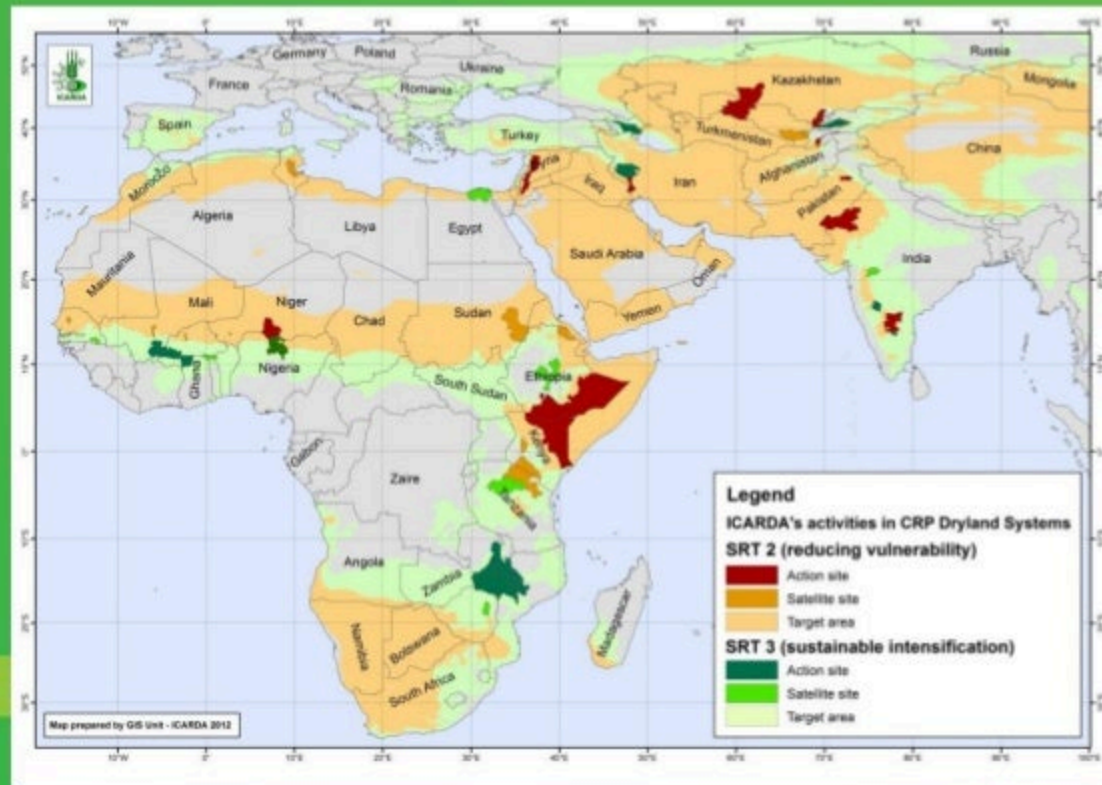


Dryland Systems

Integrated Production Systems for Improving Food Security and Livelihoods in Dry Areas



RESEARCH
PROGRAM ON
Dryland Systems

STRATEGIC AND RESULTS FRAMEWORK

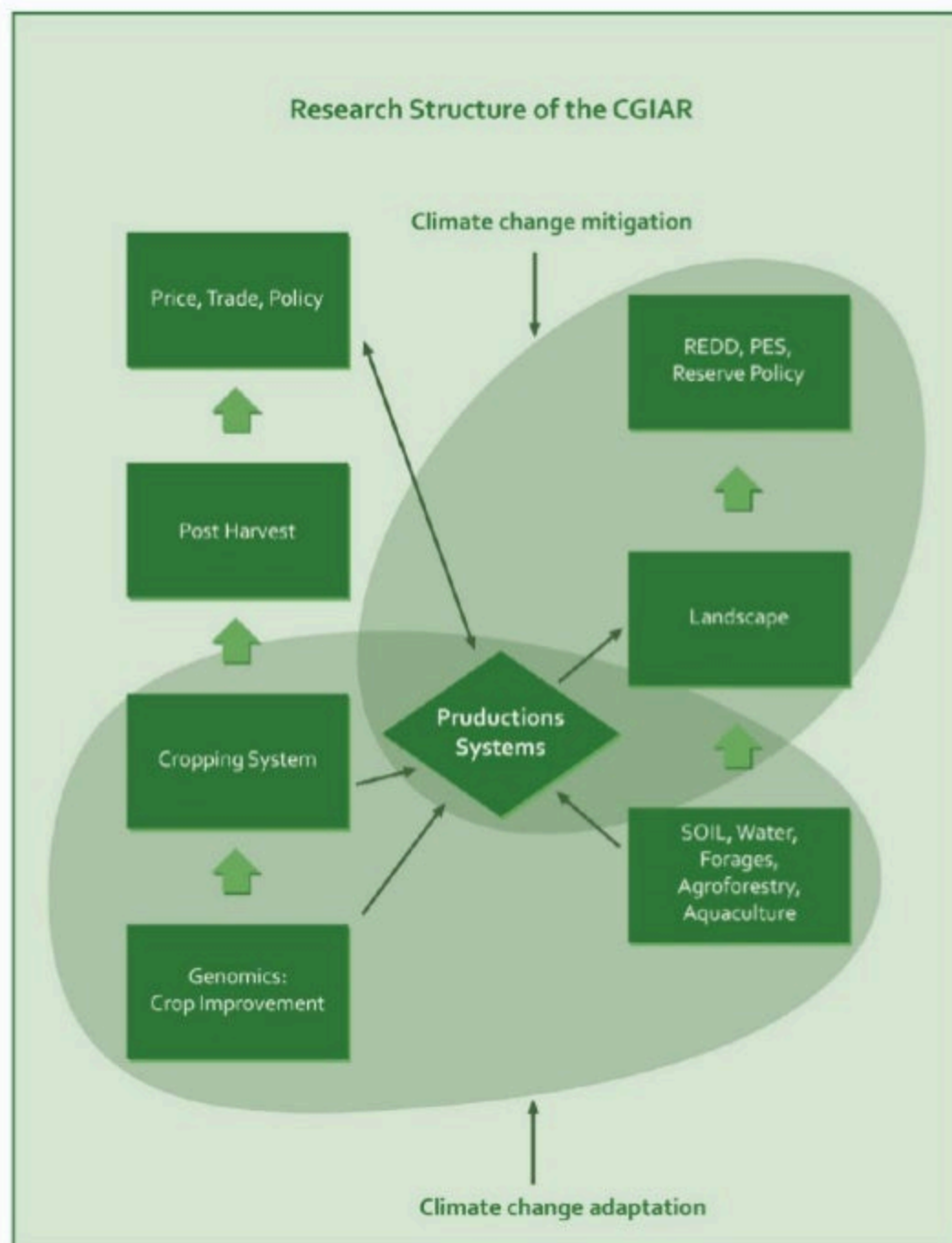
The SRF (CGIAR 2011) advocates **three additional areas of core competency** to accomplish impact on the four strategic

One is Development of core competency in the area of production systems

This will test the ability of the system to undertake inter-center research.

