

# Interlinked Food Security and Sustainability Challenges

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**Improving food security & sustainability (esp. mgmt of biodiversity, forests, soils, marine resources, water, wildlife) are inter-linked moral/economic challenges of the highest order.**





**These challenges are intrinsically linked. Most (esp. extreme/chronic) food insecurity occurs in rural areas, among people whose livelihoods depend on nature. Each causes the other, with shared causation by broader political economy forces.**



**Yet most policy/research focuses on just one or the other of these at a time.**



## **Aggr. Food Demand Growth Is Largely Unavoidable**

A more populous, urban, and wealthier world is inevitable and will demand 70-100% more food by 2050 than today.

### **Why?**

- **Population growth** of ~2-3 bn people
- Population will **urbanize**, up from 50% to >70%
- **Income growth**: Marginal growth in food demand due to income growth in LDCs is 5-8x that in the US.

**Result: >90% of demand growth will be in Africa/Asia  
And that is something to celebrate!**

### **Cannot reduce demand growth significantly**

Reduced food waste reduction, over-consumption, food/feed/  
biofuel competition, or dietary change away from ASFs

... Demand-side adjustment offers only modest gains



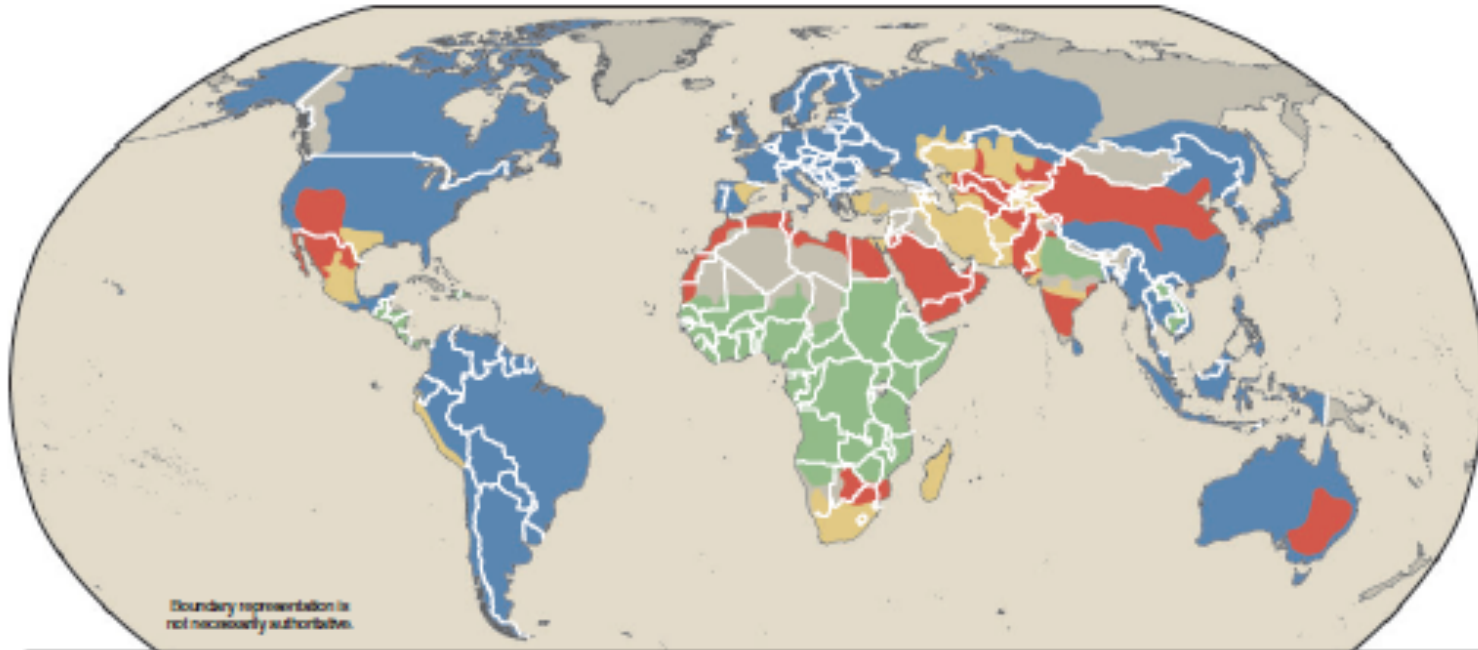


## **Must grow supply by 1 or more of 3 methods:**

- 1) More inputs ... but extensification unlikely b/c**
  - Arable land essentially fixed without major (ecologically risky) conversion of forest, wetlands, or drylands
  - Limited capacity to expand ag frontier in Asia/MENA
  - Increasing competition for land from urban expansion and protected areas
  - Ag already accounts for ~70% of human water usage, > 80% in Africa and Asia
  - Climate change will aggravate water shortages in critical regions, esp. in tropics with fastest demand growth
