CLIMATE-SMART Agriculture 2015

Global Science Conference

March 16-18, 2015
Le Corum, Montpellier France

Development of Climate Resilient Villages

Alok Sikka, YG Prasad, Ch. Srinivasa Rao

Indian Council of Agricultural Research, New Delhi, India

Montpellier

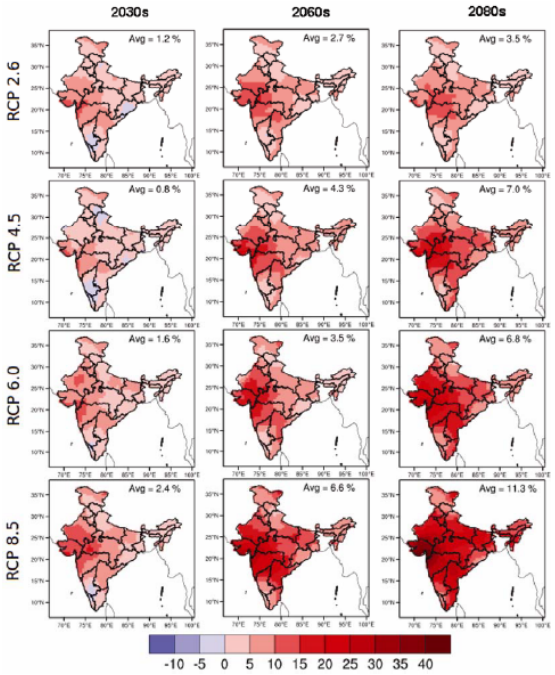
March 16-18, 2015

Climate Change Projections – India (CMIP5 model)

- Under business as usual scenarios (RCP6.0 & RCP8.5) projected increase in
  - Mean temperature in the range of
    - **1.7-2.0 C** by **2030**s &
    - **3.3-4.8 C** by **2080**s
  - Precipitation in the range of
    - **4-5%** by **2030**s &
    - **6-14%** by **2080**s
  - Positive trend in frequency of extreme precipitation days **(>40 mm/day)** for decades **2060** and beyond

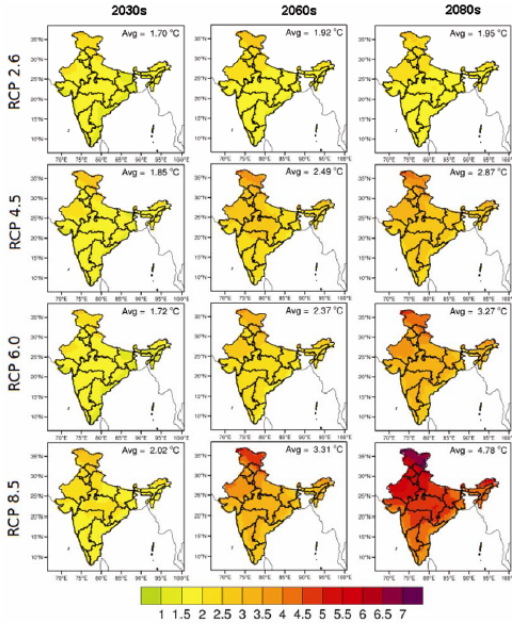
Mean Temperature Change (C)

Scenarios	2030s	2060	2080
RCP2.6	1.70	1.92	1.95
RCP4.5	1.85	2.49	2.87
RCP6.0	1.72	2.37	3.27
RCP8.5	2.02	3.31	4.78



Precipitation Change (%)

Scenarios	2030s	2060	2080
RCP2.6	1.2	2.7	3.5
RCP4.5	0.8	4.3	7.0
RCP6.0	1.6	3.5	6.8
RCP8.5	2.4	6.6	11.3



CLIMATE-SMART Agriculture 2015

Year	RF % departure (June-Sep)
2000	-8
2001	**-15**
2002	**-19**
2004	**-13**
2007	+5
2009	**-23**
2012	-8
2013	+6
2014	**-12**

Year	Event
2002	All India drought Severe cold wave (2002-03)
2004	Drought like situation High temperature anomaly in March
2005	High temperature in Jan
2006	Floods in arid Rajasthan & AP Drought in high rainfall NE India
2007	High temperatures in Jan-Feb
2009	All India drought
2010	Warmest year
2011	Failure of Sep rains in AP
2012	Drought in Punjab, Haryana, Gujarat, Karnataka, Cyclone & Floods in AP
2013	Drought in Bihar & Jharkhand, Floods in Uttarakhand, Phailin cyclone
2014	Floods in J&K, Cyclone Hudhud, widespread hailstorm in March

CLIMATE-SMART Agriculture 2015

Objectives

- To enhance **resilience of Indian agriculture** (including crops, livestock and fisheries) to climatic variability and climate change
- To **demonstrate site specific technology** packages on farmers' fields to cope with current climatic variability
- To enhance the **capacity of scientists, farmers** and other stakeholders in climate resilient agricultural research and awareness of impacts