Systems research will integrate commodity, natural resource management and policy research to improve productivity and livelihoods in a sustainable manner **at the national and regional level**

Figure 3.2: Integration of New Core Competencies into the Existing



Drylands Systems

- Dryland Systems targets the poor and highly vulnerable populations of dry areas and the agricultural systems on which they depend
- Dryland Systems was developed from SRF Thematic Area 1, “Integrated Agricultural Systems for the Poor and Vulnerable.”
- Such systems are characterized by major constraints, such as drought or other agroclimatic challenges, poor infrastructure and underdeveloped markets, or weak institutions and governance.

Prominent Features of Drylands

- **Cover 41% of the earth's surface**
- **Home to over 2.5 billion people – and the majority of the world's poor.**
- **About 16% of the population lives in chronic poverty**
- **Age distribution skewed towards youth**
- **Urbanization, unemployment, rising food prices, political unrest**
- **93% of malnourished live in dry areas**



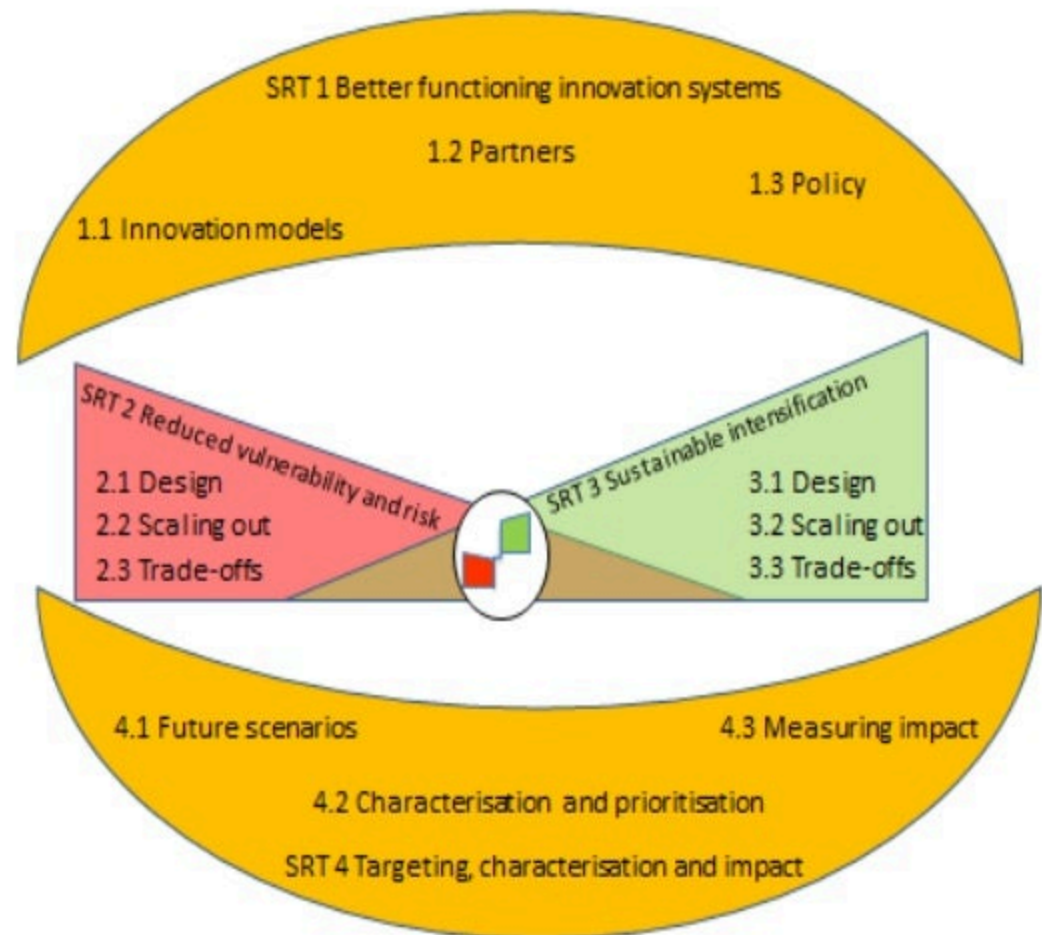
CGIAR System Level Outcomes

- Reduced rural poverty;
- Improved food security;
- Better nutrition and health; and
- Sustainable management of natural resources.

Conceptual Research Framework

SRT2: Reducing vulnerability and managing risk

SRT3: Sustainable intensification for more productive, profitable and diversified dryland agriculture with well-established linkages to markets

