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The U.S. Government's Global Hunger & Food Security Initiative

GLOBAL LEARNING AND EVIDENCE EXCHANGE  
**CLIMATE-SMART AGRICULTURE**

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# Aquaculture for Climate Mitigation and Adaptation

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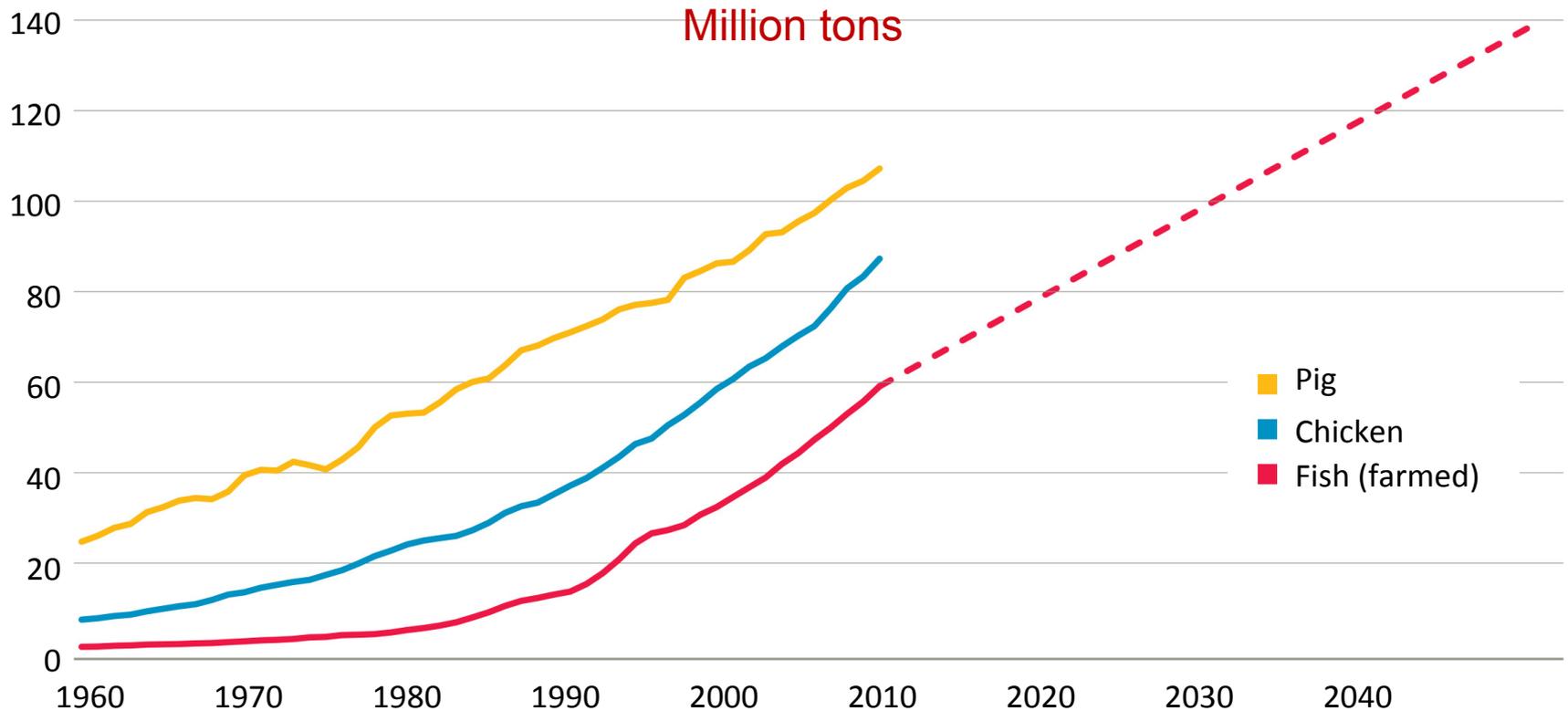


## AQUACULTURE'S ROLE IN FOOD AND NUTRITION SECURITY

- Essential supply of food for nutrition and food security
- Need to more than double production from 2010 to 2050
- This presents risks and opportunities for climate mitigation and adaptation



