

CLIMATE-SMART  
**Agriculture**  
20**15**



Global Science Conference

March 16-18, 2015  
Le Corum, Montpellier France

# Prioritizing and evaluating climate-smart practices and services

B Campbell,  
C Corner-Dolloff, E Girvetz,  
T Rosenstock and many  
others (CGIAR)



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**Climate Change,  
Agriculture and  
Food Security**



Montpellier

March 16-18, 2015

# Outline

- Introduction – tradeoffs & context specificity
- “CSA-Plan” - 4-step set of planning and implementation tools
  - CSA Country Profiles
  - Prioritization in Guatemala, Mali, Viet Nam
  - Implementation in Africa
- Conclusions

# Climate-smart agriculture

*“The overall aim .... is to support efforts from the local to global levels for sustainably using agricultural systems to achieve food and nutrition security for all people at all times, integrating necessary adaptation and capturing potential mitigation”*

Lipper et al (2014)

- 24 authors from 15 institutions
- *Nature: Climate Change*



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# Compendium of CSA practices

## 65 practices/22 indicators

Photo:  
K. Tully

**Key word search**

144,567  
papers

**Abstract/title review**

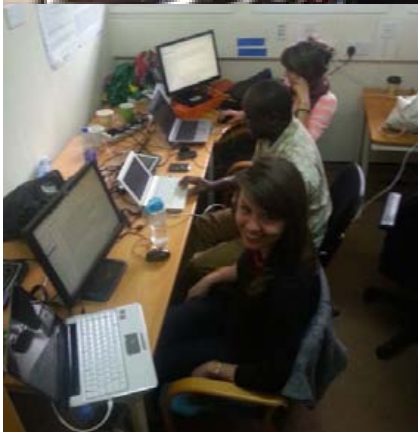
16,254  
papers

**Full text review**

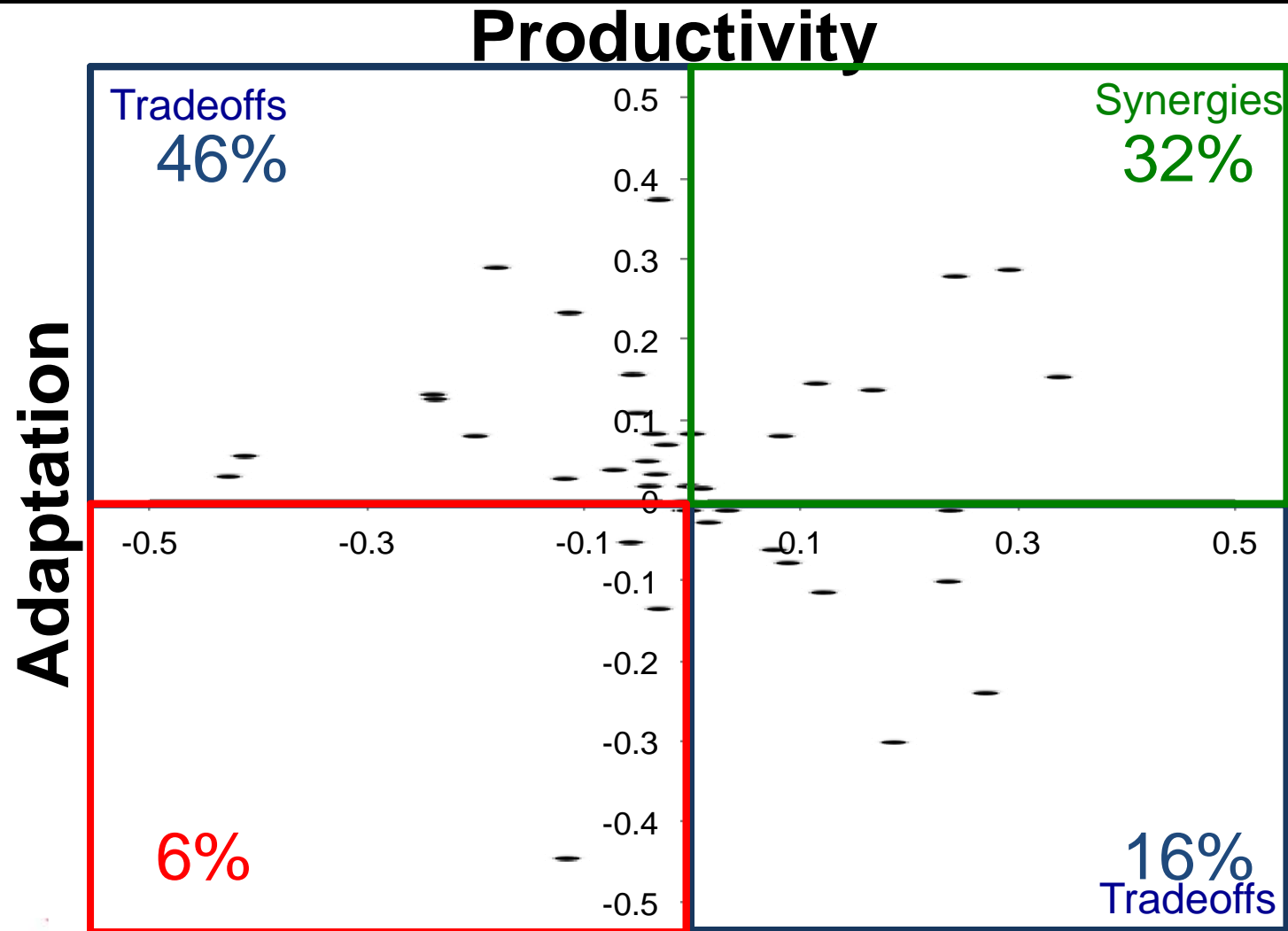
6,100  
papers

**Data extraction**

~120,000 data points

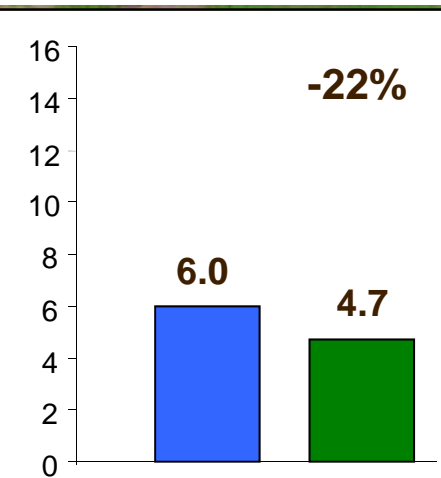
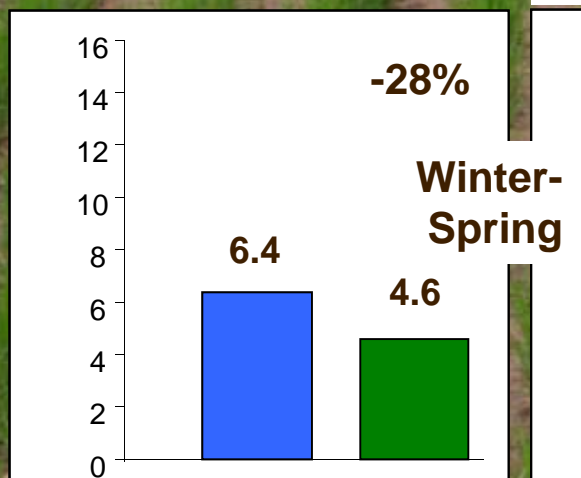
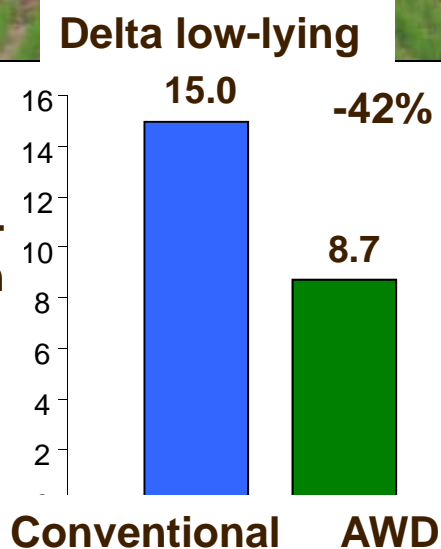
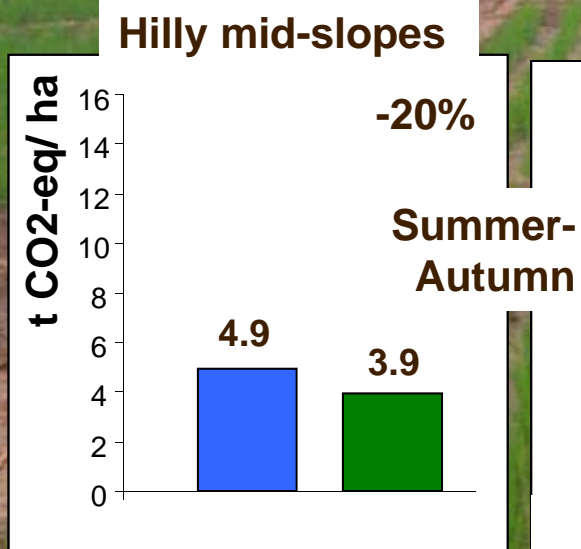


# Synergies and tradeoffs between food security and adaptation with CSA



Mean effect from random sample  
of 130 studies (55 comparisons)

# Alternate-Wetting-and-Drying (AWD)



- Keep flooded for 1<sup>st</sup> 15 days and at flowering
- Irrigate when water drops to 15 cm below the surface



30% water

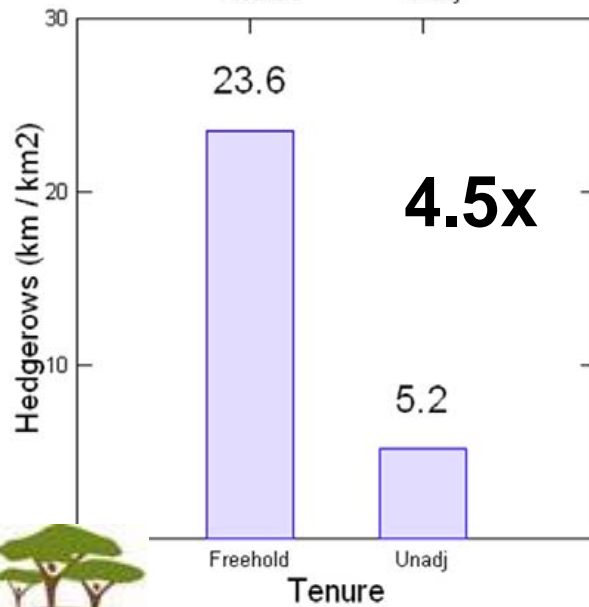
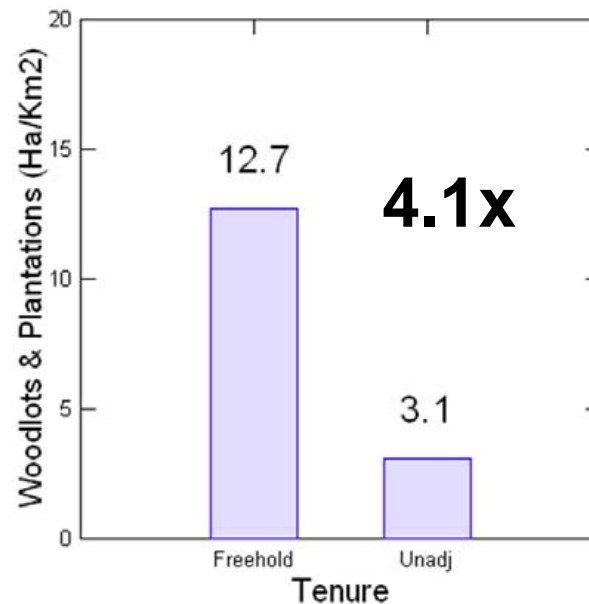
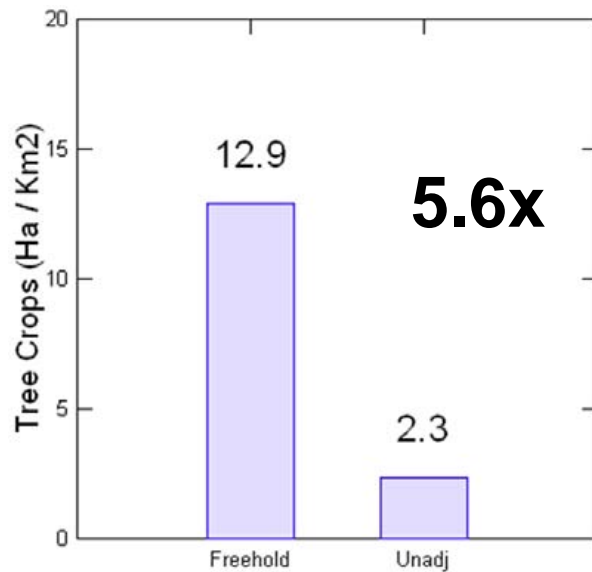



