



United States Department of Agriculture

# Water, Climate, & Food Security Research in Africa & US Career path and opportunities in Agriculture

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The findings and conclusions in this presentation are those of the author and should not be construed to represent any official USDA or U.S. Government determination or policy.

**Economic Research Service**  
[www.ers.usda.gov](http://www.ers.usda.gov)





United States Department of Agriculture

# Overview

- Turning drylands into breadbasket in Mali – West Africa
- Career path and opportunities for young scientists





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# Turning drylands into breadbasket

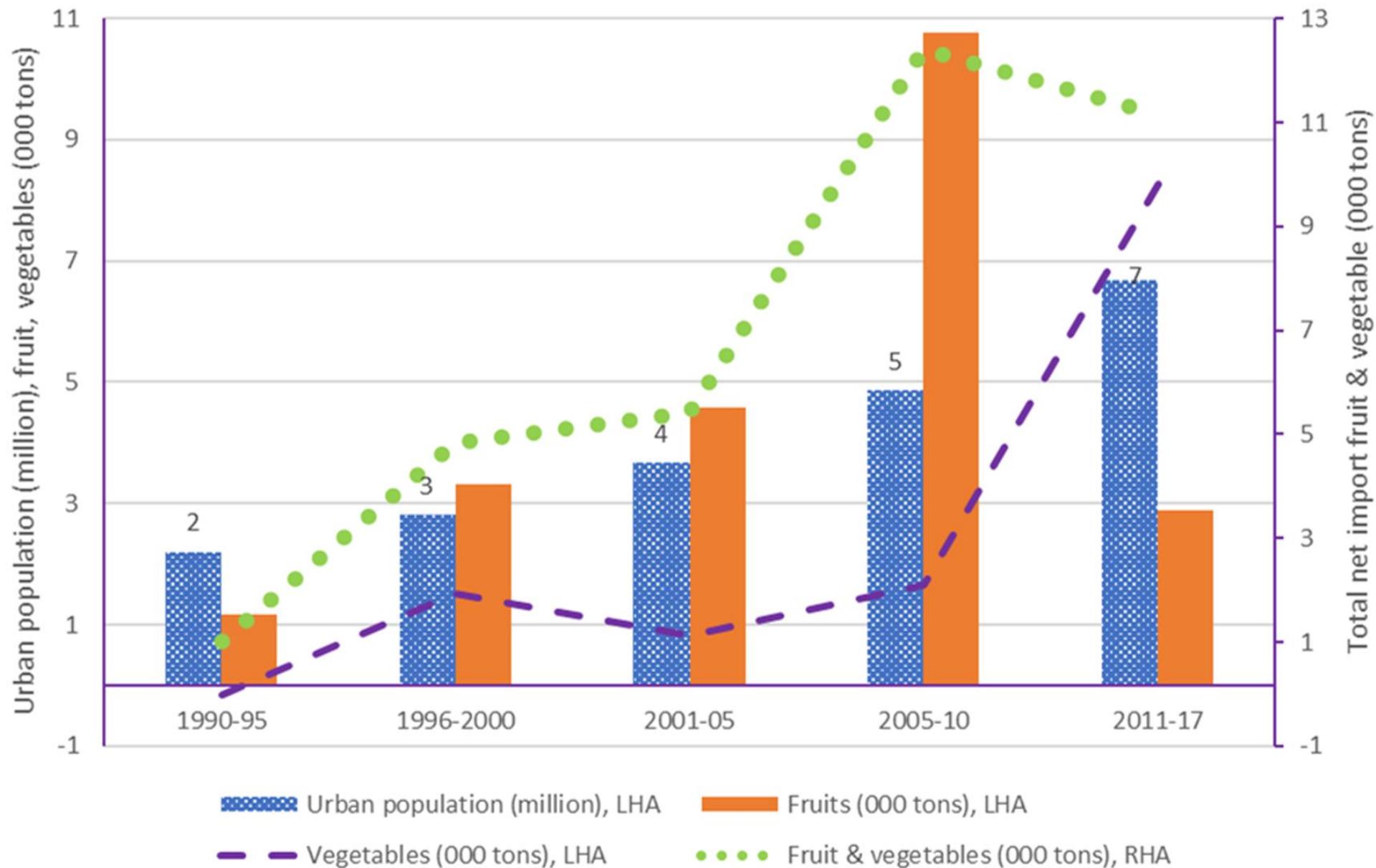
- Climate change has increased vulnerability
- Small irrigation has been identified as the most effective approach for ensuring food security, especially for women and youth who are most vulnerable
- This study was done to determine small irrigation effectiveness



