

Where the World is Going with Focus on Technological and Climate Smart Agriculture Technology

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**Eleventh Biennial [Rosenberg International Forum on Water
Policy](#)**

Monday-Friday, 23-27 October 2023

Cape Town, South Africa

Introduction

The Story Line

- Topic: Sustainable Agriculture and Climate Change
- Need to change mindset and policies
- Worldwide role of Climate Smart Agriculture (CSA) and water
- Suggestions for transformative agenda
- Work at RIZQ, Pakistan and other places, showcasing CSA and Regenerative Agriculture (RA) as case study

What Value RIQZ Brings

- Rizq is a social business enterprise enhancing food production, curtailing wastage, and improving food access
- Works to build long-term resilience and sustainability into Pakistan's food chain through a self-sustaining social business model.
- Mobilize, connect & enable various stakeholders in Pakistan's food ecosystem to build resilient food systems, ensure food security for all, & promote food justice.



Climate Change and its Impacts

Increase frequency and intensity



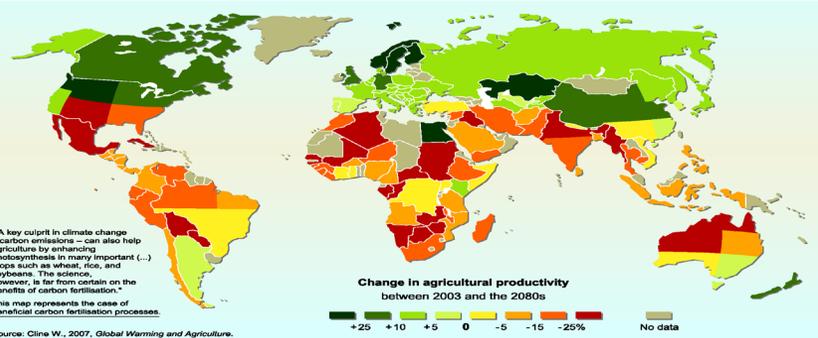
- Exceptional weather pattern engulfing the world- greater frequency and intensity – floods, droughts, rising temperature, fires, land subsiding, desertification locusts and new viruses

Crop Yield, changing Seasons



Climate Impact- Traditional Agriculture

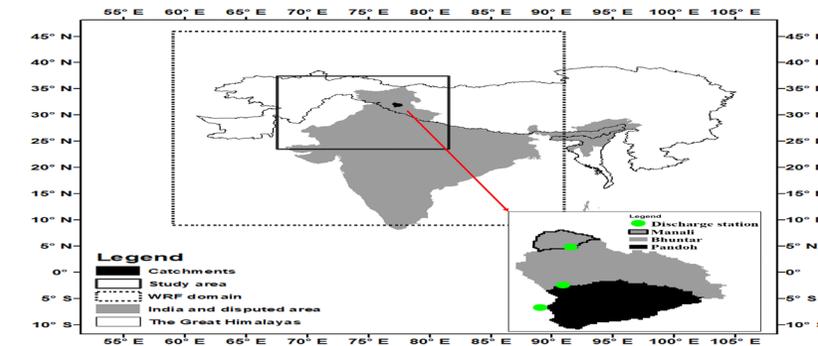
Projected impact of climate change on agricultural yields



- Further, north parts of globe are beginning to be affected
- Africa and Asia are being most affected due to rising food security concern, pervasive pockets of poverty and lack of resources to adopt.
- The small farmers are proportionally more vulnerable