Project Components

- Strategic Research
- Technology Demonstrations
- Capacity Building
- Sponsored / Competitive research grants

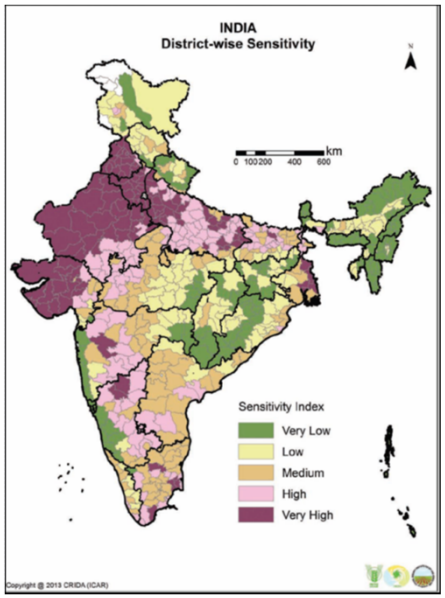
PROGRAM AREAS

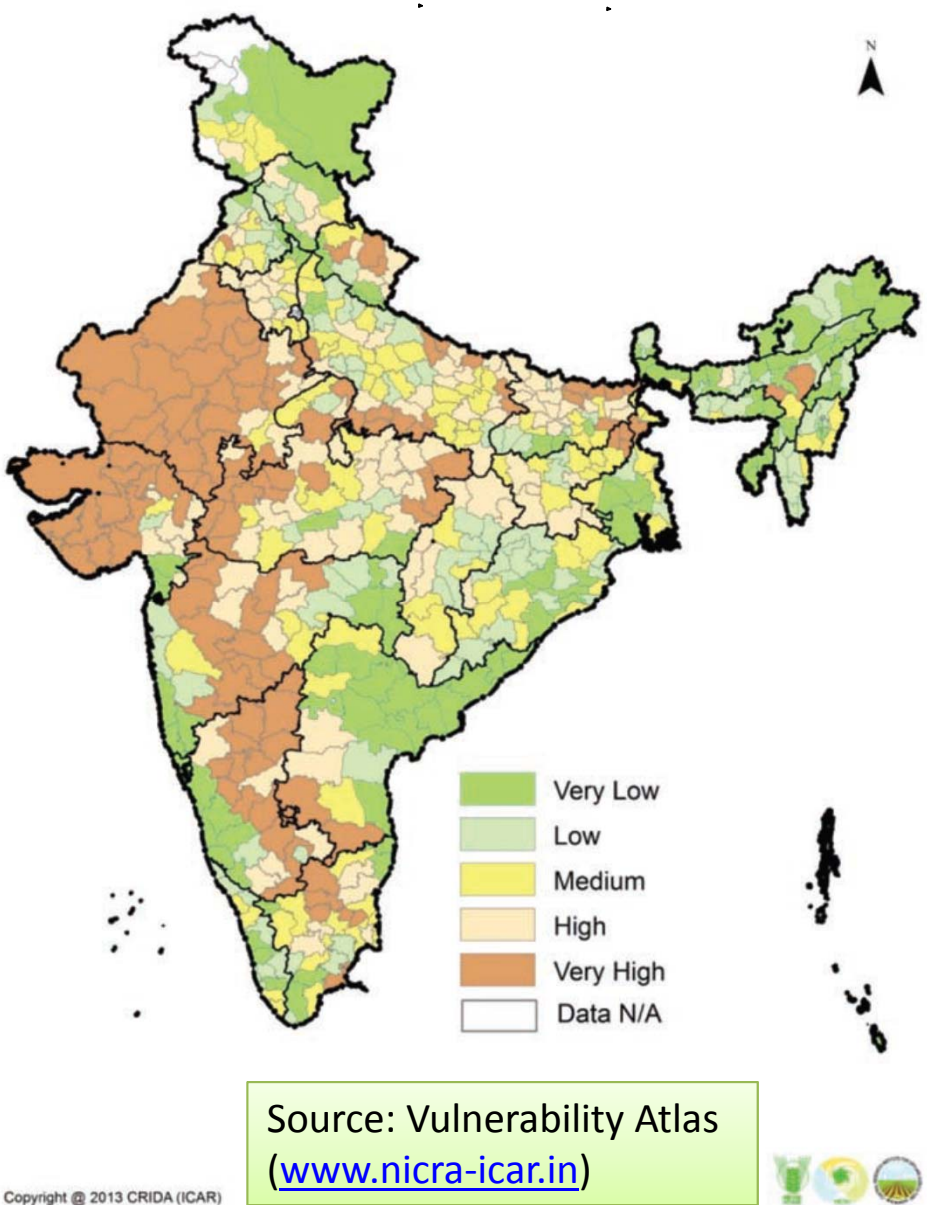
- Rainfed crop production systems
- Irrigated crop production systems
- Horticultural production systems
- Soil, water and nutrient management
- Monitoring of GHGs
- Resource use efficiency in agriculture
- Improved machinery for adaptation and mitigation
- Livestock and Dairy sector
- Fisheries including Aquaculture