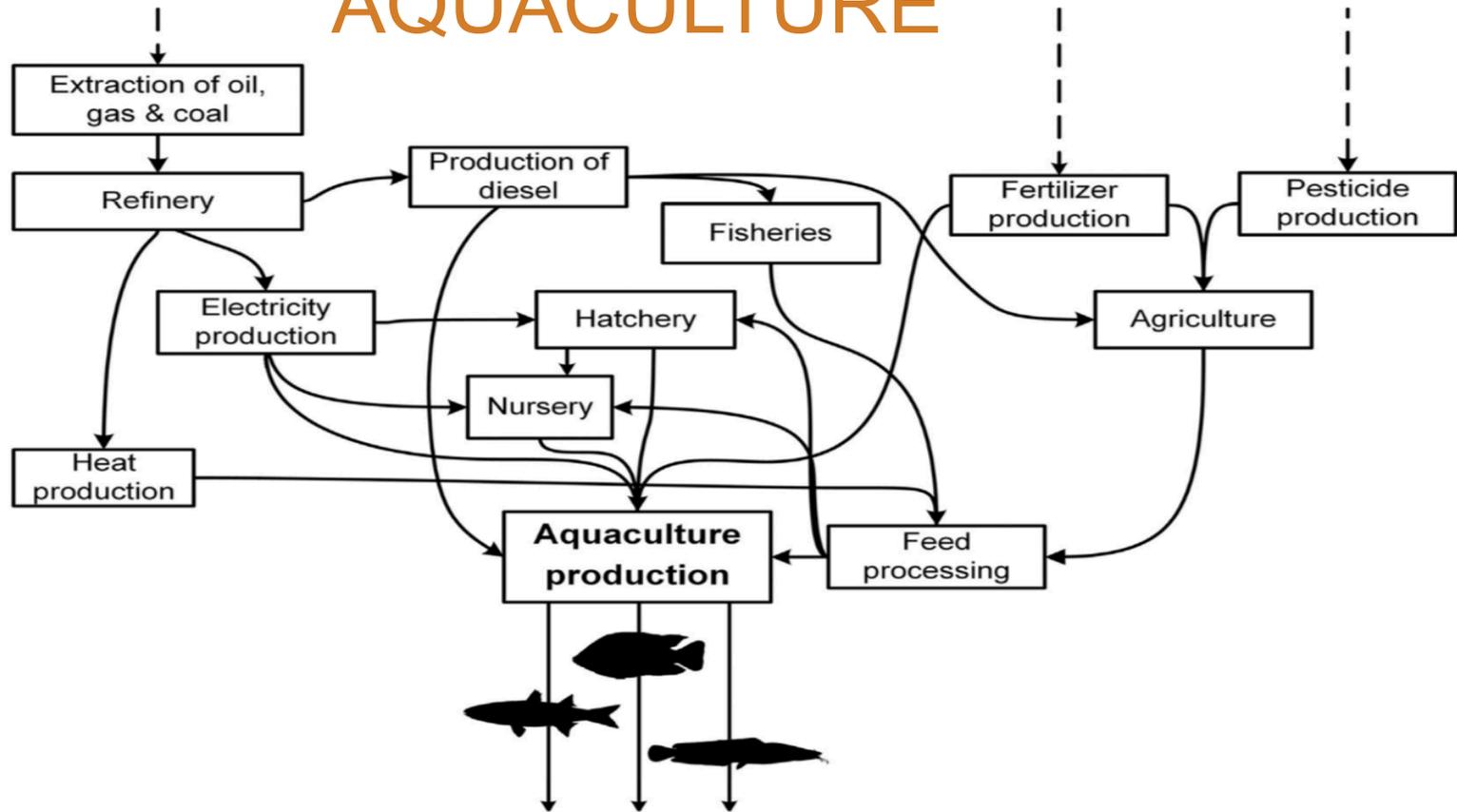
# AQUACULTURE PRODUCTION MUST MORE THAN DOUBLE BETWEEN 2010 AND 2050 TO MEET DEMAND



Sources: Production data 1961–2010: FAO (2014a), FAO (2014b). Aquaculture production projections 2011–2050: Authors' calculations assuming a linear growth rate of 2 Mt per year.