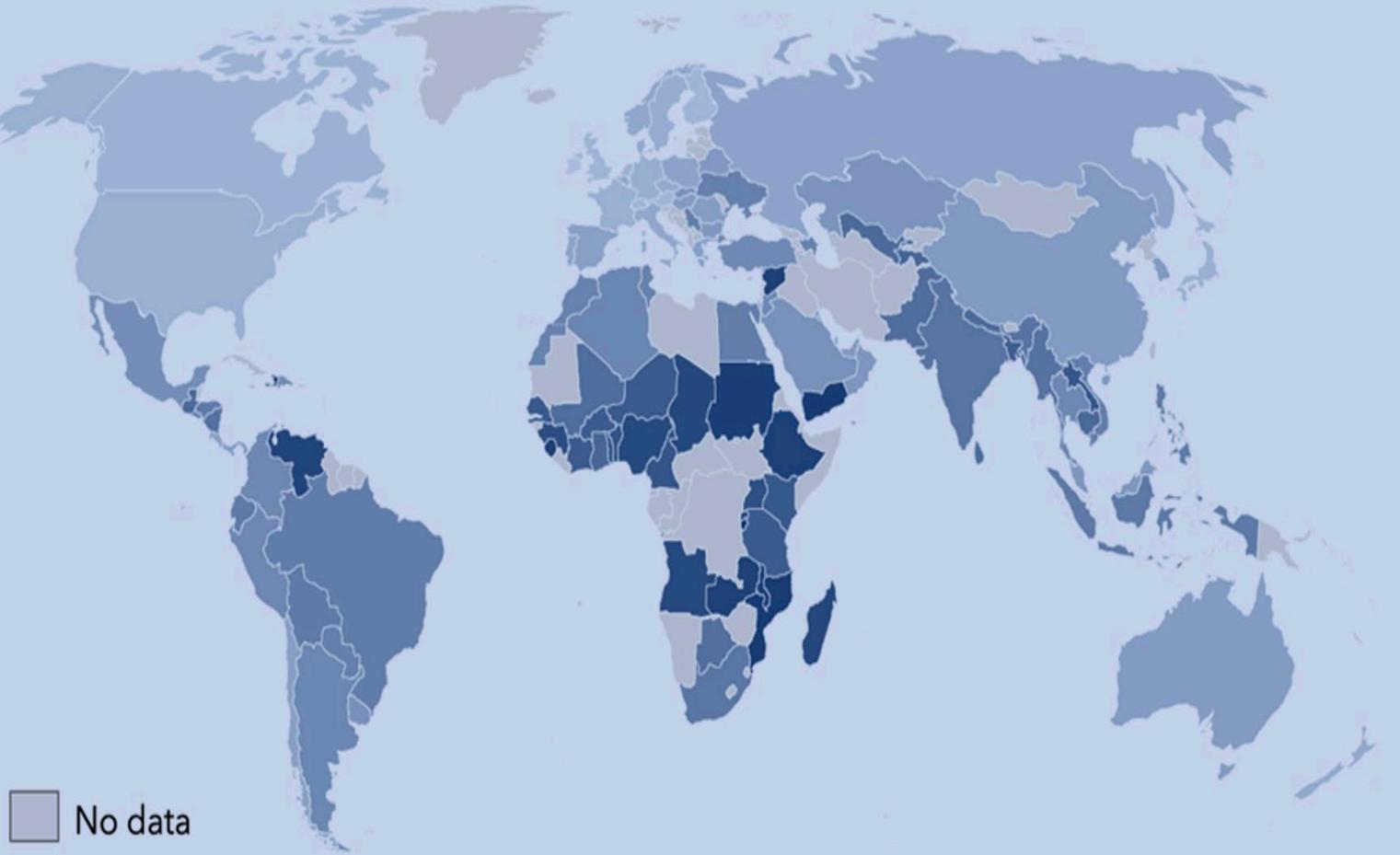


Climate Impact- CSA Agriculture



Food Security at Risk- Climate change & Regional conflicts

Score: 0 100



- Impact on Sub-Saharan Africa
- Vulnerable Countries (e.g., Sudan, Nigeria, Guatemala)
- Hunger on the Rise (SOFI Report)

SUBCONTINENT

TOXIC Agriculture – soil and people health

- Climate Change's Influence global food inflation
- Examples (e.g., Tomato prices in India, Cocoa supply, China's corn and rice)
- Export bans- India virtual water export

Food system under crisis

Generally, Plenty of food – trade was key



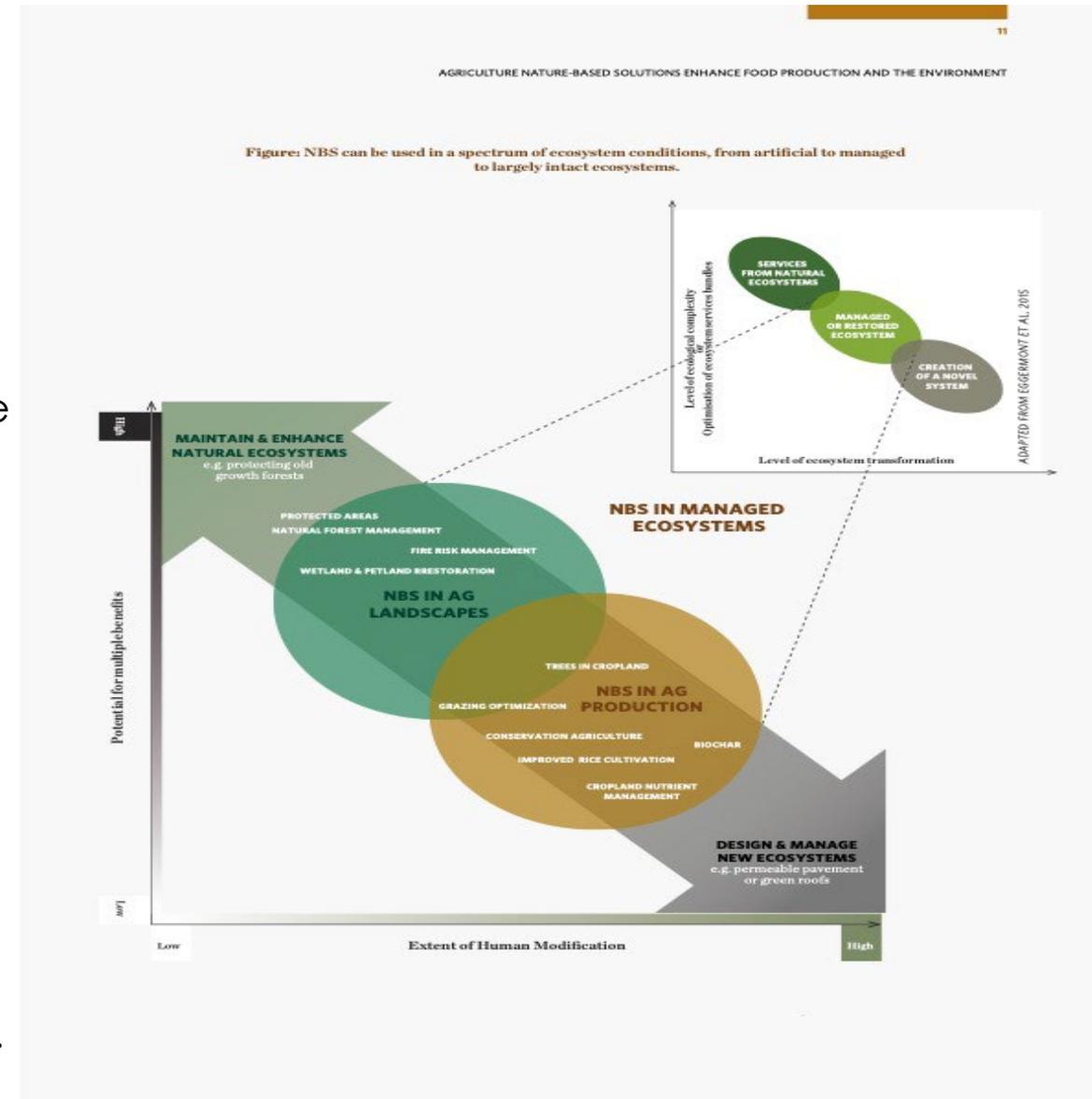
Ukraine war
Climate
Change
System Failure
Trade
Domination

