



Plenary Session 3: Public - Private Partnerships in Agri-food Systems Transformations

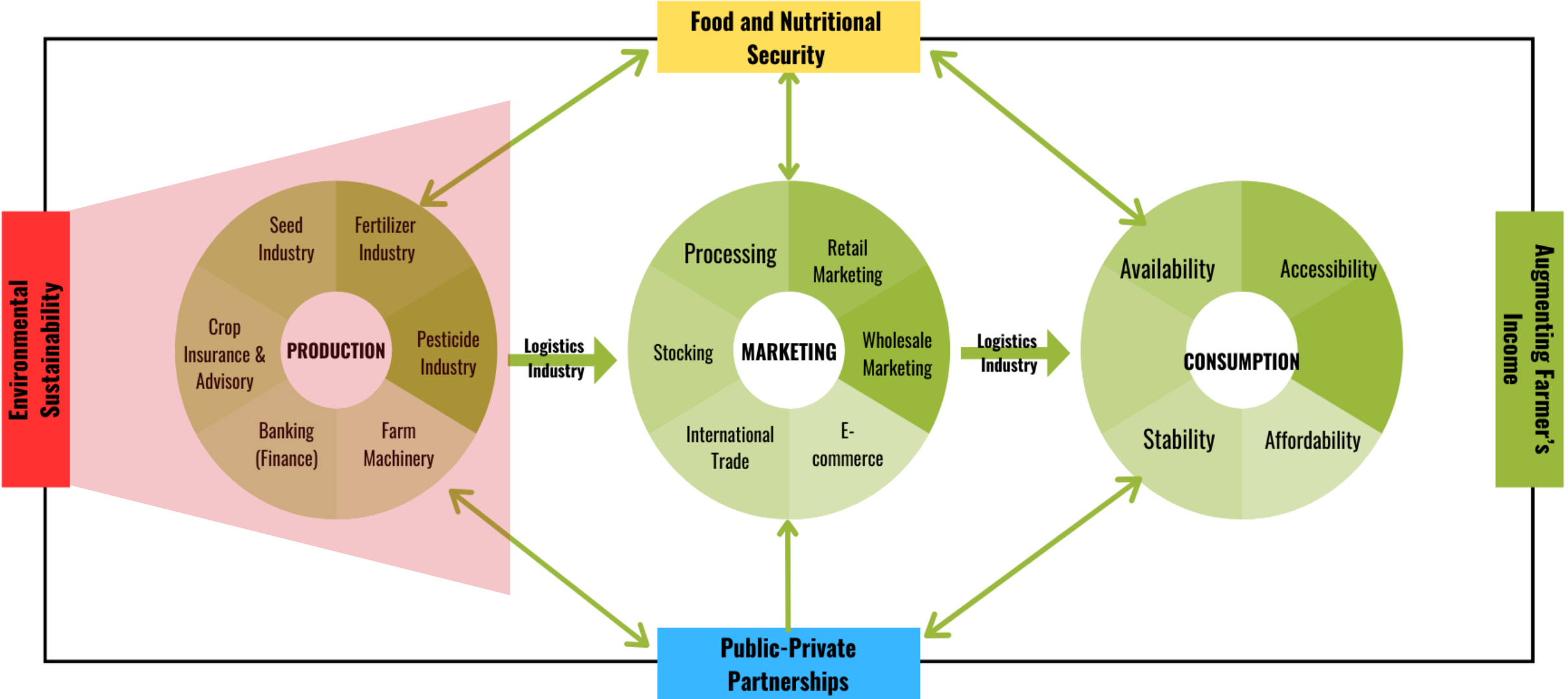
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Key Note Address for ADB's conference on
"Investing for the Future of Climate-Food-Nature"
April 9-12, 2024
Manila

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Sustainable Agri-Food Systems



Why is there a need to transform Agri-food Systems?



- Increasing number of mouths to feed – By 2030, global population is going to be 8.5 billion .. And by 2050, it will be 9.7 billion... (UN Population projections);
- Increasing urbanization – 68% of the global population is projected to live in urban area by 2050 (UN, 2018);
- Increasing fragmentation of land holdings;
- Extreme weather events due to climate change – Global surface temperatures have increased by **1.1°C** in 2011–2020 above 1850–1900 levels (IPCC 2023);
- Soil, Water, Air, and Biodiversity (SWAB) are under pressure;
- Government cannot alone tackle this.
They need **public–private partnerships (PPP)** with Corporates, NGOs, FPOs to transform agri–food systems against the backdrop of Environmental challenges



People and planet—what we know

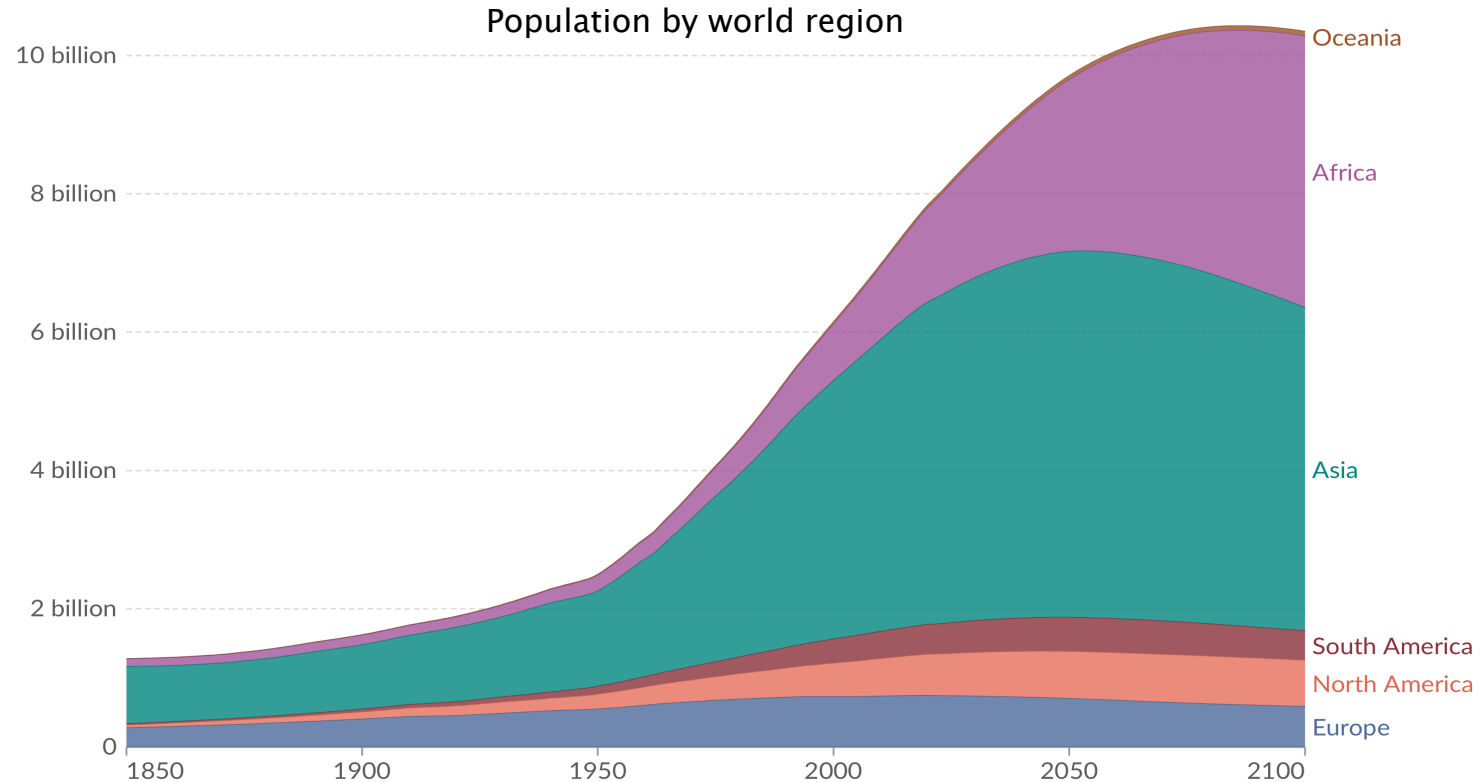


It took more than 200,000 years for homo sapiens to reach 1 billion in 1804; But thereafter...