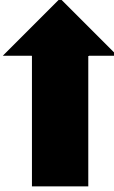
20-50% GHG

Without compromising yield

Sander et al. in press IRRI

# Agroforestry: Integrating trees on farms

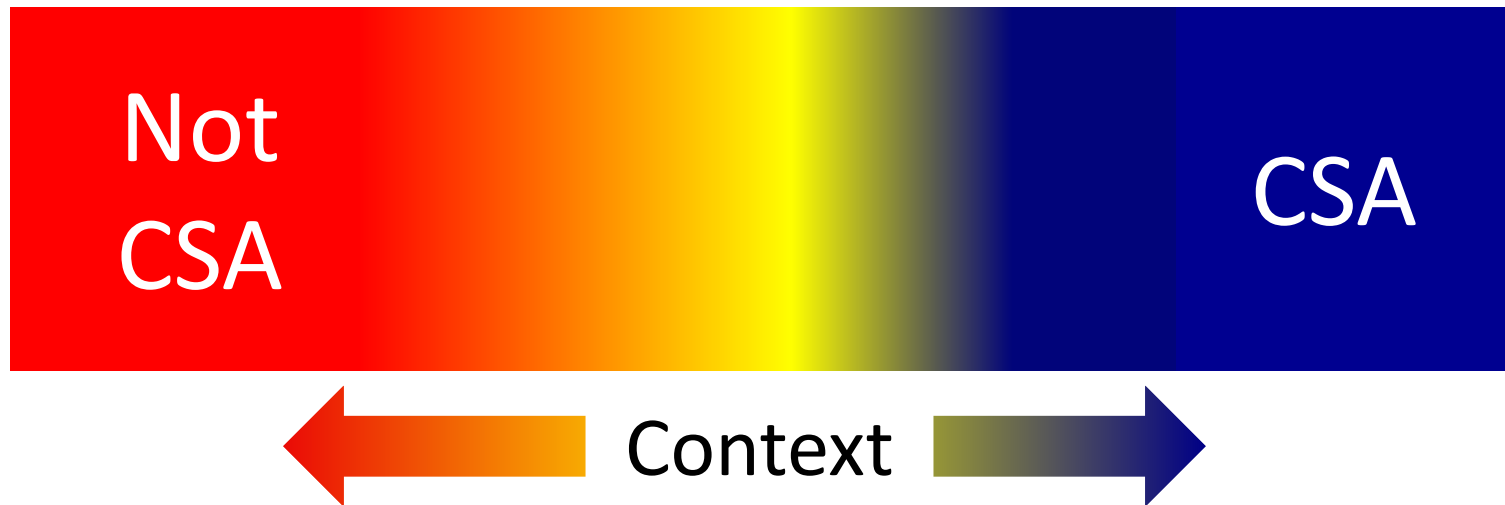


 Diversified livelihoods, as much as 5 additional uses  
 Carbon  
*Reppin in prep*

	Unadjud?	Freehold?	Tenure?
Effect?			
Net returns to land (\$ha <sup>-1</sup> y <sup>-1</sup> )?	\$126?	\$288?	2.28?
Woody crops, woodlots etc (ha km <sup>-2</sup> )?	5.4?	25.6?	4.7?