Major Food Exporter – China,
India, the U.S., and Brazil
Wheat – Russia, USA, Canada,
Australia, France, Ukraine
Major Food Importers: North
Africa, Sahara and the Horn of
Africa and China

- Ukraine's conflict has disrupted its agricultural exports, affecting global food prices
- Climate change exacerbates the issue, causing unpredictable weather patterns and impacting crop yields, disproportionately affecting poorer nations.
- Food access is still a major factor
- few major corporations dominate the global grain trade, potentially leading to collusion and price manipulation

Solutions: Need Change in thinking and policies

- Practices and Technologies – low cost, tuned to local conditions and usable all along supply chains, especially save waste. Go nature based solutions
- localizing food production, diversification of crops – improving soil health and enhancing water productivity are key.
- Climate smart technologies, practices and policies (delink global prices for food production), promote renewable energy.
- Bridge Financing for Small farmer and vulnerable populations.
- Designing climate smart subsidy.
- Better incentive - move towards more equitable and sustainable production, better access and how to ensure that food is affordable.



Climate Smart or Regenerative Agriculture

FAO and CGIAR Driven

Conservation Agriculture

Grow and Save (value chain approach)

Climate Smart Agriculture

Global and Donors

Regenerative Agriculture

Eco Based Solutions

National Programs

Pedaver , Pakistan

Zero Budget Farming (India)

Rainforest Alliance (South America)

Rainforest Alliance (global)

Three common intervention

- NO TIL
- CROP COVER
- DIVERSITY

Evolving Concepts

Conservation Agriculture & Grow and Save
FAO Driven

Climate Smart Agriculture-
Adaptation, Mitigation, and
Productivity
Multi Agencies Driven

Regenerative Agriculture
Integrating Livestock and
Agroforestry
Global Driven

Save Planet

Improve Agro-ecosystem
Improve soil health
Low water and energy intensive use
Low carbon footprint

Practices & Technologies

No Tillage

Climate Resilient seed

Manure/ Compost

Integrating Livestock

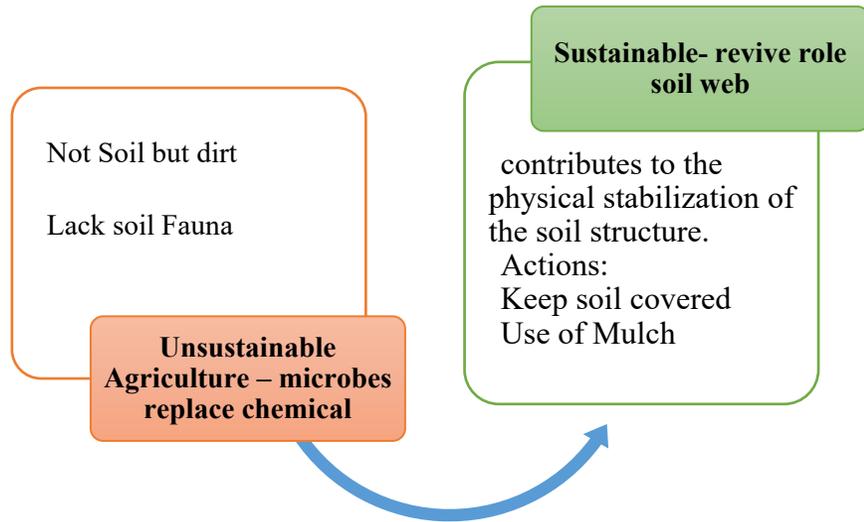
Mulching

Integrated Pest Management

Intercropping

Integrating Agroforestry

Transformation: *OUR CLIMATE SOLUTION ARE RIGHT UNDER OUR FEET* "THE SOIL" – Soil Health & Enhancing water productivity are critical



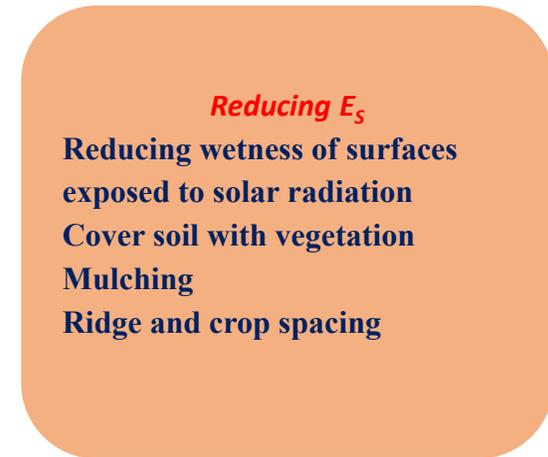
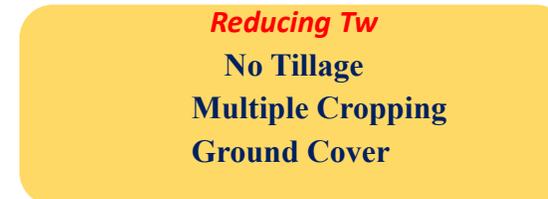
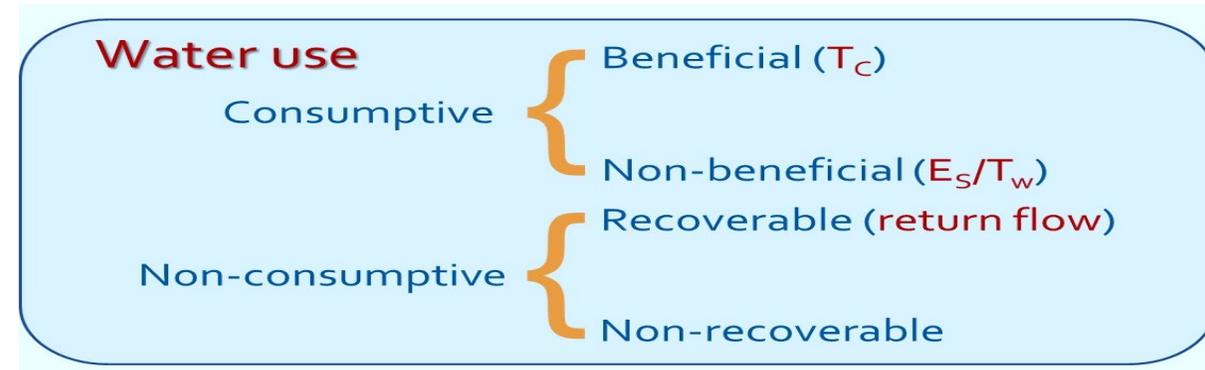
Benefits