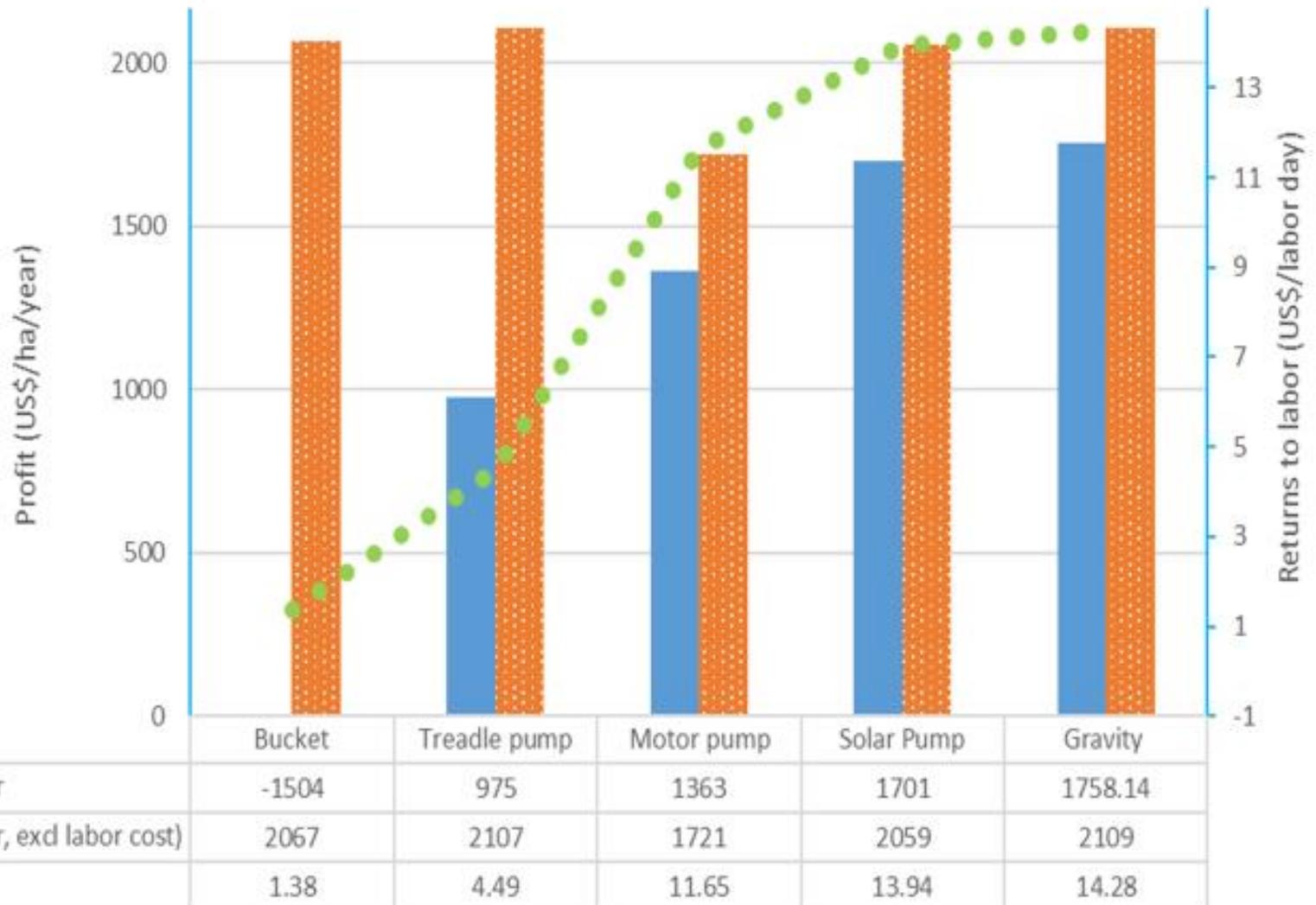
# Why small-scale irrigation?