# No blanket recommendations



Many practices/programs/policies can  
be **CSA somewhere**

But **none** are likely CSA everywhere

# Global Alliance CSA: 500 million smallholders

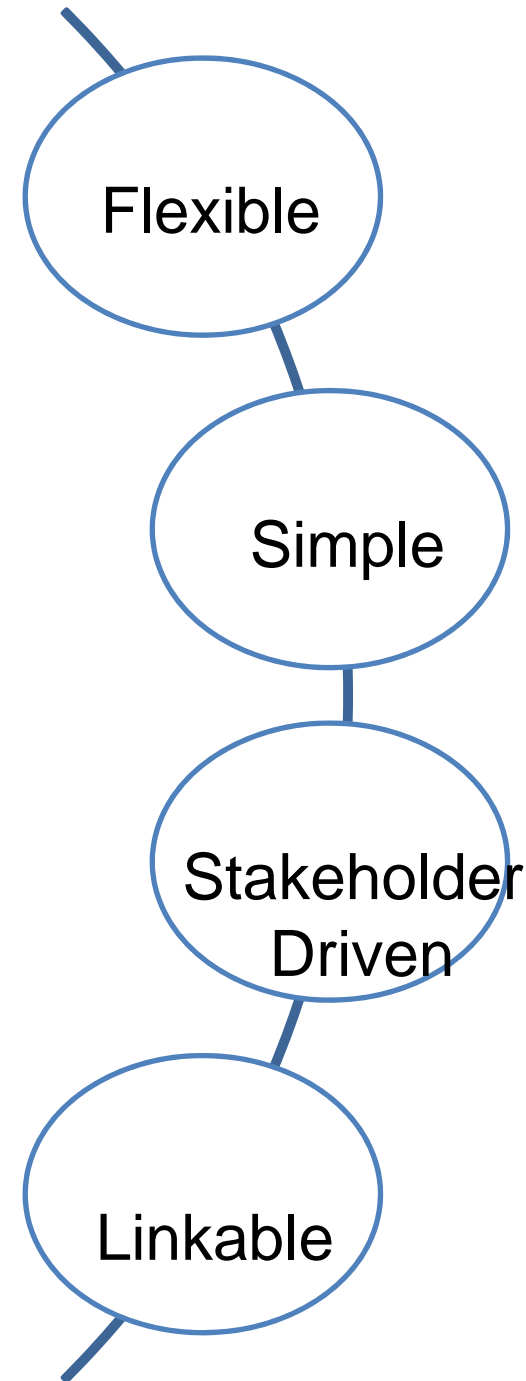
## AU-NEPAD: 25 million smallholders



Photo:  
Neil Palmer (CIAT)

# CSA-Plan:

A multi-step planning  
and implementation  
guide to scaling CSA



# CSA-Plan



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Engagement

## Situation Analysis

Risks and Enabling Conditions

Vulnerability & Impacts + Readiness

Stocktaking  
for CSA  
Action

## Targeting & Prioritizing

Practices, Programs and Policies

Trade-offs & Value for Money

CSA  
Investment  
Portfolios

## Programing Design

Guidelines & Implementation

Knowledge into Action

Taking CSA  
to Scale

## Monitoring and Evaluation

Across Scales and Systems

Evidence Based Results Framework

Learning  
from  
Experience

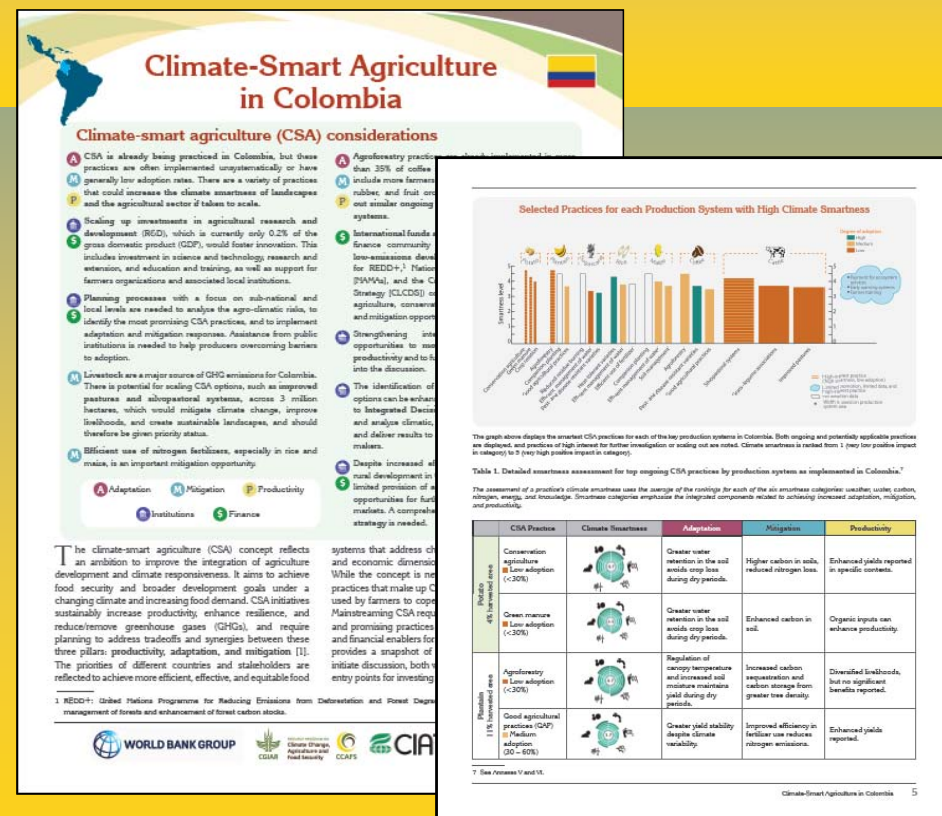
Capacity development

# CSA-Plan

## Situation Analysis Risks and Enabling Conditions Vulnerability & Impacts + Readiness

## Stocktaking for CSA Action

- Indicators & targets to achieve
- Agricultural snapshot
- Future climate impacts
- Ongoing & promising CSA practices
- Institutions & policy entry points
- Finance mechanism



# CSA Compendium

## CSA Compendium Search Results

- 1 Practices for context
- 2 Performance based on indicators
- 3 Identify gaps in data
- 4 Links directly to CSA-Plan

