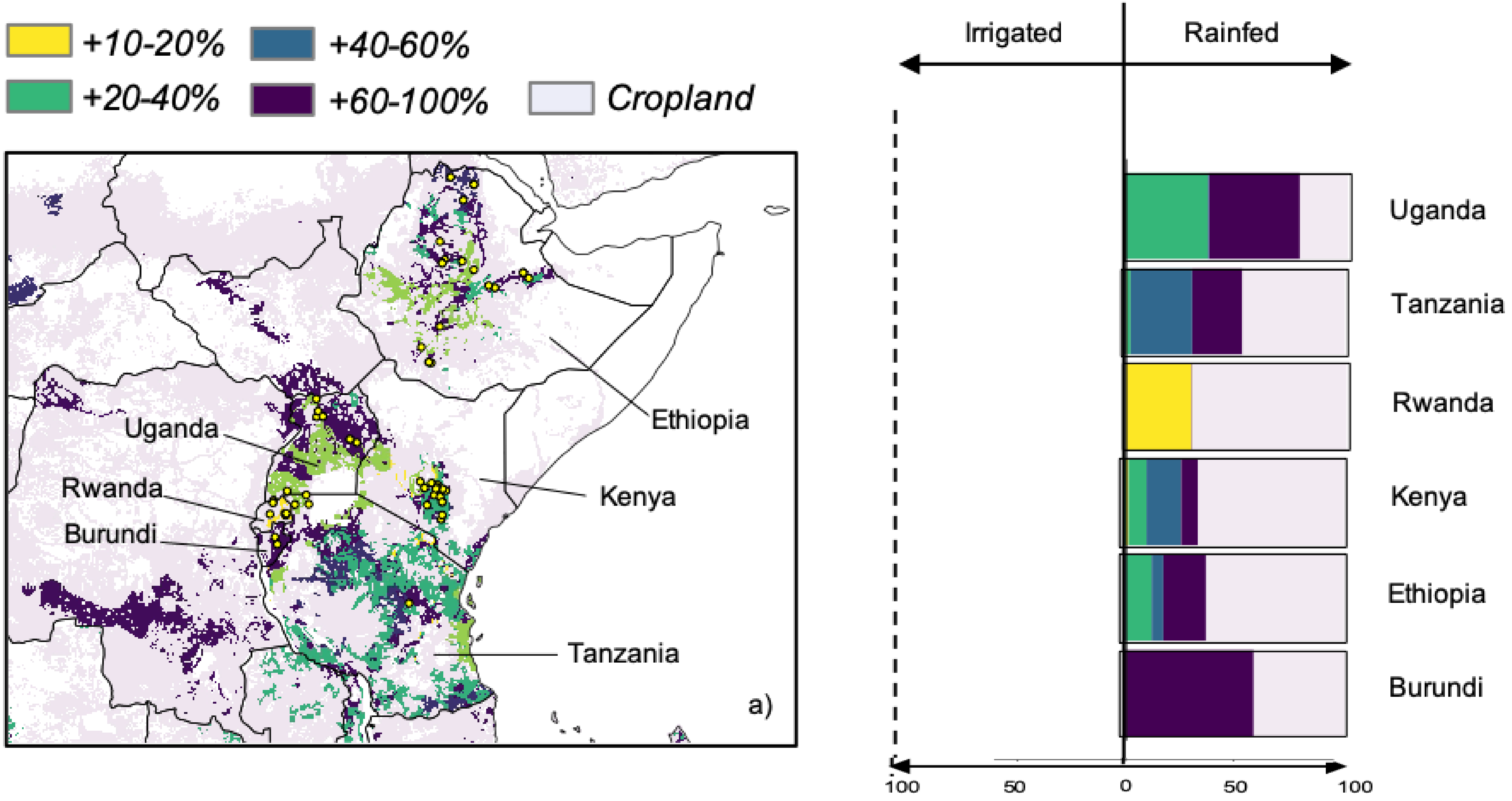
19% of global agricultural land

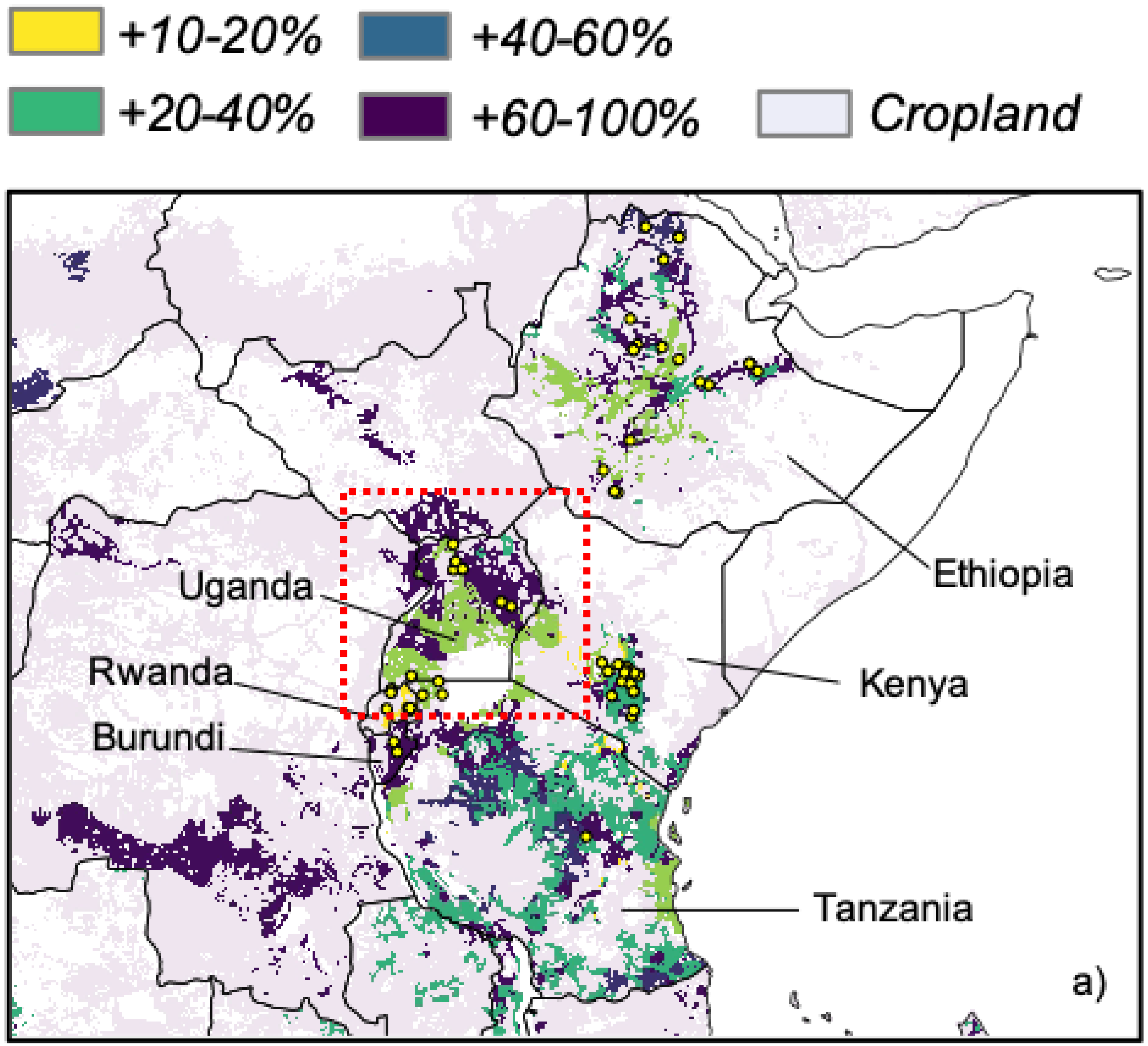

Crop production increase
Moderate (5-20%)
High (20-40%)
Very high (40-60%)
Highest (60-100%)
Cropland area