- Small-scale irrigation allows farmers to grow multiple crops in one year
  - Even small plots owned by women and youth can generate income much greater than large farms planted with low-value cereal crops (e.g. sorghum, corn and rice)
- Increasing urbanization and middle income is increasing demand for fruit and vegetables in Mali.
- Climate change increasing vulnerability. Irrigation will enhance resilience of smallholder farmers





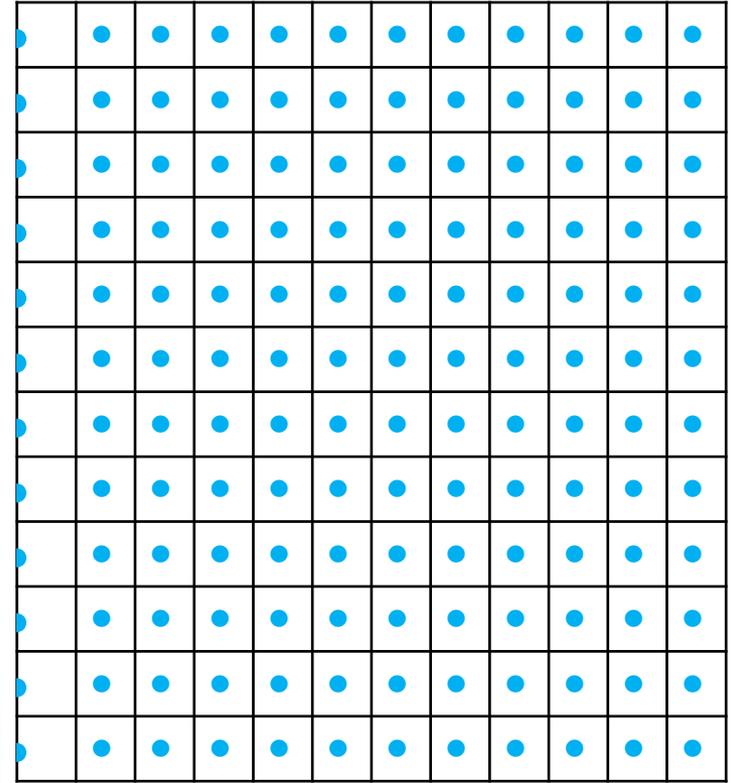
# Profitability of irrigation by water-lifting technology