Practices	Indicators (Percentage Change)								
	YLD	VAR	LAB	INC	FAC	WUE	NUE	ERS	EMS
Silvopastoral Systems	80% ★ ★ ★	83% ★ ★ ★	3% ★ ★ ★	20% ★ ★ ★	42% ★ ★ ★	90% ★ ★ ★	68% ★ ★ ★	79% ★ ★ ★	8% ★ ★ ★
Biogas	20% ★ ★ ★	15% ★ ★ ★	25% ★ ★ ★	30% ★ ★ ★	33% ★ ★ ★	82% ★ ★ ★	20% ★ ★ ★	80% ★ ★ ★	45% ★ ★ ★
Water Harvest Structure	35% ★ ★ ★	27% ★ ★ ★	85% ★ ★ ★	12% ★ ★ ★	56% ★ ★ ★				-3% ★ ★ ★
Efficient Use of Fertilizer	72% ★ ★ ★		30% ★ ★ ★		24% ★ ★ ★	57% ★ ★ ★		-40% ★ ★ ★	
Grass-Legume Association	18% ★ ★ ★	32% ★ ★ ★		50% ★ ★ ★		60% ★ ★ ★	20% ★ ★ ★	-10% ★ ★ ★	30% ★ ★ ★
Improved Forages	10% ★ ★ ★		3% ★ ★ ★	20% ★ ★ ★	42% ★ ★ ★		12% ★ ★ ★		10% ★ ★ ★
Diseases Management	20% ★ ★ ★	15% ★ ★ ★	25% ★ ★ ★	30% ★ ★ ★	33% ★ ★ ★	82% ★ ★ ★	20% ★ ★ ★	80% ★ ★ ★	45% ★ ★ ★
Silage, Haylage and Nutritional Blocks	35% ★ ★ ★	27% ★ ★ ★	85% ★ ★ ★	12% ★ ★ ★	56% ★ ★ ★				-3% ★ ★ ★
Early Warning Systems	72% ★ ★ ★		30% ★ ★ ★		24% ★ ★ ★	57% ★ ★ ★		-40% ★ ★ ★	
Harvest Residues in Livestock Diet	18% ★ ★ ★	32% ★ ★ ★		50% ★ ★ ★		60% ★ ★ ★	20% ★ ★ ★	-10% ★ ★ ★	30% ★ ★ ★

### Indicators

YLD	Yield
VAR	Variability
LAB	Labour
INC	Income
FAC	Food access
RES	Resilience
WUE	Water use efficiency
NUE	Nutrient use efficiency
EUE	Energy use efficiency
BD	Biodiversity
PP	Pest-pathogen Resistance and Tolerance
ERS	Soil erosion
SOQ	Soil quality
EMS	Emissions intensity
OFE	On farm emissions
OFFE	Off farm emissions

### Legend

The number of the stars shows the quality of the source based on the data used in the context of the experiment, along other criteria such as region, country, production system, year, etc.

★	Low
★ ★	Medium
★ ★ ★	High

### Partners



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**CIAT**  
International Center for Tropical Agriculture  
Since 1967 / Science to cultivate change



# CSA Practice Briefs



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## PRACTICE BRIEF

CLIMATE-SMART AGRICULTURE

APRIL 2014

### Alternate wetting and drying in irrigated rice

Implementation guidance for policymakers and investors

Meryl Richards, B. Ole Sander

#### OVERVIEW OF ALTERNATE WETTING AND DRYING

Alternate wetting and drying (AWD) is a management practice in irrigated lowland rice that saves water and reduces greenhouse gas (GHG) emissions while maintaining yields. The practice of AWD is defined by the periodic drying and re-flooding of the rice field.

While AWD requires a specific water regime (see *The practice of AWD on the farm*, below), the practice of allowing the water table to drop below the soil surface at one or multiple points during cultivation is not new. AWD and other single- or multiple- drying practices have been used for several decades as water-saving practices. About 40% of rice farmers in China practice some form of water management and short intervals of non-flooded conditions are common among rice farmers in northwestern India and in Japan (more than 80%). AWD-like practices have continued to spread.

A large potential exists for GHG reductions from rice puddles through the use of systematically introduced AWD, optimized for GHG mitigation. At present, AWD is widely accepted as the most promising practice for reducing GHG emissions from irrigated rice for its large methane reductions and multiple benefits.

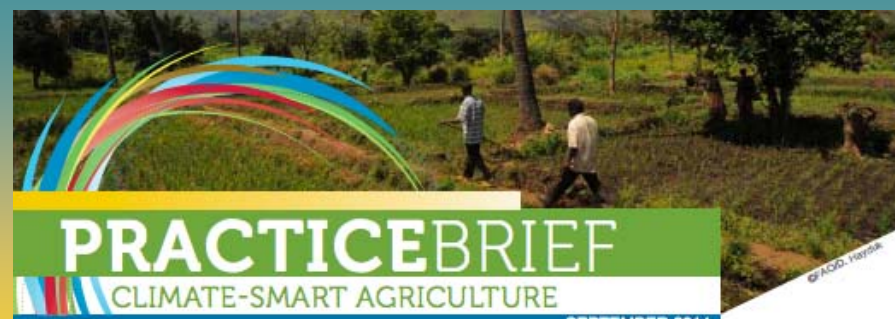


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#### KEY MESSAGES

1. Alternate wetting and drying (AWD) is a rice management practice that reduces water use by up to 30% and can save farmers money on irrigation and pumping costs.
2. AWD reduces methane emissions by 48% without reducing yield.
3. Efficient nitrogen use and application of organic inputs to dry soil can further reduce emissions.
4. Incentives for adoption of AWD are higher when farmers pay for pump irrigation.



## PRACTICE BRIEF

CLIMATE-SMART AGRICULTURE

SEPTEMBER 2014

### Conservation agriculture

Implementation guidance for policymakers and investors

Meryl Richards, Tek Sapkota, Clare Stirling, Christian Thierfelder, Nele Verhulst, Theodor Friedrich, Josef Kienzle

#### OVERVIEW OF CONSERVATION AGRICULTURE

Conservation agriculture is an approach to agricultural management based on three principles:

##### 1. Minimum soil disturbance

Zero tillage is ideal, but the system may involve controlled tillage in which no more than 20 to 25% of the soil surface is disturbed.

##### 2. Retention of crop residues or other soil surface cover

Many definitions of CA use 30% permanent organic soil cover as the minimum, but the ideal level of soil cover is site-specific.