  - Marine capture fisheries stable or declining



## Projected Global Water Scarcity, 2025



- Physical water scarcity:** More than 75% of river flows are allocated to agriculture, industries, or domestic purposes. This definition of scarcity — relating water availability to water demand — implies that dry areas are not necessarily water-scarce.
- Approaching physical water scarcity:** More than 60% of river flows are allocated. These basins will experience physical water scarcity in the near future.

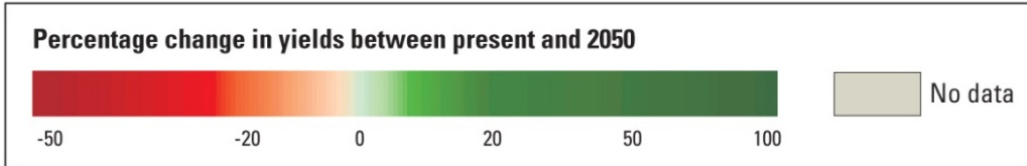
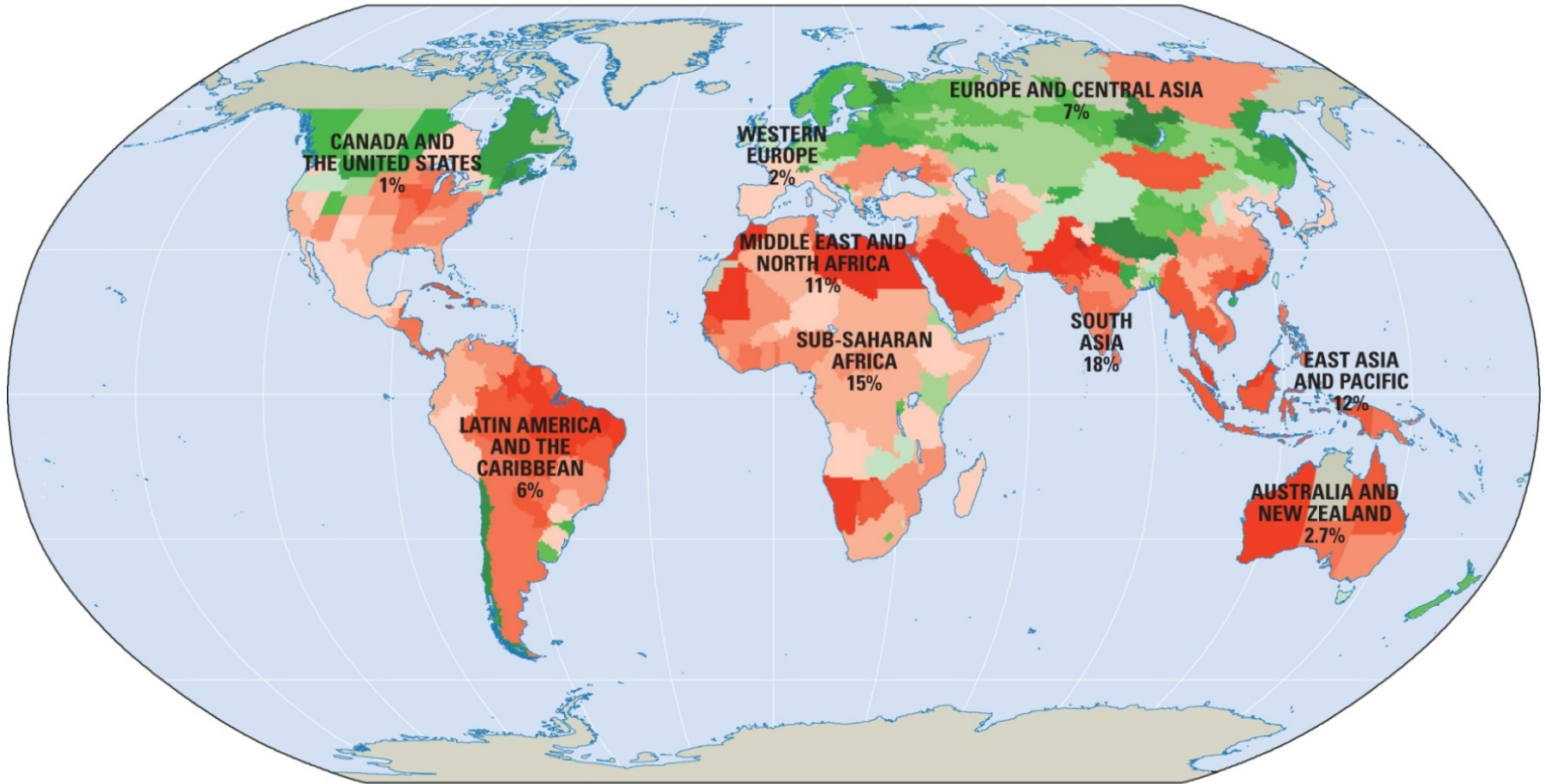
- Economic water scarcity:** Water resources are abundant relative to water use, with less than 25% of water from rivers withdrawn for human purposes, but malnutrition exists.
- Little or no water scarcity:** Abundant water resources relative to use. Less than 25% of water from rivers is withdrawn for human purposes.
- Not estimated**

