Climate Smart Agriculture: evidence based technologies and enabling policy frameworks

2014, LIFT Annual Forum, NPT

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CC and vulnerability in Myanmar

- Droughts- in the dry zone/Sagaing, Mandalay, Magway regions
- Cyclones, storm surges, heavy winds, floods - in the Coastal areas, mainly the Rakhine Coastal State, Ayeyarwady Delta and Mon State.
- High temperatures – Flat regions in Central Dry zones/ arid-semi-arid belts
- Intensive rains – Tanintharyi, Yangon, Rakhine, Ayeyarwady and Mon State/Region and other parts of the country
- Sea level rise – coastal regions/Ayeyarwady Delta

Agriculture in Myanmar

- *66% of the population are rural/ 75% of them live on agriculture*
- *Agriculture – 43% of GDP (2011)*
- *3 main agro-ecological regions : Central dry (500-1000mm), coastal and hilly with different crops*
- *Rice (50%), oil seeds, pulses, wheat, maize, millets, root crops, soyabean*
- *Average farm size- 2.25 ha*
- *12.5% area under irrigation*

Climate change and adaptation

- **Agriculture is listed as First priority level sector** (together with EWS and Forests)
- **First priority: Reduced CC vulnerability of subsistence farmers through locally relevant technologies, climate-resilient rice varieties, and ex/in-situ conservation of genetic resources. /in Central dry and coastal zone**
- **Second priority: Increased CC resilience of rural and subsistence farmers in the Dry and Hilly Zones through legume crop diversification and other climate-resilient varieties. /in Central dry and hilly zone**
- **Third priority: Increasing the CC resilience of Dry Zone communities by diversifying and intensifying home-gardens through solar-power technology, high-income fruit crops and CSA approaches. /in Mandalay**
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- **Fourth priority: Reducing the vulnerability of livelihoods in agro-ecological zones to CC through the transfer of a wide range of high-yielding and climate-resilient rice varieties (availability of seeds and varieties) . /in Irrigated and rainfed lowlands and hill zone with rice**

(Ref:Myanmar's National Adaptation Programme of Action (NAPA) to CC, 2002)

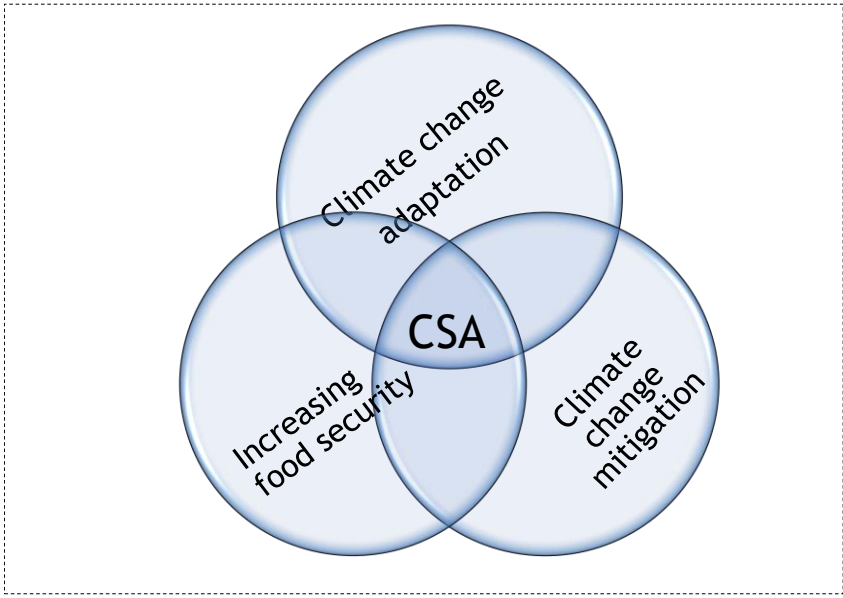
Climate Smart Agriculture-Concept

- ***Climate-smart agriculture*** *(CSA) is defined as an approach that "sustainably increases* ***productivity****, enhances resilience (****adaptation****), reduces GHGs (****mitigation****), carbon sequestration and increases food security and development goals" (FAO, 2010).*
- ***Key words: Innovation, Knowledge, technology***
- *What is new with CSA?*
- *The approach? to exploit the*

adaptation and mitigation potential

- *Some prefer the term*

"Climate resilient"



Contributing to productivity

- CSA technologies should improve **resource use efficiency**/ and **higher productivity** and yields.
- Measures that contribute to slow down adverse effects of climate change.
- Examples-

