Climate-Smart Agriculture: Overview
The Challenge

The new challenge for agriculture is emphasised by different organisations:

- in 2010 Committee on World Food Security (CFS) commissioned a study on climate change and food security
- Study on food and agriculture: future of sustainability – UN Committee on Sustainability Assessment 2012
- World development report 2008 (agriculture for development) and 2010 (development and climate change)
- UNDP green economy report (2011)

In 2010 FAO developed the concept of Climate-Smart Agriculture (CSA)
Addressing the Challenge

CSA

UNFCCC

Agenda 2030

AU Strategy on CC

Sustainable Agriculture
Agenda 2030 and Paris Agreement

- SDG 2: Zero Hunger
- SDG 12: Responsible Consumption & Production
- SDG 13: Climate Action
- SDG 15: Life on Land
- Integrated Approach including all SDGs
The global framework: Agriculture & (I)NDCs
Definition of Climate-Smart Agriculture (CSA)

CSA is an approach to help guide the management and transformation of agriculture for food security under the realities of climate change.

It is composed of three main pillars:

1. Sustainably increase agricultural productivity and incomes;
2. Adapt and build resilience to climate change;
3. Reduce and/or remove greenhouse gases emissions, where possible.

FAO, 2013: Climate-Smart Agriculture Sourcebook
Climate-Smart Agriculture

“Agriculture that sustainably increases productivity, resilience (adaptation), reduces/removes GHGs (mitigation), and enhances achievement of national food security and development goals”

Climate-smart agriculture (CSA)

• Approach for transforming and reorienting agricultural systems to support food security under the new realities of climate change.

• Climate change threats can be reduced by increasing adaptive capacity of farmers, increasing resilience and resource use efficiency.

• CSA is not just about new technologies, it is combining indigenous knowledge, common agricultural practices and appropriate new technological developments for agriculture to increase sustainably production efficiency – to ensure food security for future generations.

• Knowledge and information is available but a giant task still remains: closing the gap between research and application on farm level and for policy and decision making – knowledge translation for different users.
Old vine in new bottles? What is new?

• Synergies and trade-offs in local context between adaptation, mitigation and productivity benefits

• Inclusion of mitigation (sequestration of CO2 in soils, reduced emissions of greenhouse gases);

• Inclusion of services and tools – climate insurance, climate services, etc.

• Provision of funds to finance CSA (e.g. through green climate fund – GCF, REDD+); but not clear to what extent GCF and REDD+ funds can be used to finance CSA activities;

• Emphasis on climate change projections and forecasts as basis for formulation of National Adaptation Plans (NAP) and measures;

• Increasing importance of insurances to cover loss and damage.
Critical issues, though this is changing
(mainly raised by NGOs and CSOs and developing countries)

- Strong focus on mitigation and carbon markets
- Danger of small-scale farmers to focus too much on carbon certificates rather than improving resilience
- Incorporation of CSA in carbon markets benefits large-scale agriculture enterprises at the cost of smallholders who will receive less money for promotion of sustainable agricultural initiatives
- Very much focused on climate at the costs of biodiversity
- CSA approach is often used synonymous with sustainable agriculture, although it may be part of it only
CSA Pillar 1:
Sustainably increase agricultural productivity and incomes

Increased demand
- Population growth
- Dietary changes

Sustainability
- Availability of land
- Pressure on natural resources & ecosystem services

Source: FAO
Changes in the nature and the geographic distribution of environmental conditions, e.g.:

- Temperature
- Rainfall amounts and distribution
- Extreme weather events (droughts, storms, floods)
- River flows
- Sea levels
- Ocean temperature and acidity

Affecting:

- Growing conditions of crops, livestock, fish, trees
- Ecosystems services
- Livelihood of people, often the poorest

CSA Pillar 2: Adapt to climate change and build resilience

Source: FAO
CSA Pillar 3: Reduce/remove GHG emissions, where possible

- Achieving the Paris Agreement requires action in agriculture sectors

- Many developing countries have committed to mitigation in agriculture sectors

- Agriculture sectors potential for adaptation-mitigation synergies recognized and for mitigation as co-benefit of adaptation

GHG reductions –

Key elements:

Resource Use Efficiency

Improved management

Combining reduction of emission intensity with productivity increase

Source: FAO
Major Stakeholders

- FAO: MICCA-Project (Mitigation of Climate Change in Agriculture); FAO-Adapt
- World Bank
- CCAFS (CGIAR Research Programme on Climate Change, Agriculture and Food Security)
- Africa CSA Alliance
- CFS (Committee on World Food Security)
- HLPE (High Level Panel of Experts on Food Security and Nutrition)
- NGOs und Civil Society Organisations (CSOs)
- Private sector (e.g. companies that promote integrated pest management and targeted fertiliser application)
Country commitments: More than 30 countries explicitly refer to CSA in their INDCs
CSA in German Development Cooperation

Food Security under Climate Change

- Sustainable increase of Agricultural Productivity
- Adaptation of agriculture to climate change (Resilience)
- (if possible) Mitigation of GHG emissions from agriculture
Components of CSA

Enhancing the policy-framework for CSA

Capacity Development for CSA

Financing mechanisms for CSA

Improvement of climate-specific data in agriculture

Fostering CSA at local level

From left to right: © GIZ / Markus Kirchgessner, Joerg Böthling, Shilpi Saxena, Ursula Meissner, Michael Kottmeier
“Climate-smart” villages: engage multiple stakeholders necessary for support