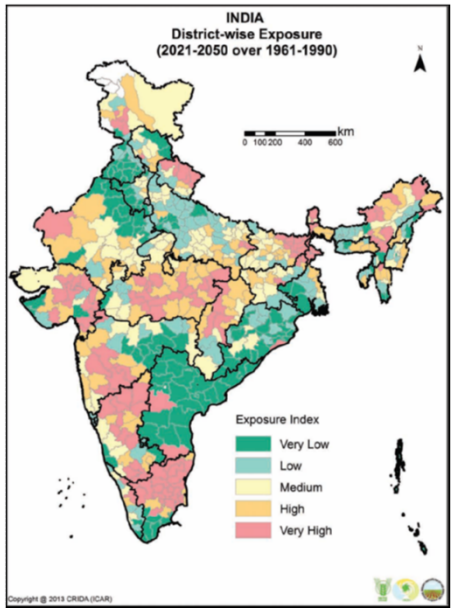
CLIMATE-SMART Agriculture 2015

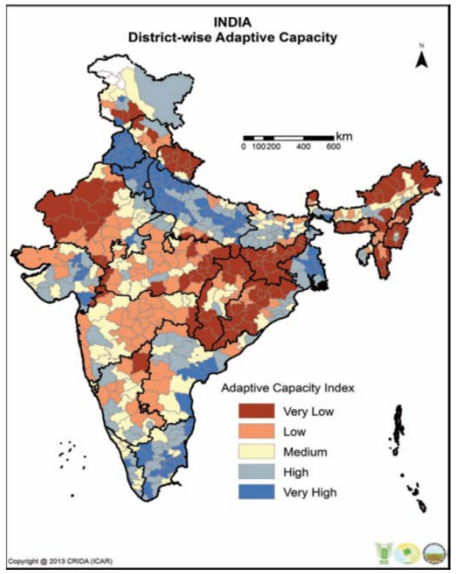
Strategic Research product

ulnerability of ndian griculture to limate hange –



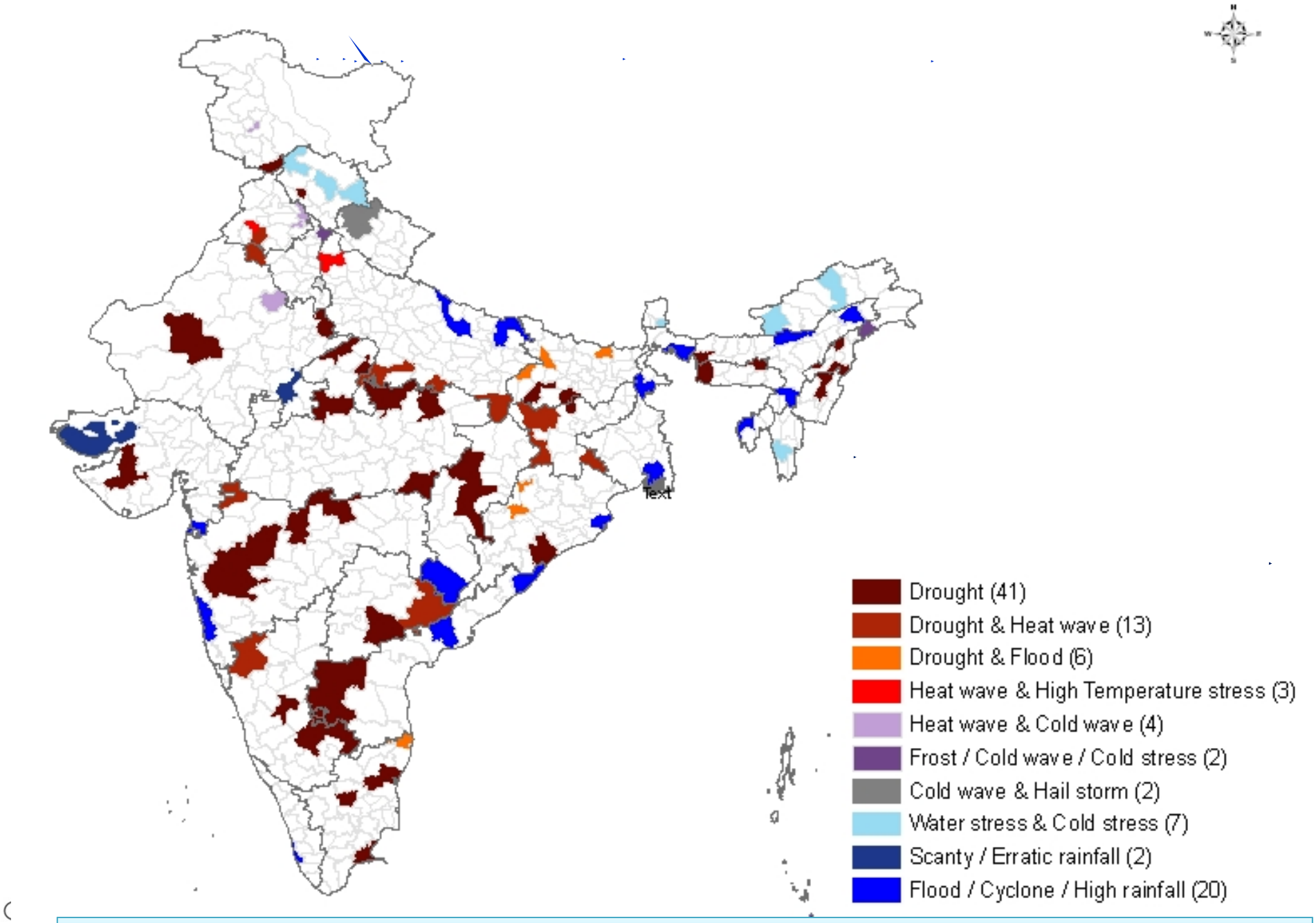






