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Across Water, Energy, Food
and Ecosystems

The Implications of Ending Groundwater Overdraft for Global Food Security

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Irrigated agriculture contributes to GW depletion

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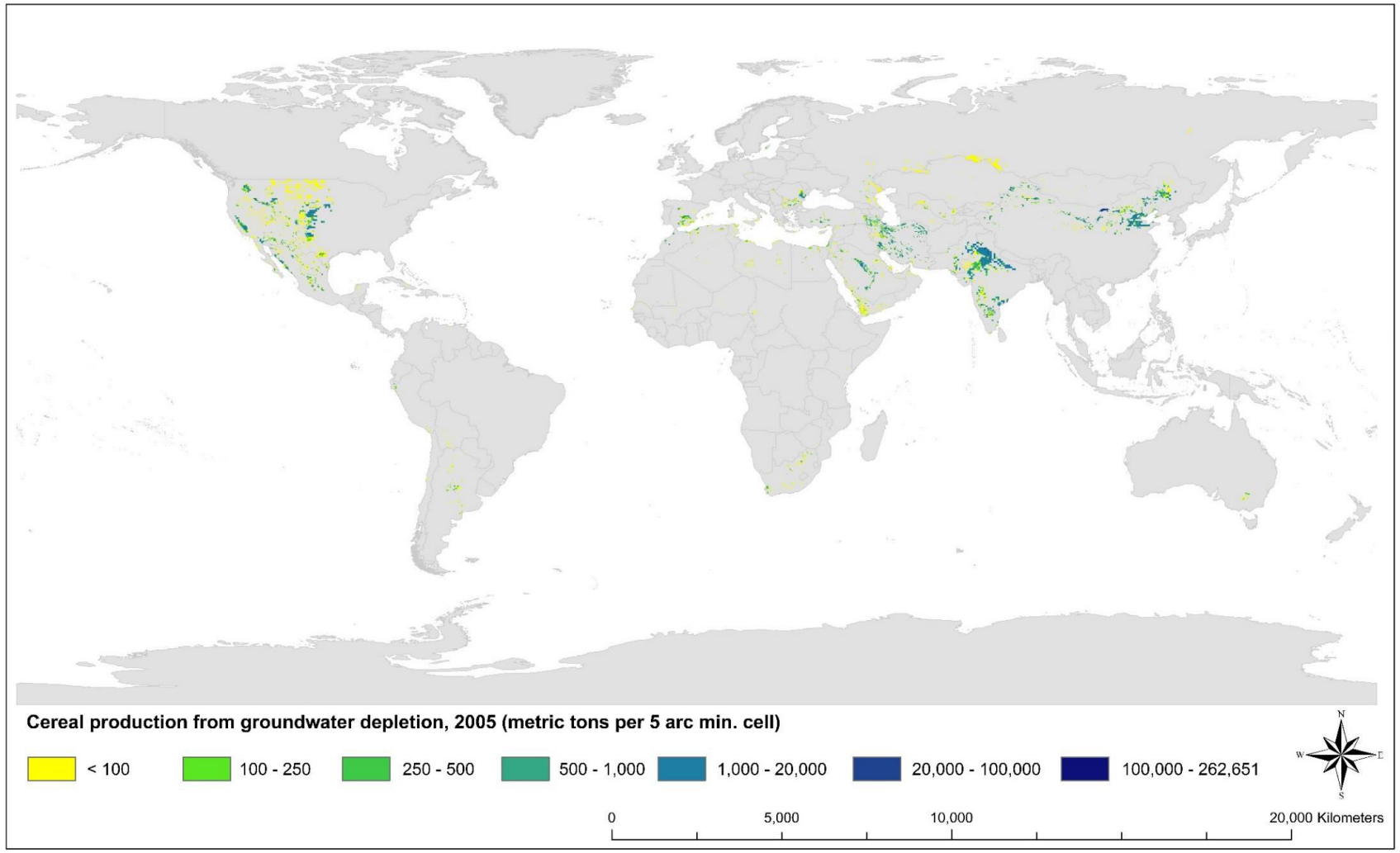


Source: Villholdt et al.

- What would be the food security impacts if we were to overcome groundwater depletion globally?