Source: Nkonya et al 2021

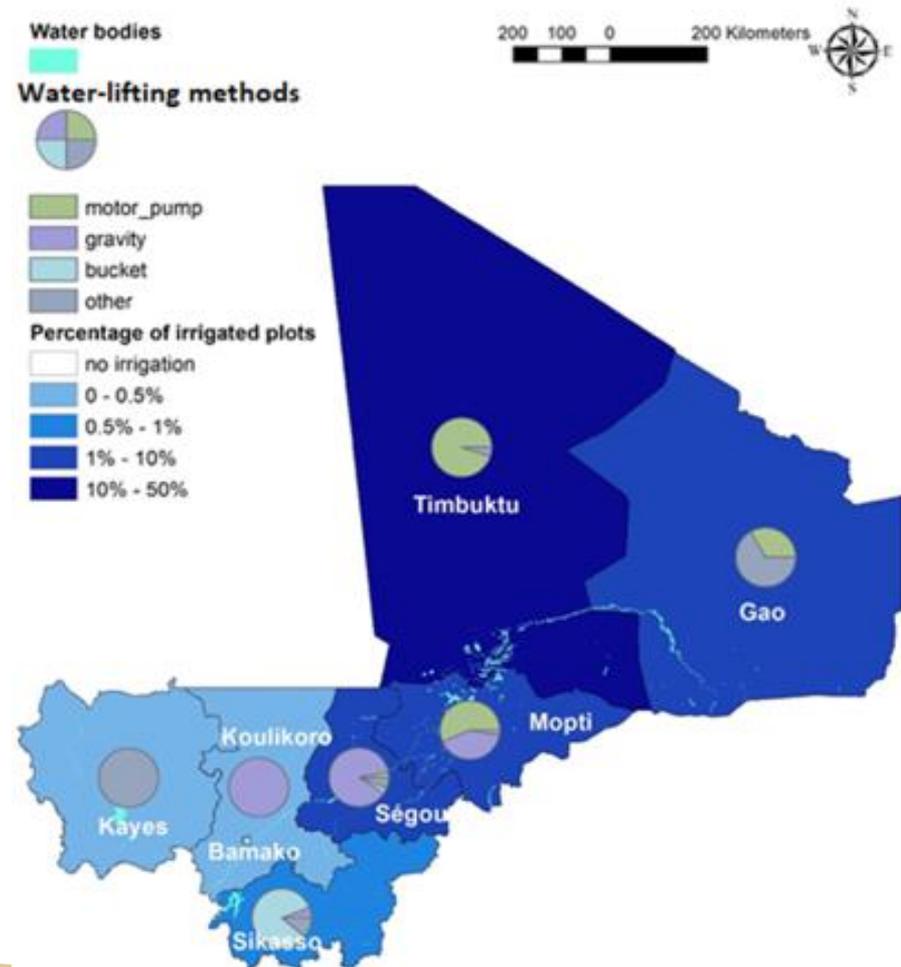


Bucket irrigation used by 80% of farmers in Sikasso. Takes 3.4% of area, 1,406 labor days per year



# Adoption rate of water-lifting technologies do not match profitability – as expected. Why?

- Lack of information.  
Extension services do not promote better technologies like solar irrigation
- Traditional method that have been passed down for generations
- Gravity irrigation require community organization. Water user associations are weak
- Technologies unavailable - especially solar pumps
- High cost



# Career path & opportunities for young scientists

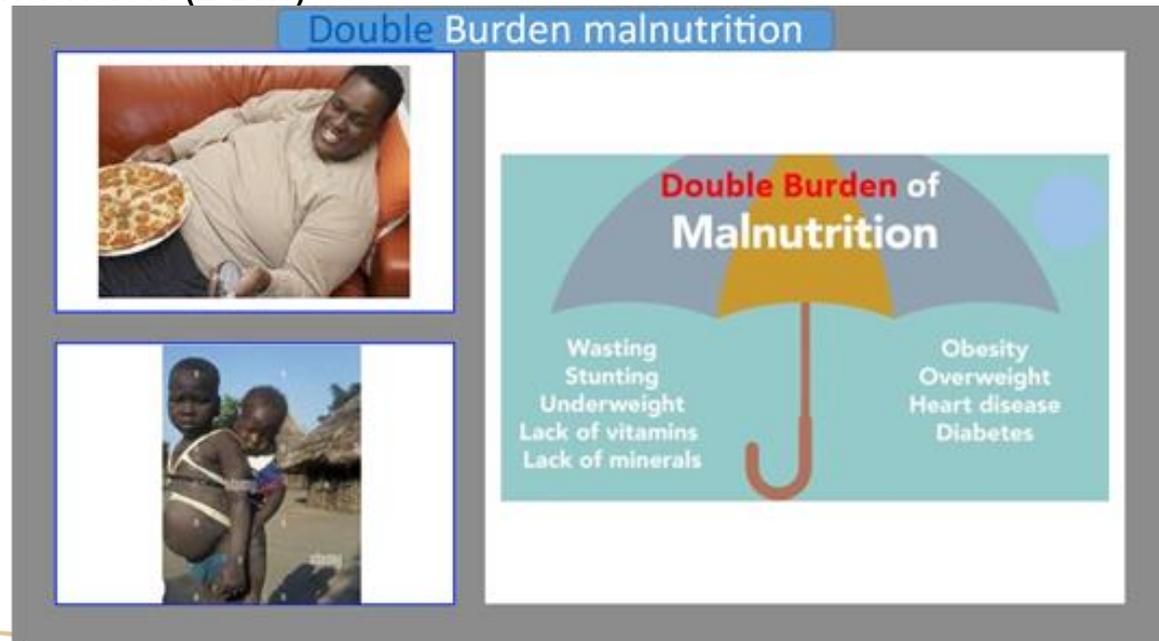


# Ag-related career opportunities in US & in International organizations & companies

Demand agri-food products is changing in high-, middle- and low-income countries

- **Increasing bioeconomy** – economy based on products, services, and processes from biological resources
  - Nutrient-dense and healthy foods in high- & middle-income countries
  - Increasing middle income and urban population in low-income countries
- ➔ leading to double burden of malnutrition (DBM)

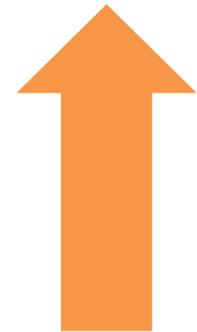
The changes are increasing  
Job opportunities  
➔ Young mind like yours on high demand