Less water

Less or no fertilizer

Lower cost and enhance income in medium terms

Scale neutral



Benefits

Enhancing water productivity

Producing more with less water

Low-cost solutions

Available Technologies and Takeoff

Indigenous Technologies
Low cost

Bio fertilizer
Composting
Old Early warning systems
Water ponds for animal or village use
Treadle pumps suction

CSA & RA Technologies
Net benefits

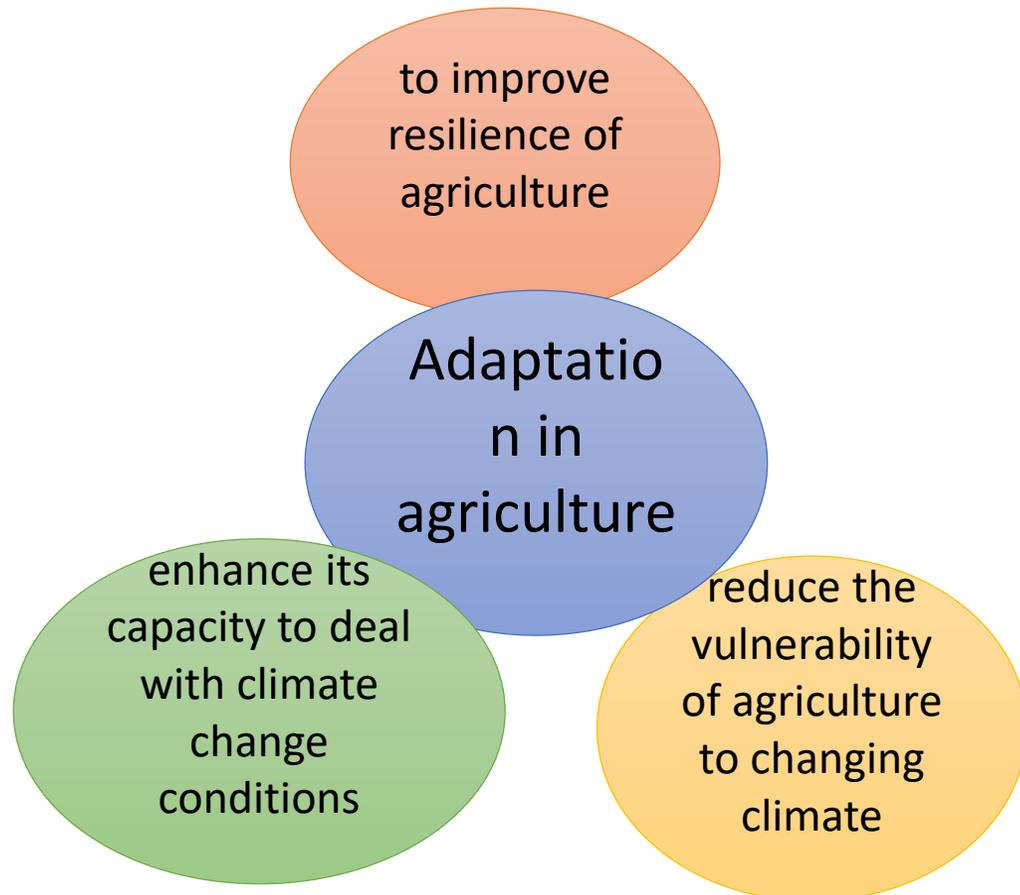
No till, Cover crop, crop rotations
Hybrid Seed
Drip Irrigation
Laser Leveler
Tunnel Farming
Hydro-cooling
Hermetic Packing
Silage bailing
Biogas
Treadle pumps, or Pressure pumps

Precision Agriculture Technologies
Costly & energy intensive

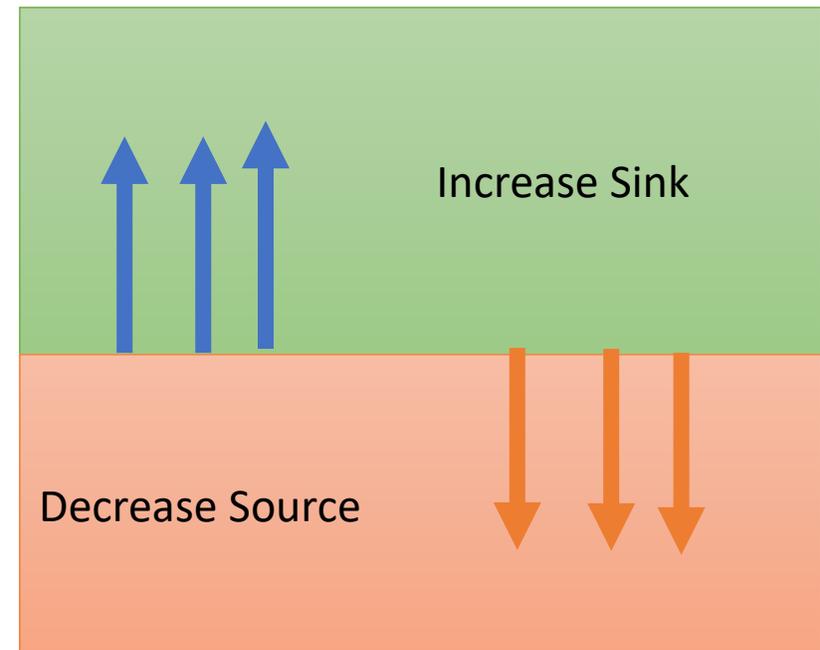
Precision Agriculture
Remote sensing
Drown technology
Weather stations
Plant sensors
Internet things
Tensimeters, soil moisture meters

