Global Food Loss and Waste Prevention

INVESTING IN AN AGRICULTURE AND FOOD SYSTEM THAT IS MORE PRODUCTIVE, INCLUSIVE, SUSTAINABLE & NUTRITION SMART TO SUSTAINABLY FEED EVERYONE, EVERYDAY, EVERYWHERE

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Presentation Outline

I. The Agriculture & Food System – A Pathway to Reduce Poverty

II. The Food Loss and Food Waste Challenge

III. Pathways to Reduce Food Loss and Food Waste

IV. Policies and Programs for the Ways Forward

The Agriculture & Food System – A Pathway to Reduce Poverty

Agriculture and food, more than any other sector, plays a catalytic role in reducing poverty

Eradicating Extreme Poverty Sustainably

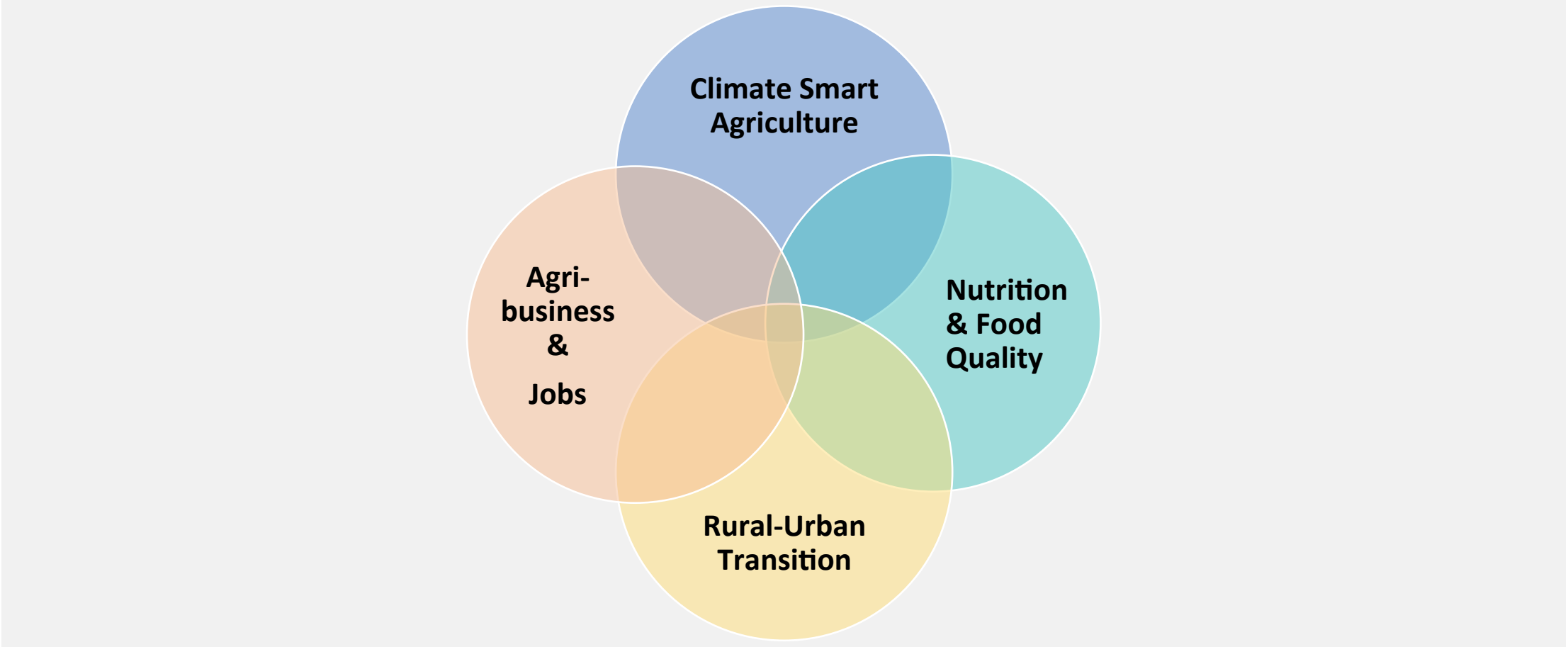
- Agriculture GDP growth has 2 to 4 times more impact on poverty reduction than non-agriculture GDP growth
- Of the 3 billion living in rural areas, 2.5 billion participate in agriculture
- The world's poorest spend as much as 60% of their income on food
- There are more than 700 million rural poor to be lifted out of poverty by 2030
- There will be ~2 billion living in slums by 2030, facing informality
- Agriculture development is key to ensuring food security and nutrition, especially in fragile/conflict/violent countries

- Agriculture can account for more than half of GDP growth during the early stages of development
- Agriculture is inclusive and reduces inequality by boosting the incomes of the poor
- Women comprise nearly 45% of the agricultural labor force globally (> 60% of female employment in SSA & SAR) - yet they lag in Opportunities, Access, Endowments & Voice
- Agriculture is characterized by low investments in the Global South, and the required additional agriculture financing is approximately USD 265 billion per year

Boosting Shared Prosperity Sustainably

The Agriculture and Food GP's Global Agenda:

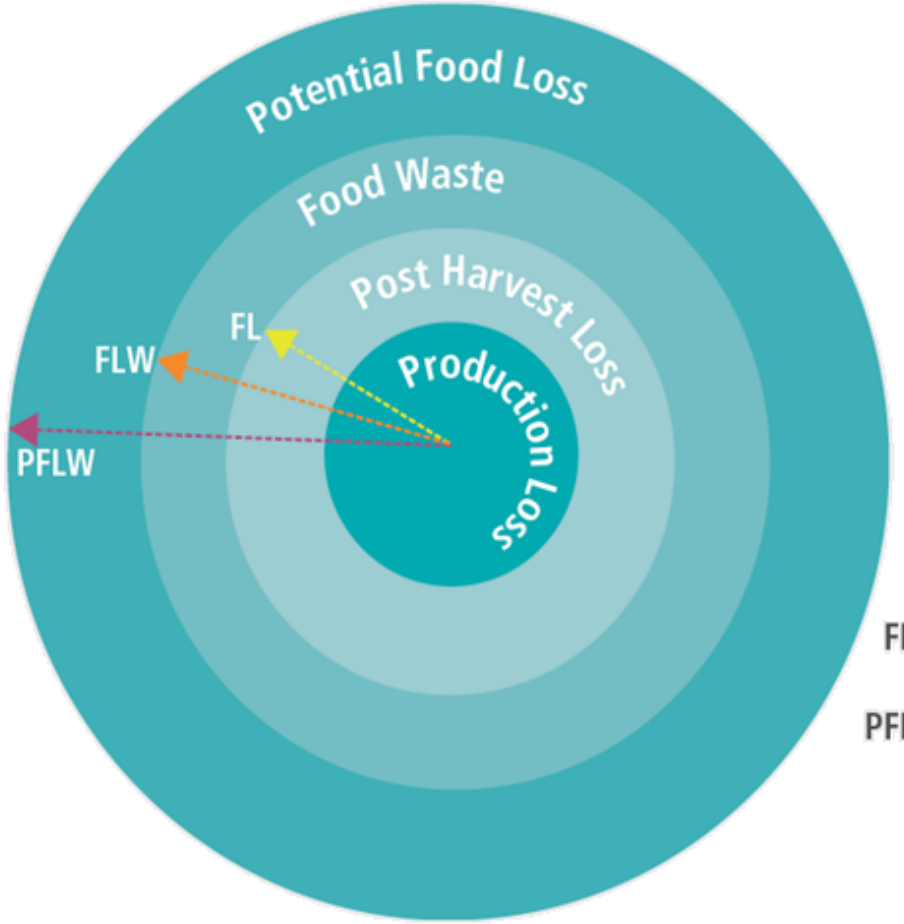
To feed every person, every day, everywhere with a safe, nutritious, and affordable diet