CLIMATE-SMART Agriculture 2015

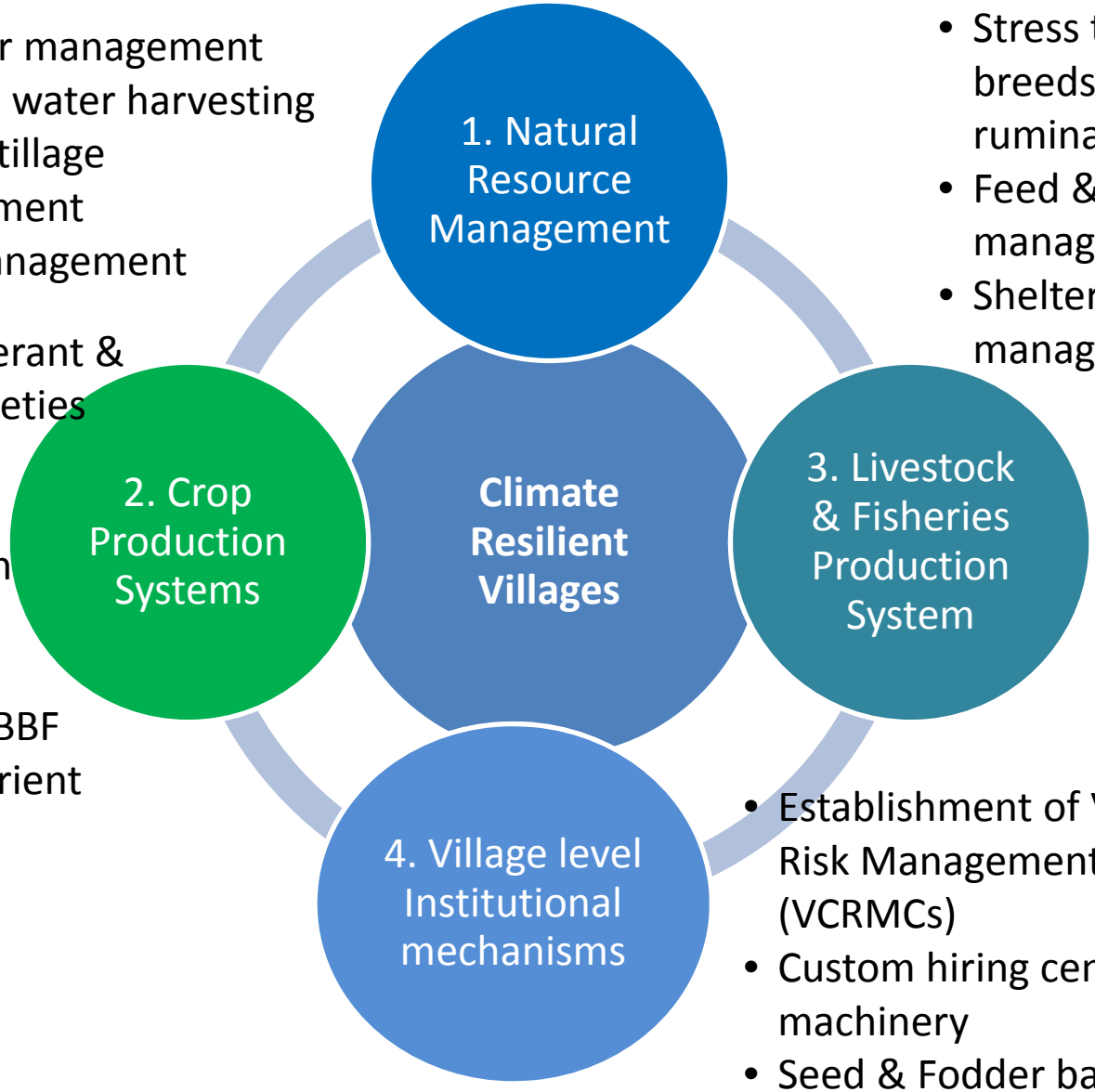
Source: Vulnerability Atlas (www.nicra-icar.in)



+ 23 AICRPDA sites, 7 sites of core institutes + 31 new sites in XII plan = a total of 161 sites