The Tools

- **Adaptation** - adjust to changes in climate by making changes in production systems and social and economic organization

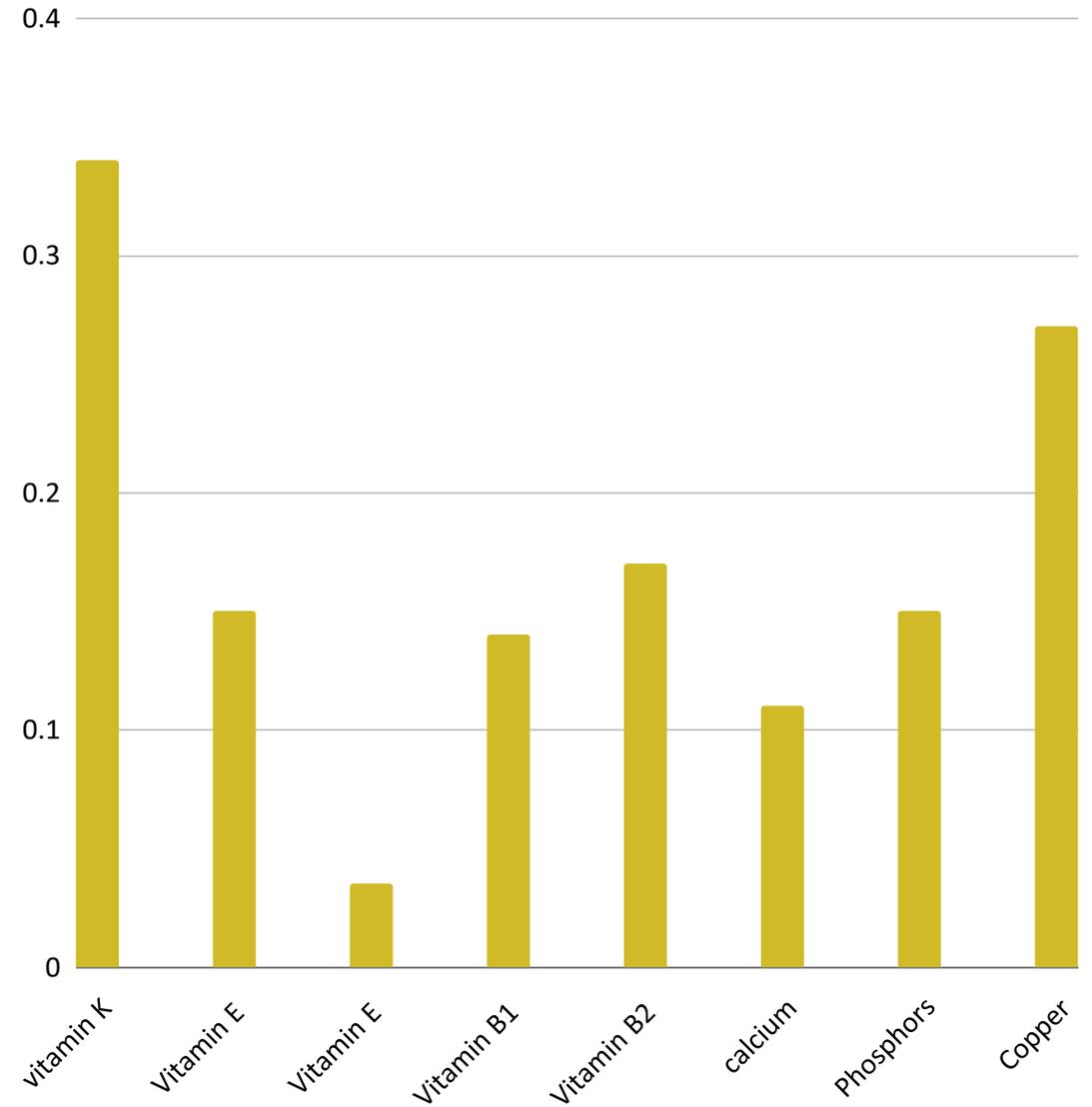


- **Mitigation** :actions to reduce and avoid GHG emissions and to Increase sinks and sequestration of atmospheric Carbon through absorption by carbon sinks