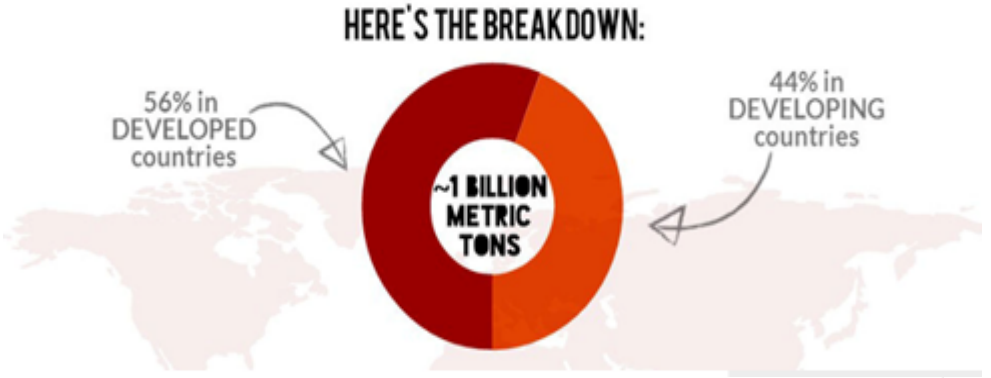


Working together to meet the SDGs: Zero Poverty & Zero Hunger

Food Loss and Waste (FLW) – The Challenge

~ 1/3 of All Food Produced for Human Consumption is Lost or Wasted





Defining FLW

FL → FOOD LOSS: Unintentional reductions in food quantity or quality before consumption, including postharvest losses.

FLW → FOOD LOSS + FOOD WASTE: Deliberately discarded food that is fit for human consumption

PFLW → FOOD LOSS + FOOD WASTE + POTENTIAL FOOD LOSS: Crops lost before harvest to pests and disease or left in the field, crops lost due to poor harvesting techniques or sharp price drops, or food that was not produced because of a lack of appropriate agricultural inputs

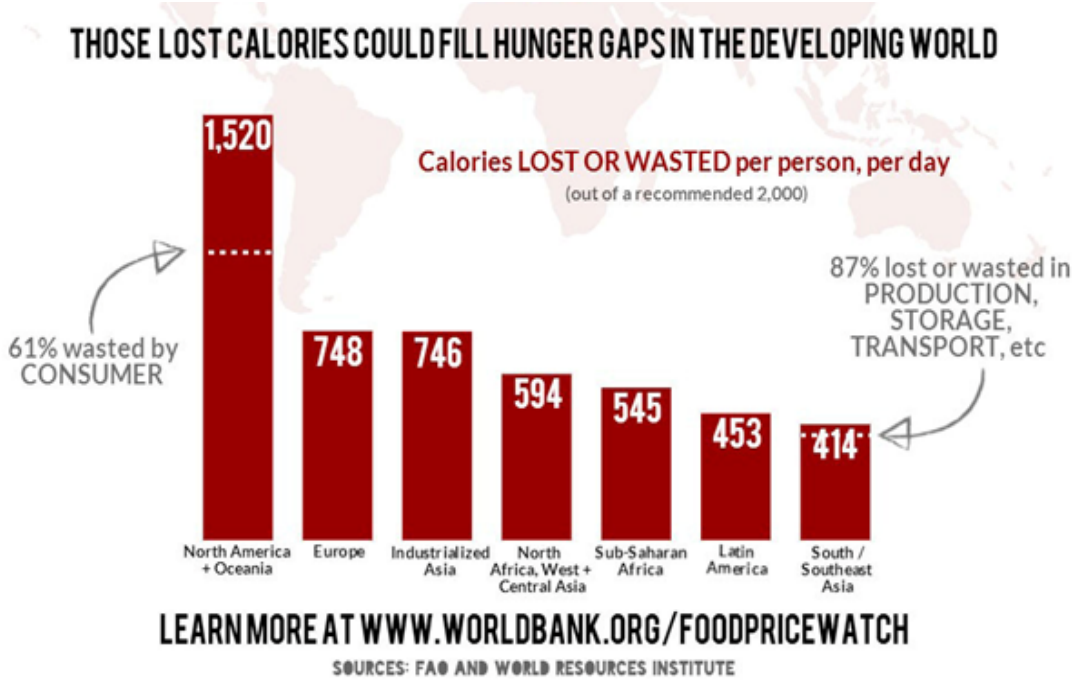
IFPRI 2016, World Bank 2014

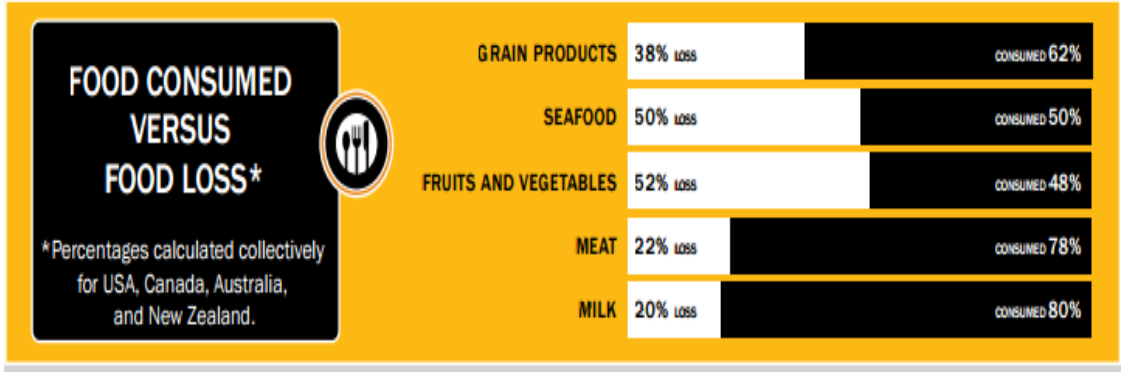
~ 1/3rd of All Food Produced for Human Consumption is Lost or Wasted

