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## Introduction

• The global population is projected to increase to about 10 billion by 2050

Data Science

SYMPOSIUM November 17, 2021

- Agricultural production needs to increase by 70% by 2050 to meet the growing demand
- To meet this demand, irrigation can play a vital role as with agricultural intensification, more food can be produced by using the same amount of cropland
- Irrigated areas occupy 20% croplands, but contribute to ~40% of total food production
- This comes at a cost irrigation is the largest consumer of freshwater resources
- Most of the irrigation takes place in already water stressed regions

### **Research Questions**

- How much area equipped with irrigation (AEI) increased since the start of the century?
- Did irrigation expand in already water-stressed regions and by how much?

### Methods

Reports of FAO, AQUASTAT, UN, Ministries of Agriculture, Irrigation associations, etc.

### **Irrigation Database** Geographic information Statistical data Area equipped for irrigation data Location of AEI as per (sub)national statistical unit Polygon data (outlines of (190 countries) irrigation schemes) Actual irrigated area Raster data (interpreted satellite Different administrative levels imagery) ○ Federal Land cover raster maps (cropland • Province extent) Boundaries of (sub)national units County (GADM) Municipality Modeling (applying priority levels of geographical information)

Downscaling to resolution 5 arc-minute grid cells using cropland data

Global map of areas equipped for irrigation

### Results

- Overall, the global area equipped with irrigation increased by 33 million hectares (~11%) from 2000 to 2015
- It increased the most in China (~22%), India (~13%), and Brazil (~113%) by area
- In China, the total AEI increased from 59 million hectares to 72 million hectares from 2000 to 2015
- Asia and South America area the driving regions of irrigation expansion
- The top 10 countries are responsible for ~80% of the increase in AEI
- About 40% (30 million Ha) of irrigation expansion has happened in already water stressed regions since 2000











# Mapping global irrigation expansion since the start of the century





## References

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