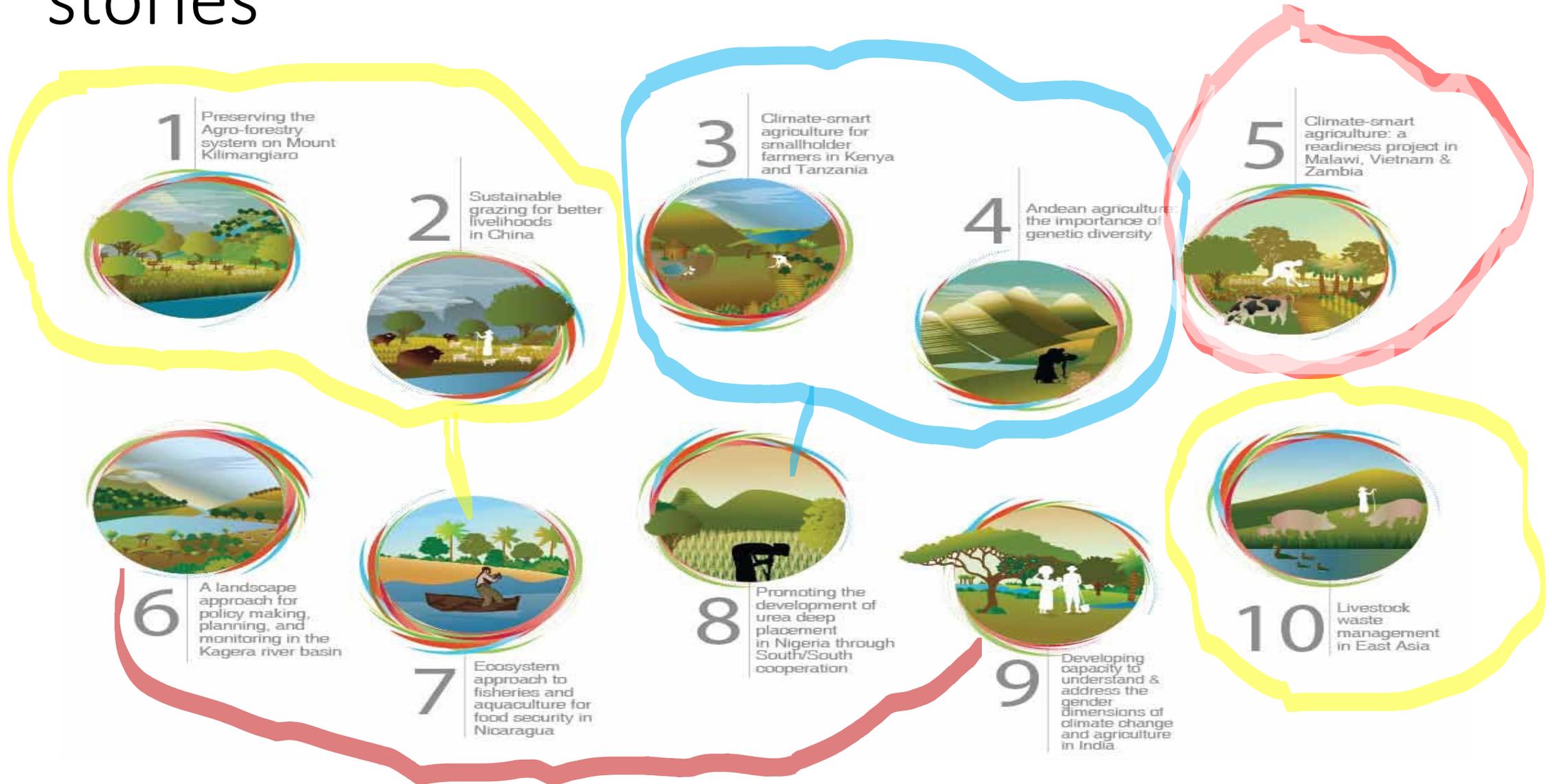


CSA/RA Benefits to the World

- Agriculture [accounts for over 10%](#) of greenhouse gas emissions. Will help reduce carbon footprints.
- techniques will improve crop yields reduce soil erosion, improve water retention and have biodiversity benefits as well. Can add around US\$ 70 billion per year of gross value to farmers
- Modelling shows a conservative increase of yields by 13% in 2040 if regenerative agriculture is implemented versus a business-as-usual approach
- And the boost to economies would create as many as 5 million new full time jobs by 2040 in farming, processing and supportive industries.
- And health benefits as increase in providing more nutrient dense food



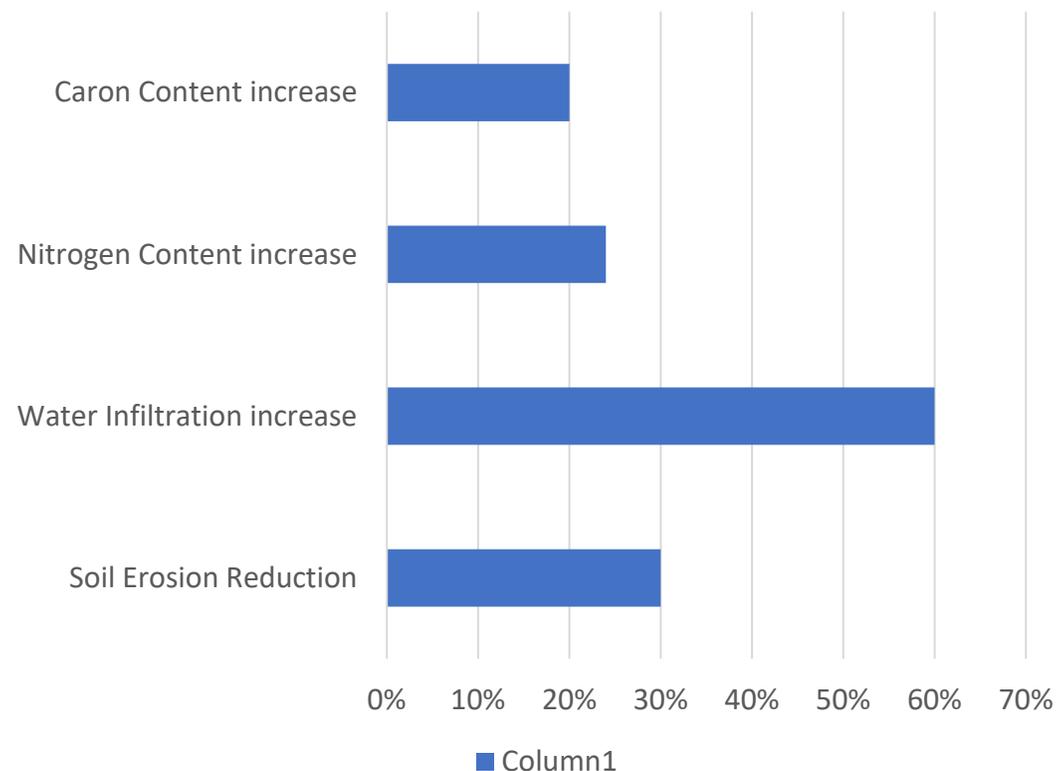
Climate Smart Agriculture - FAO Success stories



CSA/RA Benefits to Africa

- An opportunity for businesses and society to restore degraded land in Africa.
- Pilot projects show that eventual 68% to 300% crop yield increases are possible.
- adding more than \$15bn in gross value added per year by 2030, increasing up to \$70bn by 2040 (one fifth of the current agricultural GDP of sub-Saharan Africa).
- Hundreds of millions of smallholder farmers collectively produce 80% of the food in sub-Saharan Africa. Household income for these smallholder farmers could rise up to US\$ 150 per year
- According to the [World Agroforestry Centre](#), 500,000 farmers in Malawi, Tanzania and Zambia intercrop maize with faidherbia, and have reported a doubling or tripling in maize yields.
- By 2040, this additional carbon benefit alone could equate to 4.4 GtCO₂e (almost 10 times South Africa's annual emissions).
- Another 106 MtCO₂e per year could be sequestered by restoring degraded land with the inclusion of agroforestry systems.