- Of the 1.3 billion tons of FLW - 70% is lost before it ever reaches the consumer in developing countries and the reverse in developed

- 45% of fruit and vegetables, 30% of cereals, and 20% of dairy products/meat is lost or wasted every year

- Food waste at the consumer level in industrialized countries (222 million tons) is almost as high as the total net food production in Sub-Saharan Africa (230 million tons)

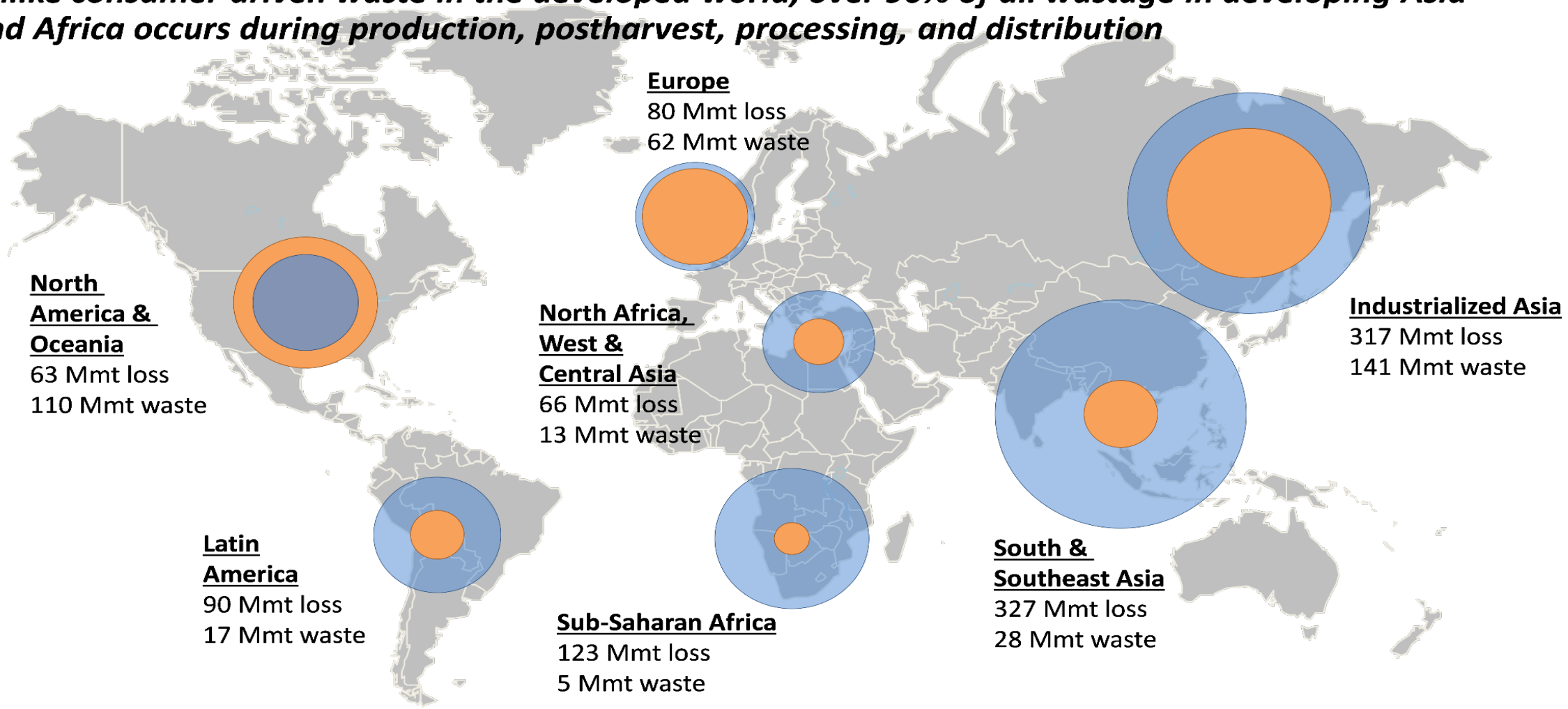




Financial Times, UNEP, 2016; FAO, 2012 (as in NRDC Issues Paper –Gunders, 2012)

Food waste and food loss around the world, millions of metric tons[1]

Unlike consumer driven waste in the developed world, over 90% of all wastage in developing Asia and Africa occurs during production, postharvest, processing, and distribution