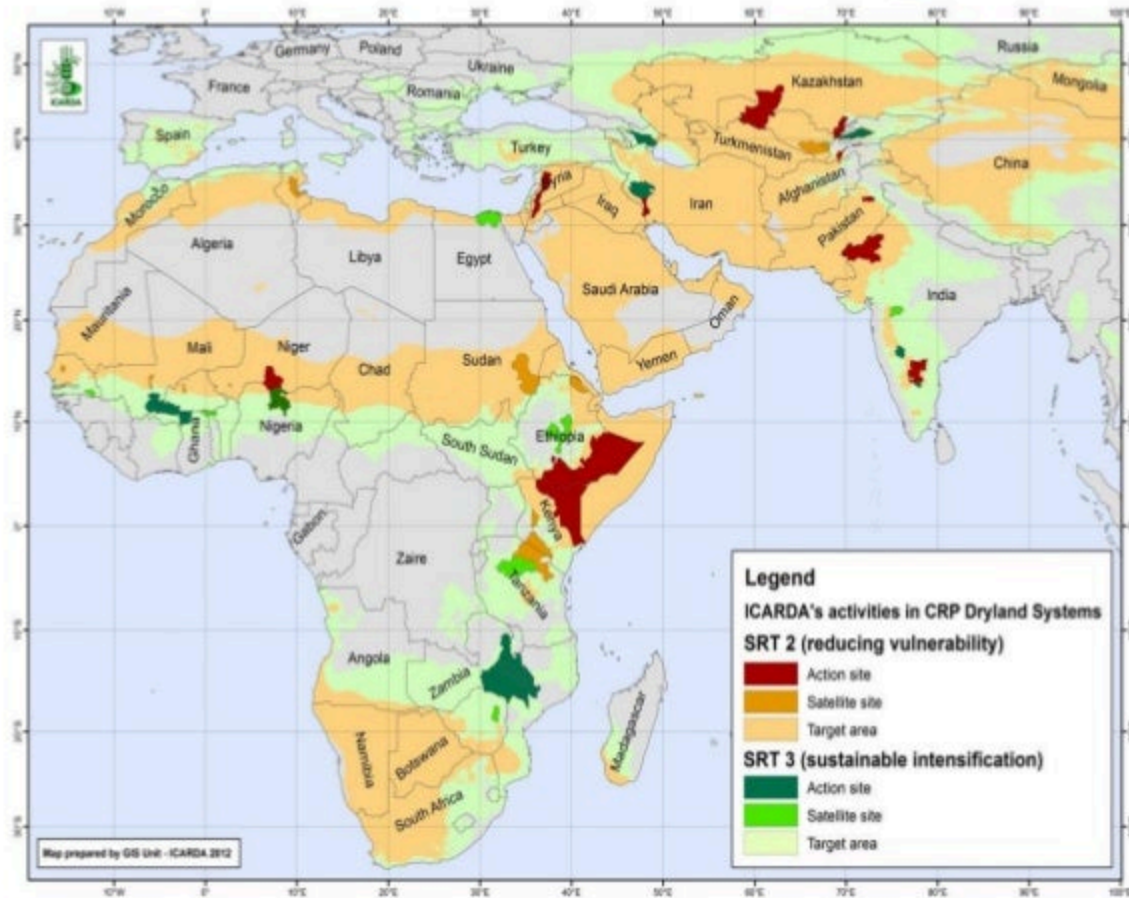


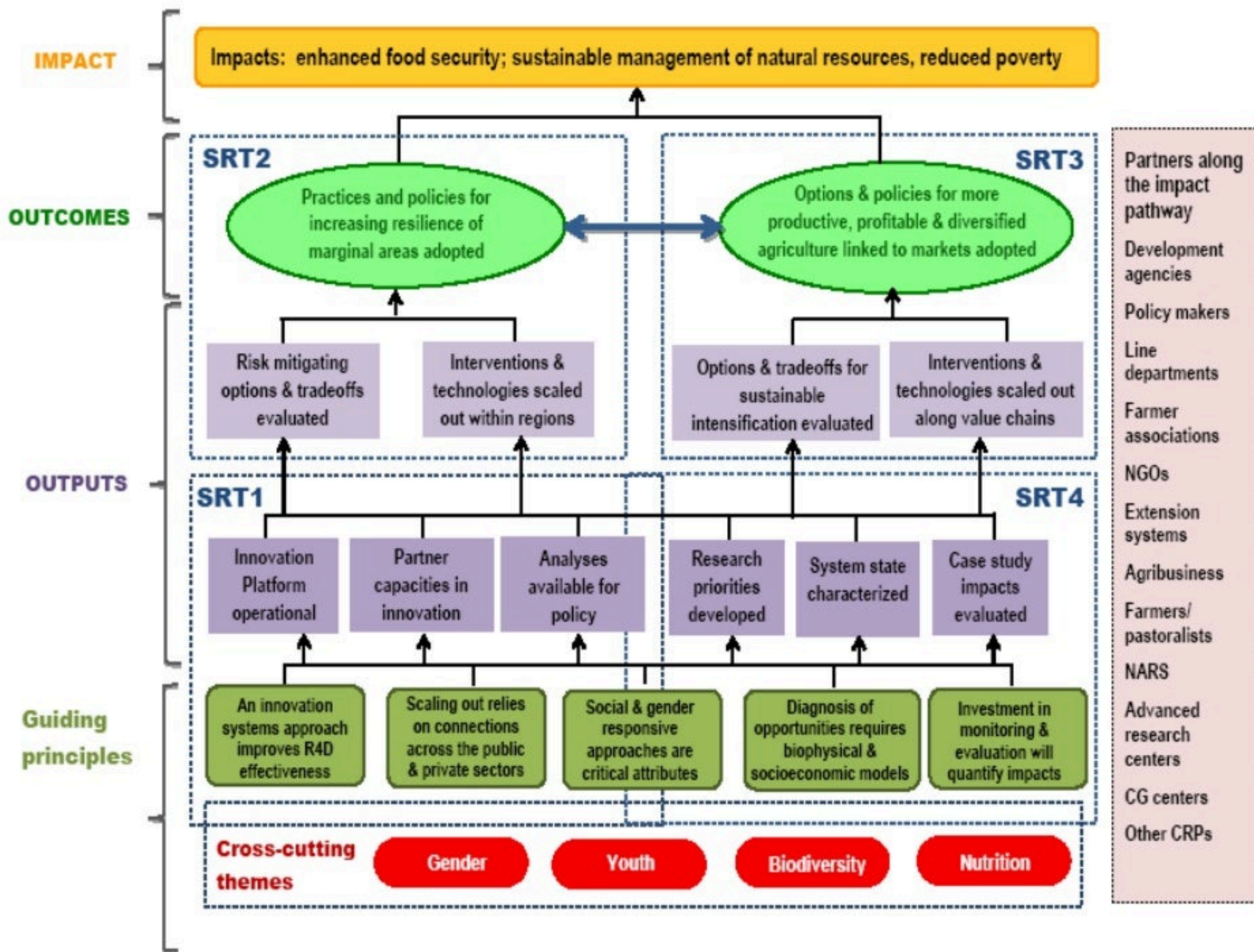
Cross-Cutting Themes

- **Gender**
- **Youth**
- **Biodiversity**
- **Capacity building**

Partnership in Dryland Systems

- Part of conceptual framework Consultative selection of Action Sites
- Groundwork in 5 regions to characterize Target Areas
- Prioritize research in Regional Inception Workshops
- Partnership in governance
- Need to outscale





Inception Phase

- **Groundwork for baseline characterization**
- **Workshops to set Research Priorities**