2 billion in 1927 (123 years);
3 billion in 1960 (33 years)
4 billion in 1974 (14 years);
5 billion in 1987 (13 years)
6 billion in 1998 (11 years);
7 billion in 2010 (12 years)
8 billion in 2022 (12 years)*
9 billion by 2037 (15 years)*;
10 billion by 2058 (21 years)*
>11 billion by 2100*

Are we over the hump? Where will we stabilise?

*projected by UN Population Prospects



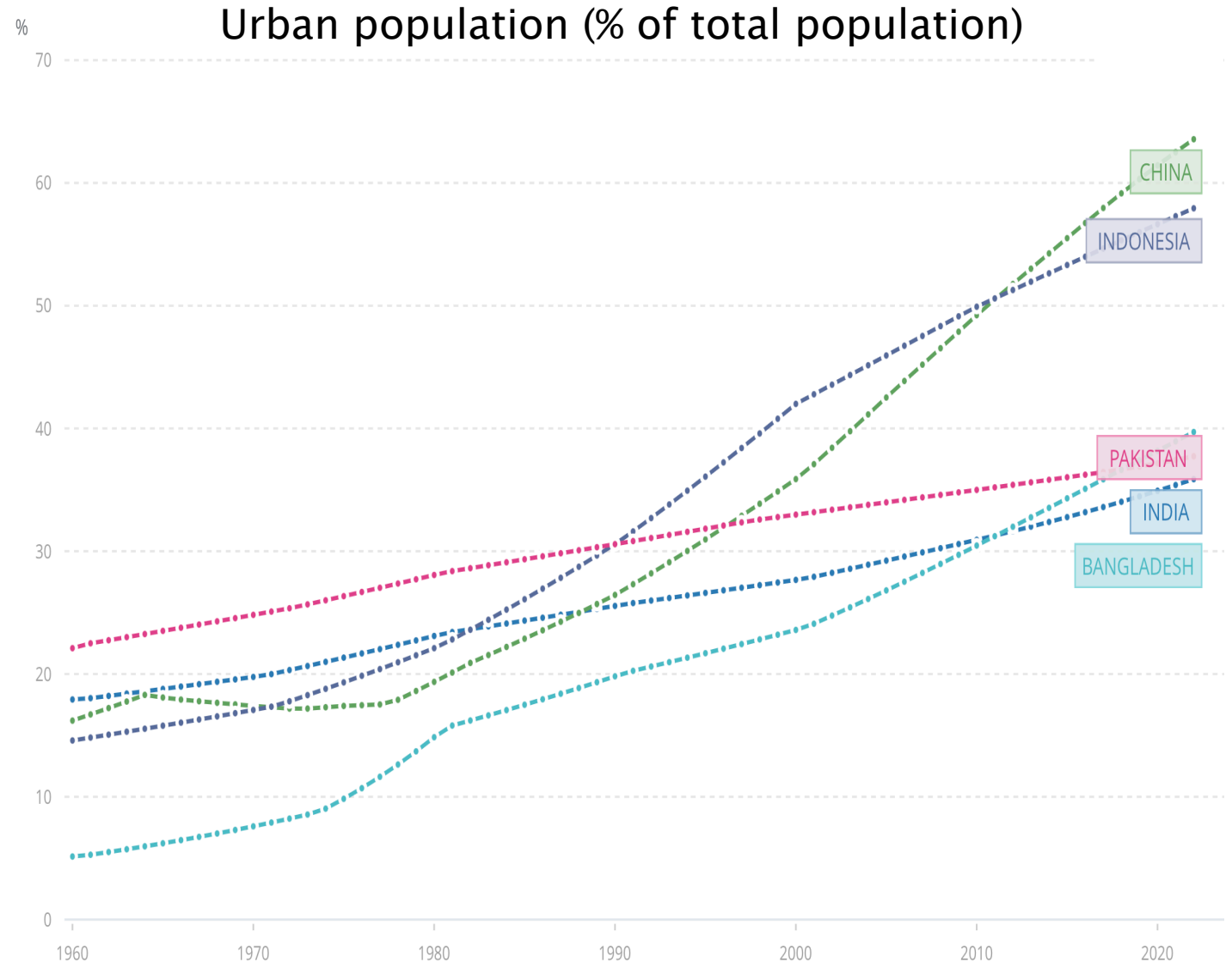
Out of 49 Asia-Pacific countries, India, China, Indonesia, Pakistan and Bangladesh account for **44%** of World Population and **23%** of the World Economy in 2024.

Source: HYDE (2017); Gapminder (2023); UN (2022)