- On-farm water management including rain water harvesting
- Conservation tillage
- Land management
- Soil health management

- Stress tolerant breeds eg., small ruminants
- Feed & Fodder management
- Shelter & Health management



- Multiple stress tolerant & short duration varieties
- Resilient crops & cropping systems
- Crop diversification
- Adjustments in planting tim
- Planting methods BBF
- Soil test based nutrient management

- Establishment of Village Climate Risk Management Committees (VCRMCs)
- Custom hiring centres for farm machinery
- Seed & Fodder banks

CLIMATE-SMART Agriculture 2015

Check dams

(Farmer contribution @ $ 16/farmer)

Recharging of wells

Efficient use thru' drip irrigation (thro'convergence)

In-situ measures Farm bunding with pucca waste weir, 41 farmers, 82 ha, convergence with **DWDU**

NRM interventions

Border plantation (Agroforestry)

Vulnerability:

- Scanty & erratic rainfall (360mm, 13-15 rainy days)
- Depletion of groundwater
- Cyclonic storm events
- Soil erosion

CLIMATE-SMART Agriculture 2015

Cotton (drip irrigation), 20 farmers, 31 ha

Cluster bean (GG-2), 100 demos, 40 ha, 26% productivity increase (17.5 vs 13.8 q/ha)

Cumin (GC-4), 170 demos, 68 ha, 32% increase, 9.5 vs 7.2 q/ha)

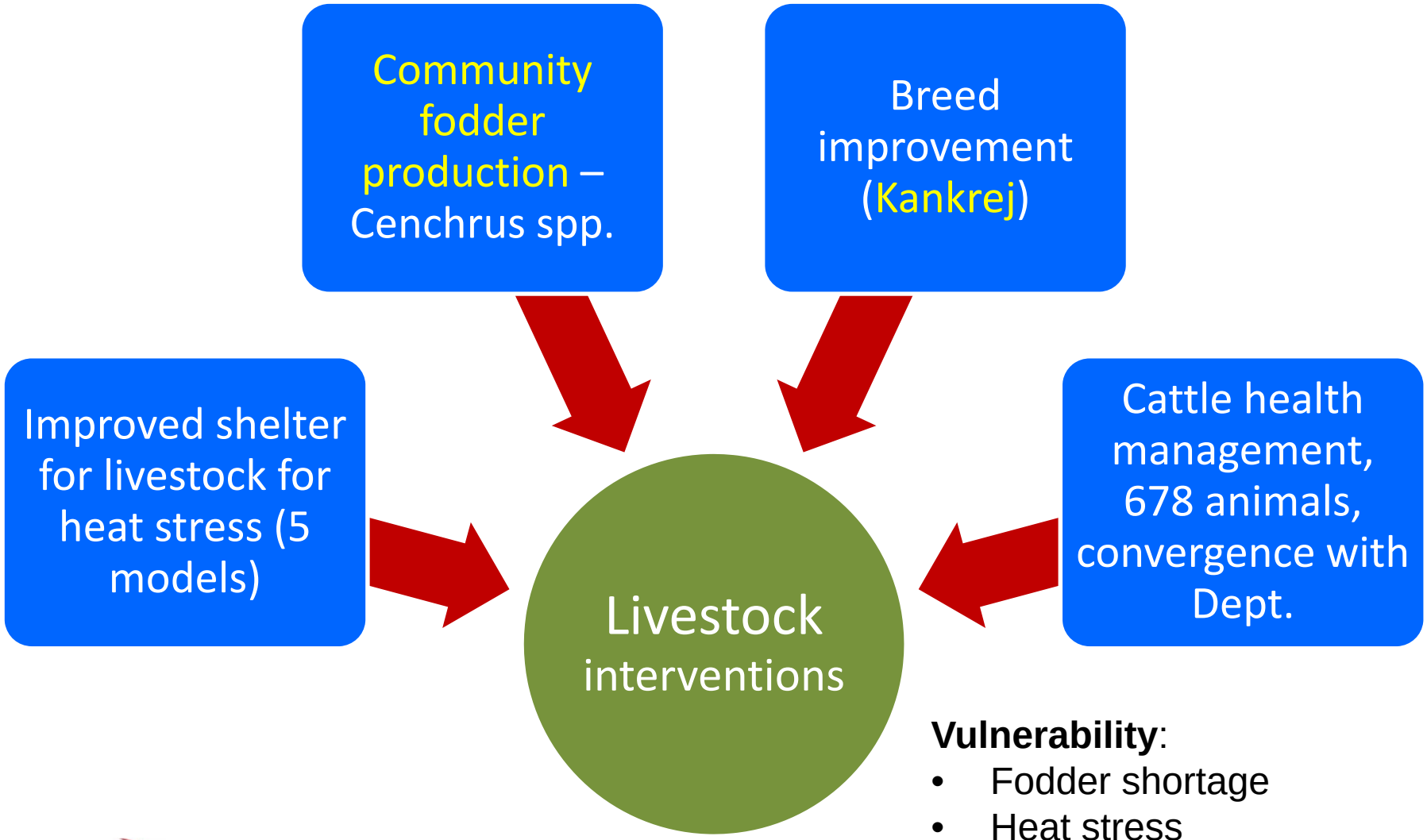
Castor (GCH-7), 15 demos, 6 ha, 16% productivity increase (40 q vs 36.6 q/ha)