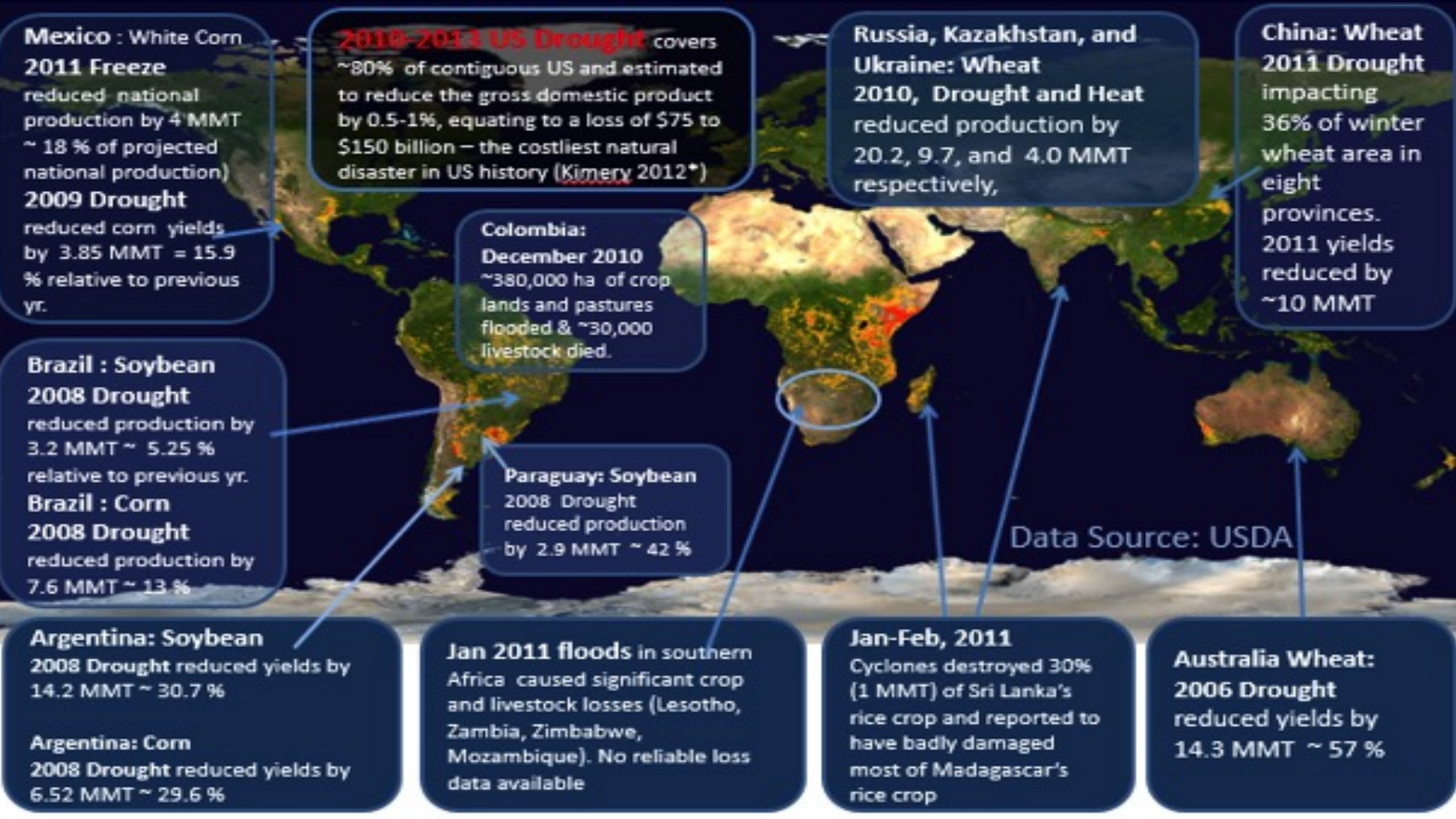


Food loss: food intended for human consumption that is wasted during production, postharvest, processing, and distribution

Food waste: food that is discarded by consumers

Mmt = million metric tonnes

Source: (1) FAO "Global Food Losses and Food Waste," 2011; Dalberg analysis


Mexico : White Corn
2011 Freeze
reduced national production by 4 MMT ~ 18 % of projected national production)
2009 Drought
reduced corn yields by 3.85 MMT = 15.9 % relative to previous yr.
2010-2013 US Drought covers ~80% of contiguous US and estimated to reduce the gross domestic product by 0.5-1%, equating to a loss of $75 to $150 billion – the costliest natural disaster in US history (Kimery 2012*)
Russia, Kazakhstan, and Ukraine: Wheat
2010, Drought and Heat
reduced production by 20.2, 9.7, and 4.0 MMT respectively,
China: Wheat
2011 Drought
impacting 36% of winter wheat area in eight provinces. 2011 yields reduced by ~10 MMT
Colombia:
December 2010
~380,000 ha of crop lands and pastures flooded & ~30,000 livestock died.
Brazil : Soybean
2008 Drought
reduced production by 3.2 MMT ~ 5.25 % relative to previous yr.
Brazil : Corn
2008 Drought
reduced production by 7.6 MMT ~ 13 %
Paraguay: Soybean
2008 Drought
reduced production by 2.9 MMT ~ 42 %
Data Source: USDA
Argentina: Soybean
2008 Drought reduced yields by 14.2 MMT ~ 30.7 %
Argentina: Corn
2008 Drought reduced yields by 6.52 MMT ~ 29.6 %
Jan 2011 floods in southern Africa caused significant crop and livestock losses (Lesotho, Zambia, Zimbabwe, Mozambique). No reliable loss data available
Jan-Feb, 2011
Cyclones destroyed 30% (1 MMT) of Sri Lanka's rice crop and reported to have badly damaged most of Madagascar's rice crop
Australia Wheat:
2006 Drought
reduced yields by 14.3 MMT ~ 57 %

WRI; Save Food

Key FLW Challenges

- **The overall productivity & effectiveness of the global food system is reduced by FLW**, which can result in **lower incomes for food producers and higher costs for food consumers**. And much of that **burden falls on the poor**.
- **Feeding the world's 800 million hungry** is one of the most urgent development challenges, yet we produce enough food to feed 10 billion people.
- From field to fork, **one-third of the food produced is lost or wasted globally**, posing a direct challenge to food security, proper nutrition and sustainability.
- If measured as a country, **food waste would rank third in the world for GHG emissions.**
- Highly nutritious foods are wasted in greater quantities than any other kinds of food, **exacerbating the growing triple burden of malnutrition** (stunting, wasting, and obesity).
- **Rapid urbanization, a rising middle class, and changing consumer preferences is transforming the agrifood system as we know it**, creating additional challenges related to food safety, food quality, the demand for more perishable foods, etc.
- **Agricultural and food systems have a key role to play in reducing FLW** which includes on-farm management and off-farm systems and activities including improving upon post-production, processing, distribution, retail, creating a circular economy and raising awareness around more responsible household-level consumption.

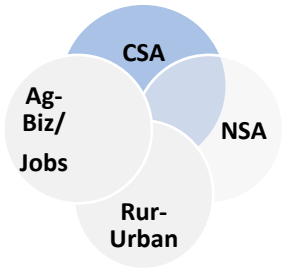
Pathways to Reduce FLW

Climate Smart Agriculture

Pathways for a More Resilient and Sustainable Food System

Synergies between greater efficiency and sustainable use of agricultural inputs

- In Vietnam, the World Bank is piloting automated sensor applications for improving rice water efficiency to achieve five reductions (seed rate, fertilizer use, water use through alternate wetting and drying of the field, frequency of pesticide application, and post-harvest losses) to overall improve the sustainability of rice production.
- Heat tolerant wheat in Sudan adapted for growing at 50˚C helped develop a wheat production sector & reduce import reliance.



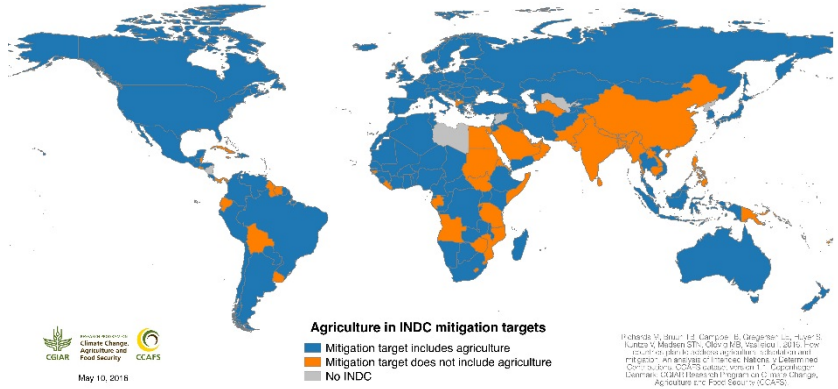
What are the issues?	Investments needed

• Nearly 30% of the world's agricultural land produces food that is wasted
• Global food waste emits 3.5 gigatons of greenhouse gases per year
• FLW represents a significant loss of natural resources and inputs (land, water, labor, fertilizers)
• We lose 45 trillion gallons of water when FLW occurs, which is ¼ of all water used for Ag, a sector which already accounts for 70% of water use
• Food waste that goes to the landfill breaks down anaerobically and produces methane, which is 21 times more potent than CO_2 as a GHG
• In 2008, the EPA estimated that food waste cost roughly $1.3 billion to dispose of in landfills
• In turn, climate change and related shocks will increase on- and off-farm food losses
	• Investing in climate smart agriculture has the opportunity to increase productivity, improve resilience & lower the carbon footprint
	• An increase in resilience is needed throughout the value chain.
	• Measures that reduce FLW increase resilience by reducing vulnerability of food systems to shocks:
	  • Improving soil health can restore the ecosystem to reduce production losses
	  • More efficient and effective use of water and climate intelligent inputs can contribute to a more resilient food system, releasing funds for investment in FLW reduction