Benefits of CSA/RA in Africa



CSA/RA Pilot - Pakistan



The primary objective of the pilot is to systematically integrate diverse regenerative principles over a period of three to five years

Our aim is to support small farmers affiliated with Rizq to adopt regenerative farming to this end Rizq has started developing model farm in different areas across south Punjab.

The pilot has successfully completed its first wheat cycle. The Pilot has

RA practices :

- 1. Adopted permanent raised bedding.**
- 2. NO till 3. Mulching 4. Utilizing low/zero chemical inputs 5. optimizing fertilizer application**
- 3. Three fertilizer levels were examined: half fertilizer, full fertilizer, and no fertilizer**

In subsequent years, the research design will expand to include livestock, cover cropping, and agroforestry.

The yield difference b/w half and full fertilizer is only 9%, which clearly shows an excessive use of fertilizers by farmers

The water productivity showed a 39.5% increase moving from traditional to sustainable (zero fertilizer farm) due to mulching.

The water productivity showcased a 101.6% increase moving from traditional to mulch half fertilizer plot.

The Total GHG Per Acre (KgCo₂eq) emissions showcased a 90.28% decrease moving from traditional to sustainable farm.

There is an overall 30% reduction in cost of production moving from traditional to sustainable (zero fertilizer farm)

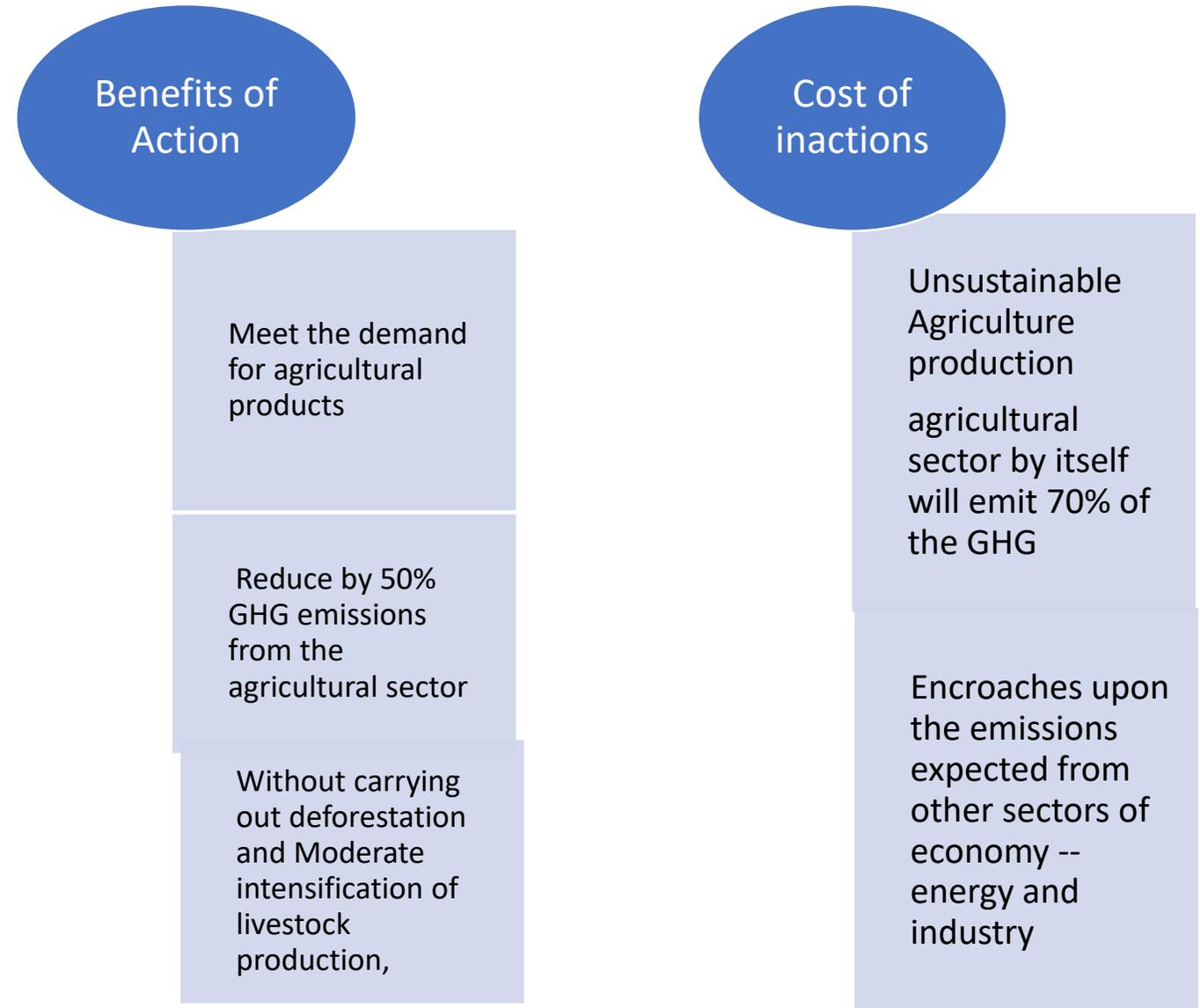
Adoption of Climate-Smart Agriculture Technologies -

Case of Brazil: The road to agriculture:
increased production with lower emissions

In Brazil, *Low-Carbon Emissions Agriculture Plan*, largest climate-smart agriculture programs is expected to sequester 7.4 million tons of carbon dioxide over the next decade.