Crop Interventions

Vulnerability:

- Rainfall variability
- Limited water for irrigation
- Shortened season

CLIMATE-SMART Agriculture 2015



Vulnerability:

- Fodder shortage
- Heat stress

CLIMATE-SMART Agriculture 2015

Seed bank

Fodder sorghum (Gundri) (860 kg), Lucerne (620 kg)

Community fodder bank, 380 animals, 142 livestock owners

Custom hiring centre for farm machinery

VCRMC

Participatory decision making & mobilizing share

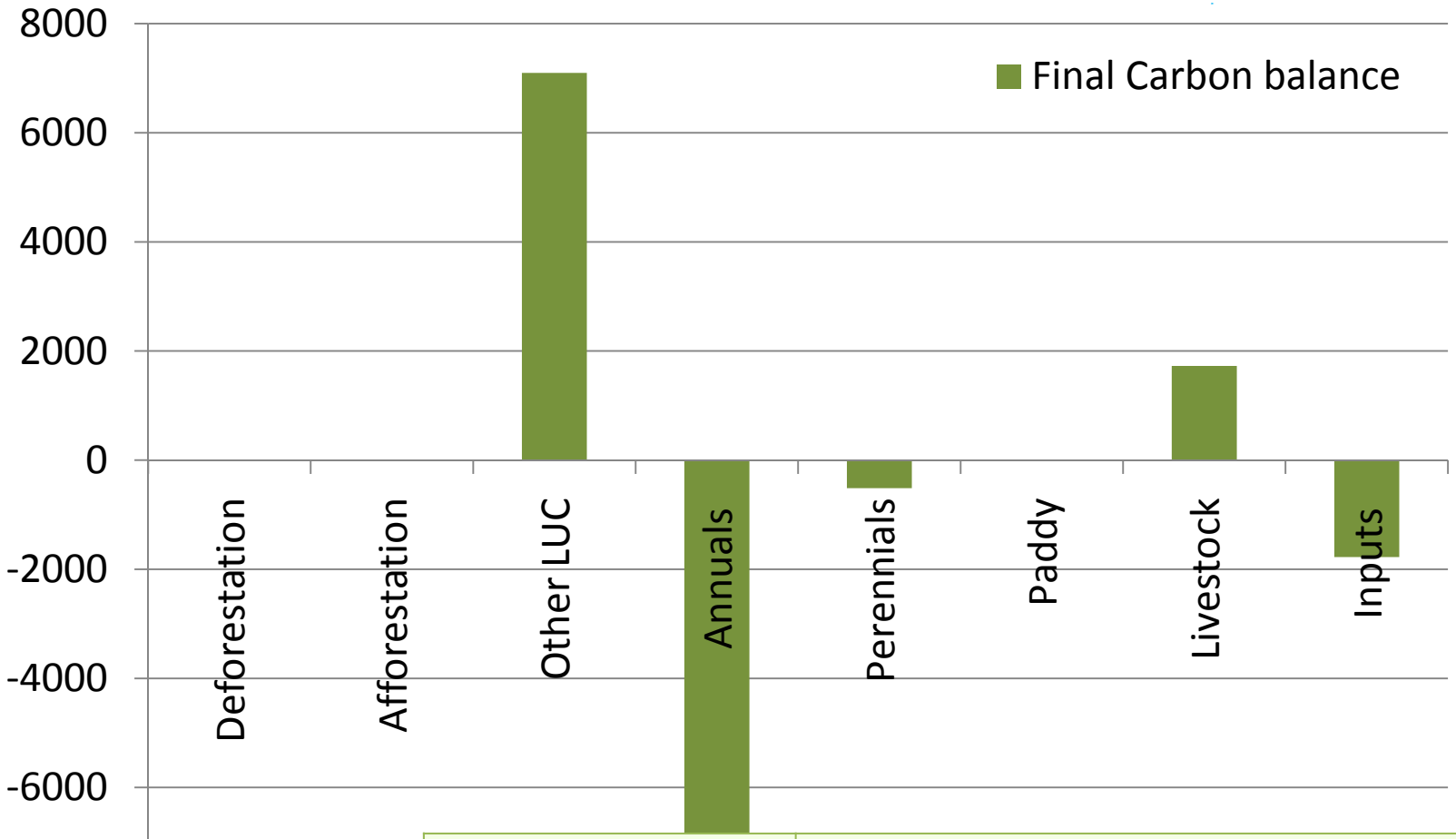
Bank deposit

$ 5000

Vulnerability:

- Seed & fodder shortages
- Poor access to farm machinery

CLIMATE-SMART Agriculture 2015



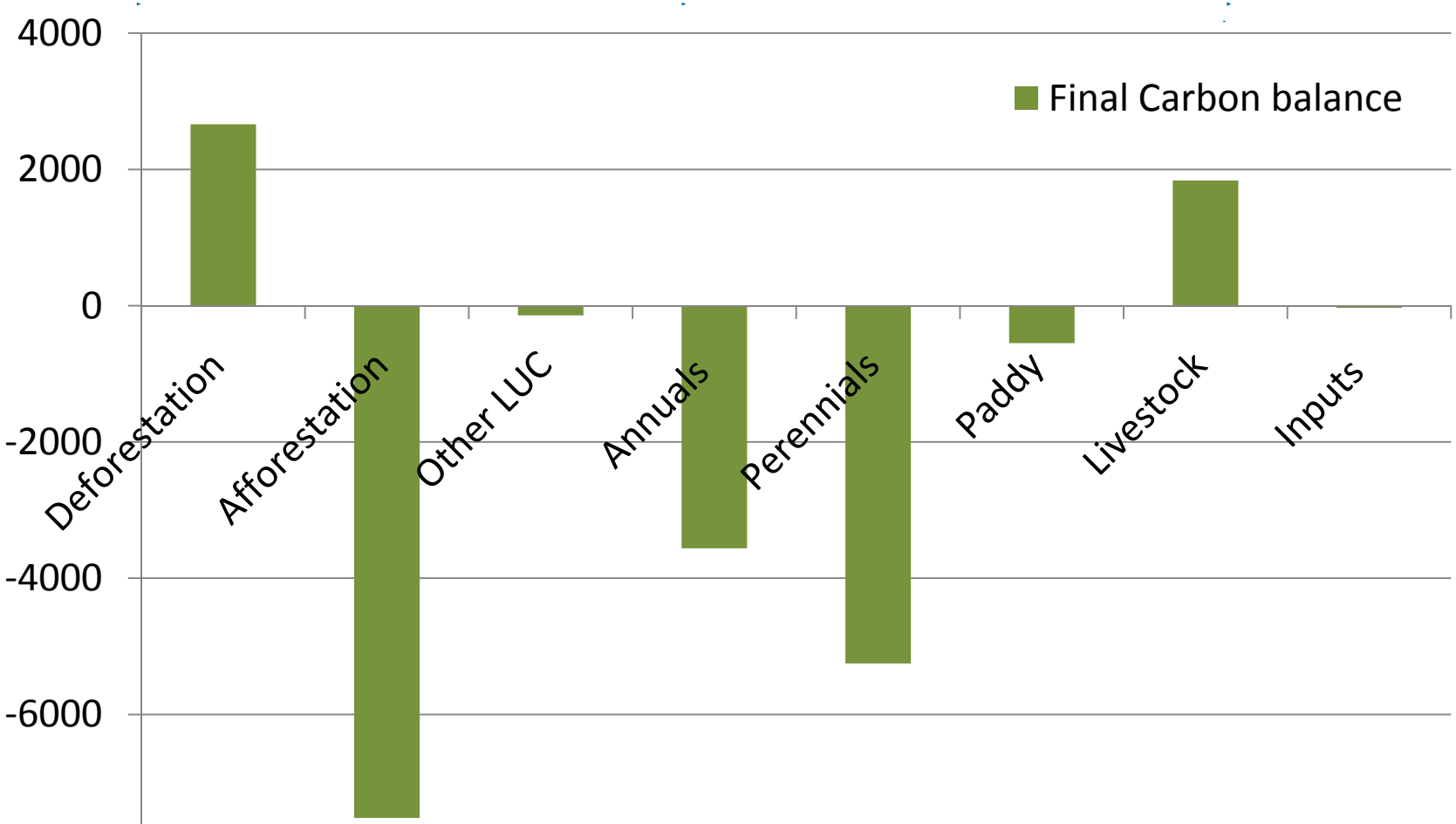
	Gross fluxes All GHGs in tCO2 eq.		
	Without	With project	Balance
Total	23,902	21,773	-2,128
Per hectare	20	18	-2
Per hectare per year	1.0	0.9	-0.1

CLIMATE-SMART Agriculture 2015

Local Ragi ML365

- Interventions in four modules (NRM, Crops, Livestock and Institutional)
- Investment @ US $ 25K/year over 3 years generated additional wealth and environmental services valued at $ 115K
- Enabled farmers to cope with severe drought of 2012-13 where the loss was restricted to 30% as against 70% in neighboring villages

CLIMATE-SMART Agriculture 2015



Tumkur village	Gross fluxes: All GHGs in tCO2 eq.		
	Without	With project	Balance
Total	8,960	-3,590	**-12,549**
Per hectare	30	-12	-41
Per hectare per year	1.5	-0.6	-2.1