EPA; Journal of Consumer Affairs, WRI

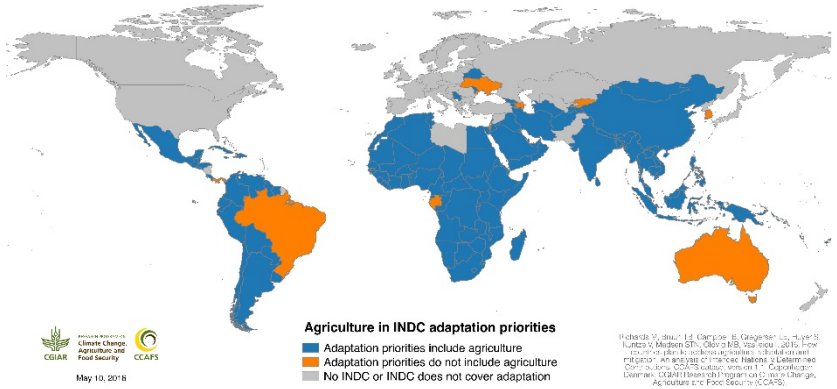
Agriculture included under mitigation and adaptation in the majority of INDCs

Agriculture included in **119 of 162** Country Mitigation Target Submissions: **73%**



Over 30 countries specifically cited Climate Smart Agriculture as a key strategy in fulfilling their commitments.

Agriculture included in **126 of 134** Country Adaptation Priority Submissions: **94%**



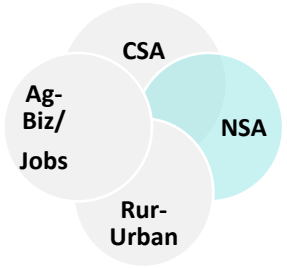
The World Bank is committed to scaling up our support to our clients in implementing INDC commitments

Nutrition and Food Quality

Pathways for Better Nutrition for Everyone

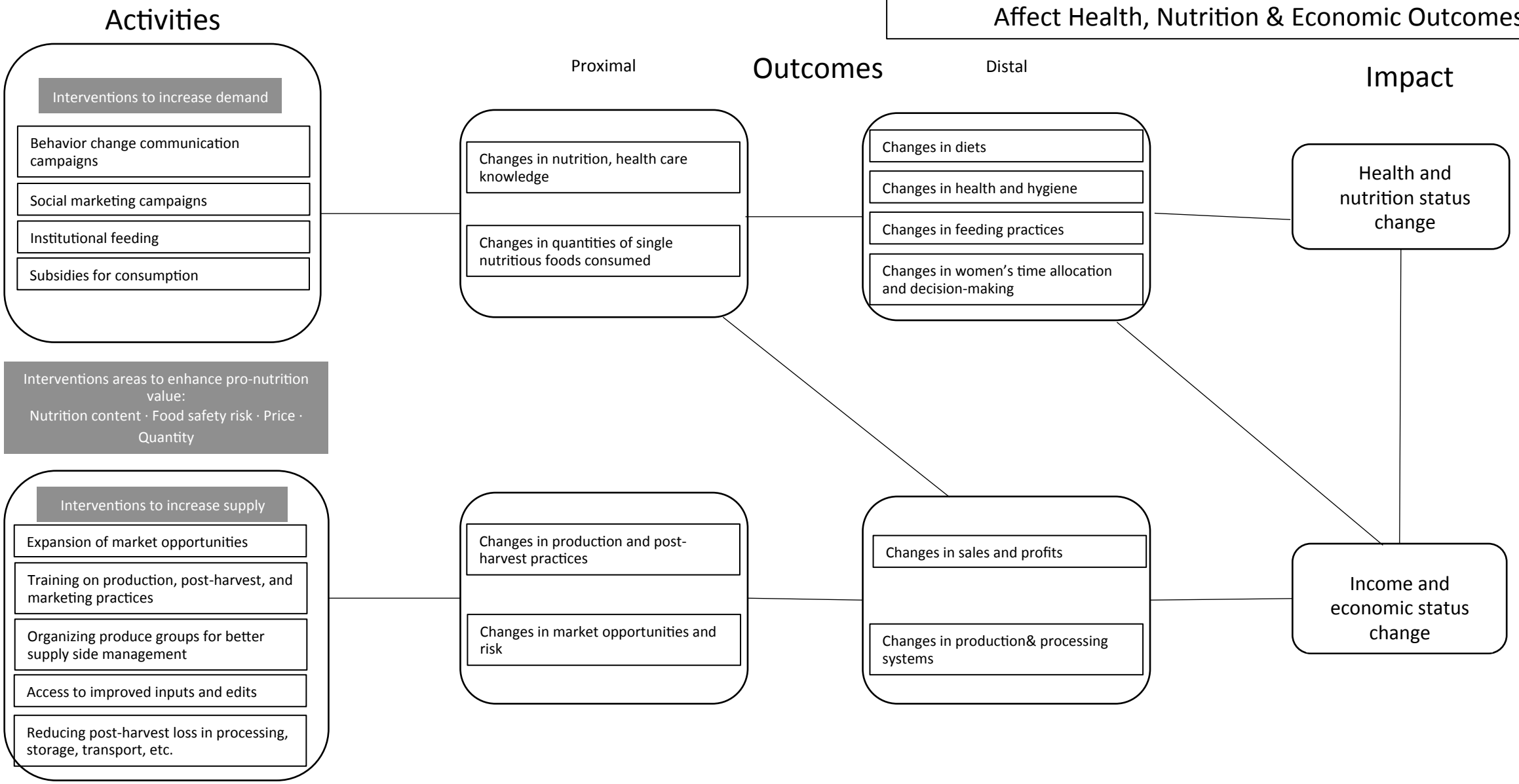
Nutrition-sensitive interventions to stem malnutrition

- A World Bank project in Zambia supported the rollout of ProVitamin A maize by stimulating the grain market for the new hybrid varieties of maize through incentives aimed at industrial millers.
- With the ultimate objective of improving vitamin A status, a project in Mozambique & Uganda distributes orange-fleshed sweet potatoes (OFSP) to producers and uses mass media to raise consumer awareness of the benefits of OFSP.