Common Ground

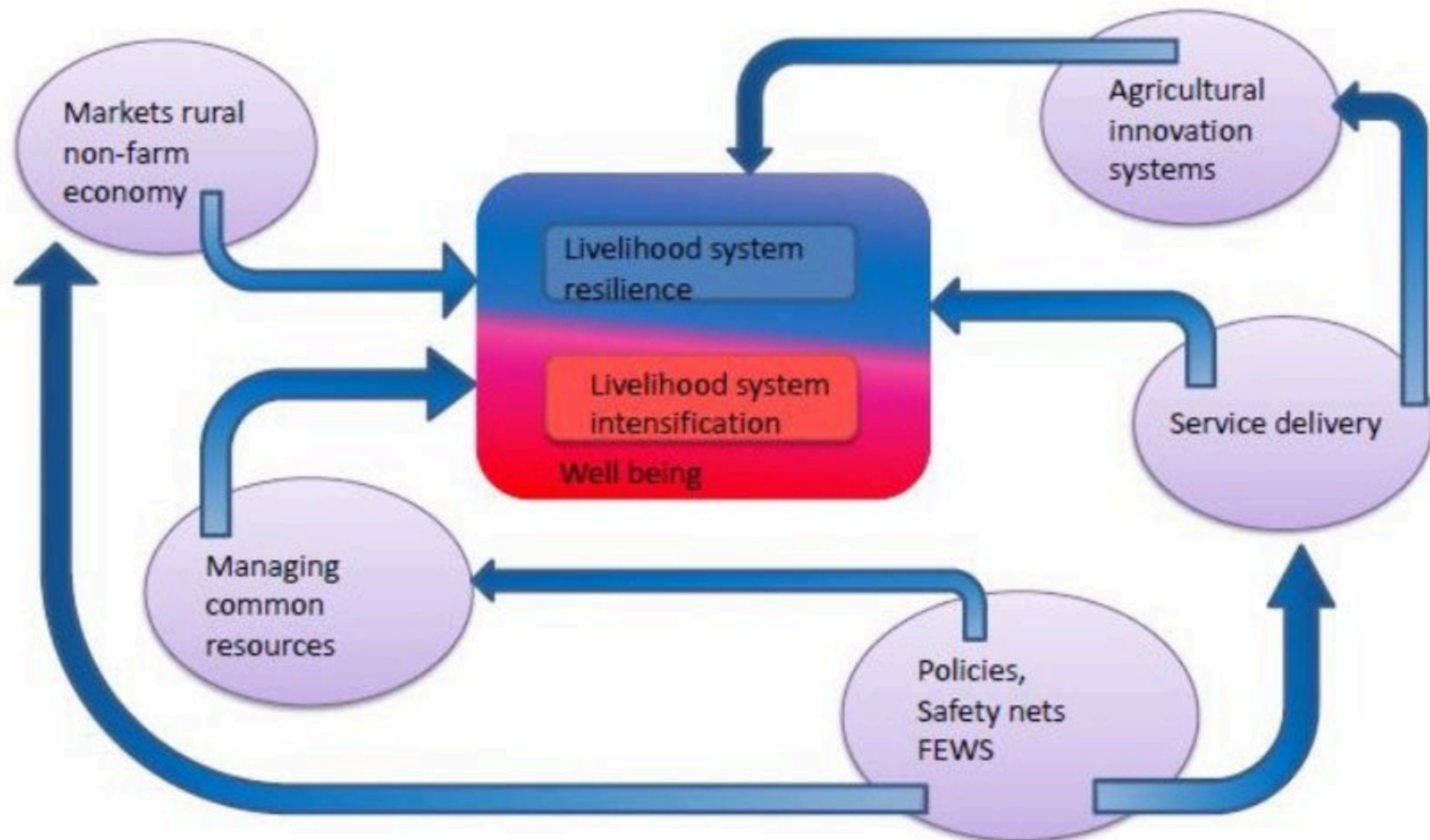
- 1) 21 Constraints
- 2) 20 Outputs
- 3) 16 Hypotheses
- 4) **20 Outcomes**



THEORY of CHANGE

Key elements of the agricultural system interact to improve human welfare and management of natural resources

Elements of a theory of change



Drivers: short term (shocks, migration): medium term (population, climate variability)

Intermediate Development Outcomes

The first 4 target direct impact on wellbeing and sustaining natural resource base:

1. More resilient livelihoods for vulnerable households in marginal areas.
2. More stable and higher per capita income for intensifiable households.
3. Women and children in vulnerable households have year round access to greater quantity and diversity of food sources.
4. More sustainable and equitable management of land and water resources in pastoral and agropastoral.

The rest relate to requirements for the first 4 to be realized:

5. Better functioning markets underpinning intensification of rural livelihoods.
6. More integrated, effective and connected service delivery institutions underpinning resilience and system intensification.
7. Policy reform removing constraints and creating incentives for rural households to engage in more sustainable practices that improve resilience and intensify production.

IDO	Abbreviated Label	System Level Outcomes				Cross-Cutting Themes			
		Rural Poverty	Food Security	Nutrition Health	Sustainable NRM	Gender	Youth	Bio-diversity	Capacity Building
<i>More resilient livelihoods for vulnerable households in marginal areas.</i>	RESILIENCE								
<i>More stable and higher per capita income for intensifiable households.</i>	INTENSIFICATION								
<i>Women and children in vulnerable households have year round access to greater quantity and diversity of</i>	NUTRITION for Vulnerable								
<i>More sustainable and equitable management of land and water resources in pastoral and agro-pastoral</i>	Sustainable NRM Management								
<i>Better functioning markets underpinning intensification of rural livelihoods.</i>	Markets								
<i>integrated, effective and connected service delivery institutions underpinning resilience and sustain</i>	Delivery Institutions								
<i>Policy reform removing constraints and creating incentives for rural</i>	Policy								

CRP IDO Abbreviated Label	System Level IDO's										
	Income	Food Security	Consumption	Productivity	Control of Assets	Capacity to Innovate	Capacity to Adapt	Greater Resilience	Policies	Environment	Carbon Sequestration
RESILIENCE											
INTENSIFICATION											
NUTRITION for Vulnerable											
Sustainable NRM Management											
Markets											
Delivery Institutions											
Policy											

Impacts from IDOs

1. More resilient livelihoods for vulnerable households in marginal areas.
2. More stable and higher per capita income for intensifiable households (those above an asset threshold that makes intensification a viable option).
3. Women and children in vulnerable households have year round access to greater quantity and diversity of food sources
4. More sustainable and equitable management of land and water resources in pastoral and agropastoral areas
5. Better functioning markets underpinning intensification of rural livelihoods
6. More integrated, effective and connected service delivery institutions underpinning resilience and system intensification
7. Policy reform removing constraints and incentivising rural households to engage in more sustainable practices that intensify and improve resilience and intensify production

Impact

More resilient livelihoods for vulnerable households in marginal areas

Outcome

NARES use tools, methods and processes to generate and customise improved resilience options for targeted groups of vulnerable households

Outputs

- **Improved resilience options** (components, interactions and their management; explicit consideration of buffer functions, managing trade-offs between production and risk; nested scale risk mitigation, including incentives to adopt them)
- Tools, methods, processes and **capacity of NARES to create and customise improved resilience options** to local circumstances across scaling domains

Indicators

Resilience index: contextualised multiscale assessment of resilience building strategies at household and community levels (see Marschke, and Berkes. 2006)

Use of outputs: number and size of organisations using them and their areal and population domains; proportion of sector in targeted areas this represents

Customised options: number of options and number of hh targeted

Impact

More stable and higher per capita income for intensifiable households

Outcome

NARES¹ use tools, methods and processes to generate and customise improved intensification options for targeted groups of intensifiable households

Outputs

- **Improved intensification options** (components, interactions and their management; information on investment costs, returns and risk; risk mitigation)
- Tools, methods, processes and **capacity of NARES¹ to create and customise improved intensification options** to local circumstances across scaling domains