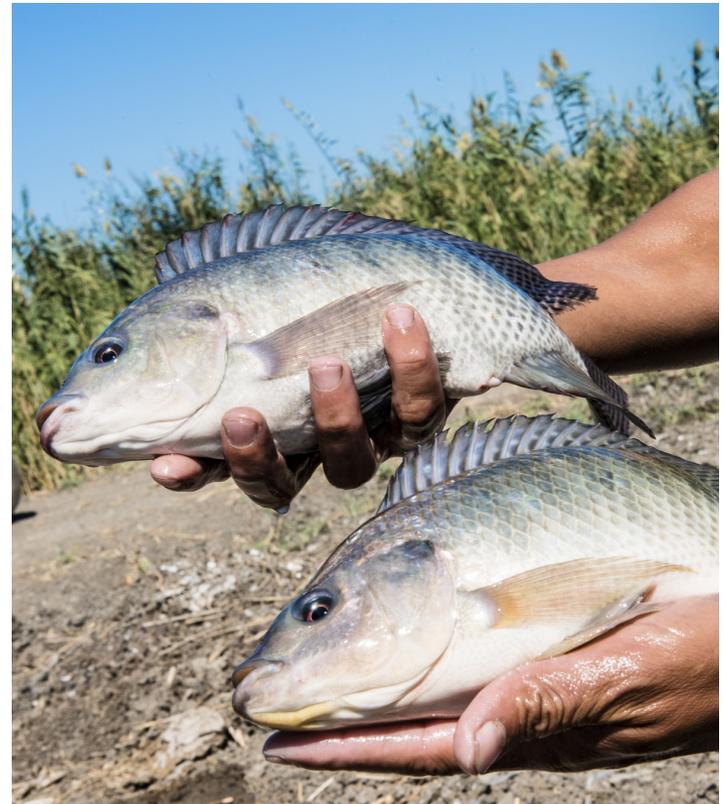
## LIFE CYCLE ANALYSIS OF EGYPTIAN AQUACULTURE





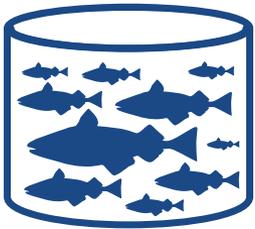
## GAINS FROM GENETICALLY IMPROVED TILAPIA (GEN-9 ABBASSA STRAIN)

- Reduced greenhouse gas emissions by up to 36%
- Reduced eutrophication impacts in freshwater, estuarine and coastal waters by 35%
- Reduced freshwater consumption by 20%
- Reduced land use requirements by 23%



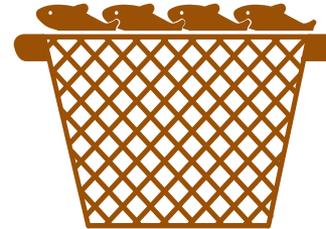


## POTENTIAL FOR SCALING SUSTAINABLE AQUACULTURE PRACTICES (WORLD FISH 2022 TARGETS)



**1.5M**

farm households have access to selectively improved, faster growing and more resilient strains of tilapia and carp seed



**2.5M**

farm households have adopted disease detection and control strategies, cost effective and sustainable aquafeeds, and/or improved aquaculture management practices



**4.8M**

metric tons of annual farmed fish production with reduced environmental impact and increased resource-use efficiency



**2.3M**

poor men, women and youth access improved livelihood opportunities resulting from increased aquaculture production





## RESPONDING TO SALINIZATION IN MEGA DELTAS

- Threats include sea level rise, decreased river flows, increasing vulnerability to natural disasters
- In southwest Bangladesh, shrimp, prawn, catfish, carp and tilapia production integrated in ghers
- Increased production and income, with fish as the most high value crop

