Crops, Drops and Climate Change:

Using Energy Efficiency to Configure the Perfect Sustainability Storm

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Crawford Fund Annual Conference, Canberra

12-13 August 2019

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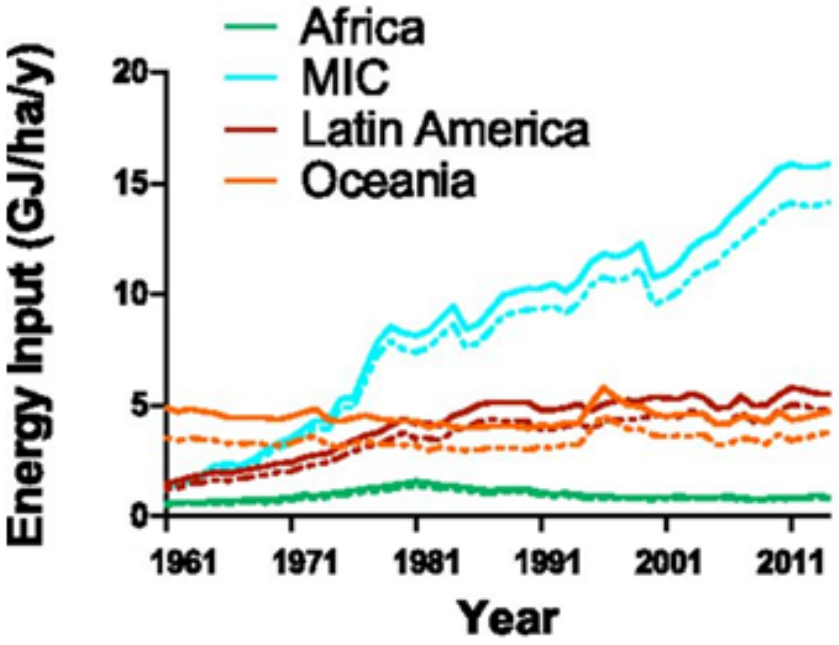
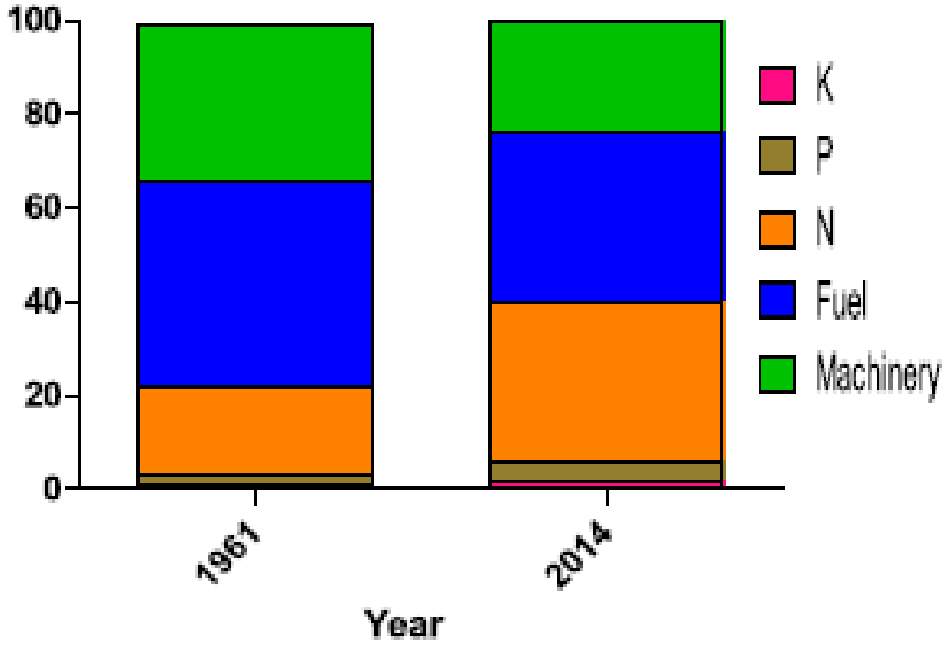
Creating Innovative Solutions For A Sustainable Future