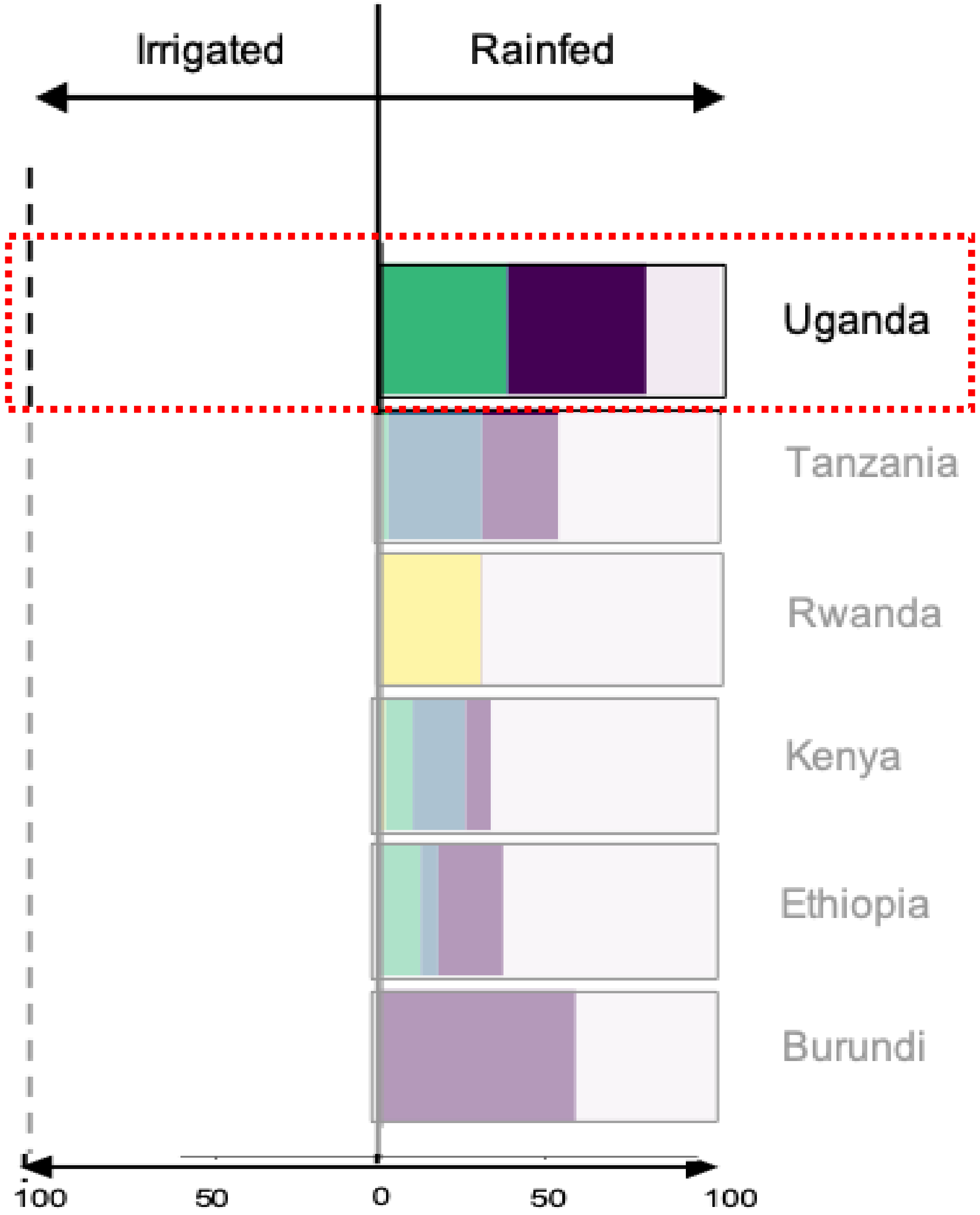
Uncertainty?



$$\text{Uncertainty} = \frac{\text{Suitability area}}{\text{\# cases}}$$


+10-20%
+40-60%
+20-40%
+60-100%
Cropland
Uganda
Rwanda
Burundi
Ethiopia
Kenya
Tanzania
a)
Irrigated
Rainfed
Uganda
Tanzania
Rwanda
Kenya
Ethiopia
Burundi
100
50
0
50
100