What are the issues?	Investments Needed
• FLW reduces the the availability of nutritious foods • Global FLW represents a loss of 400-500 calories/person/day in developing regions • Food value chain breakdowns affect the vulnerable and poor the most • Fruits and vegetables (and their valuable nutrients) are wasted (40-50%) in greater quantities than any other foods, exacerbating the growing burden of malnutrition • High rates of physical and quality loss for fresh fruits and vegetables can exacerbate government policy biases towards staple cereals production	• Food systems need to be made more resilient to prevent erosion of nutrient quality along the value chain • More research and better infrastructure is needed to reduce high-nutrient, perishable food losses • Understand consumers' preferences and demand while investing in education to increase awareness, promote, and enable more diverse dietary choices to counter FLW • Develop safety nets and policies to address food price spikes/volatility, food deserts, while meeting the nutritional needs of the poor & marginalized • Policies and programs to eliminate the "staple crops bias"

Theory of Supply & Demand Side Value Chain Interventions to Affect Health, Nutrition & Economic Outcomes



The World Bank envisions a stronger nutrition-agriculture alliance to step up progress on global nutrition targets

*Redrawn with some adaptation from IFPRI's 'Value Chains and Nutrition 2014 Discussion Paper

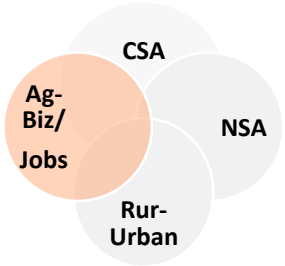
Value Chains/Jobs

Pathways for More and Better Jobs Along Agribusiness Value Chains

Integrated storage capacities and distribution systems

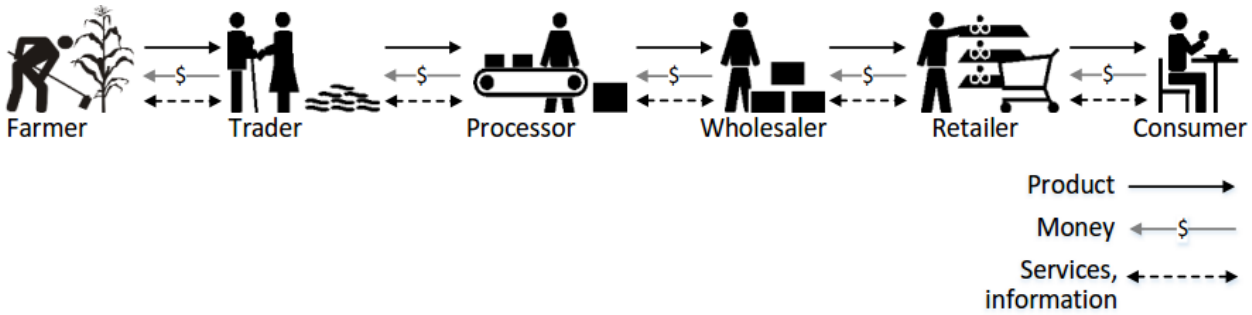
A World Bank project in Bangladesh builds modern food storage and strengthens the distribution system by constructing steel silos with a storage capacity for 535,000 tons of rice and wheat and also support the distribution of smaller household silos to 500,000 households in disaster-prone coastal areas.

What are the issues?	Investments Needed
• The estimated value of global food waste is estimated at US$1 trillion annually • 470 million smallholders (of a total cohort of ~500 mln) can lose upwards of 15% of their income due to FLW • FLW impacts incomes, profitability of smallholders and agribusinesses/SMEs • FLW leads to proportionally less efficient outcomes for public resources used for agriculture (subsidies, public services and infrastructure costs) • Women's access issues affect productivity and worsens food loss	• Broaden efforts from a production focus to the entire agri-food system with emphasis on: • Corporate Social Responsibility in Food Supply Chains -> attention to FWL • Secondary uses of surplus/ imperfect food • Linkage with institutional feeding programs • Enabling environment for small farms/firms to engage in gender-sensitive low cost/low-tech handling, processing, packaging storage enterprises • Skills development & marketing strategies/ links • Knowledge and technologies for quality and sanitary standards

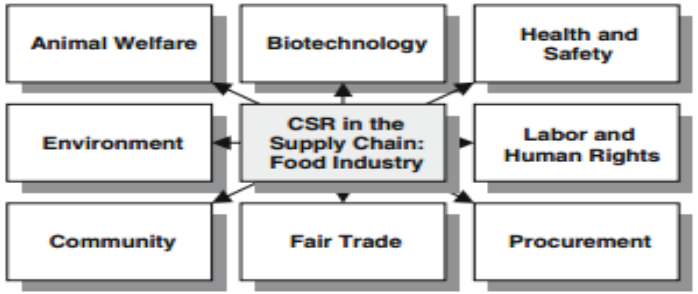


FAO; Chicago Council on Global Affairs

Investing in the value chains to boost incomes, provide more and better jobs, and improve livelihoods



Corporate Social Responsibility in Food VCs



	Production	Post-production	Processing	Distribution	Consumption
Value Chain Stages	• Post-harvest • Harvest • Breeding	• Handling • Storage • Cold Chains • Transport	• Canning • Packaging • Cold Chains • Transformation	• Retail • Transport	• Preparation • Consumption
Causes of Loss	• Damage/spillage • Left behind in fields • Pests/diseases • Spoilage • Weather • Wrong inputs	• Degradation • Pests • Premature animal death • Spillage • Spoilage	• Degradation • Discard • Spillage • Spoilage	• Degradation • Discard • Excess supply • Spillage • Spoilage	• Discard • Excess purchase • Excess preparation • Spoilage

The World Bank is promoting private sector employment growth in agribusiness and related subsectors, and fostering partnerships for innovation in agribusiness value chains

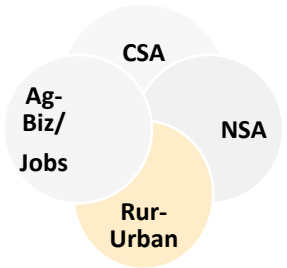
*Adapted from "Reducing Food Loss and Waste"; IFPRI, 2016; Malone et al (2006) Journal of Business Ethics (2006) 68:35–52