Yields have increased; as have fertilizer and water use



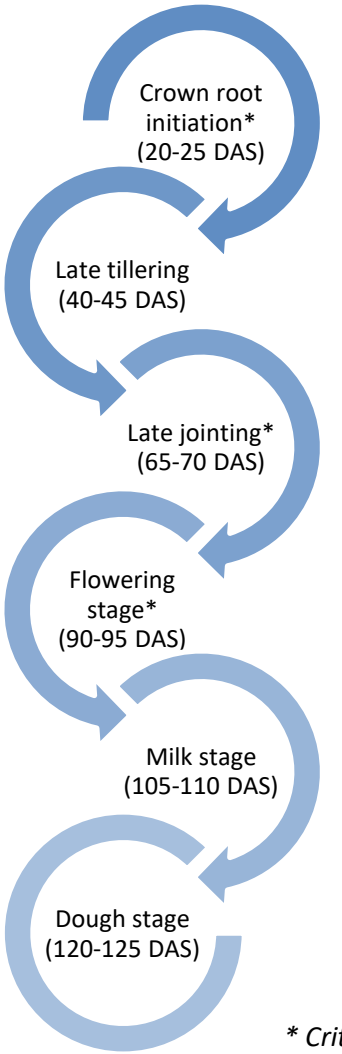
Note: Countries with more than 30% of their agricultural area under irrigation in 2005 were analyzed separately as MICs; Solid and dashed lines are for 10- and 30-y machinery lifespans, respectively

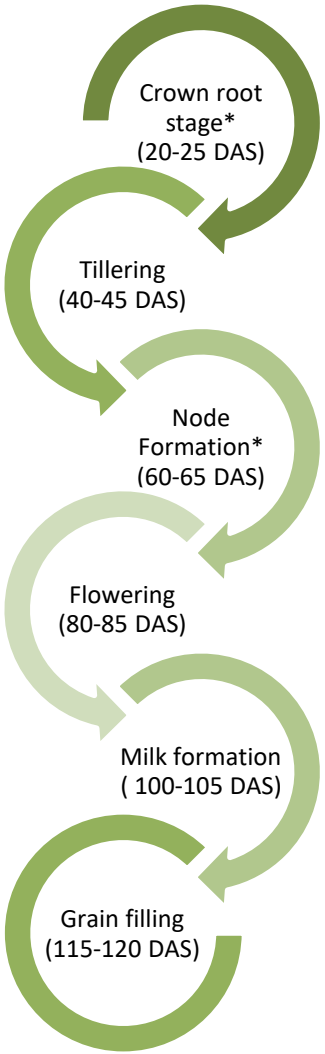


Relative contribution of farm inputs

Source: *Pedro Pellegrini, and Roberto J. Fernández , PNAS, 2018*

Windows for Irrigation are small; we have tended to overcompensate and overirrigate