##### 3. Use of crop rotations

Crop rotation helps reduce build-up of weeds, pests and diseases. Where farmers do not have enough land to rotate crops, intercropping can be used. Legumes are recommended as rotational crops for their nitrogen-fixing functions.

The idea of minimizing soil disturbance was introduced in the 1930s as a soil conservation system to counter the Dust Bowl in the United States, but the term "conservation agriculture" was not coined until the 1990s. Only recently has CA been promoted on the basis of its climate adaptation and mitigation benefits. CA is now widespread in parts of the Americas, as well as Australia. In the tropics, Brazil has the

#### KEY MESSAGES

1. Conservation agriculture (CA) can increase resilience to climate change and has the potential to contribute to climate change mitigation.
2. The benefits of CA are highly site-specific.
3. Innovative approaches are needed to overcome barriers for uptake of CA by smallholders.



Food and Agriculture  
Organization of the  
United Nations



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# CSA-Plan



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## **Situation Analysis**

**Risks and Enabling Conditions**

**Vulnerability & Impacts + Readiness**

**Stocktaking  
for CSA  
Action**

## **Targeting & Prioritizing**

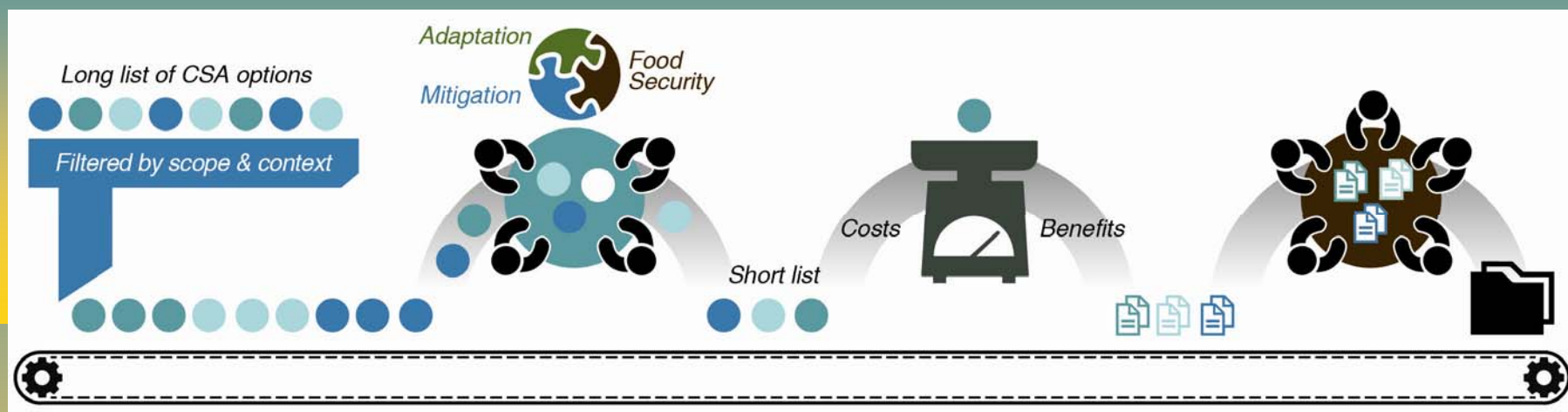
**Practices, Programs and Policies**

**Trade-offs & Value for Money**

**CSA  
Investment  
Portfolios**

# Prioritization

## Action Research Methodology



### ➔ Results

Ranked **long list**  
of CSA practices

### ➔ Results

- **Short list** of priority practices and programs
- Stakeholder selection via **workshops**

### ➔ Results

Ranked short list  
based on **economic analysis**

### ➔ Results

- **CSA investment portfolios**
- Identified opportunities and constraints

# Prioritization in action



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## Guatemala

### Ministry of Agriculture, Livestock, and Food

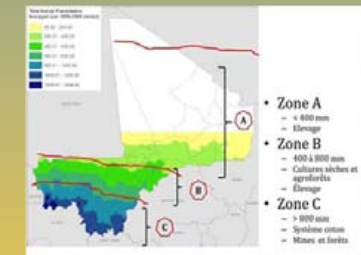
- 'Dry corridor' - severe drought in 2014
- Objectives
  - Assess and validate the previously incentivized practices from food for work program
  - Prioritize practices for promotion by government extension.



## Mali

### National Science Policy Dialogue Platform

- Three zones prioritized – cc impact, production systems
- Objectives:
  - Create technical info for farmers
  - Cross-ministerial CSA programs to incentivize adoption & investment



## Colombia

### Local organization: Foundation Rio Las Piedras

- Objectives:
  - Evaluate ongoing CSA practices
  - Improve existing practices
  - Create programs to scale up high outcome practices



Photos: Neil Palmer (CIAT)