Impacts from halting GW depletion

IMPACT Food Model

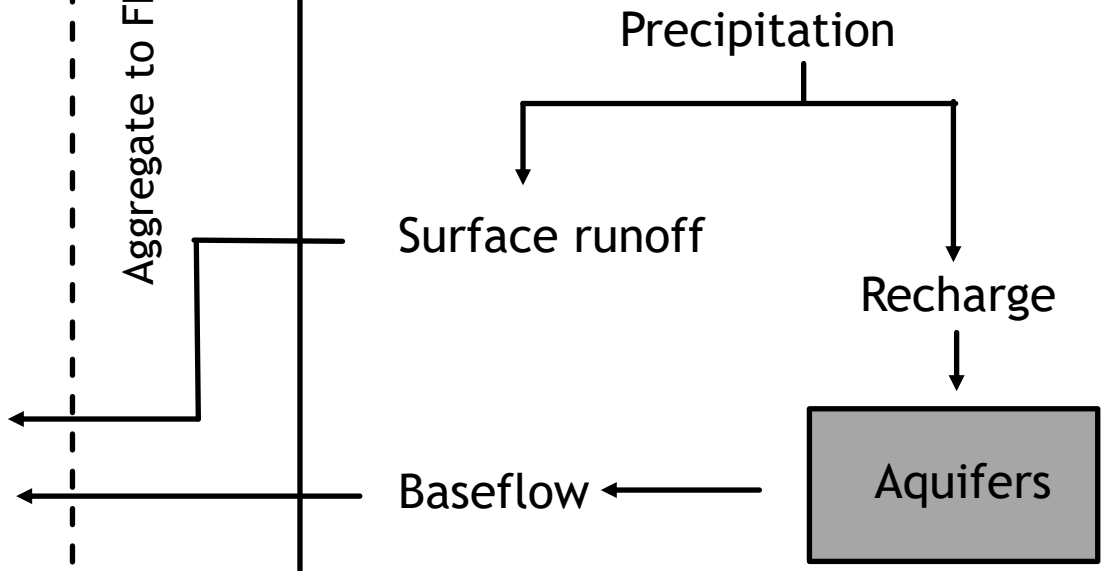
Core Food Model
- Multi-market partial equilibrium agricultural sector model
- Designed to simulate national and international agricultural markets

IWSM (Impact Water Simulation Model)
- Developed to model sectoral water allocation
- Water consumption is constrained by withdrawal capacity and water availability

Aggregate to FPUs

IGHM (IMPACT Global Hydrology Model)

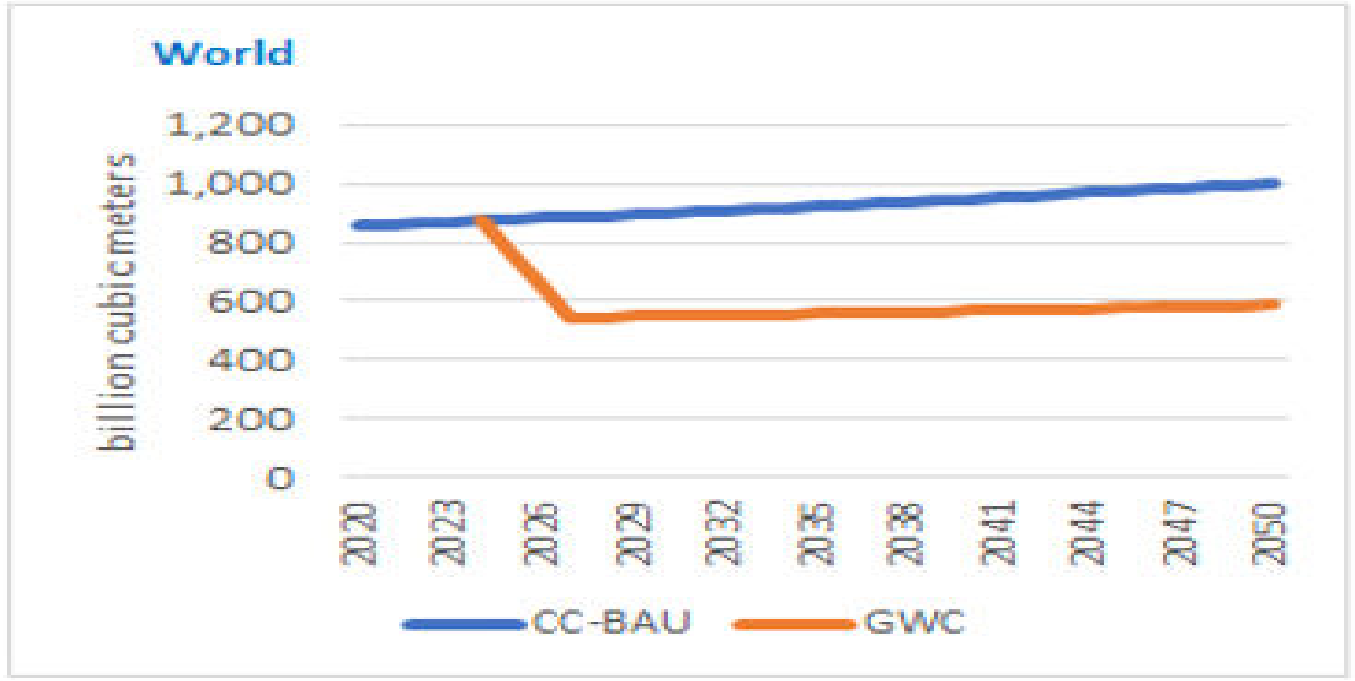
- A physical global hydrological model on 0.5-degree latitude-longitude grid