Indicators

Increase: i) absolute increase, ii) % increase, iii) % of hh above poverty threshold

Stability: iv) variance in per capita annual income (nine year rolling); v) trend in iii

Use of outputs: number and size of organisations using them and their areal and population domains; proportion of sector in targeted areas this represents

Customised options: number of options and number of hh targeted

Impact

Women and children in vulnerable households have year round access to greater quantity and diversity of food sources

Outcome

NARES and health sector organisations work together and adopt diagnostic and systematic research approaches to promoting and developing interventions to improve vulnerable women and children's access to, and control of, more and more diverse food sources, throughout the year

Outputs

- Diagnosis and identification of constraints and opportunities of local food systems leading to **improved year round access to food and diversified diets**
- Systematic research on interventions to address identified constraints and opportunities, leading to a **matrix of tested interventions and delivery strategies associated with the contexts in which they work**

Indicators

Dietary diversity: i)time concentration index of number of food groups and individual foods consumed by women and children in sample hh ii)proportion of women and children above threshold dietary diversity in target communities.

Integration: network strength amongst agricultural and health workers and organisations

Adoption: number and size of organisations, their areal and population domains; proportion of sector in targeted areas this represents

Interventions: number of interventions and number of hh they target

Impact

More sustainable and equitable management of land and water resources in pastoral and agropastoral areas

Outcome

Multiple stakeholders (gender, age) in pastoral / agropastoral areas , use evidence-based ecosystem management, at community level in the governance of **common and privately managed land and water resources**

Outputs

- Technologies, tools, methods, processes and approaches developed and tested for **evidence-based ecosystem management**
- Focus on **negotiation support (amongst stakeholders)** and **governance** models

Indicators

Area: i)ha and proportion of target area under governance arrangements meeting equity standards set *a priori*

People: ii)gender-disaggregated number of people and proportion of target population encompassed by land area in i)

Use of outputs: number and size of communities adopting evidence based governance models developed by DS

Effect: trends in NVDI over time for areas under and outside new governance models

Impact

Better functioning markets underpin intensification of rural livelihoods

Outcome

Farmers and pastoralists (especially women) have better access to more diverse, efficient and equitable markets

Outputs

- Modes of operation to **lower transaction costs** through development of assembly points and market hubs
- More **innovative partnership models** involving entrepreneurs, marketing commissions, traders and warrantage (inventory credit systems)
- Improved **market information systems**

Indicators

Efficiency: trend in average transaction cost for key marketed products

Equity: proportion of product value accruing to rural households

Access: Gender disaggregated numbers of people and proportions of target population with access to better functioning markets

Impact

More integrated, effective and connected service delivery institutions underpinning system intensification and resilience

Outcome

Service providers adopt innovations to improve their effectiveness, integration and reach

Outputs

- **Improved and innovative extension methods** better targeted to message and context and tools to assist in selection of appropriate methods
- **Improved models for interaction amongst service providers** to enable integration of service provision amongst sectors
- **Innovative public-private partnership models** for service delivery

Indicators

Reach: gender disaggregated numbers and proportions of people and rural households accessing services

Uptake: Number and proportion of service provider using models and methods developed by Dryland Systems



Impact

Removal of constraints and incentives lead to rural households engaging in more sustainable practices that increase resilience and intensify production

Outcome

Policy makers reform and institutions implement policies that remove constraints to, and improve incentives for, rational management of natural resources

Outputs

- **Analysis of policy and institutional barriers** to adoption of sustainable intensification options
- **Ex-ante analysis** and other quantified impact of effectiveness of **policy alternatives**
- **Policy briefs** providing evidence targeting key fora for policy change

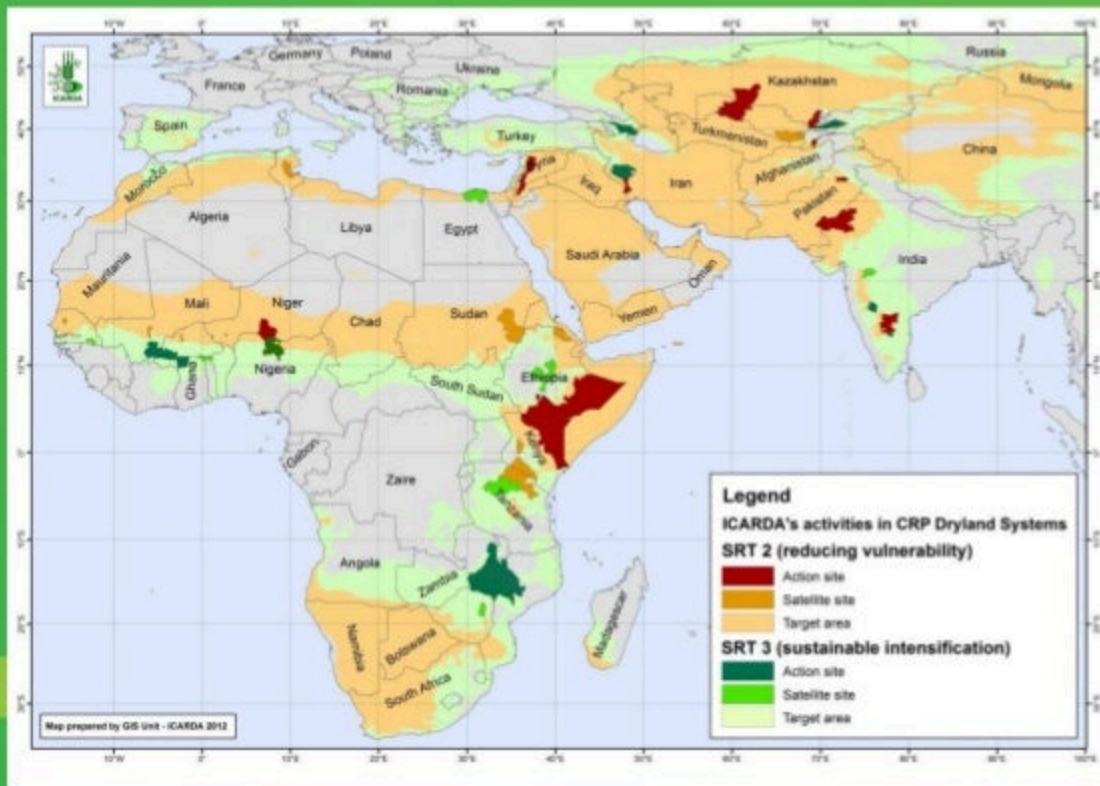
Indicators

Effect: numbers and proportions (within target areas) of rural households adopting more sustainable practices

Policy: documented change in policies and the number and proportions of people and area potentially affected