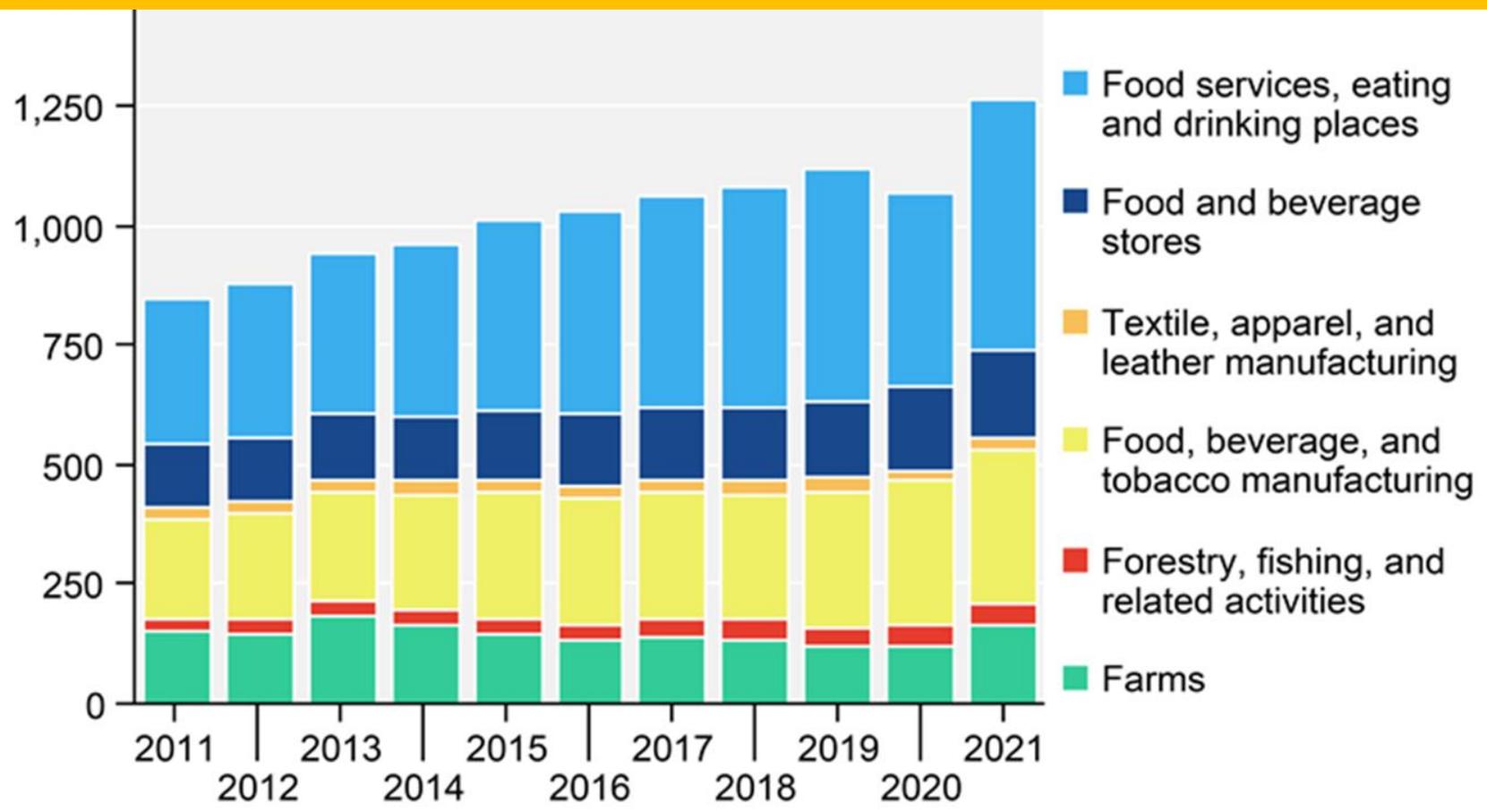
# Career opportunities in the US

- Industries
- Colleges
- Federal & state government
- Other

Ag-related opportunities are on the rise



# Value added to U.S. GDP (US\$ billion) by agriculture & related industries, 