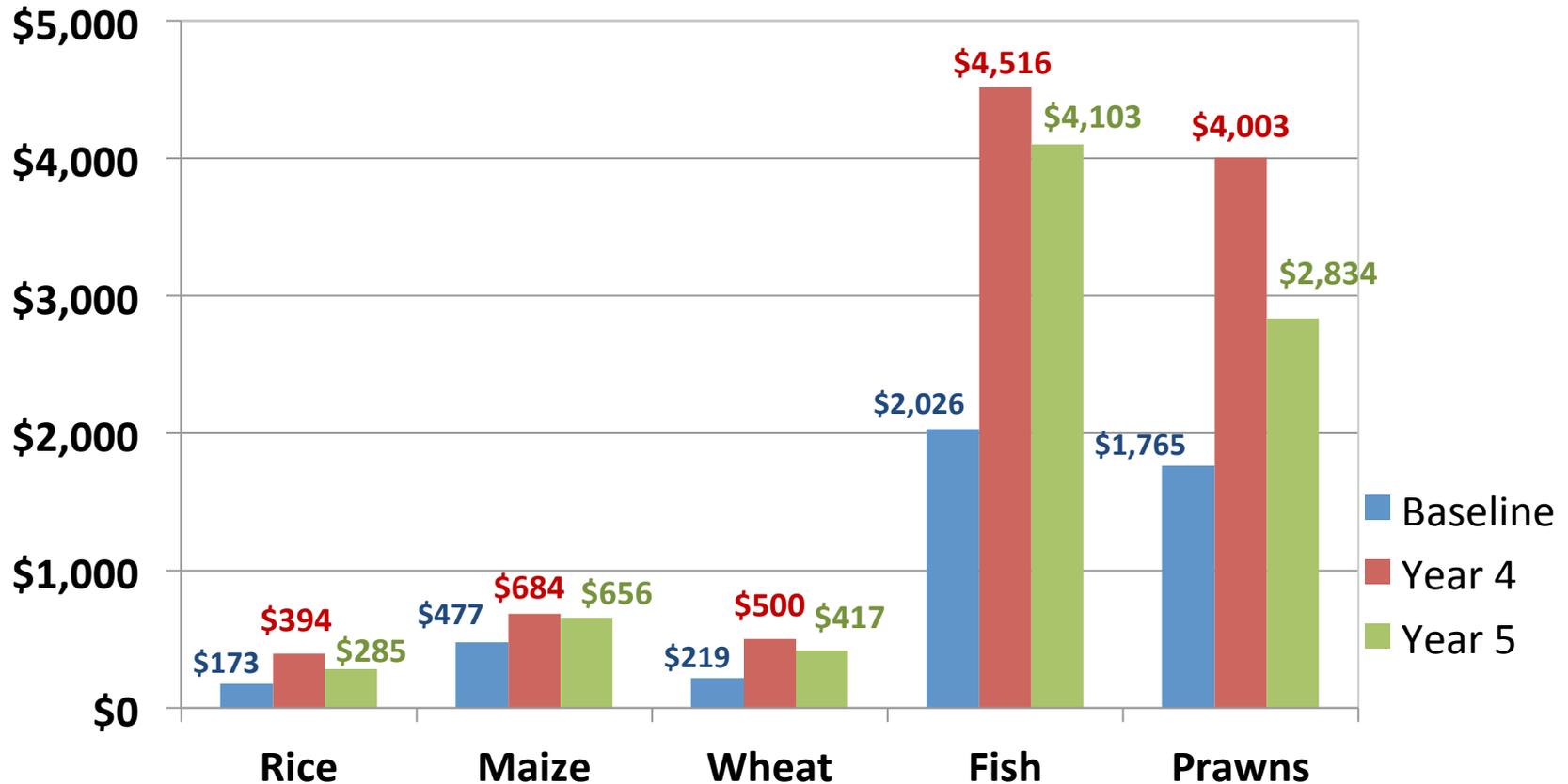




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## GROSS MARGIN VALUES FOR CSISA-PROMOTED CEREALS AND AQUACULTURE CROPS (US\$/HA)



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## INTENSIFICATION OF HOMESTEAD PONDS

- Women-led improvements, suitable for labor requirements and accessibility
- Benefits for household nutrition, resource control, adaptive capacity
- Demonstrated value in resilience during post-cyclone recovery





## SUSTAINABLE AQUACULTURE AT THE LAND-SEA INTERFACE

- Brackish water aquaculture beyond the mangrove fringe—economic benefits from poor agricultural land
- Brackish water aquaculture at the interface with rice farms with seasonal or permanent saline intrusions
- Marine aquaculture in ponds along desert coastlines (e.g., Red Sea)
- Novel sustainable aquafeeds via bioconversion of crop wastes using marine microbial processes





## KEY MESSAGES

- Sustainable aquaculture offers water, energy and feed conversion efficiencies superior to any other animal food production system
- Improving aquaculture systems can rapidly reduce greenhouse gas emissions while intensifying production
- A variety of aquaculture intensification strategies can support climate adaptation from household to landscape scales





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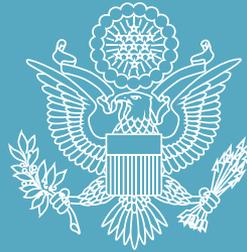
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