Urbanization of Population



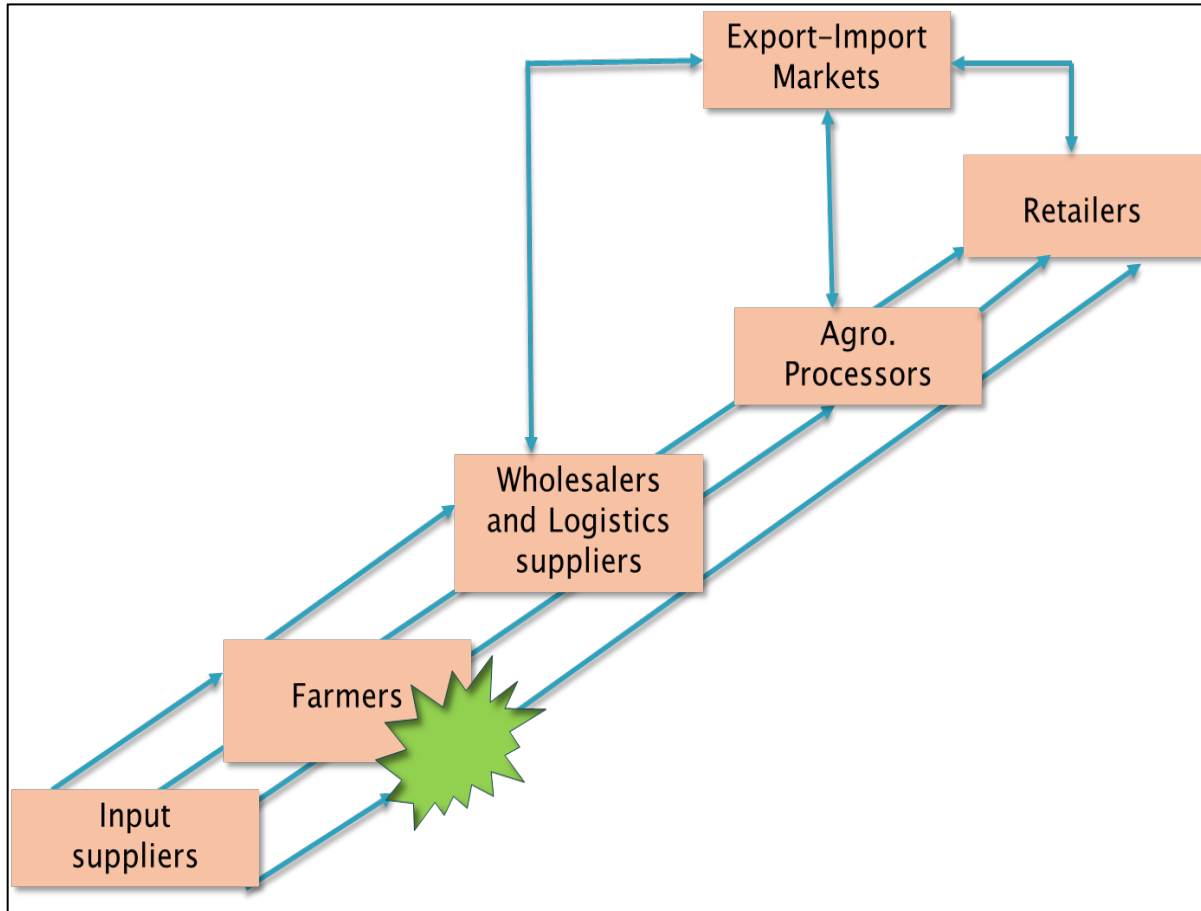
- ▶ World urban population has reached 57% in 2022
- ▶ China, 2nd most populous country, has 64% of urban population
- ▶ Indonesia is slightly above the world average at 58%.
- ▶ India, Pakistan and Bangladesh are close behind at 36%, 38% and 40%, respectively.
- ▶ Increasing urbanization will need stronger logistics and value chain networks for food security and safety.



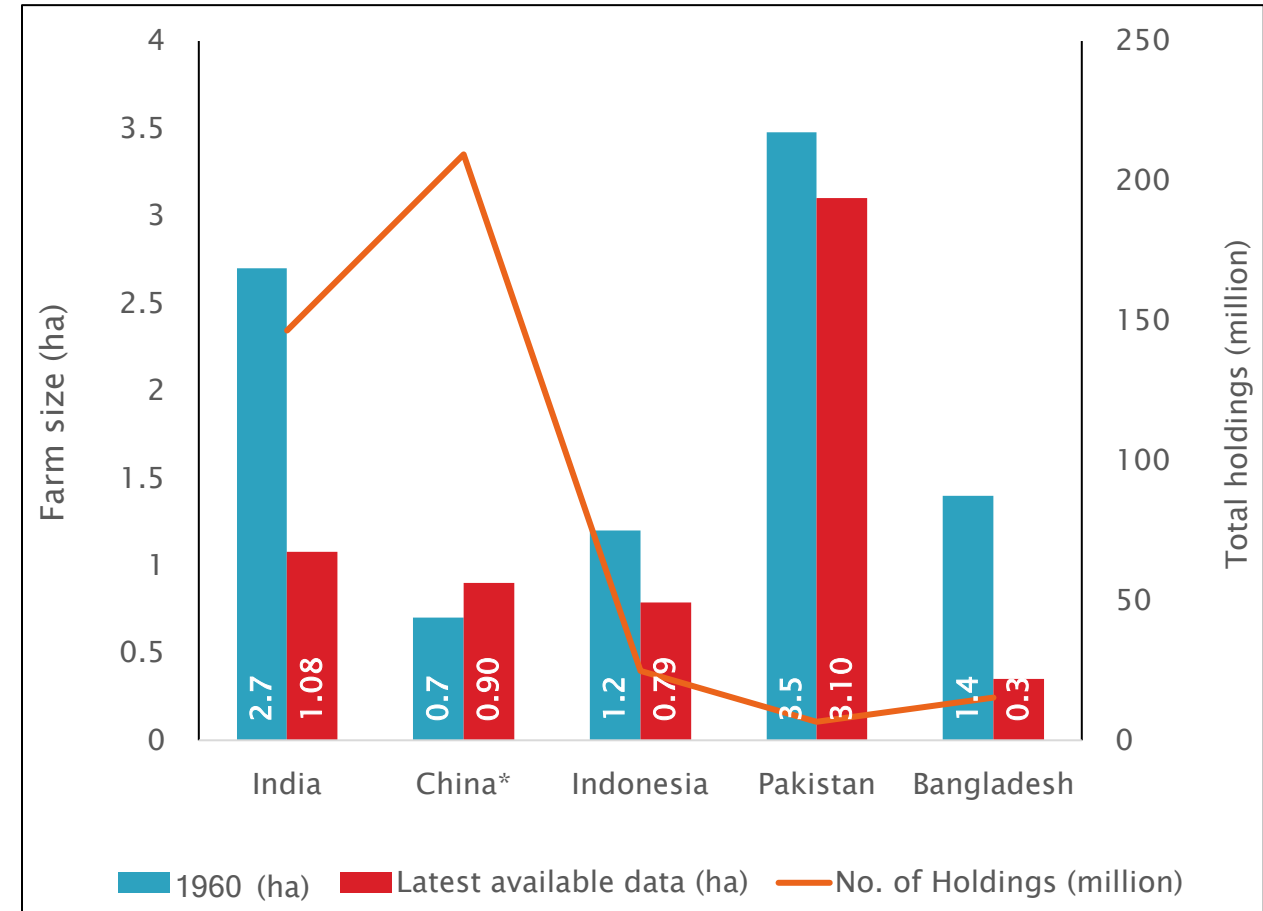
Consolidating Top and Fragmenting Bottom