Implementation: assessment of policy implementation

Regions: «Flagships» and Partners



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The global research partnership to improve agricultural productivity and income in the world's dry areas

West Africa & Dry Savannas

- ❖ SRT2: the KKM (Kano-Katsina-Maradi) action transect
- ❖ SRT3: the WBS (Wa-Bobo-Sikasso) action transect

Regional:

FARA,

CORAF CILSS

Burkina Faso:

INERA

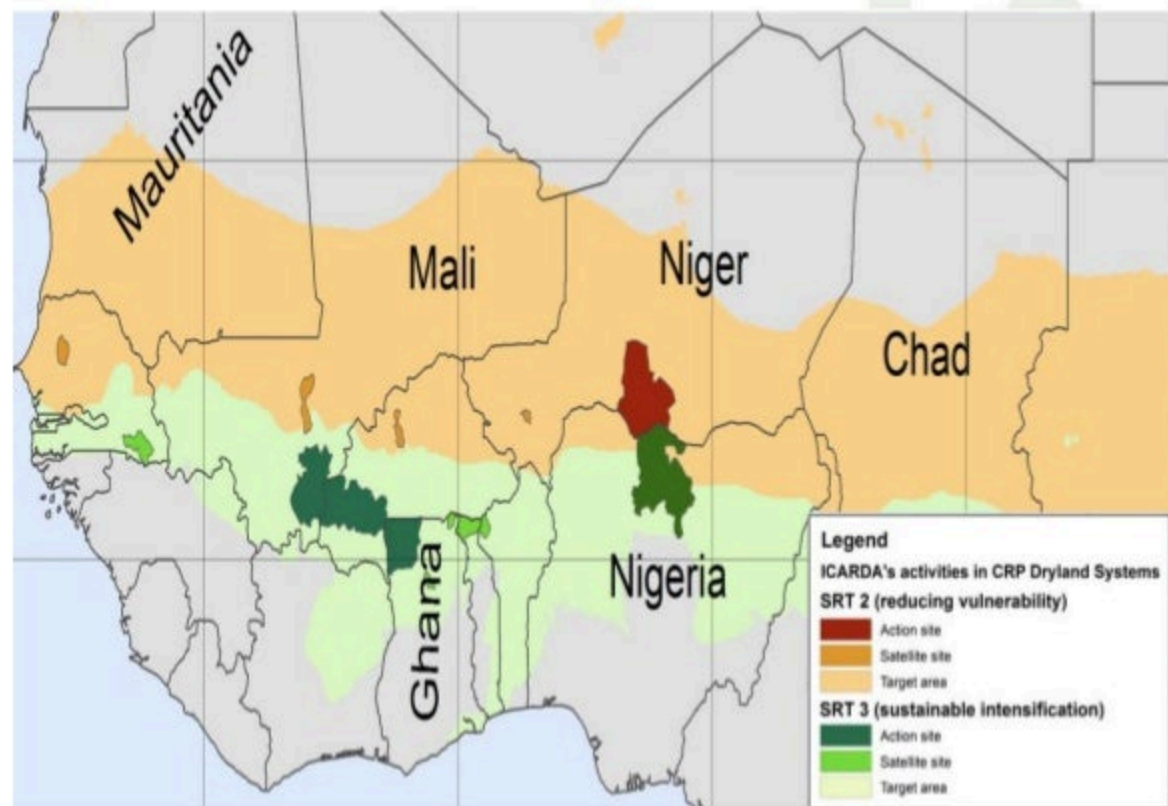
Ghana: SARI,

CSIR

Mali: IER

Niger: INRAN

Nigeria: ARC



South Asia

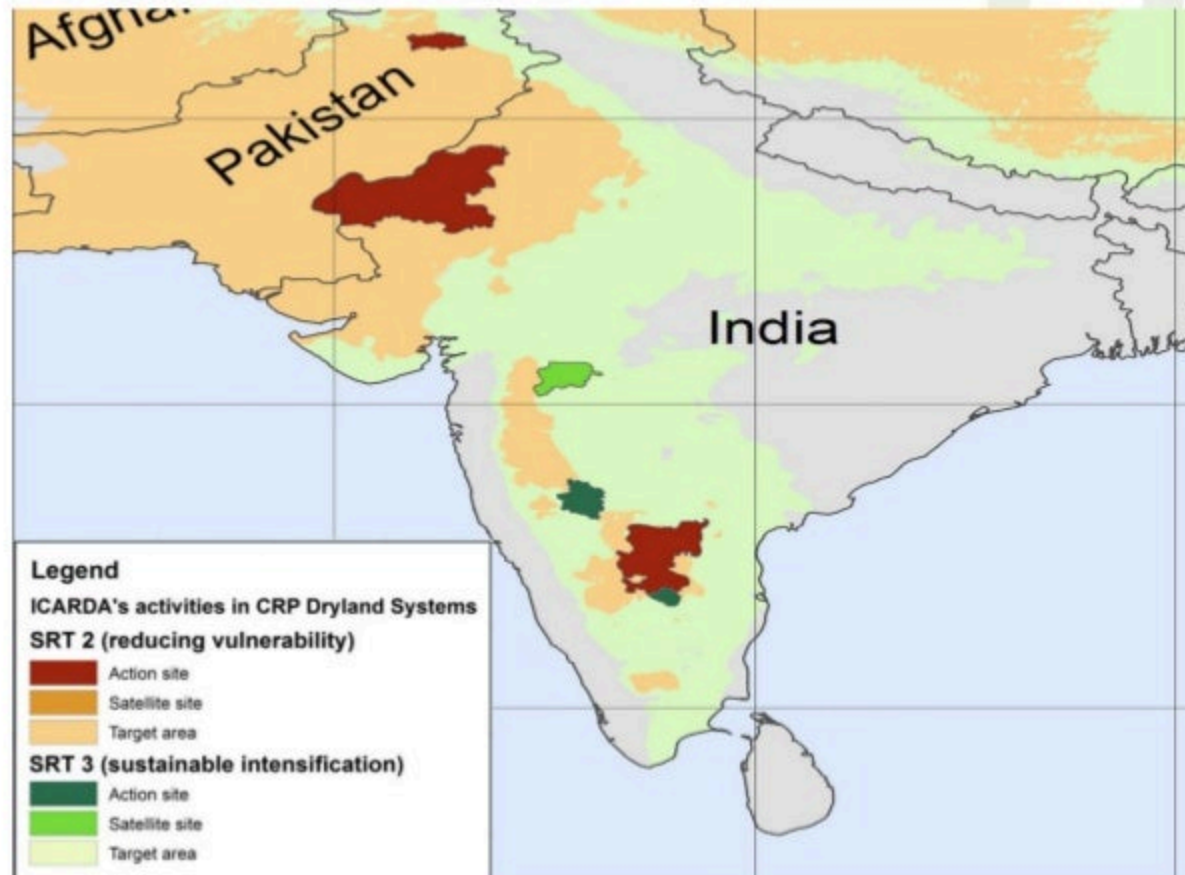
Regional: Asia-Pacific Association of Agricultural Research Institutions