Source: IFPRI IMPACT

Scenarios

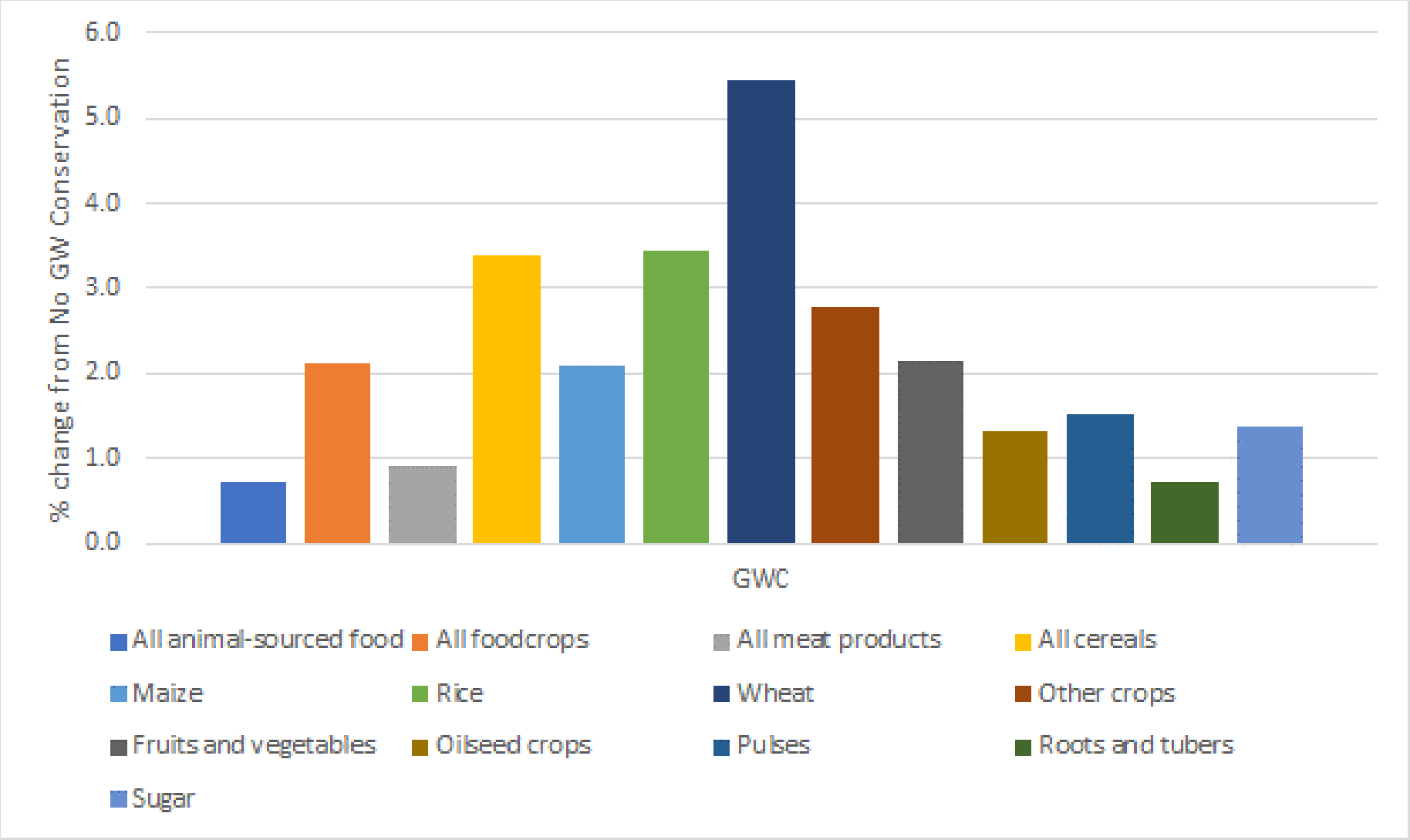
- Reference scenario: continued growth in groundwater use and depletion
- Conservation without compensation