Dynamics of the modern agri-food system



Average Farm Size and No. of Holdings



*Average farm size is for 1984

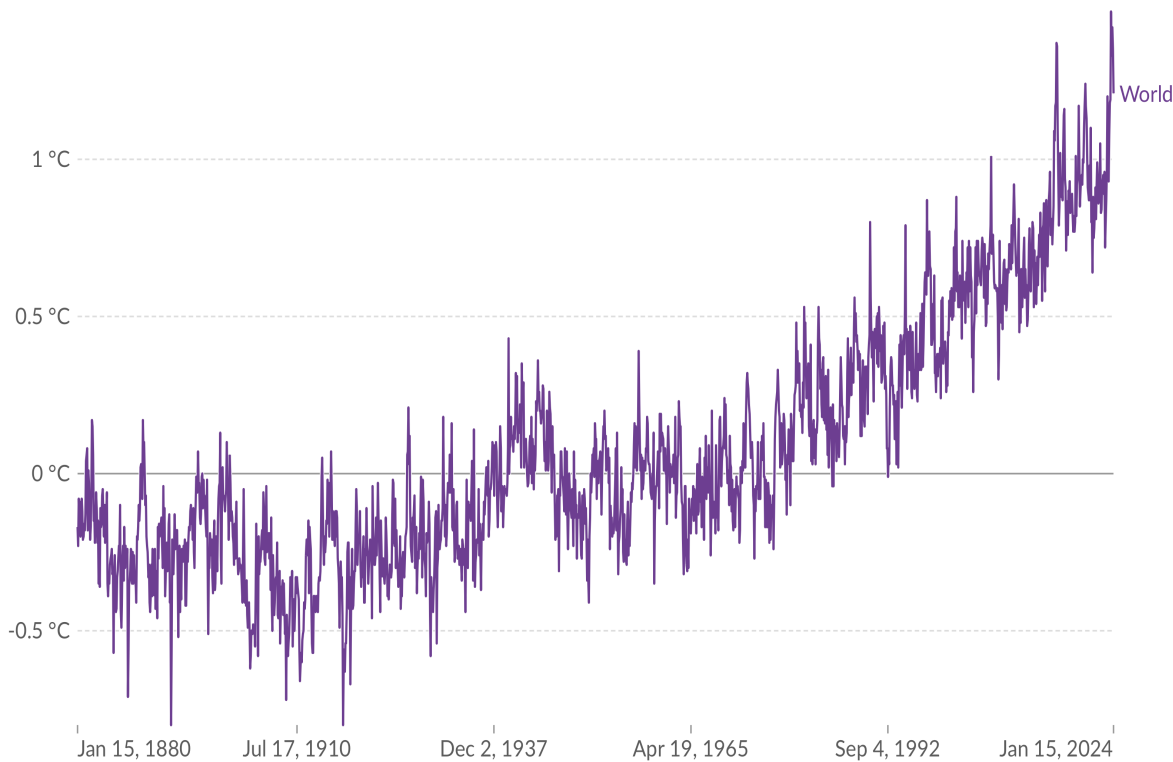
Note: No. of holdings is for latest year data available

Climate change is knocking!



Asia and Pacific region accounted for **44%** of global emissions in 2019 (IPCC, 2023)

Global warming: monthly temperature anomaly



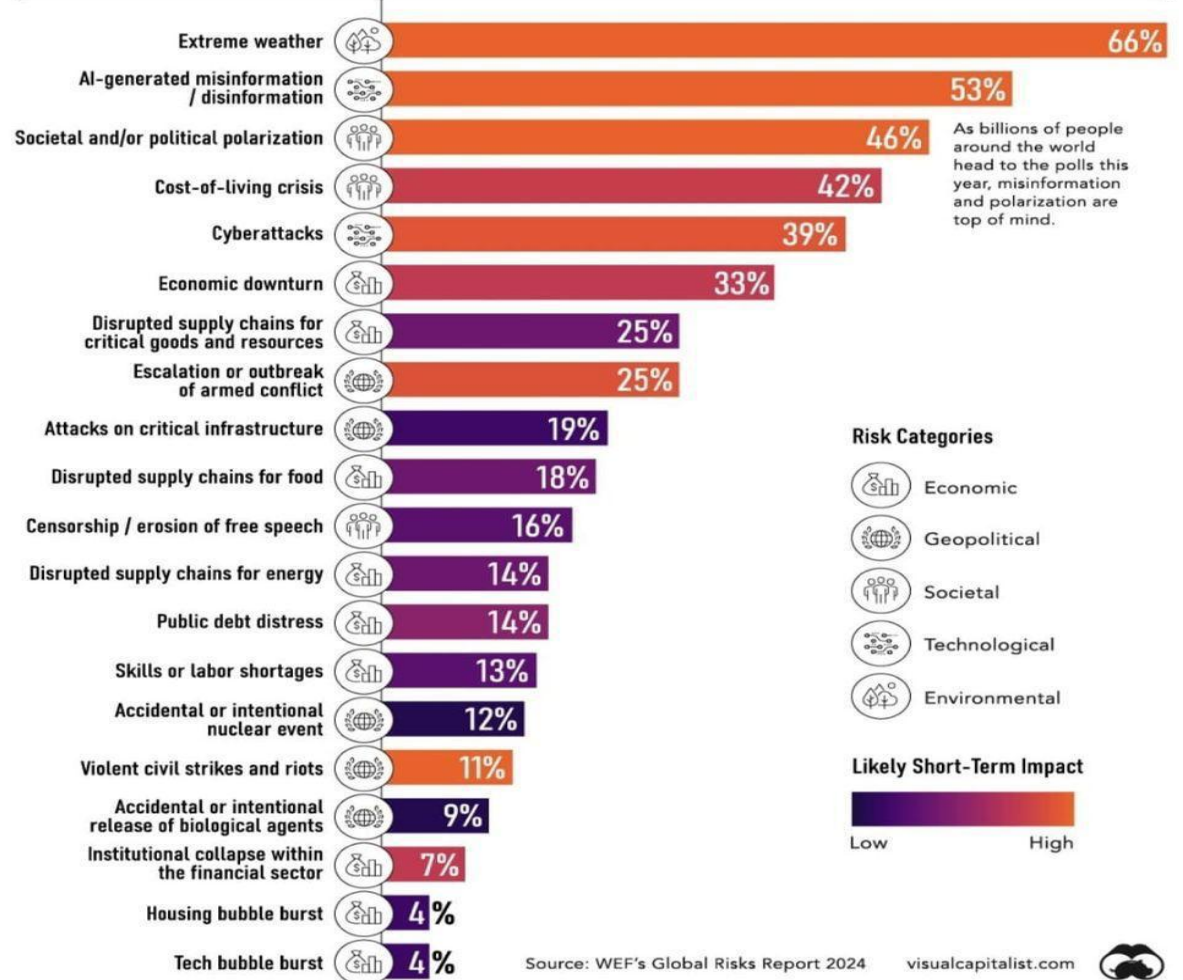
*The combined land surface air and sea-surface water temperature anomaly is given as the deviation from the 1951–1980 mean.

Source: NASA Goddard Institute for Space Studies

THE TOP GLOBAL RISKS IN 2024

The World Economic Forum surveyed 1,490 leaders on the top global risks in 2024 and their potential scale of impact.

Please select up to five risks that you believe are most likely to present a material crisis on a global scale in 2024.

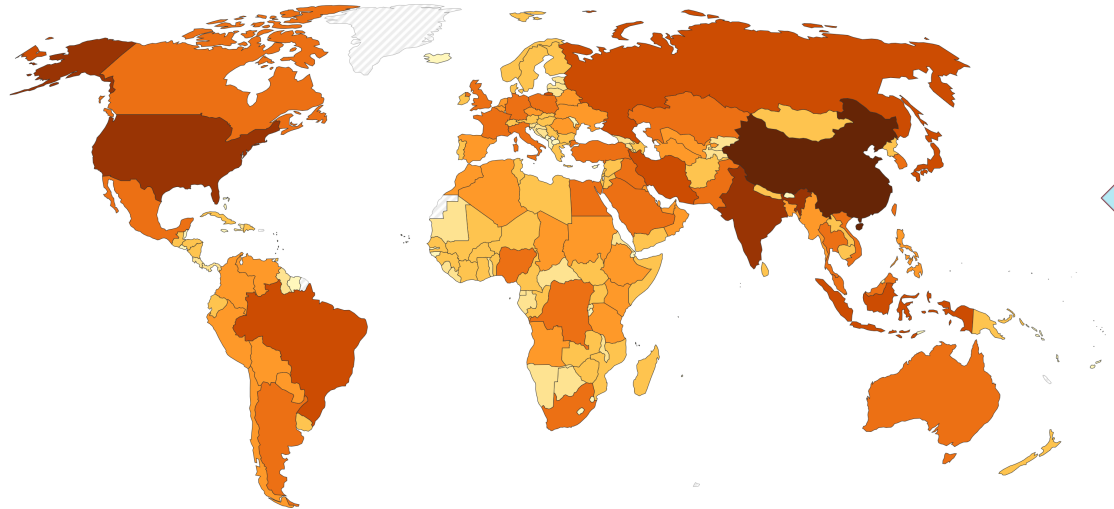


Source: WEF's Global Risks Report 2024

visualcapitalist.com



Who emits and Who suffers?