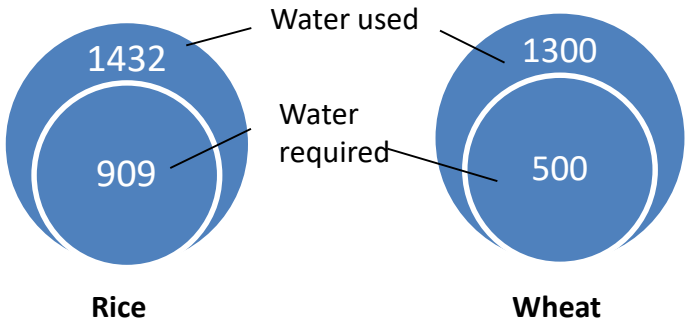




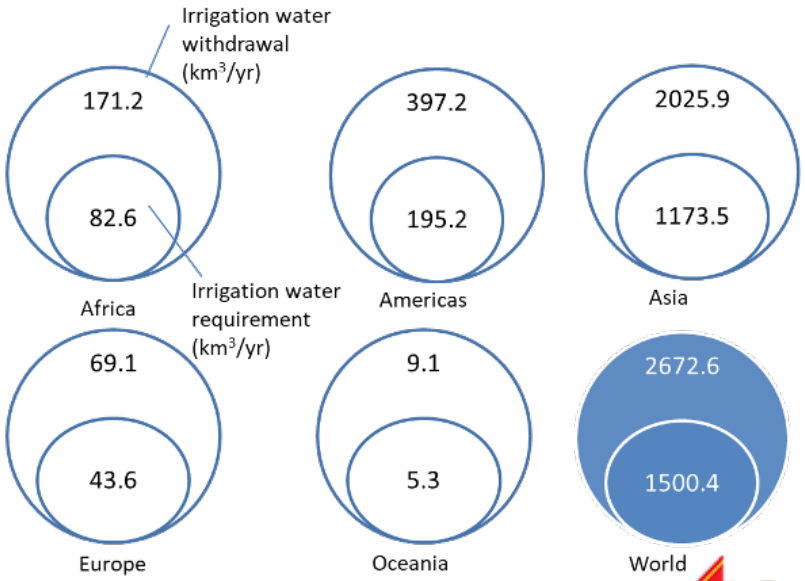
** Critical stage*
DAS – Days after sowing