- Eliminate groundwater overdraft in food-producing areas with overdraft in 3 years' time in a phased manner -33% reduction per year; other things remain constant

Source: IFPRI IMPACT

Moving from depletion to conservation of GW- impacts on food prices (average of 3 CC scenarios, 2050)



Source: IFPRI IMPACT

Addressing higher food prices from GW depletion

- Conservation with increased investment in agricultural R&D (short duration/dwarf varieties, drought and heat stress tolerance, etc.) for irrigated crops

- Conservation with more effective use of precipitation – Share of effective rainfall used increased by 10% on croplands through zero till, mulching, rainwater harvesting

- Conservation with declining demand for animal-sourced food in HICs +China + Brazil (income elasticities -10%)

Source: IFPRI IMPACT

Moving from depletion to conservation of GW

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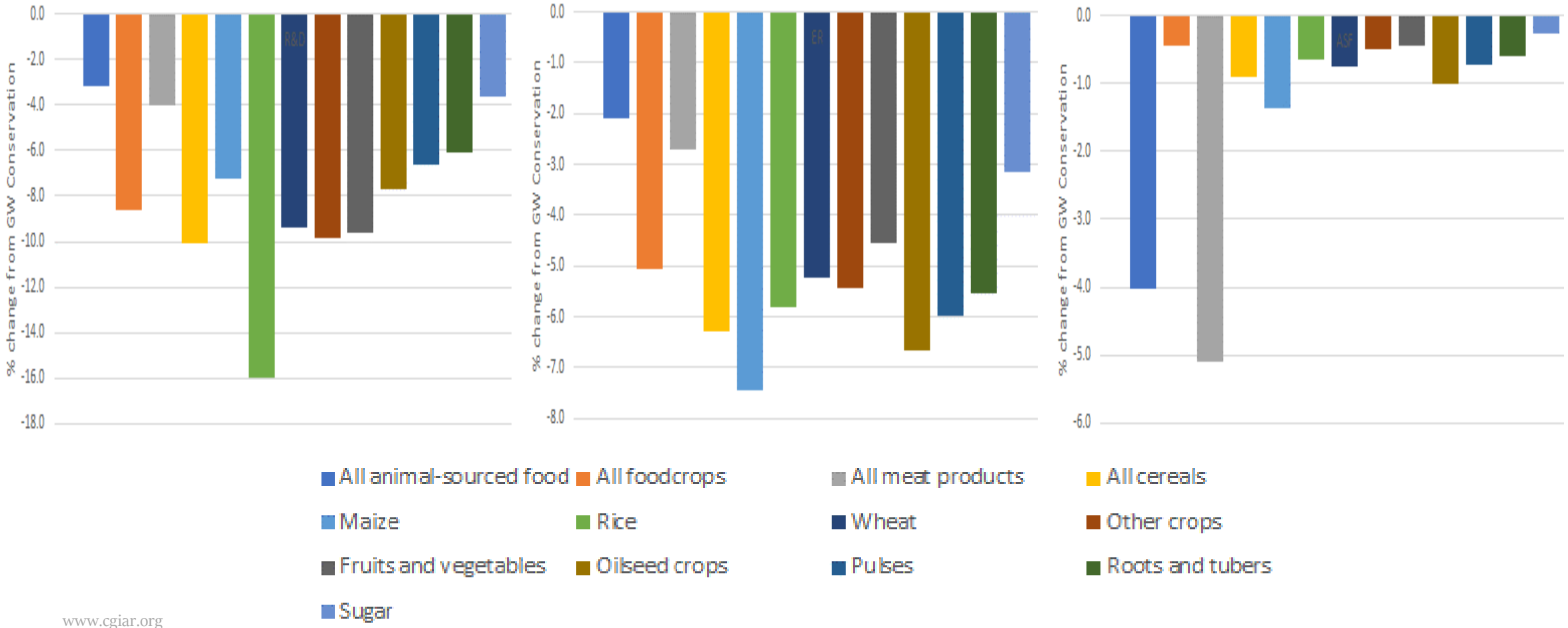
(a) Investment in Agricultural R&D