Greenhouse Gas Emissions, 2021

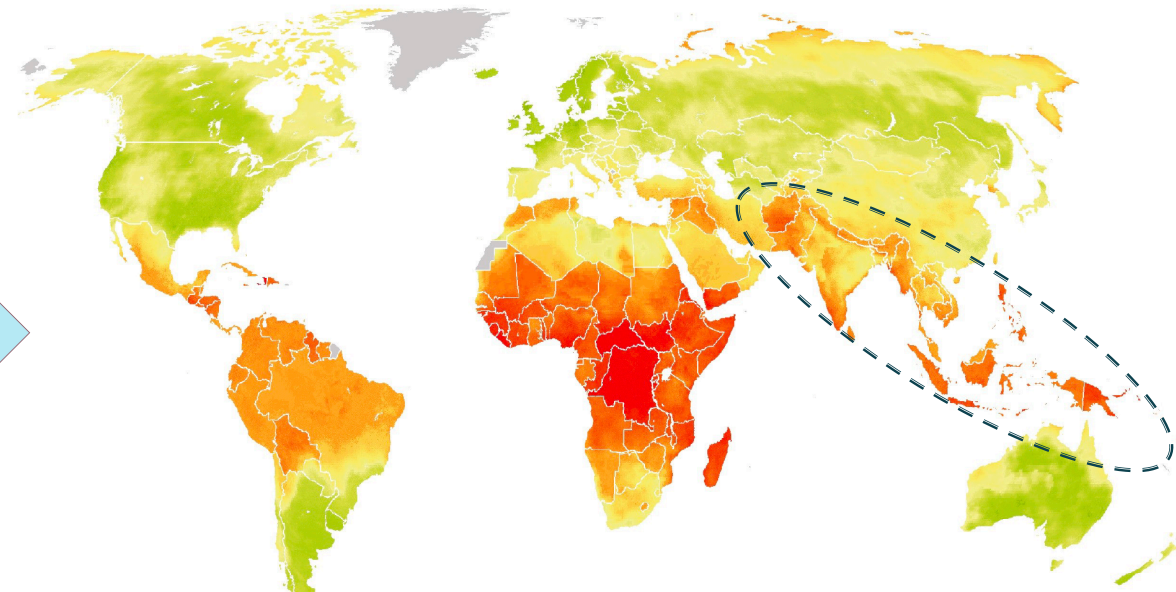
- Greenhouse gas emissions include carbon dioxide, methane and nitrous oxide from all sources, including land-use change.
- **Top emitters: China, USA, India, Russia and Brazil**

Source: Jones et al. (2023) - with major processing by Our World in Data

Climate Vulnerability Risk Index, 2017

- **South Asia remains a region very vulnerable to climate change and extreme events.**

Source: Maplecroft Climate Vulnerability Index 2017, World Bank 2021



Towards Adaptation and Mitigation through PPP



- Create climate resilient agriculture which adapts and mitigates the environmental challenges;
- Government needs to play a key role in crafting policies that encourage Environment, Society and Governance (ESG) framework, and monitor its progress;
- Private sector needs to join hands with the government and move towards developing People and Planet Positive agriculture;
- Private sector has potential to mobilize capital, which is critical for financing the projects;
- Even the Banking Industry needs to adopt ESG framework for financing private projects;
- **Bottom line** – Produce more from less through precision farming

Ushering in the Brown Revolution



Precision Technologies

What they do

Global Positioning System (GPS)
(guidance systems)

Efficient field coverage,
reduce fuel and other
input costs

Sensors
(Yield, Nitrogen, Moisture)

Facilitate variable rate
application of inputs

Unmanned Aerial Vehicles
(UAV's)/Drones

Surveillance, imagery,
spraying pesticides

Robotics

Weeding, fruit harvesting,
pruning vines

Big Data, Internet of
Things

Analysis of data collected
on field, facilitates
planning

Precision Technologies – Soilless farming and protected cultivation



India



Indo-Israel Agriculture Project for Protected Cultivation: 29 active centres for F&V in India

China



Indonesia



Mizuna Covered with *Pass Lite*
(Collaboration with UNITIKA LTD.)

Partnership of Government of Indonesia;
Japan International Cooperation Agency;
IMG Inc.; Task Co., Ltd

A view of an agricultural industrial cluster in Yinchuan, capital of Ningxia Hui Autonomous Region, China, June 25, 2022

Singapore



Sky Green Project: Rooftop Vegetable gardens (Collaboration between Agri-Food and Veterinary Authority of Singapore (AVA) and a local firm, Sky Greens)

Micro Irrigation (Drip & Sprinklers)

Producing more from Less



Paddy, Haryana, India



- ▶ Under “Per Drop More Crop (PDMC)”, centre and state government give subsidy in the ratio of 60:40;

- ▶ 7.8 million ha under MI (from 2015-16 to 2023)- A long way to go!

Wheat, Ningxia Hui, China



In 2017, area with drip (micro)irrigation systems totaled 6.2 million ha.

Corn Farming, Indonesia



Ensures better harvest yields, water use efficiency, nutrient distribution and prevention of root diseases