Rice: Irrigation stages

Wheat: Irrigation stages

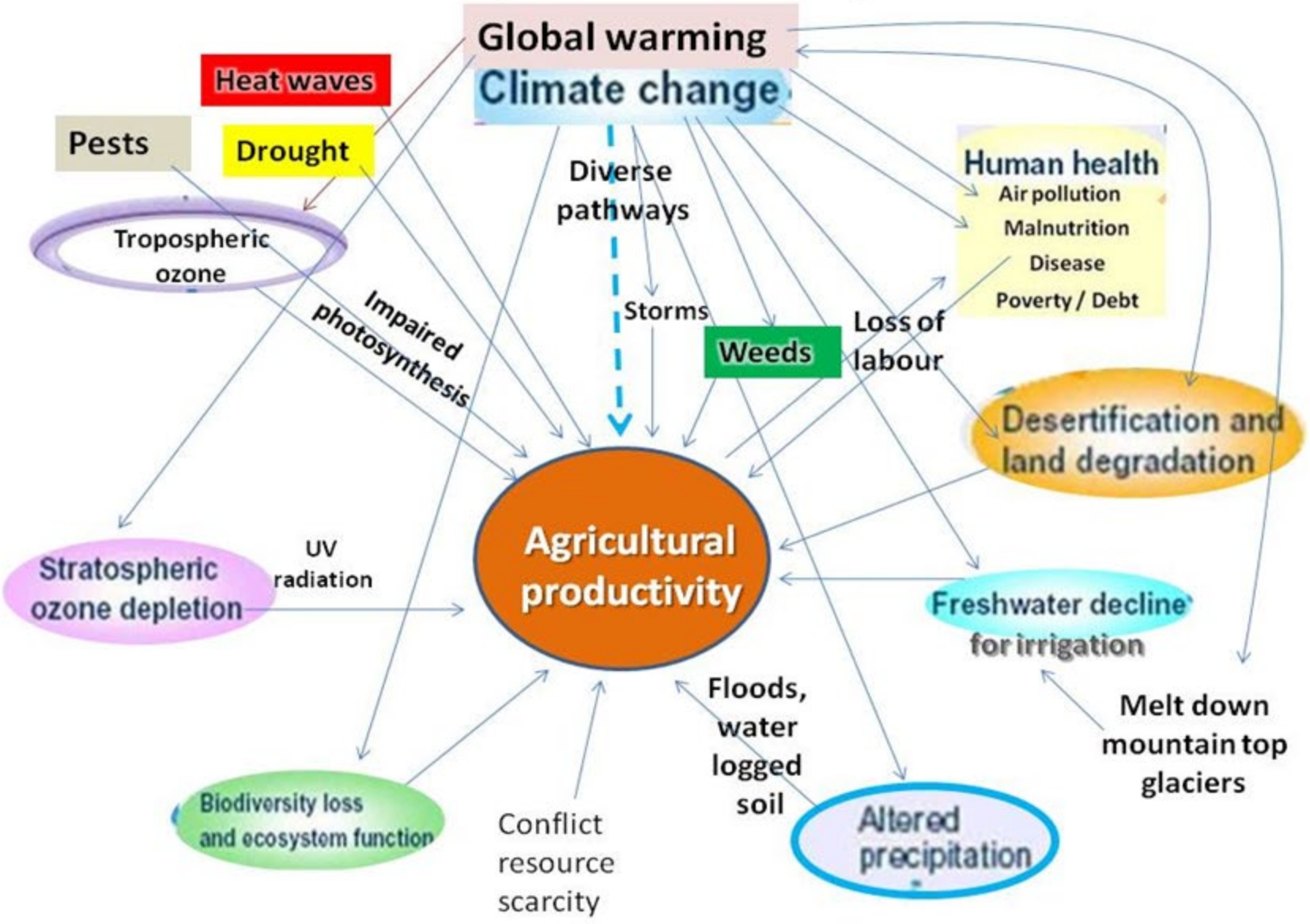


Source: Mom R, 2007; Zwart and Bastiaansen, 2004; Chapagain and Hoekstra, 2004



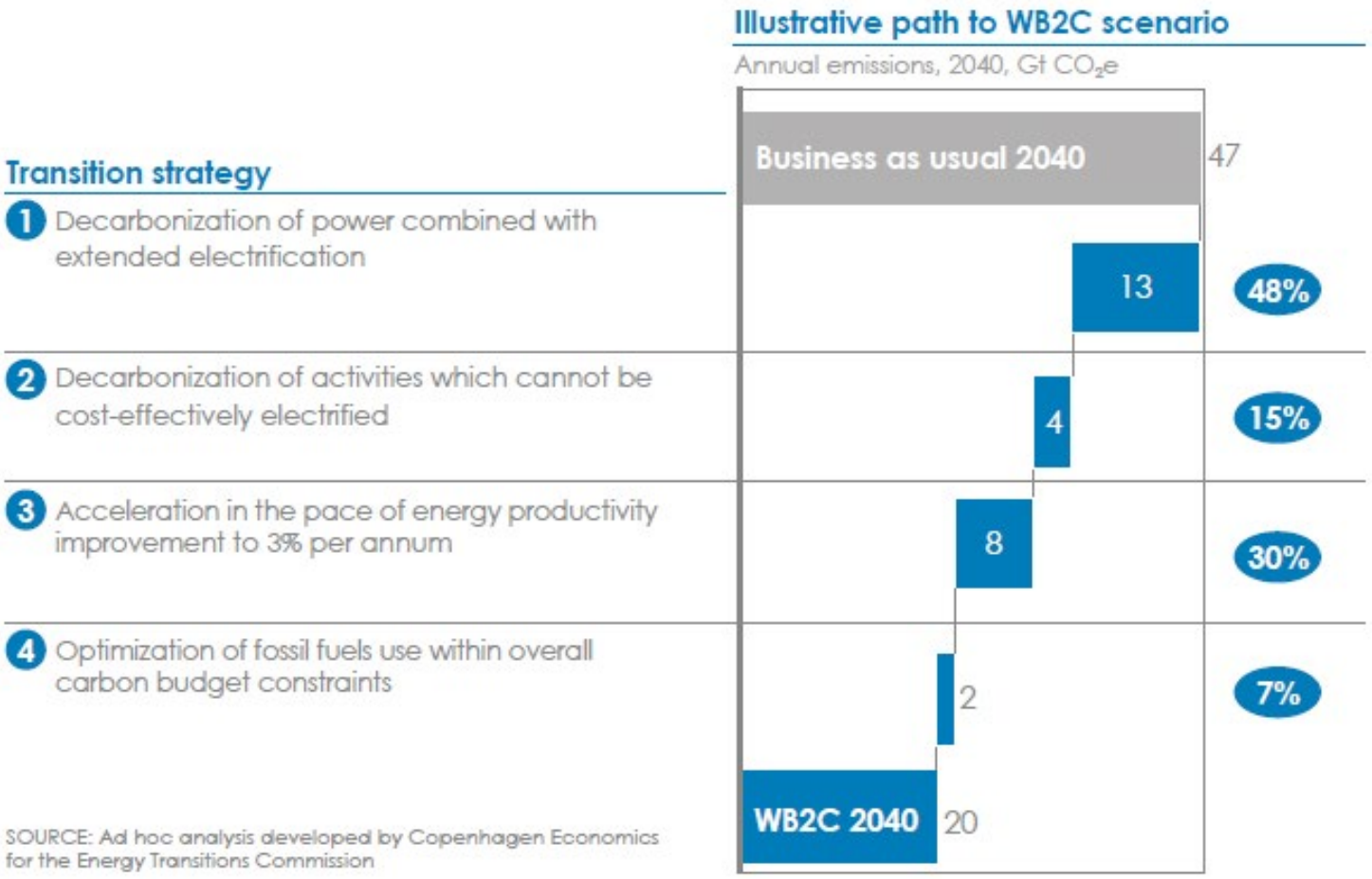
Source: FAO Aquastat

Multiple impacts of global warming and climate disruption on agriculture



Achieving the Paris Goal Needs Simultaneous Action on at least Three Fronts in the Agriculture Sector

4 transition strategies need to be pursued simultaneously to achieve a well below 2°C scenario



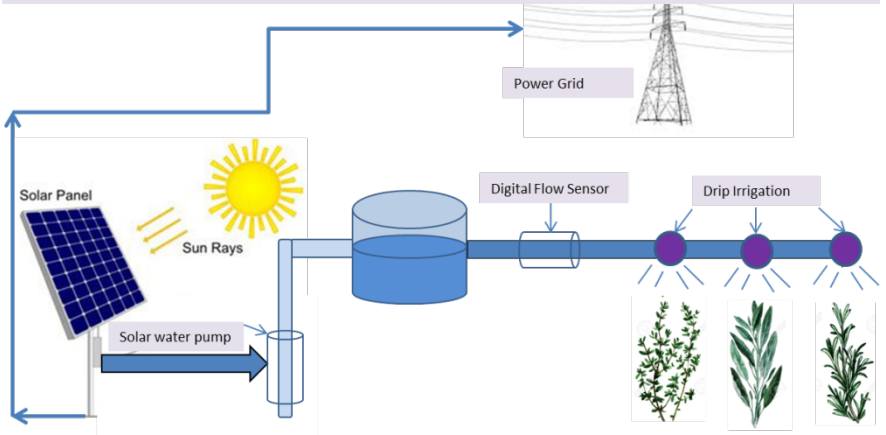
Strategy for Agriculture Sector Decarbonization

- Enhance water-use and energy-use and fertilizer-use efficiency in agricultural operations;
- Convert agricultural operations to utilize electricity instead of fossil fuels; and
- Decarbonize the electricity supply by converting to renewable sources, instead of fossil fuels, as energy sources for electricity generation, and for heating applications

Green Farming: Water Pumping & Water Use

Energy inefficient pump for flood irrigation

Efficient SPV pump with micro-irrigation and purchase of electricity by grid



For 1 hectare of wheat, over the growing season:

Cost of irrigation: **~ US$132**