In Tanzania, using data collected from 821 evaluated the *determinants of adoption* - Application of chemical fertilizers was fairly well adopted (34% of farmers), while irrigation was least adopted (26%).

In Guatemala *Costs and benefits of CSA options* were used to channel investments effectively and



Enabling Environments

Capacity building at Policy Level – Creating Enabling Environments

Farm Level

- Fam Managers Training covering wide range of topics
- Training of machinery operators.
- Training in RAP
- Farm as business

Community Levels

- Strengthen capacities of public services and institutions to control and protect forest and rural areas from slash and burn and pasture and to promote sustainable watershed management;
- Strengthen local community and municipality capacity to improve local behaviors (local funding, training, legislation);

Begin with policymaking as a driver :
incorporation of climate change considerations into
established or on-going development programs,
policies or mainstreaming

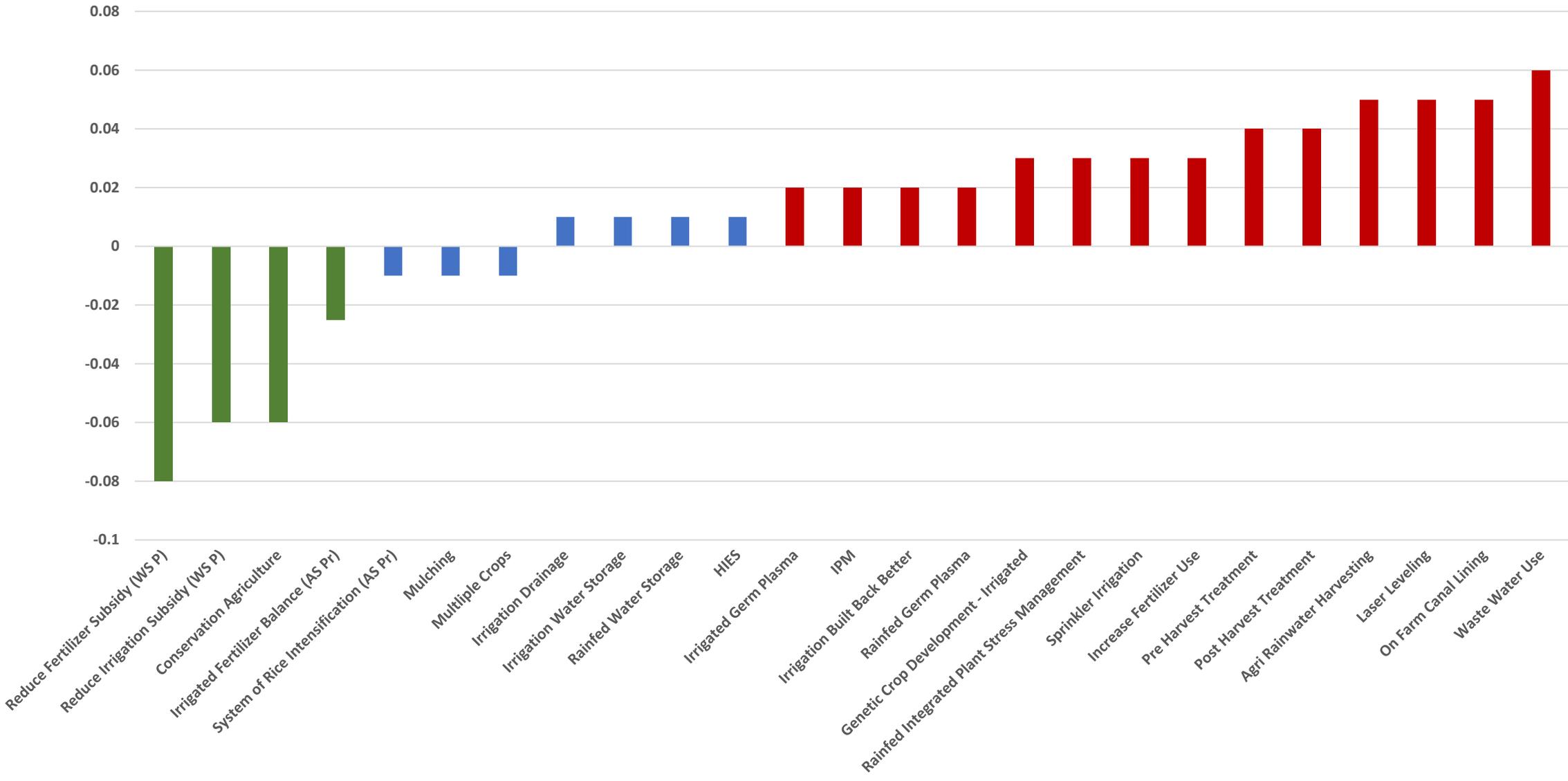
Promote local entry points to test and multiply pilot
experiences which will help design adequate policies

encourage or facilitate donor initiatives to
propose innovative projects

simultaneously promote mainstreaming at all levels
with synergic effects of self-led dynamic of local
initiatives vis-à-vis public policies

Financing CSA: Cost-effective way

Source: Author Research based on Global Data





Way Forward



- Establish a clear and concise definition of CSA, as the existence of multiple versions limits the recognition of benefits and allows various organizations using the term to implement vastly different ideas and practices
- Mitigate the risk of greenwashing, wherein food producers may claim climate actions without substantiating their impact
- Institute guidelines and a governing body akin to those in place for organic farming to evaluate practices based on outcomes
- Academic institutions still teach largely industrial agriculture without imparting needed knowledge on green growth
- Provide substantial support for small-scale farmers, rather than allowing industrial agriculture to disproportionately benefit from unproven climate mitigation practices. Additionally,
- Coordinated guidelines across geographic regions are essential for effective implementation. Propose undertaking a comparative analysis of five to six countries (tentatively, Brazil, SA, Tanzania, Morocco, Israel, and Pakistan/India) through research project, leading to a book