2011-21

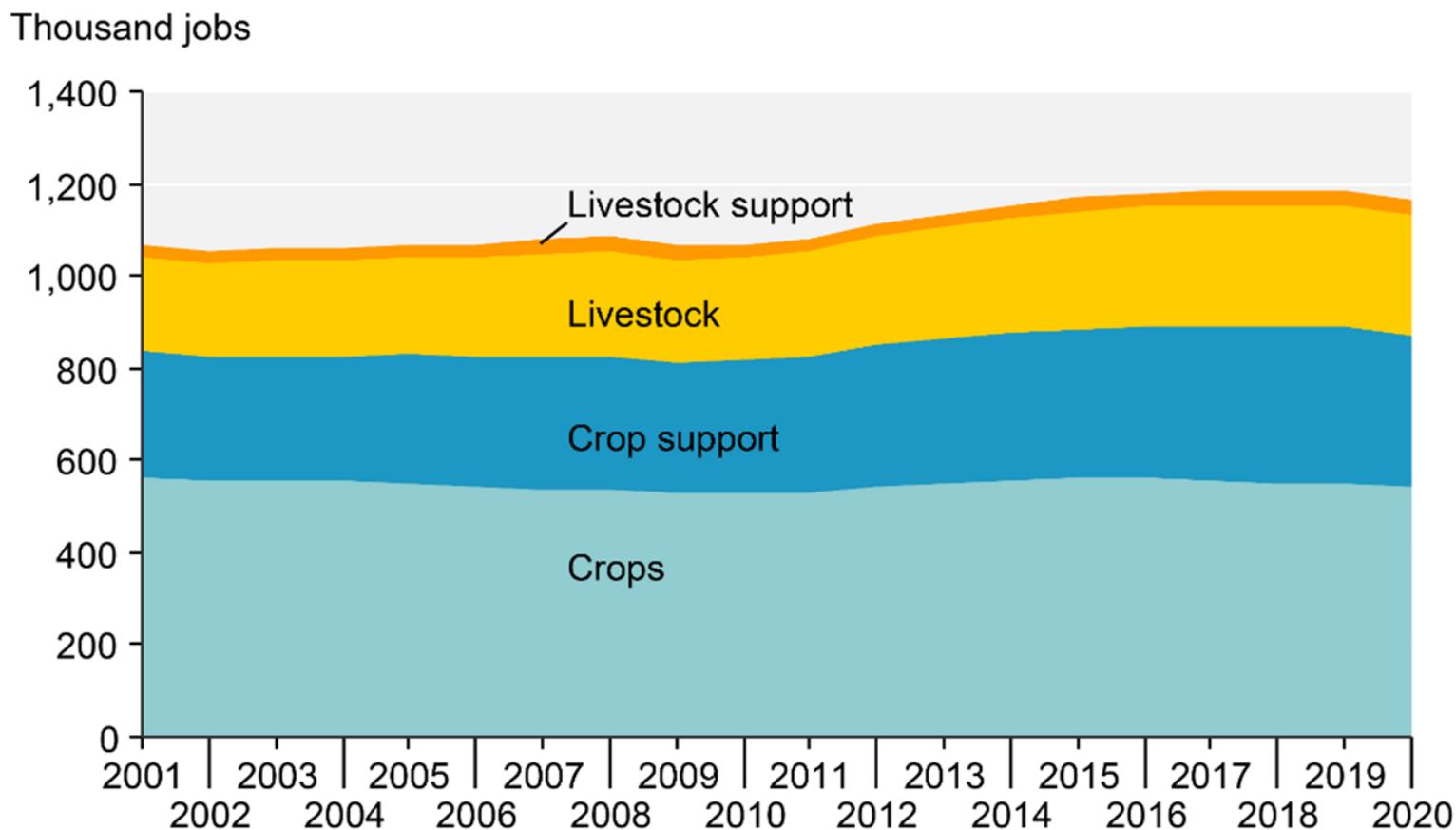


Note: GDP = Gross domestic product.  
 Source: USDA, Economic Research Service using data from U.S. Department of Commerce, Bureau of Economic Analysis, Value Added by Industry, as of December 22, 2022.