-crop varieties (that are drought resistant, and high yielding)

- improved cropping systems and animal husbandry

- cereal-legume based cropping systems

Contributing to Adaptation

- Any agricultural practice that **reduces exposure, sensitivity or vulnerability** to climate variability or change is climate-smart.
- these practises enhance farmers' ability to cope with extremes weather events
- Examples-

-shifting sowing windows,

-zero tillage, mulching,

-conservation agriculture,

-drought-tolerant crops/ improved crop varieties

-crop insurances, weather forecasts,

Contributing to mitigation

- CSA technologies have a greater capacity to sequester carbon from the atmosphere

-Examples- Improved soil management, green manuring, agroforestry, minimum tillage

- technologies/practices that help mitigate CH_4 and N_2O emissions

- Examples- SRI and AWD (Rice cropping systems), soil management (Biochar), biogas plants, reduced conversion of forests and rangeland management

Climate-resilient rice varieties

- Varieties suited for different agro-ecological zones
- Resistant to drought , salinity, waterlogged conditions
- Collecting genetic resources from different locations
- Sharing genetic resources
- Farmer participatory research/field trials
- Education, agricultural extension and training for up/ out scaling technologies
- Investments and policy support for research and seed production
- Quality and high yielding seeds to be made available to farmers

Alternate Wetting and Drying in Rice

- Rice yields under AWD increased by 14% and 55% during winter and monsoon rice crops, respectively, compared to the Normal Irrigation (NI)
- Water productivity, number of tillers and panicles were higher in AWD than NI cultivation
- Farmers profit increased on an average by about 22% in AWD compared to NI
- To introduce AWD as climate-smart rice farming system, system level irrigation water control through close coordination among farmers, irrigation authorities and local governments is essential
- requires more multi-location cluster trials (including GHG emissions) with farmer participation
- Training and capacity building of farmers

(Results based on 5-6 seasons farmer field trials in India)

System of Rice Intensification

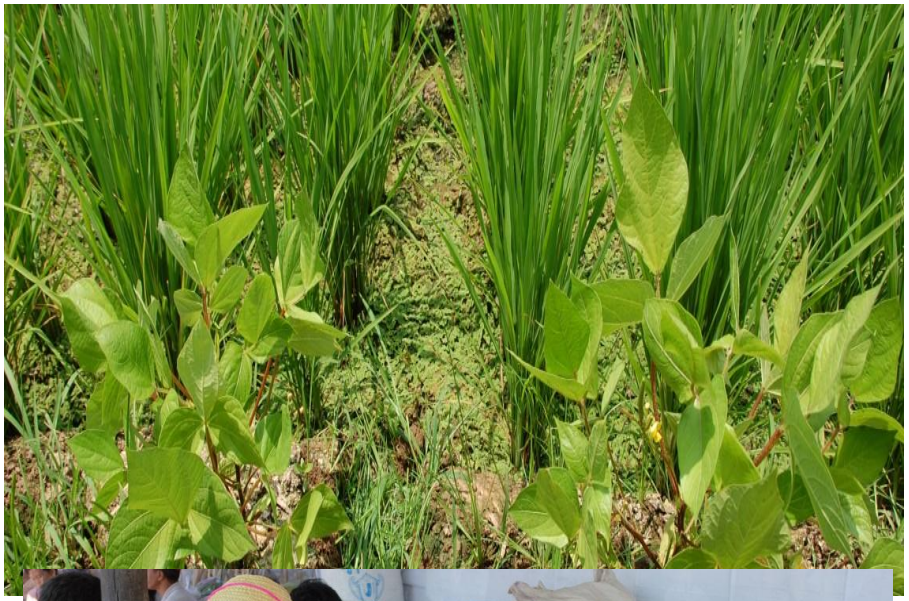
- *Proper land levelling*
- *Water management for intermittent irrigation*
- *12-15 day old seedlings for planting*
- *Plant single seedling /hill with a spacing of approx. 20-25x20-25 cm*
- *Proper weed management using conoweeder*
- *22% increase in yield and 25% water saving compared to paddy*
- *Less methane emissions (8 mg/m2/hr) in SRI compared to paddy rice system (13 mg/m2/hr).*
- *Challenges: Labour intensive; Nitrous oxide emissio*

Direct seeding of rice

- Direct seed drilling above 2.5cm depth
- Weed management with selective herbicides and manual weeding
- Lower cultivation costs due to reduced labour cost
- 50% reduction in seed rate (12-18 kg/acre)
- Reduced water usage by 20-25%
- More productive tillers and panicles
- Less incidence of pests and diseases
- Early harvest (7-10 days)
- DSR now in 100,000 ha in the project area