Bangladesh: BARI

India: ICAR, CRIDA, CAZRI, FES, NRAA, Watershed Organization Trust

Pakistan: BARI, CSO, PARC, SSD

- Rajasthan (SRT2)
- Chakwal, Pakistan as satellite site, mainly SRT2
- Bijapur, Karnataka, India, SRT3 (black soils).
- Anantapur & Kurnool, Andhra Pradesh SRT2/3 (red soils)
- Maharashtra/ Karnataka Pradesh, satellite SRT3



Central Asia and Caucasus

SRT2: Aral Sea Basin and Rasht Valley

SRT3: Fergana Valley

Central Asia and Caucasus:

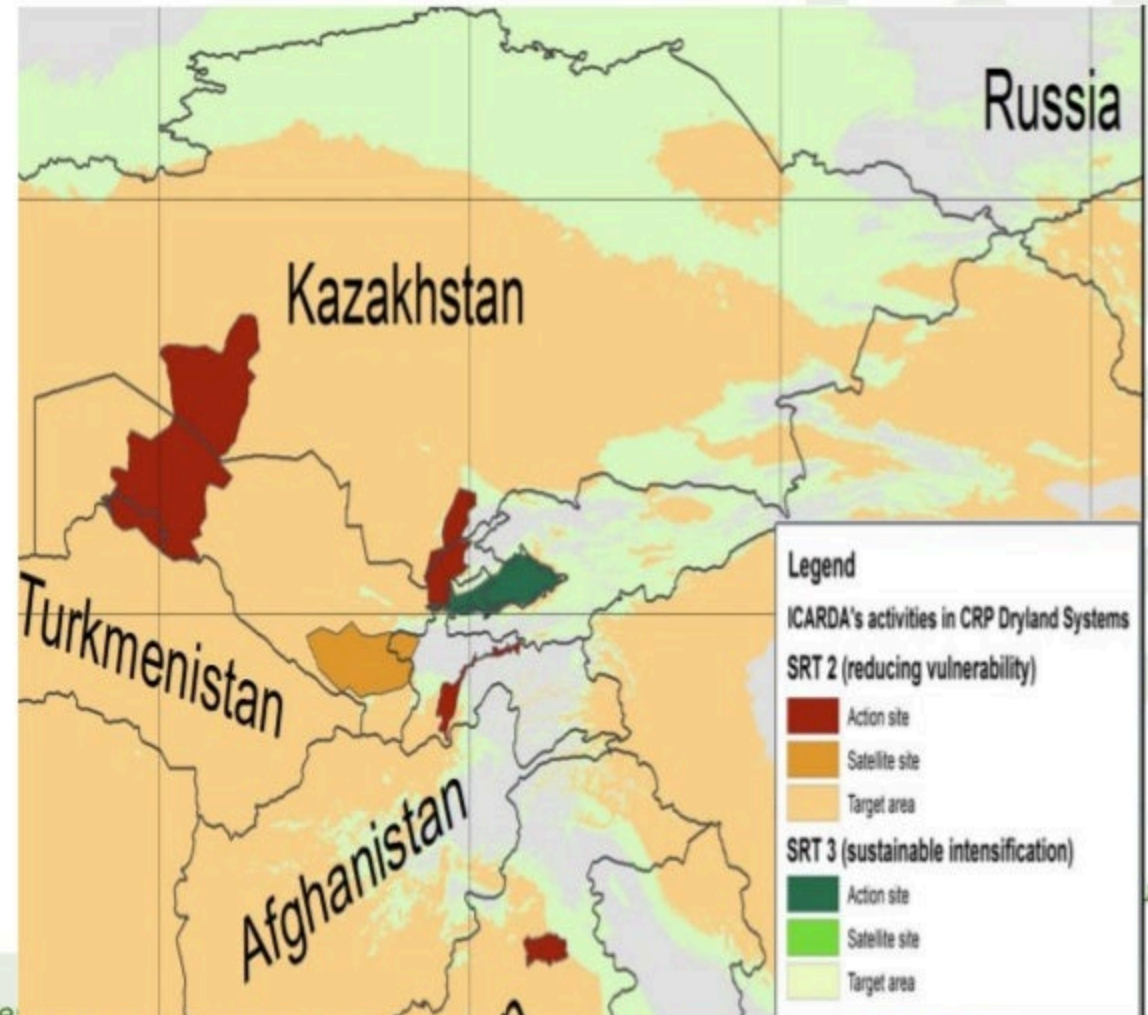
Regional Fora

Kazakhstan: South-Western Scientific Production Center of Agriculture

Tajikistan: TAAS

Turkmenistan: National Farmers' Association, NAS

Uzbekistan: Kashkadarya Research Institute



North Africa and West Asia

- SRT2: Jordan/Syria;
- SRT2: Satellite: Béni Khedache-Sidi Bouzid, Tunisia
- SRT3: Mekness region of Morocco; Egypt Nile delta
- SRT3 Satellites: Karkheh River Basin, Iran

Regional: Association of Agriculture Research Institutions in the Near East & North Africa.