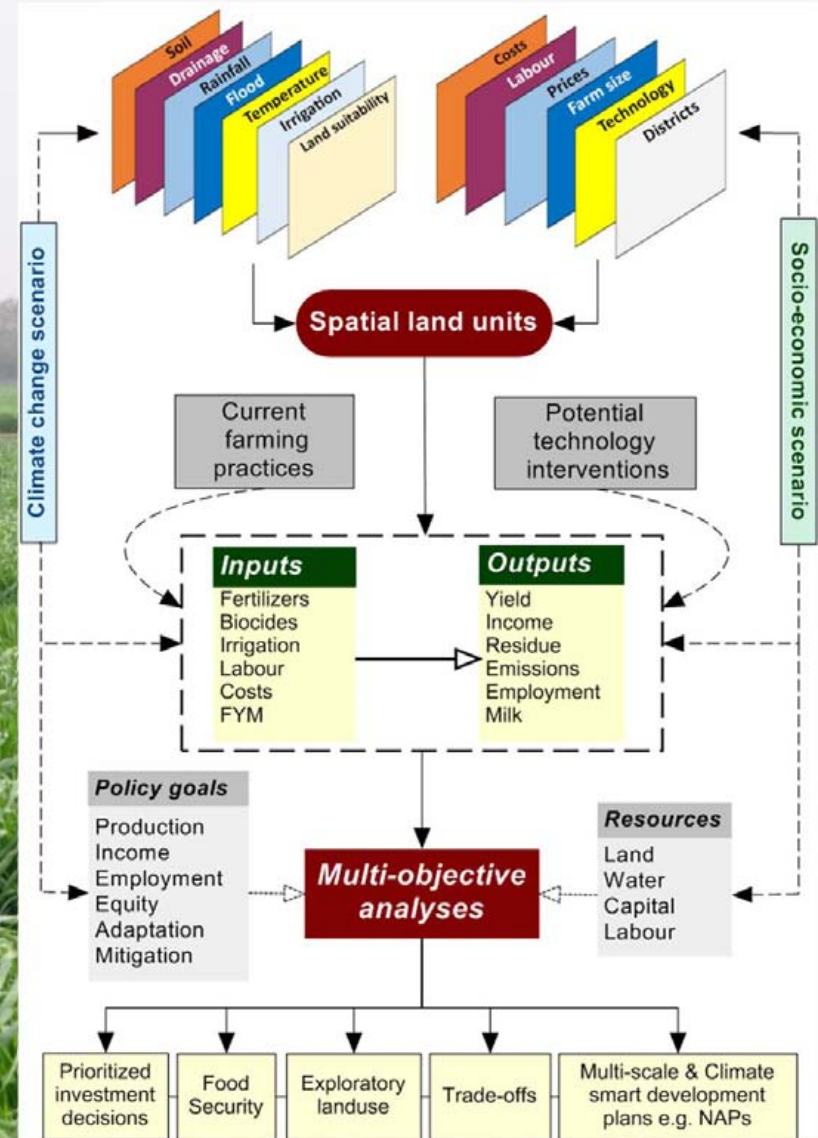
# Multiple prioritization tools



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- Spatially explicit
- Integrated modeling framework
- Climatic and socio-economic scenarios
- Supports multi-objective trade-off analyses



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## Situation Analysis

Risks and Enabling Conditions

**Vulnerability & Impacts + Readiness**

**Stocktaking  
for CSA  
Action**

## Targeting & Prioritizing

Practices, Programs and Policies

**Trade-offs & Value for Money**

**CSA  
Investment  
Portfolios**

## Programming Design

Guidelines & Implementation

**Knowledge into Action**

**Taking CSA  
to Scale**

- CSA Toolbox
- Decision trees
- Business models

# CSA-Plan



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## Situation Analysis

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## Monitoring and Evaluation

Across Scales and Systems

**Evidence Based Results Framework**

**Learning  
from  
Experience**

# Indicators and metrics

## A Monitoring Instrument for Resilience

Working Paper No. 96

CGIAR Research Program on Climate Change,  
Agriculture and Food Security (CCAFS)

Terry Hills  
Emilia Pramova  
Henry Neufeldt  
Polly Ericksen  
Philip Thornton  
Andrew Noble  
Elizabeth Weight  
Bruce Campbell  
Matthew McCartney



Working Paper

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Engagement

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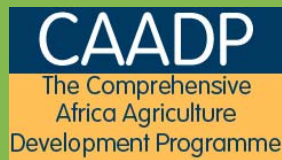
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from  
Experience

Capacity development

# CSA Integration Across Scales in Africa



## African Union – New Partnership for African Development



## Regional Economic Communities (RECs)



## National Agricultural Investment Plans (NAIPs)

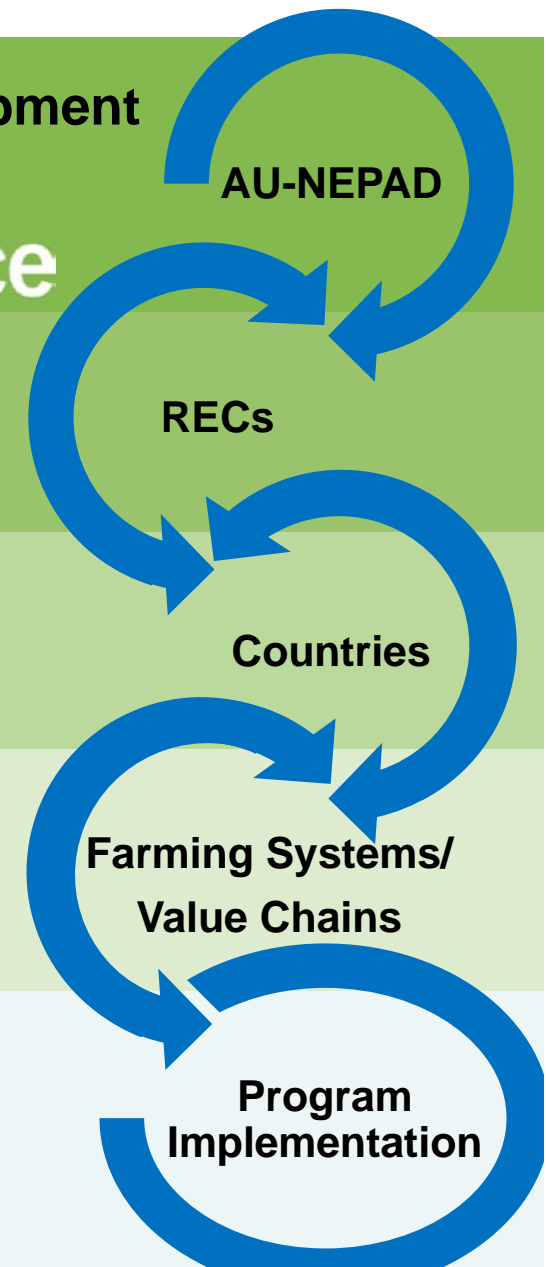
Other National Level Policies (NAPAs/NAPs/NAMAs, etc.)