Employment in ag & support industries  
stable & slightly increased since 2001

## U.S. employment in agriculture and support industries, 2001-20



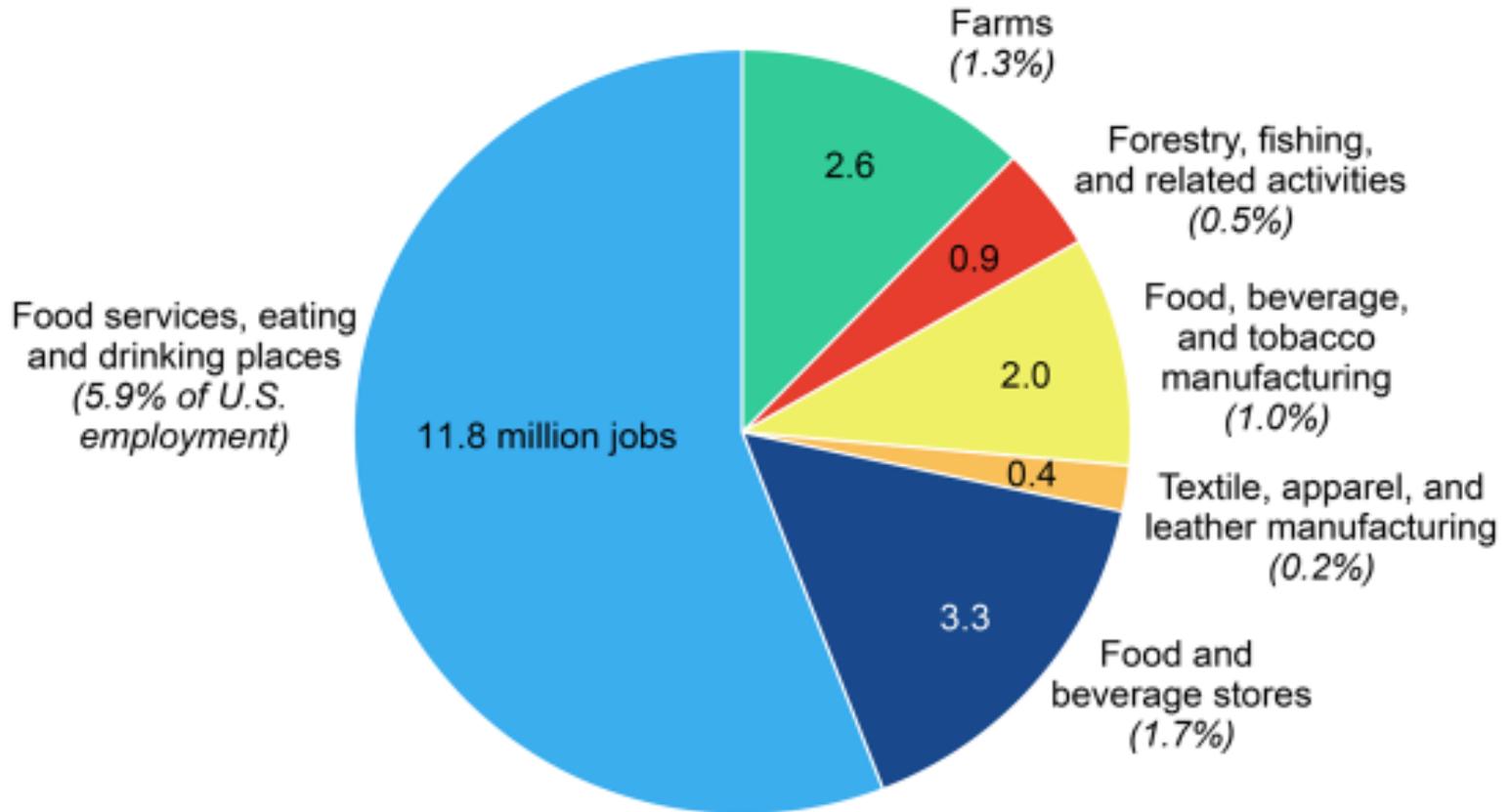
Note: Employment is measured as the annual average number of full- and part-time jobs. Data do not cover smaller farm employers in those States that exempt them from participation in the unemployment insurance system.

Source: USDA, Economic Research Service using data from U.S. Department of Labor, Quarterly Census of Employment and Wages, as of June 2, 2021.



# Employment in agriculture, food, and related industries, 2021

21.1 million jobs\*  
(10.5 percent of U.S. employment)



\*Full- and part-time jobs. Categories may not sum to total because of rounding.  
Source: USDA, Economic Research Service using data from U.S. Department of Commerce, Bureau of Economic Analysis (SAEMP25N), data as of September 30, 2022.