Source: *International Water Management Institute.*





## Adverse expected yield change in 11 key crops due to climate change



Source: World Bank  
*WDR 2010*





## **2) Improved efficiency given current inputs/tech. But**

...

- **Smallholder 'inefficiency' mainly due to variable agro-environmental conditions and untargetable**
- **Inverse farm size-productivity relationship hard to exploit for yield gains b/c arises from mkt failures, behavioral factors or simply measurement error**
- **The true extent of waste in post-harvest food systems remains unclear, as does the cost-effectiveness of safe/sustainable waste reduction**

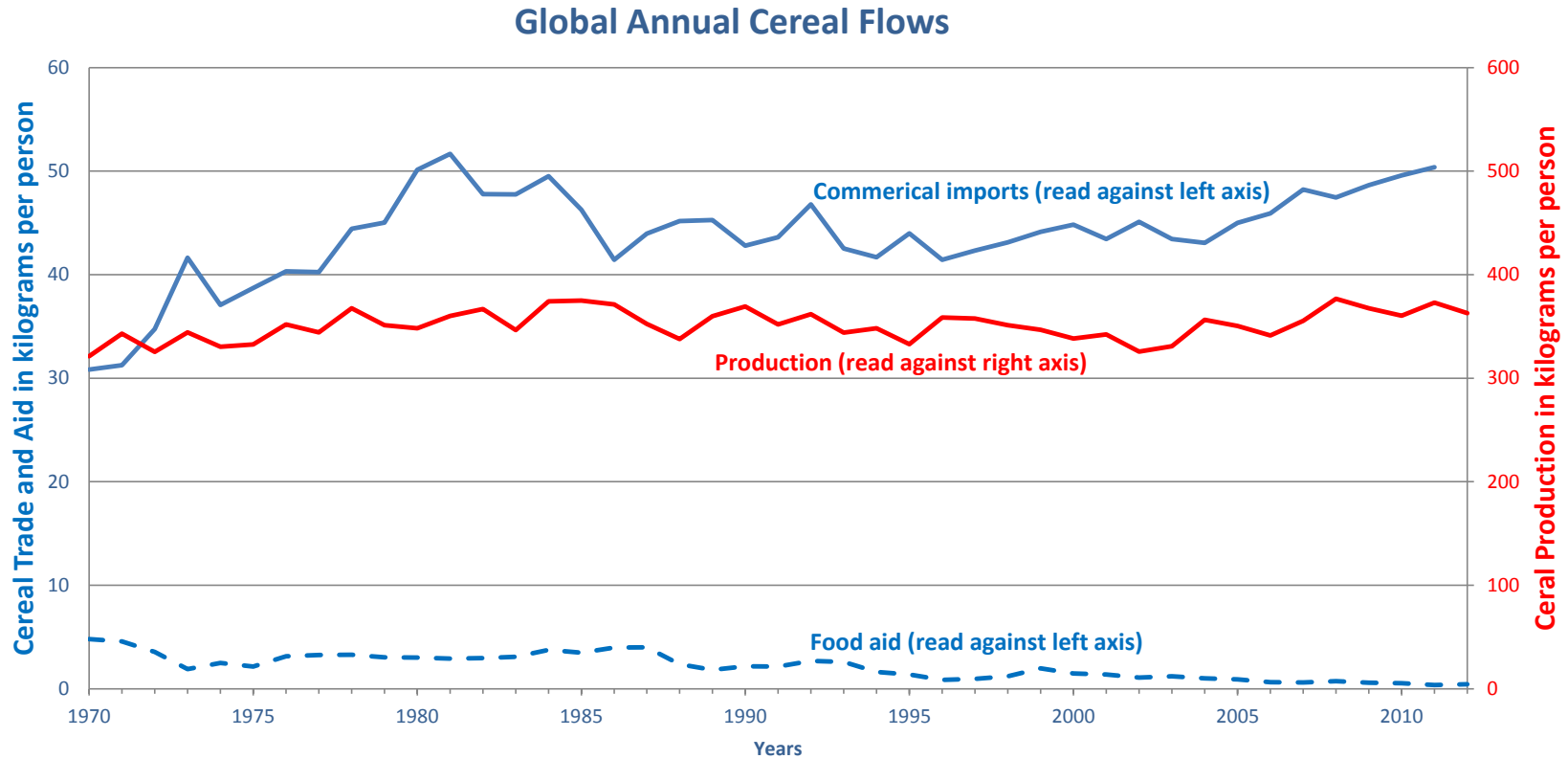




### 3) So must rely mainly on technological advances to resolve demand-supply growth imbalance. But ...

- Slowing growth in yields (esp. w/climate change)
- Challenge of widespread opposition to GMOs
- IP regimes and associated 'gene grabs' pose obstacles
- Site specificity due to agroecological heterogeneity
- Africa/Asia ag R&D capacity very limited
- Requires investment beyond gov't/philanthropists ... must rely heavily on the private sector.





Source: FAO, FAOStat database

Productivity growth must occur in Africa/Asia, where most demand growth will occur because **85-90% of food is consumed within the country where it is grown**, even with food trade growing faster than production.





**But increasing food *availability* is only necessary, not sufficient, to improve food security.**

- Improved *access is key* and depends mainly on poverty reduction and improved **social protection** measures to ensure that ample food gets distributed equitably.
- The biggest challenges surround *utilization* and especially **micronutrient deficiencies**, wider spread and respond more slowly to productivity/ income growth.
- So cannot focus just on cereals or even just staples ... must pay more attention to fruits and vegetables.



**“Most of the people in the world are poor, so if we knew the economics of being poor we would know much of **the economics that really matters**. Most of the world's poor people earn their living from agriculture, so if we knew the economics of agriculture, we would know much of the economics of being poor.”**

**- Theodore W. Schultz, opening sentences of 1979 Nobel Prize in Economics lecture**



**Thank you for your time and interest!**