## Programmatic Investments and Policies

Staple Crops, Cash Crops, Livestock/Dairy, etc.

## CSA Adoption by farmers

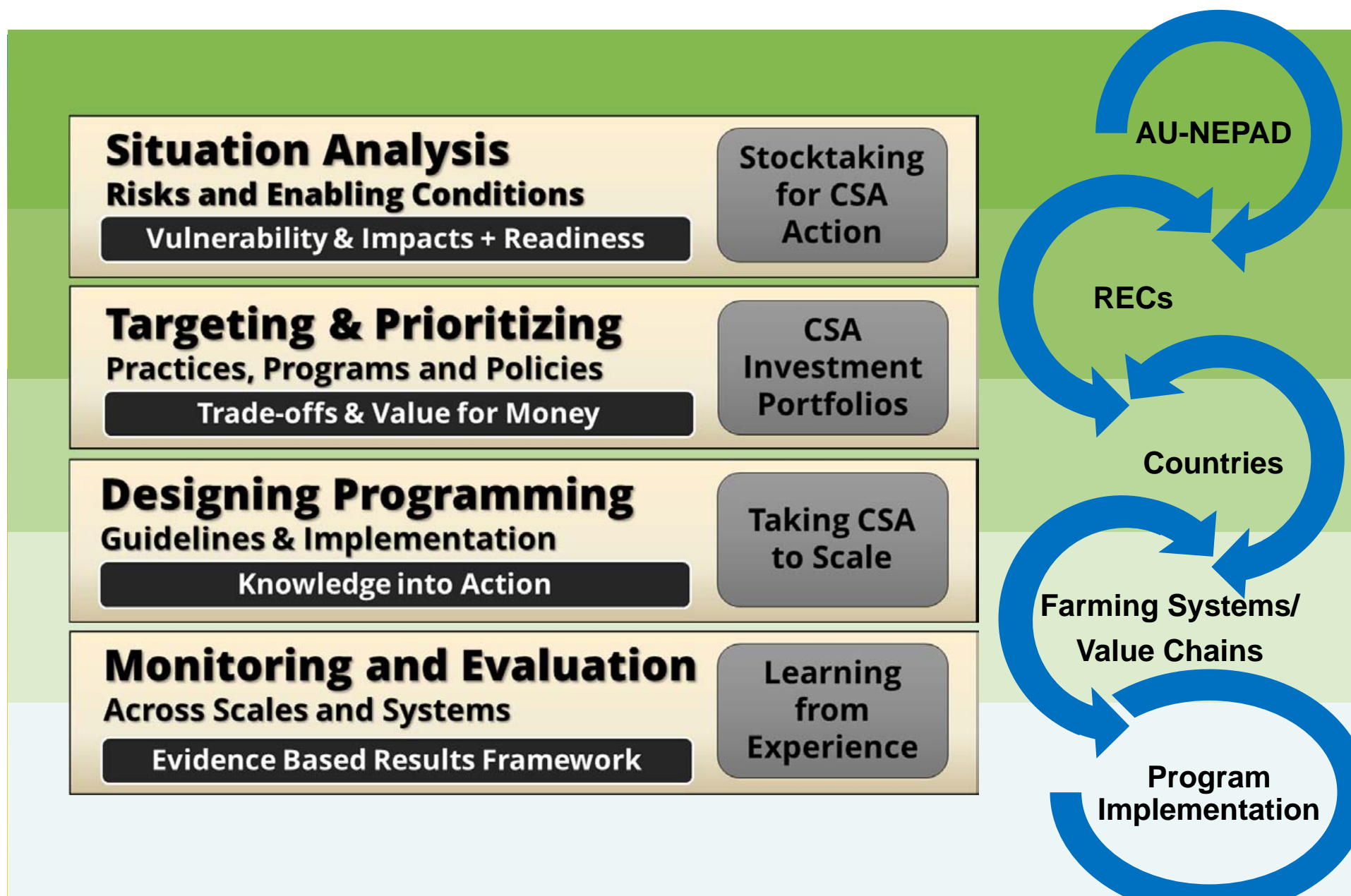
Through development partner implementation



# CSA Integration Across Scales in Africa



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# Current Engagements for Scaling CSA in Africa

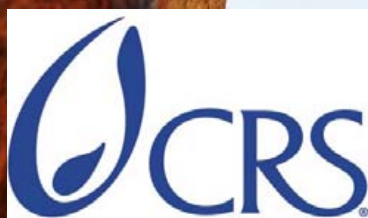
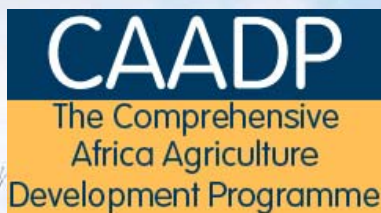
- 
- ACSAA
  - COMESA/CSAP
  - USAID/ECOWAS
  - World Bank
  - World Vision
  - PACCA

\*Stripes indicate overlap



# Alliance for CSA in Africa

Empowering 6 million  
smallholder farmers in  
Sub-Saharan African by 2021



# Thanks!

For more information check out our posters

Tuesday: 38, 42, 59

Wednesday: 59, 126



# Overarching Issues



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- Operational Minimum Criteria for being CSA
  - Modified within bounds by RECs & Countries
  - Indicators & criteria chosen at REC/County level
  - MRV or other similar approach
- Links directly to the engagement pathways, strategy, and country engagement plan
- Tools and analyses incorporated from Technical Support Workstream

# Conclusions

- Major investments in CSA coming
- Key challenge: What is CSA for a particular context
- Now testing a set of planning tools in multiple situations
- We can support CSA through deep engagement with non-research stakeholders