Impact of Micro Irrigation in India



Farmers
Benefited
10 million +



Saving on Labour Cost
30-40%



Employment Generated
50,000 +

With every 10 Ha of land is irrigated, employment increases from 8 to 24 persons



Fertilizer Saving
28.5%



We ALSO Save WATER
40%



Increase in Farmer's
Income
42%



Increase in
Yield/Productivity
Fruit/Crops -
42.4%
Vegetables -
52.7%



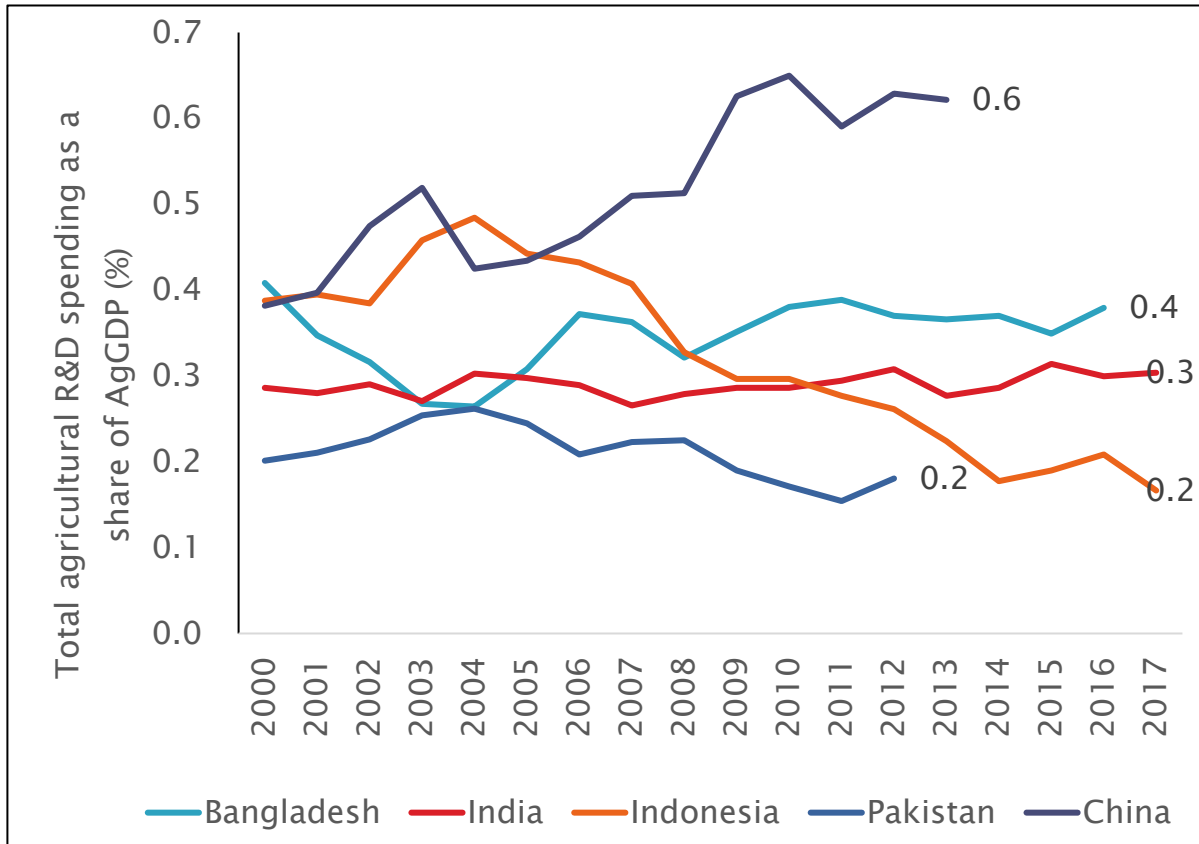
Energy Saving
30.5%



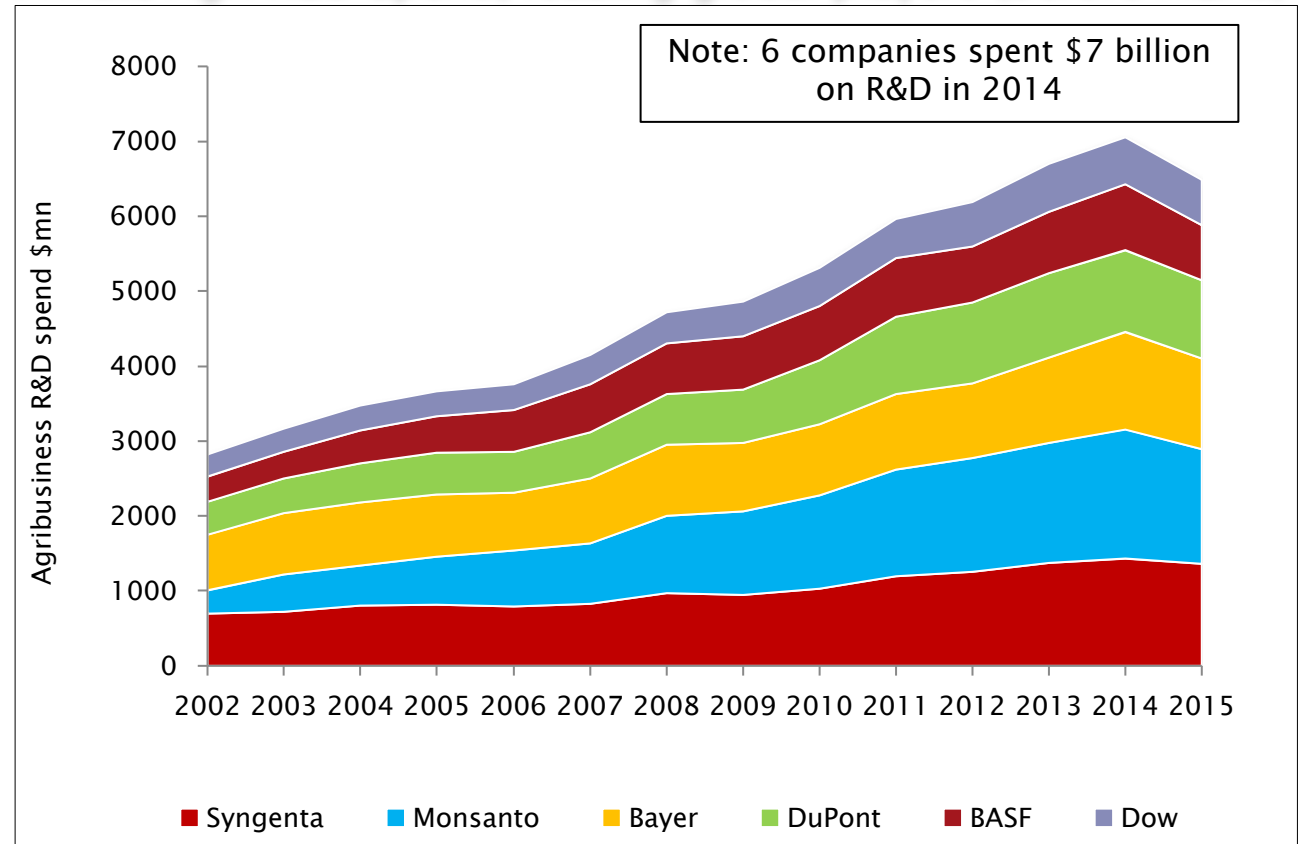
Agriculture R&D

(Seeds, fertilizers, pesticides etc.)

Public Agri R&D Intensity



Private Agri R&D Spend, leading global players (before M&As)



In India, during 2014-15 to 2022-23, NARS- ICAR has released 2681 high yielding/ stress tolerant varieties/ hybrids of field and horticultural crops (402) for different agro-climatic conditions.