Cost of irrigation: **~US$ 64**

Revenue from Electricity sale: **~US$ 15**

Cost of SPV system (5HP) = **~ $ 5,000**

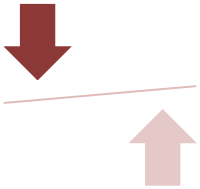
For 1 hectare of paddy, over the growing season:

Cost of irrigation: US$ **340**

Cost of irrigation: **~ US$163.4**

Revenue from Electricity Sales: **~US$12**

Creation of Demand, and Reduction in their Cost are the Current Challenge



Demand creation to exploit economies of scale

Loans for Zero-Carbon options

The challenges are the same as those faced by HYV crops during the Green Revolution !

Approach is to create demand, and enable price reductions with increasing scales of production

India's Experience

FASTEST GROWING LED MARKET IN THE WORLD

DOMESTIC LED MARKET ON THE RISE
(100 million LED bulbs delivered; 770 million by 2019)

ECONOMIES OF SCALE AT WORK

HIGH QUALITY IS PRIORITY

UJALA
Unnat Jyoti by Affordable LEDs for All

RENEWABLE ENERGY

Capacity installed

~ 29000 MW (solar)

~ 35000 MW (wind)

Tariff

Decline in cost from 0.25$/kWh to < 0.04$/kWh

AGRICULTURAL KNOWLEDGE AND INFORMATION SYSTEMS

MARKETS AND FINANCIAL INSTITUTIONS

INFRASTRUCTURE

PUBLIC POLICY

GREEN REVOLUTION

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Thank
You