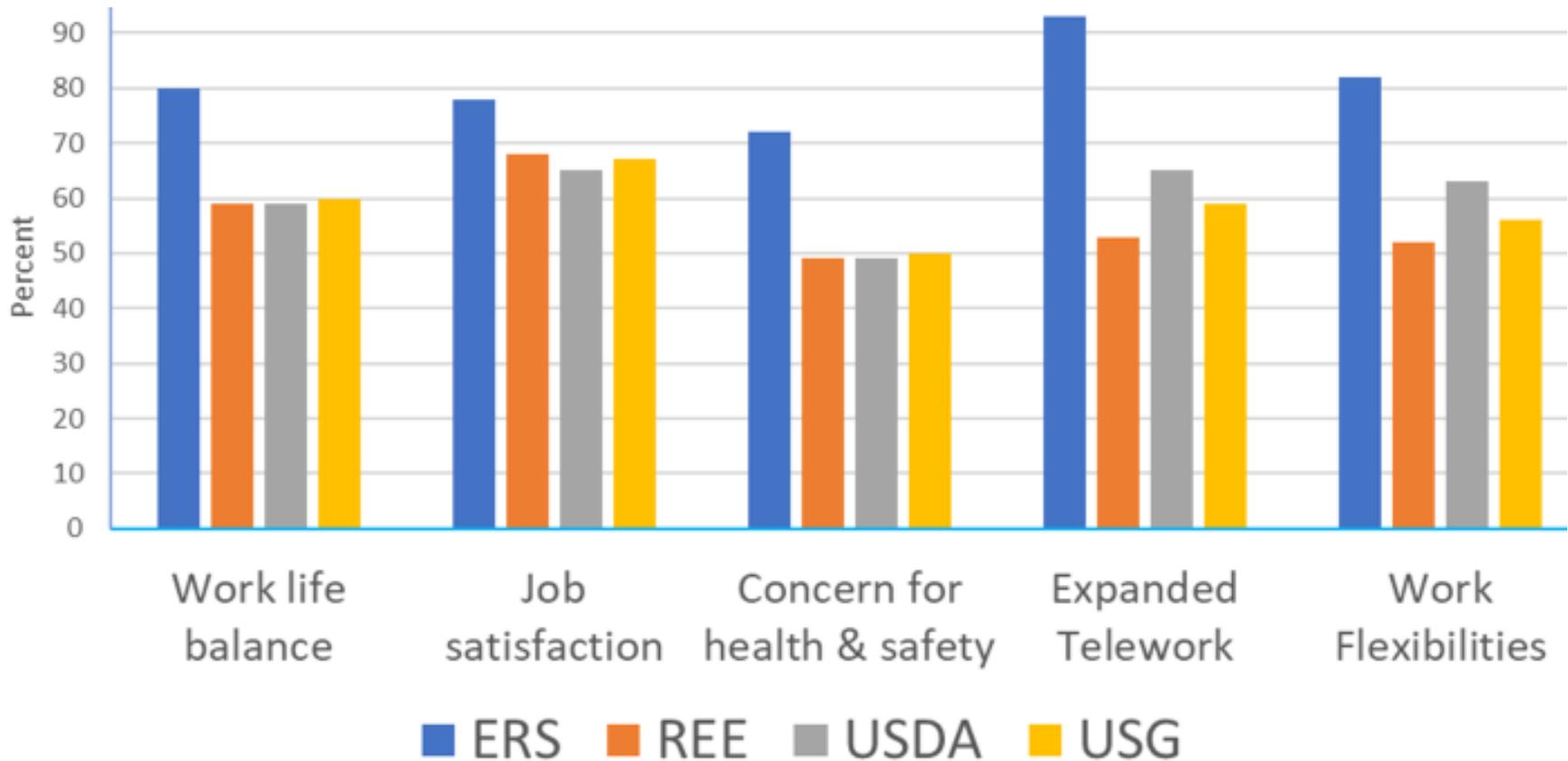


# Federal government ideal place if you are looking for:

- Stability
- Directly providing services to lawmakers & executive branch
- Contributing to changing lives of people



# Job satisfaction & other indicators are high in Federal Government, especially at ERS



Source: <https://www.opm.gov/fevs/>



# Most common International employers of ag graduates

- FAO – has many offices around the world
- Consultative Group of International Agricultural Research (CGIAR) – 15 centers
- Multilateral Institutions:
  - World Bank Group
  - Asian Development Bank (ADB)
  - International Monetary Fund (IMF)
  - International Fund For Agricultural Development (IFAD)
  - Global Environment Facility (GEF)
  - African Development Bank Group (AfDB)



# International employers (cont'd)



- International donor organizations (e.g., USAID, DFID, GIZ), NGOs and projects
- Multinational companies (e.g., Cargill, Monsanto, etc)