However, it is critical for government to ensure protection of breeders' rights and plant biotechnology

From Food Security to Nutritional Security



Biofortification – breeding micronutrients into staple crop

- Globally, HarvestPlus (CGIAR) has released the following biofortified seeds:
 - **India:** Iron pearl millet, Zinc rice & wheat, Vitamin A orange sweet potato, Iron/Zinc cowpea, lentil, sorghum
 - **Bangladesh:** Zinc rice and Zinc wheat, Vitamin A orange sweet potato, Iron/Zinc Lentil
 - **China:** Vitamin A orange sweet potato
 - **Indonesia:** Zinc rice and Vitamin A orange sweet potato
 - **Pakistan:** Zinc wheat
 - **Nepal:** Zinc wheat, Iron/Zinc Lentil
- Future – Genome sequencing and genetic modification

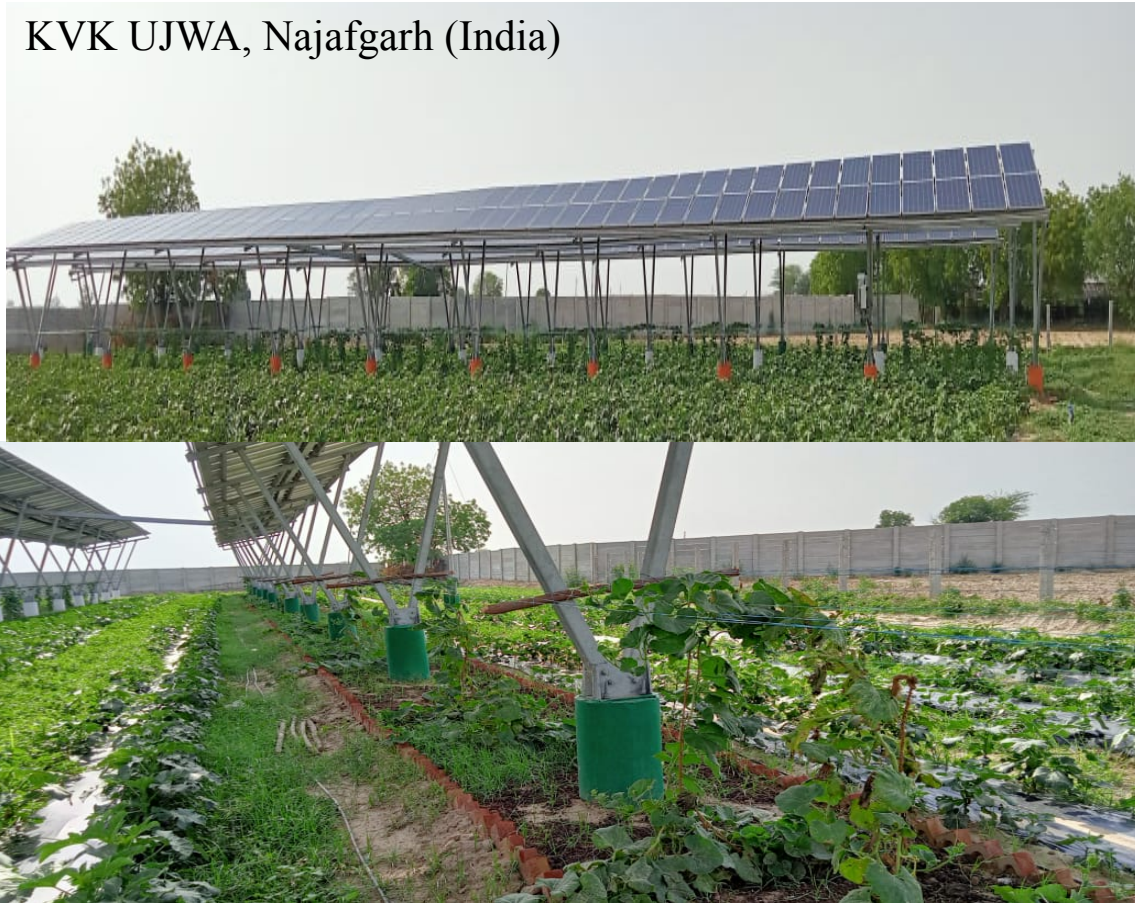


Agrivoltaics

Potential to reduce carbon emissions and mitigate climate change



KVK UJWA, Najafgarh (India)



PM-KUSUM scheme promotes the “solarization” of agriculture. Even Govt. of Delhi promoted it through “Mukhyamantri Kisaan Aay Balam Yojana” (Pilot Stage)

China



Baofeng Group has installed a solar park (~640 MW) in goji berry plantation in the Binhe New District on the eastern banks of the Yellow River in the Ningxia Province, China

Major developments in agrivoltaics in some first-mover countries



China¹	<ul style="list-style-type: none"> • Installed capacity of agrivoltaics: 1,900 MW (as of 2020). Promotion through PV poverty alleviation and power generation front-runner base schemes. • Baofeng Group is developing a 1 GW agrivoltaic project in Ningxia province.
Japan	<ul style="list-style-type: none"> • Installed capacity of agrivoltaics: 500-600 MW.² • Promotion through feed-in tariff scheme with preferential treatment to agrivoltaics. • New Energy and Industrial Technology Development Organization published new guidelines.³
Germany	<ul style="list-style-type: none"> • Installed capacity of agrivoltaics: 15 MW. • German regulator BnetzA invited bids for allocating 403 MW agrivoltaics capacity in 2022.⁴ • Fraunhofer Institute for Solar Energy Systems published new guidelines on agrivoltaics.
Italy	<ul style="list-style-type: none"> • Italy is investing EUR 1.1 billion for the development of 2 GW in agrivoltaics capacity.⁵ • The Italian National Agency for New Technologies, Energy and Sustainable Economic Development (Agenzia nazionale per le nuove tecnologie, l'energia e lo sviluppo economico sostenibile) launched a "National Network for Sustainable Agrivoltaics" to develop a regulatory framework for agrivoltaics in the country.
France	<ul style="list-style-type: none"> • France Agrivoltaisme, world's first trade association of agrivoltaics, was formed in 2021. • The French Agency for Ecological Transition (Agence de l'environnement et de la maîtrise de l'énergie, or ADEME) defined standard for agrivoltaics in 2022. • Implemented several tender rounds, with more than 100 MW capacity already allocated.⁶

Japan



Germany



Adopted from the IISD Report on "Agrivoltaics in India: Challenges and Opportunities to scale-up" (2023)

Innovations in Uberisation of Farm Machinery in India



Uberisation of tractors & farm equipments at the cost of required technology

- Pay as per use basis; Technology based; Choice driven
- Cost efficient & effective

Government Support

- Sub-Mission on Agricultural Mechanization (SMAM) Scheme under National Mission on Agricultural Extension & Technology
- Custom Hiring Centres (CHCs) – Promoting progressive farmers, agri graduates and entrepreneurs
- **Status:** As on February, 2024, 44,598 CHCs/Hi-tech Hubs/Farm Machinery Banks established

Uberisation of Solar Pump-sets

- Solar panels on rental basis to generate energy for pumping irrigation water for crops
- Claro Energy in some parts of Bihar introduced Mobile solar pump-sets operating under principle of “pay as you go”.

Key
Private
Players:



Drones...India will catch up fast!