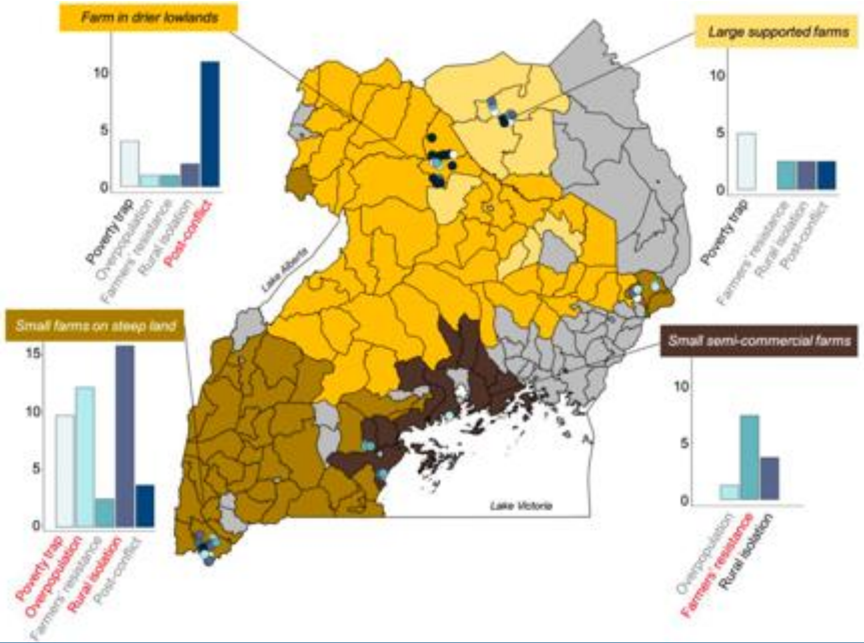

+10-20%
+40-60%
+20-40%
+60-100%
Cropland
Uganda
Rwanda
Burundi
Ethiopia
Kenya
Tanzania
a)


Irrigated
Rainfed
Uganda
Tanzania
Rwanda
Kenya
Ethiopia
Burundi
100
50
0
50
100

Follow up

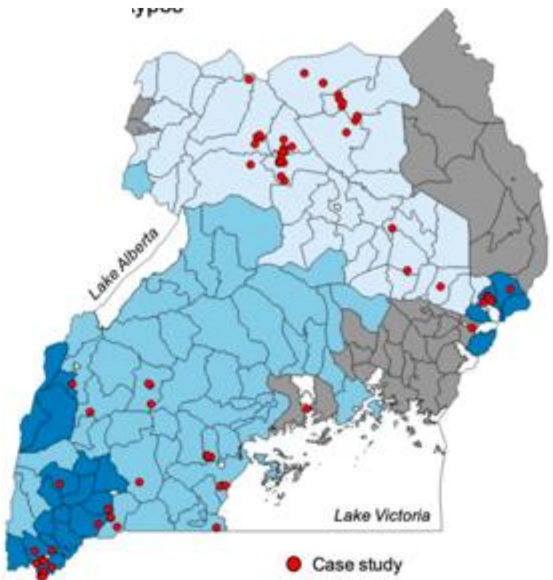
What are the barriers to scaling SLWM in Uganda?

Piemontese, L., R. N. Kamugisha, J. M. B. Tukahirwa, A. Tengberg, S. Pedde, and F. Jaramillo. 2021. Barriers to scaling sustainable land and water management in Uganda: a cross-scale archetype approach. Ecology and Society 26(3):6. https://doi.org/10.5751/ES-12531-260306



What is the investment required to upscale the successful SLWM practices in Uganda?

Piemontese, L., Kamugisha, R.N., Barron, J., Tukahirwa, J.M.B., Harari, N., Jaramillo, F., 2022. Investing in sustainable intensification for smallholders: quantifying large-scale costs and benefits in Uganda. Environ. Res. Lett. https://doi.org/10.1088/1748-9326/ac5ae0



Thanks!

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Water Harvestin Lab: www.dagri.unifi.it/vp-261-wh-lab.html

WOCAT database: https://qcat.wocat.net/en/wocat/list/?type=technologies