- Designed diversification
  - adapted varieties
  - crop livestock systems
  - biodiversity

- Community management of resources
  - water and soils
  - seeds
  - fodder
  - grain

- Climate services
  - weather forecasts
  - agro advisories
  - ICT-based dissemination

- Weather insurance
  - temperature
  - rainfall

- Mitigation/carbon sequestration
  - crop residues
  - soil management
  - irrigation
  - agroforestry

- Capacity building
  - farmers
  - SHGs
  - extensionists
  - scientists
  - industry
  - others

Climate Smart Village
## Climate-smart practices in smallholder agricultural production

<table>
<thead>
<tr>
<th>Crop management</th>
<th>Livestock management</th>
<th>Soil and water management</th>
<th>Agroforestry</th>
<th>Integrated food energy systems</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Intercropping with legumes</td>
<td>• Improved feeding strategies</td>
<td>• Conservation agriculture (e.g. minimum tillage)</td>
<td>• Boundary trees and hedgerows</td>
<td>• Biogas</td>
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<tr>
<td>• Crop rotations</td>
<td>• Rotational grazing</td>
<td>• contour planting</td>
<td>• nitrogen fixing trees on farms</td>
<td>• production of energy plant</td>
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<tr>
<td>• New crop varieties (e.g. drought resistant)</td>
<td>• Fodder crops</td>
<td>• terraces and bunds</td>
<td>• multipurpose trees</td>
<td>• improved stoves</td>
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<tr>
<td>• Improved storage and processing techniques</td>
<td>• Grassland restoration</td>
<td>• planting pits</td>
<td>• improved fallow with fertiliser shrubs</td>
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<tr>
<td>• Greater crop diversity (agrobiodiversity)</td>
<td>• Manure treatment</td>
<td>• water storage (e.g. water pans)</td>
<td>• woodlots</td>
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<td></td>
<td>• Improved livestock health</td>
<td>• alternate wetting and drying (rice)</td>
<td>• fruit orchards</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Animal husbandry improvements</td>
<td>• dams, pits, ridges</td>
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</tbody>
</table>

### Source:
Synergies in **Crop production**

- **Agricultural Input Management** (fertilizer management, pesticides, herbicides)
- **Residue Management** (building up soil humus)
- **Cropping Patterns** (shifts, diverse patterns)
- **Cultivar Selection** (climate stress tolerance, salt tolerance, high biomass, biodiversity friendly)
- **Tillage** (zero tillage, CA, strip tillage)
- **Rice Cultivation Options** (**SRI** System of Rice Intensification, **ICM** - Integrated Crop Management)
Synergies in Livestock production

- Pastoral lands and grazing management (Range Management)
- Livestock production (feed, breeding, manure management)
- Biogas production (60% CH4, 40% CO2)
Synergies *Aquaculture and Fisheries*

- Promoting sustainable fish farming (e.g. rice - fish culture)
- Developing countrywide maps that depict areas for shore protection
- Encouraging coastal and watersheds basin management approach linking land-use practices to marine and fisheries resources conservation

ridge to reef approach

- Establish fisheries biodiversity network to identify and monitor species that will be affected by climate change
Synergies at **Landscape Management Level**

- Agrobiodiversity (genetic diversity, plant species richness, conservation of soil fauna and flora)

- Agroforestry (increased resilience, nitrogen fixing)

- Organic Agriculture (Mitigation potential depends on organic farming system: (0.4 t – 11 t Carbon/ha/year)

- Ecosystem and sustainable Approaches (sustainable agriculture, sustainable forest and landscape management, conservation agriculture, precision farming, climate smart agriculture)
An ideal climate-smart landscape of the future

**City**
- built away from the flood plain
- distributed energy system including renewables
- planned for low-carbon transport
- buildings use low environmental-impact materials
- road materials and drainage designed for increased temperatures and severe storms

**Bonded warehouse**
- for grain stocks to buffer price shocks in international grain market

**Wastewater treatment plant**
- treated water
  - injected into aquifer to protect against saline intrusion
  - piped to coastal wetlands to counteract excess abstraction
  - used for irrigation upstream

**Wetlands**
- preserved to sequester carbon, provide habitat, and purify water

**Mangroves**
- protected:
  - in response to incentives from carbon credits
  - to provide ecosystem services, including fish nursery and storm protection

**Fish farms**

**Dam**
- provides energy, irrigation, and drought and flood protection
- re-engineered to cope with extreme rainfall and minimize environmental damage

**Upgraded port and customs facility**
- to facilitate international trade

**Power station**
- carbon captured and stored underground

**B Indigenous trees**
- sequester carbon in former wasteland

**Modern crop varieties**
- adapted to climate change stress

**Coastal agriculture**
- with irrigation from coastal aquifers protected from saline intrusion

**Desalination plant**
- uses renewable energy
- provides water to city and coastal agriculture

**Regulated fishery**
- ensures catch is at sustainable levels

Source: World Development report, 2010
Steps in planning CSA measures

- Vulnerability assessment (target groups)
- Identification of adaptation measures
- Identification of measures for reduction of emissions
- Identification of potential for carbon storage
- Elaboration of an action plan (integrated planning: including agriculture, forestry, fisheries and water) at different levels – local, watershed, regional
- Explore possibilities for “carbon finance” (NEPAD, GCF…)
- If possible link to climate risk insurances
- Provision and dissemination of timely climate information to farmers
Thank you and hope to see you again!