Leveraging Rural-Urban Transition

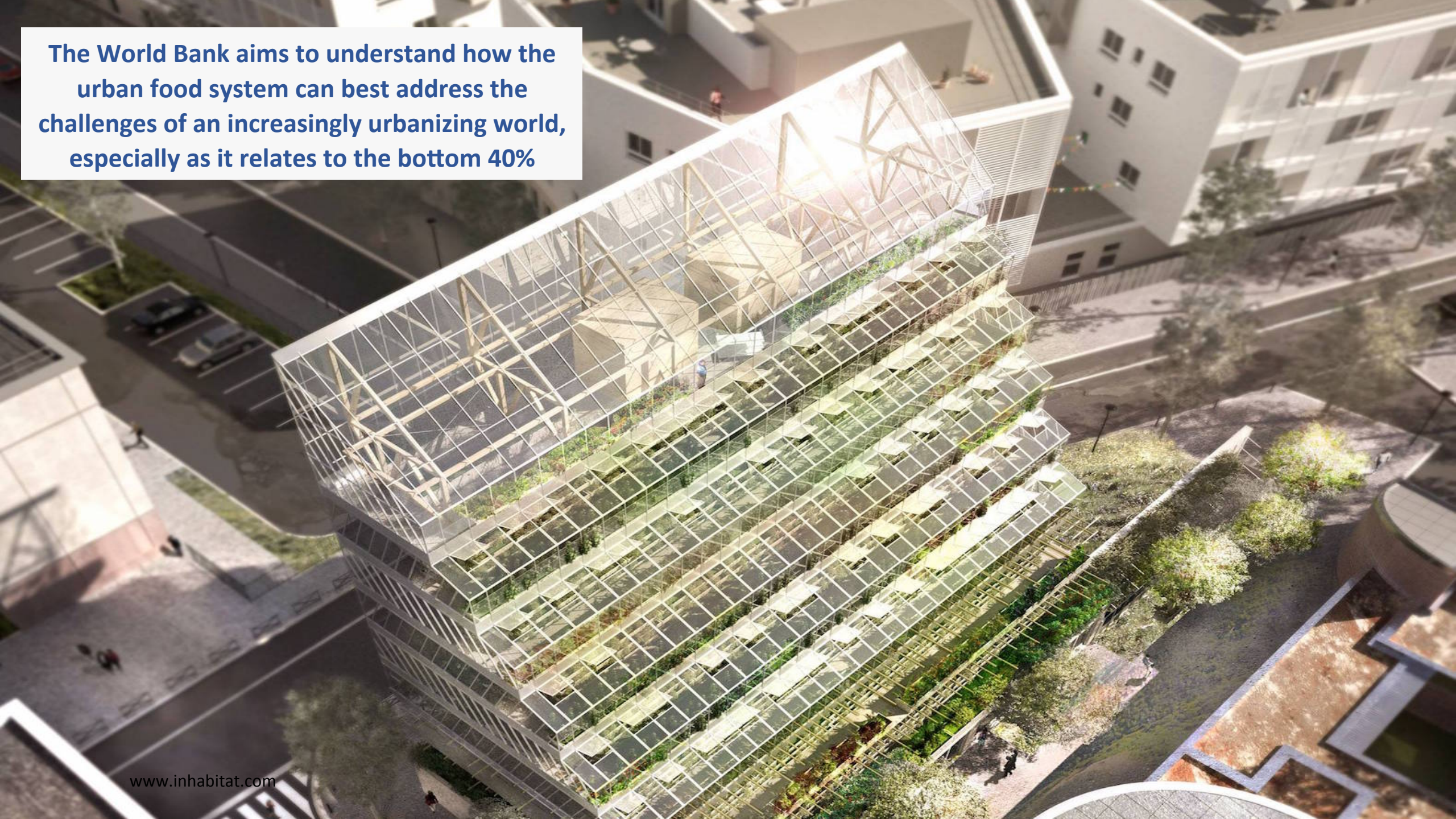
Pathways to Enhance the Food System Leveraging the Rural-Urban Transition

Innovation solutions to feed a growing urban population

Singapore, the densely populated island city with scant farmland and heavily reliant on imports, has invested in vertical farming as a way to meet the needs of the growing urban population. A public-private partnership has come up with one of the world's first commercial soil-based, low-carbon hydraulic water-driven vertical farm, and produces 1 ton of vegetables every other day and is 5-10 times more productive than a regular farm.



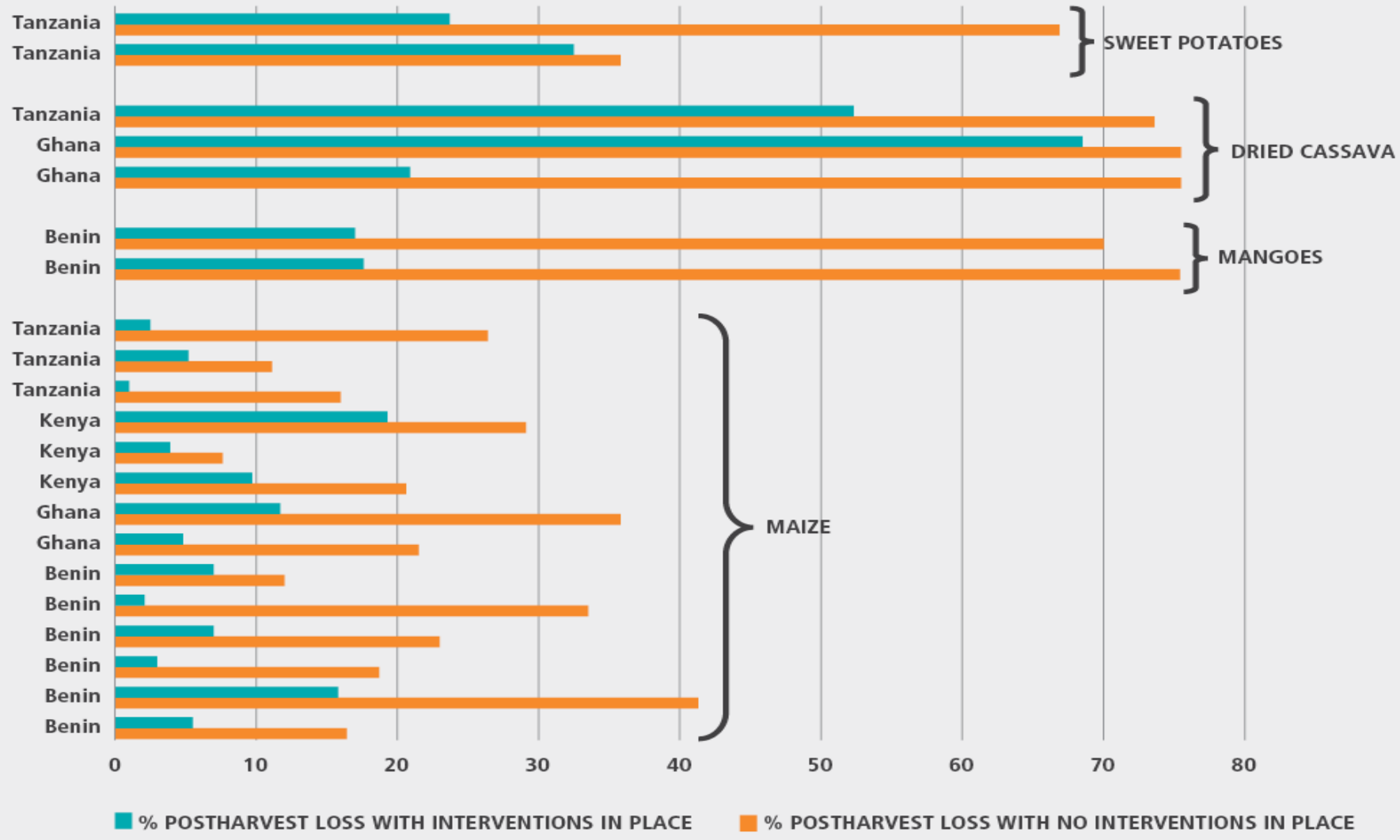
What are the issues?	Investments Needed
• Rapid urbanization (over 50% presently and much higher in several countries in the Global South) • An aging (farmer) population • Slum growth (nearly 1/3 of all city dwellers in developing countries live in slums and over 1 billion people globally living in slums) • The expansion of national and sub-regional food markets (not just export production) in part due to the urban "pull effect" (in Africa, food markets there have expanded nearly 8 fold over the past 4 decades) • We are facing the largest numbers of displaced persons since WWII (65 million displaced of which ~22 million are refugees) highlighting the need for more and better food in urban areas	• Reduce food miles, leveraging data and technology to improve processes and systems • Tailor and customize approaches to address challenges of local food security & links to agri-food system • Increase the capacity/engagement of city/region governments in contextualized food security planning • Promote a circular economy, identifying opportunities for on-/off-farm job creation • Allocate resources for services, infrastructure and social protection which respond to increasing mobility • Promote rural and urban producer engagement in local and regional value chains so that they may derive greater value