CLIMATE-SMART Agriculture 2015





CLIMATE-SMART Agriculture 2015

Village Climate Risk Management, Custom hiring centres, Capacity building of stakeholders, Cross learning visits

www.aicrpam-nicra-aws.in

- AWS network established at 100 sites across the country
- Pilot agro-met advisory services implemented based on short to medium range weather forecasts at sub-district (block level) in partnership with IMD
- Pilot advisory services using mobile applications (SMS & Voice in local languages) through ICT delivery platforms developed
- Agro-advisories by KVKs (Farm Science Centres) through Farmers Portal of Government of India

CLIMATE-SMART Agriculture 2015

Mainstreaming of resilient interventions through National Mission on Sustainable Agriculture

CCAFS-ICAR collaborative project including developing a framework for climate smart villages

CLIMATE-SMART Agriculture 2015

- ✓ Integrated farming system approach to adaptation in NICRA villages including technological interventions, management practices, institutional and policy interventions has shown promising results
- ✓ Case studies demonstrated evidence of productivity and income enhancement, resilience and adaptation with mitigation co-benefits
- ✓ Mainstreaming of these smart practices in NMSA has begun with a Policy Dialogue with the Ministry of Agriculture for its out scaling
- ✓ Initiative taken for follow-up of Technology Demonstrations in cluster villages

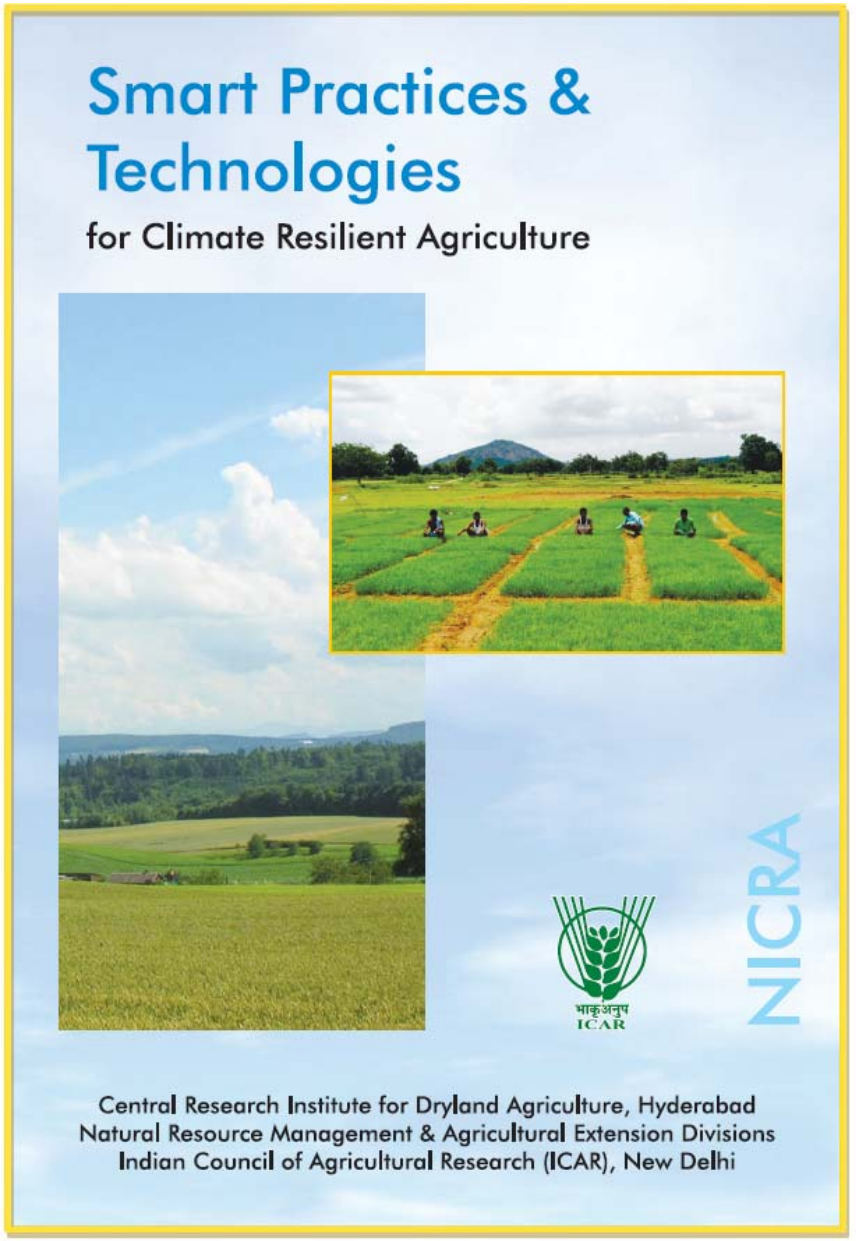
CLIMATE-SMART Agriculture 2015

- ✓ Mapping area and farming system specific climate smart practices / products
- ✓ Develop framework and metrics for CSA
- ✓ Integrated modelling framework to develop local area plans and out scaling
- ✓ Simple Decision Support tools for prioritisation of climate smart practices for investment planning
- ✓ Institutional mechanisms and convergence

CLIMATE-SMART Agriculture 2015

Thank you

http://nicra-icar.in



CLIMATE-SMART Agriculture 2015