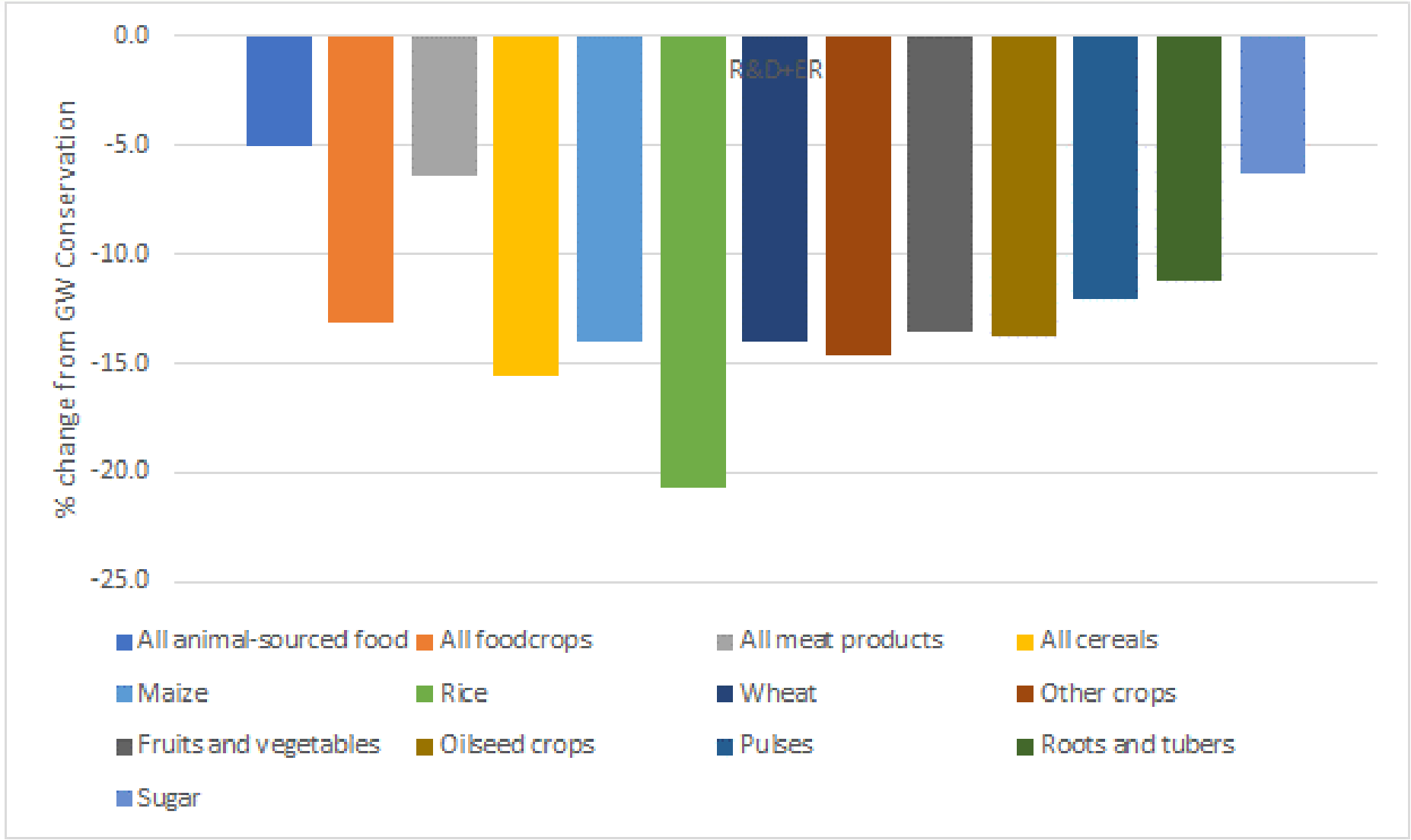
(b) Investment in effective rainfall management

(c) Reduced meat product consumption



Source: IFPRI IMPACT

Moving from depletion to conservation of GW- Increased investment in R&D+ER



Source: IFPRI IMPACT

Summary

- Arresting groundwater depletion without complementary policy action would put upward pressure on food prices growing hunger.
- Several options can dampen price impacts, such as improving water management in rainfed areas, investing in agricultural R&D, or reducing ASF intake. GW conservation, coupled with these policy interventions can potentially offset the negative impacts of reduced GW use.

Thank You !

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