Legume based cropping systems

- *Promote legumes- chick pea, cow pea and groundnut etc*
- *Suitable for hilly and dry zones and water scarcity*
- *Addresses the nutritional security*
- *Provide good quality seeds and varieties for different zones and weather/ exploit genetic diversity*
- *More farmer participation trials and training*
- *Cereal-legume crop rotations*

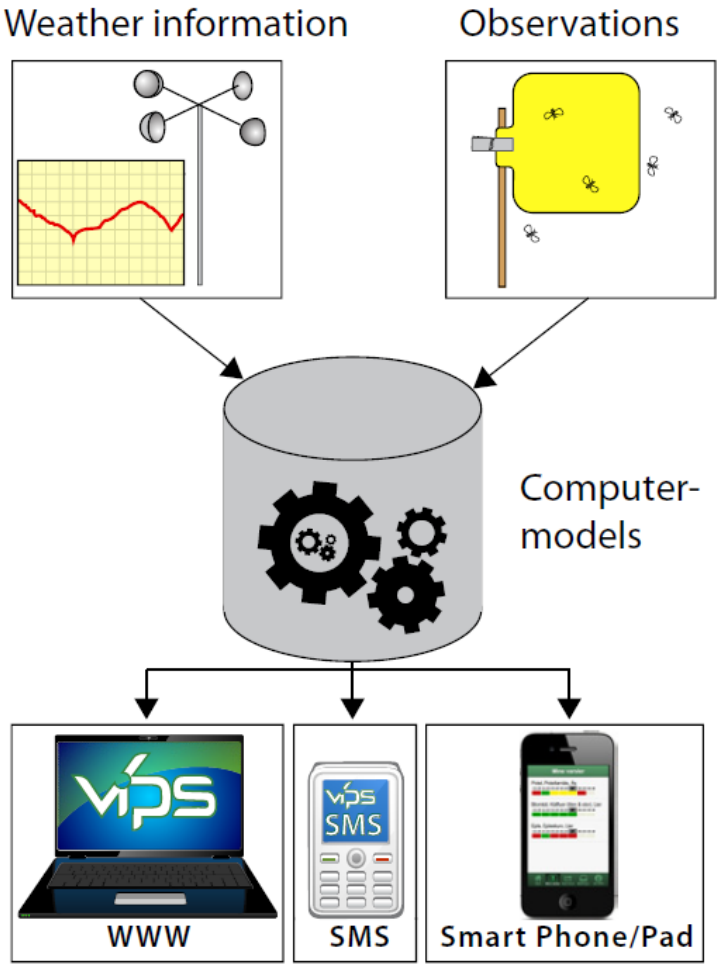


Small-scale water conservation

- Small-scale, cost-effective and rapidly installed earth fill dams
- It can provide supplemental irrigation during droughts
- Increases productivity and income
- Soil/water conservation
- Groundwater recharging

Crop pest and disease risk assessment and management

- Weather data, numerical weather forecasts
- Biological knowledge and observations from field
- Forecasting models for plant pests/diseases
- Early warnings based on damage thresholds and recommendations to farmer



Post-harvest processing and storage

Drying and storage–

- low quality grains,
- wastage, diseases.
- Not climate resilient and it is weather dependent

Mechanical heated-air seed dryer systems.

- Even drying/less labour
- Increases climate-resilience of harvested seed/grains.
- Design /production locally/ technical capacity/ awareness to use
- Improved storage bins

CSA-enabling frameworks

- Institutional support
- Research, extension
- Enabling policies for scaling up/out scaling
- Financial support and investments
- Small holder friendly
- Gender consideration

Farmer participatory learning

- Farmer participatory field trials
- Scientists-farmer link
- Farmer to farmer learning/ **Village Knowledge Centres**
- Simultaneous capacity building and training of farmers/women
- Developing upscaling/ outscaling frameworks
- Building CSA knowledge base /local context

Challenges and future directions

Main challenges

- Government prioirty?
- Farmer willingness to adopt new practises
- Low private sector investments in CSA
- Lack of evidence based CSA knowledge base
- Linkage to markets
- Lack of innovation

Future Directions

- Mobilize investments
- Share CSA knowledge (between regions, agencies)
- Share genetic resources
- More field based trials and testing
- Increase capacity and awareness of scientists and farmers