India



NaMo Drone Didis (PILOT): Govt. has recently introduced a scheme to empower women to revolutionize agricultural practices. Govt. will supply drones to 15000 self-help groups who will rent them to farmers for various agricultural activities such as monitor crop health, optimize resource allocation (water, fertilizers, pesticides) etc

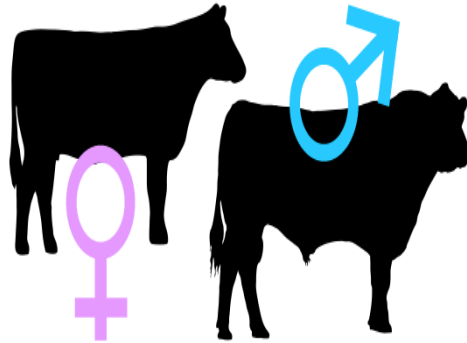
China



The number of agriculture drones is estimated to have doubled between 2016 and 2017, reaching 13,000 aircrafts. It accounts for 12–17% of the commercial drone market in China

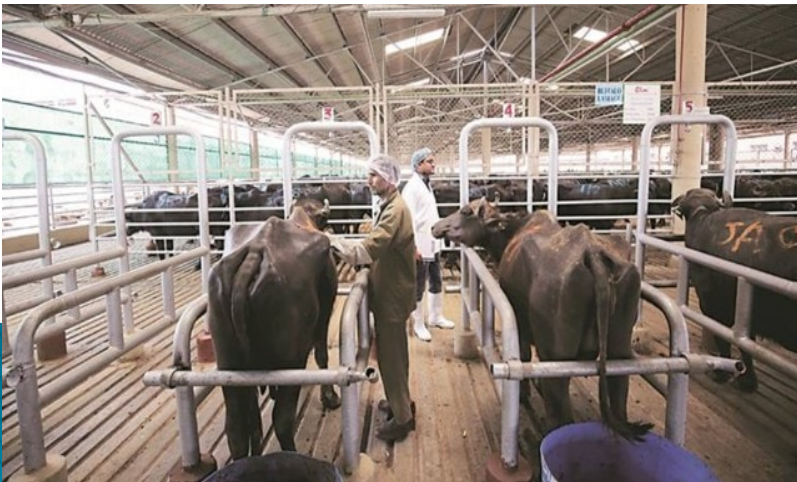
Livestock: Sorted Sex Semen Technology in India

- Production of only female calves upto 90% accuracy
- Technology: Originally patented by U.S. based XY Inc., acquired by Sexing Technologies™ . Other companies into business – Select sires, Genex, Accelerated Genetics, CRV, ABS Global WWS and Prime Genetics etc.
- India – West Bengal, Punjab, Gujarat, Kerela, Haryana, Madhya Pradesh, Maharashtra etc. by State Govts., BAIF, JK TRUST, NDDDB, Amul



Present Status

- Sex sorted semen production facility established at 4 Government semen stations and at 3 private semen stations.
- So far, 44.37 lakh sexed semen doses produced.
- Under 'Accelerated Breed Improvement Programme – Using Sex Sorted Semen Technology', subsidy of Rs 750 or 50% of the cost of sorted semen on assured pregnancy (on average 3 doses per pregnancy) will be made available to farmers

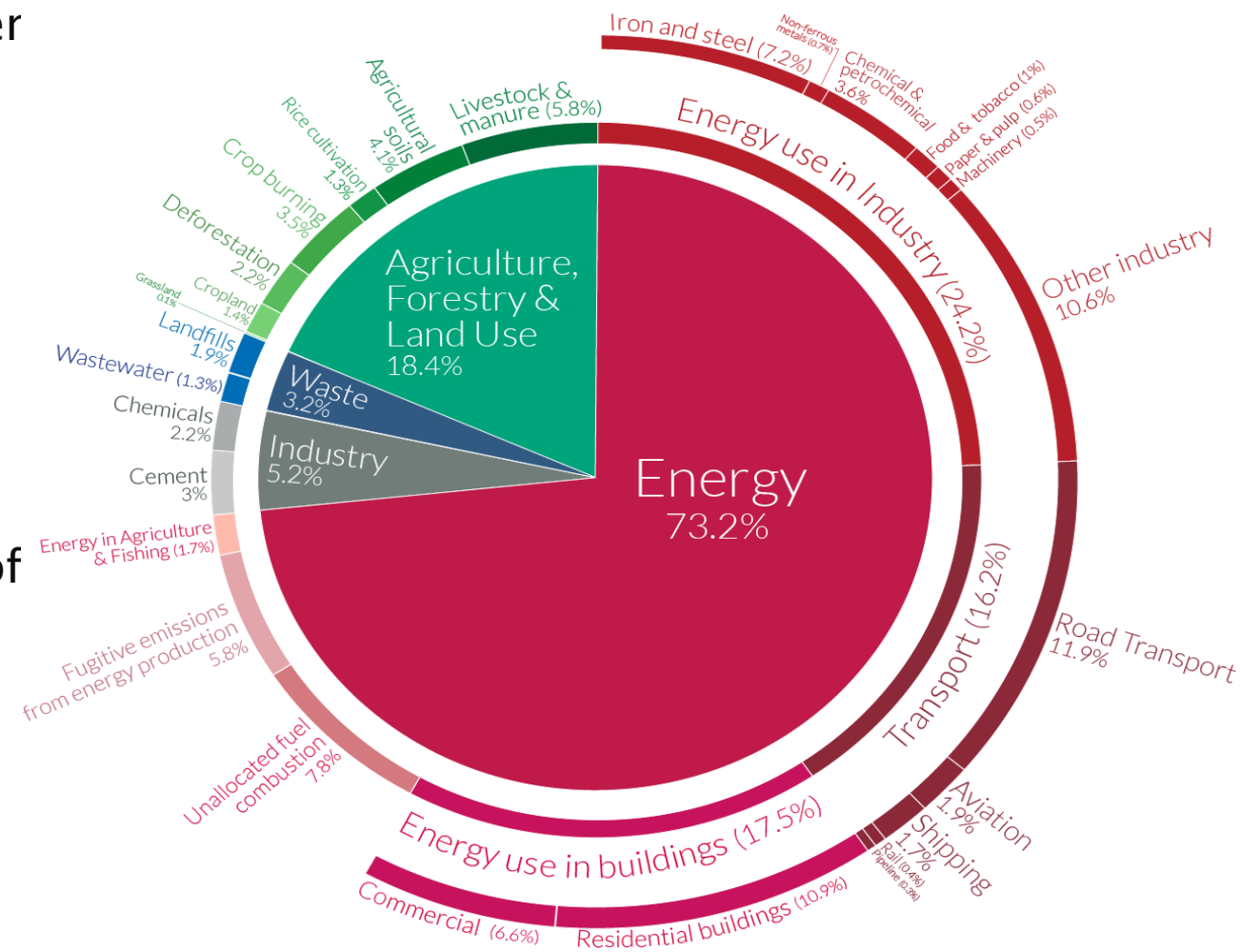


- Government of Maharashtra is heavily subsidizing semen straw at Rs 81 against its market value of Rs 1,200/straw.
- Straws will be manufactured by international animal genetics giant ABS Global.

To save agriculture, need is to go beyond Agriculture....



- ▶ Agriculture sector Mitigation suffers due to other sources of pollution – energy, vehicular etc.;
- ▶ Adaptation and mitigation need to move to energy transition – thermal, solar, electric
- ▶ ADB should have a real-time monitoring of their support to agriculture sector in different countries
- ▶ Way forward: More innovative technologies such as genetic technologies, digitalization, Internet of Things, Artificial Intelligence--all are needed to ‘produce more from less’ to feed an increasing and urbanizing population of the Asia-Pacific.
- ▶ Technologies succeed with right policy and PPP mix: need to be aligned from just saving livelihoods to saving planets’ health too.





Thank you