The World Bank aims to understand how the urban food system can best address the challenges of an increasingly urbanizing world, especially as it relates to the bottom 40%

Minimizing Food Loss & Waste – Policies and Programs for Bringing It All Together

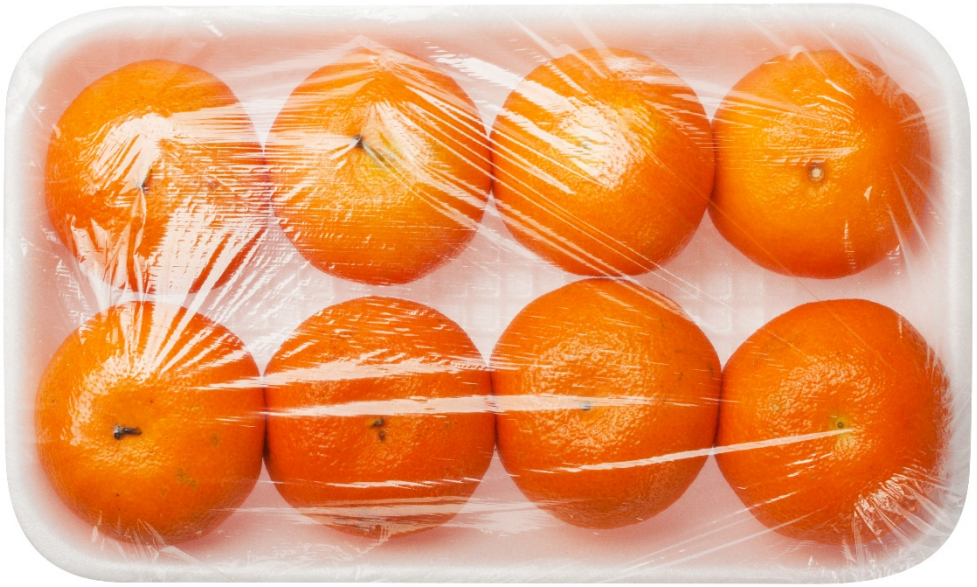
Evidence that Effective Interventions Reduce FLW



Government actions:

Strengthening Public Policies, Institutions & Partnerships

- **Mainstream FLW reduction strategies within various sectoral policies** (policy convergence)
- **Think critically about different sectoral policies that could potentially undermine each other's goals** (policy coherence)
- **Smart incentives** to counter the negative impacts of overproduction in developed countries and seasonal gluts in developing countries
- **Food smart public/institutional procurement policies & programs**
- **Address local barriers to donations** to food banks etc.
- Create **an enabling environment** (i.e., increasing access to credit for smallholders/SMEs, support for innovations)
- Public investments in **infrastructure, advocacy, education, and training** around best practices in harvest and post-harvest handling
- Deliver on **research and extension capacities** to better understand the technical dimensions of FLW
- Invest in **data collection/management** to identify impacts and design appropriate interventions.
- Set and monitor **national and local targets for reduction of FLW**



Smallholders & Agribusinesses' actions:

Good Practices + Innovative Solutions to Reduce FLW streams

- Promote **resource-efficient production, processing and marketing** practices
- **Promote market linkages & ICT** related to pricing information, removing bottlenecks, improve financing, operational capita
- Improve **farming and post-harvesting practice**
- Improve processing, e.g., better **preservation and packing technologies**
- Improve **transportation and logistics** management
- **Private investments to improve and expand infrastructure** e.g., (cold) storage facilities
- **Social marketing and consumer awareness raising**
- **Engage with state and national authorities around policies, legislation, e.g., on food standards and labeling** that may be counter productive
- **Promote recycling practices and technologies**, e.g., composting or employing anaerobic digestion to produces biogas for electricity and gas generation

Consumers' actions:

Good Practices for Consumers to Reduce Food Waste At the Household Level

- **Plan, create shopping lists, and monitor** food purchased and consumed
- **Shop in the refrigerator first**! Cook or eat what's already at home before buying more
- **Store fruits and vegetables properly** so they stay fresh longer inside or outside refrigeration
- **Freeze, preserve, or can surplus fruits and vegetables** - especially abundant seasonal produce
- **Learn the difference between "sell-by," "use-by," "best-by," and expiration dates**
- **At restaurants, order only what you can finish** by asking about portion sizes and be aware of side dishes included with entrees. Take home the leftovers and keep them for or to make your next meal
- **Donate extra foods to food banks** and other food distribution centers
- **Create nutrient-rich soil by composting**
- **Divert food scraps to animal feed**

www.epa.gov, South China Morning Post

Concluding Thoughts

- Although some degree of food waste is inevitable, **there is clear consensus that today's levels are economically, environmentally, and socially unsustainable, considering the need to feed a world population that will reach ~9.7 billion by 2050**.
- Reducing food loss and waste in a significant way **requires a multisectoral supply chain approach**, **because losses occur at every stage with varying degrees**, and are the responsibility of all actors, including producers, retailers, consumers and every sector in between. International organizations, governments, civil society and other stakeholders, all have responsibilities to act.
  - FLW is a complex value chain inefficiency problem requiring solutions that are value chain-oriented
- When designing interventions, **attention should be made to the varying local and regional contexts**.
  - Food losses result from multiple factors, and the mix of interventions needed will vary depending on local circumstances. In addition, post-harvest loss especially varies significantly by crop and even region within country, necessitating a careful review of specific contexts before investing.
- In low-income countries, **losses can be reduced through better timing of planting and harvesting; improved post-harvest techniques; upgrading storage facilities and their management; and investments in rural infrastructure, market linkages, cold chains, and other logistical services**.
  - Engineering solutions can use food waste for heat, power and fertilizer.
- In high-income countries, **significant gains can be made through influencing consumer behavior via public and private campaigns, reducing portion sizes at home and in restaurants, and developing markets for produce that is discarded because the products do not meet grade standards on size, shape, or appearance**.


Thank you!