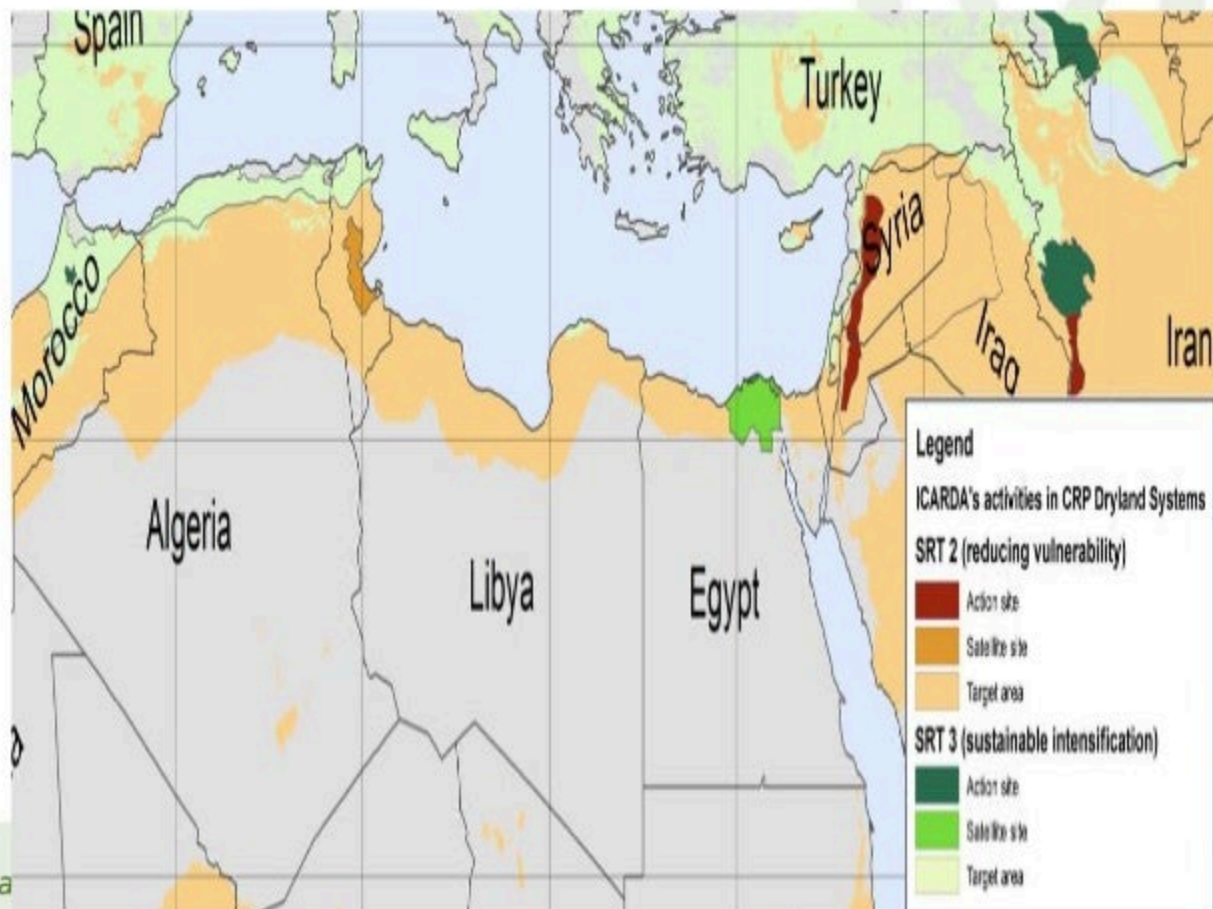
Egypt: ARC

Jordan: NCARE

Morocco: INRA

Syria: GCSAR, Agha Khan Foundation

Tunisia: IRA



East & Southern Africa

SRT2: Northeastern Kenya and Southeastern Ethiopia

SRT3: Chinyanja Triangle (central and southern Malawi, eastern province of Zambia, and the Tete Province of Mozambique)

East and Southern Africa:

Regional: Association for Strengthening Agricultural Research in Eastern and Central Africa

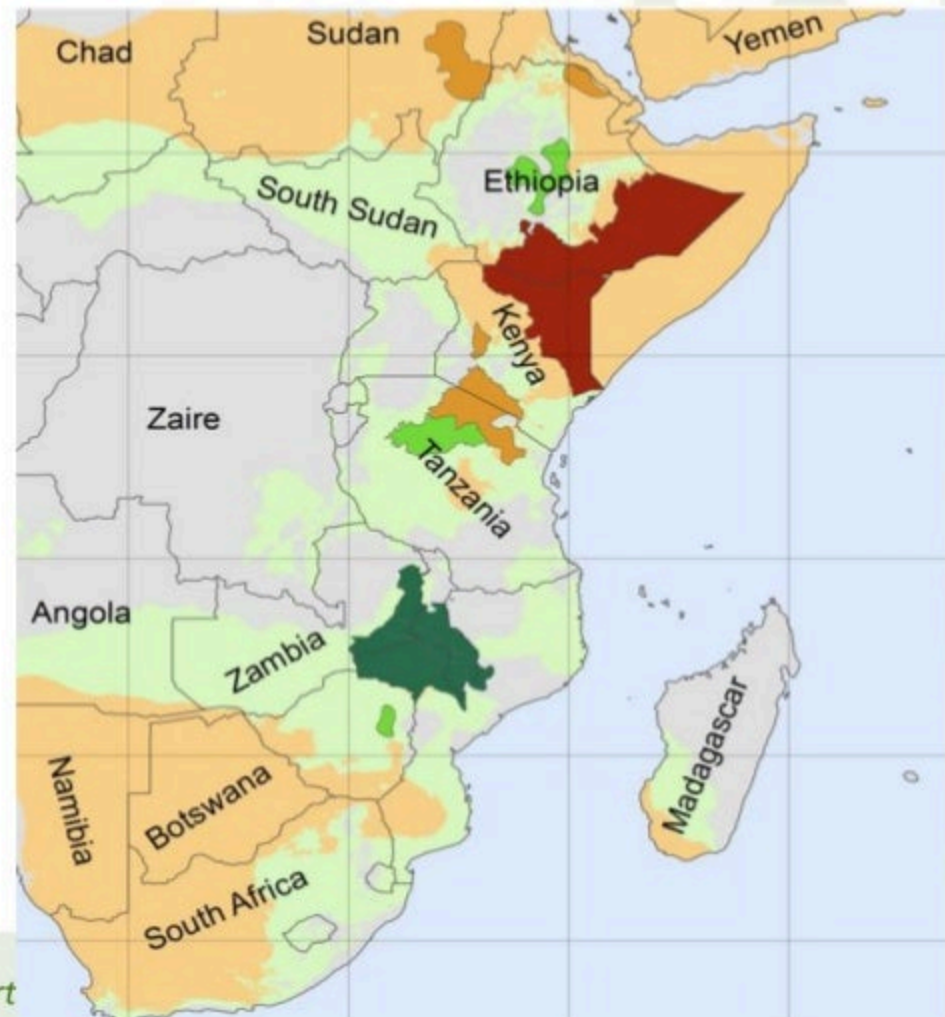
Ethiopia: EIAR

Kenya: KARI

South Africa: CSIR, Univ. of Ft Hare, WRC

Sudan: ARC

Zambia: University of Zambia



Cross-cutting Themes and Program-level Tools

- Gender
- Youth
- Biodiversity
- Capacity building
- Modeling
- Geoinformatics
- Research Support Systems



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Dryland Systems

Gender And Youth Matter

- Land tenure
- Access to financial tools
- Employment
- Decision-making
- Natural resource access
(trees, fields)
- Food preparation and
processing
- Household nutrition
- Varietal assessment
- Use of disposable income
- Landed and Landless labor



Geoinformatics



a. Shark Elowinat, Egypt



b. Queen Alia AR, Amman, Jordan



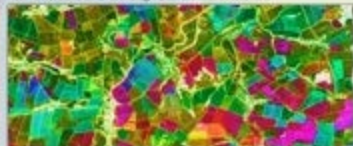
c. Al-Jawf Farms, Libya



d. Todhia Farm, Saudi Arabia



e. El Reno, Oklahoma, USA



f. Black Earth Farms, Russia

Markets



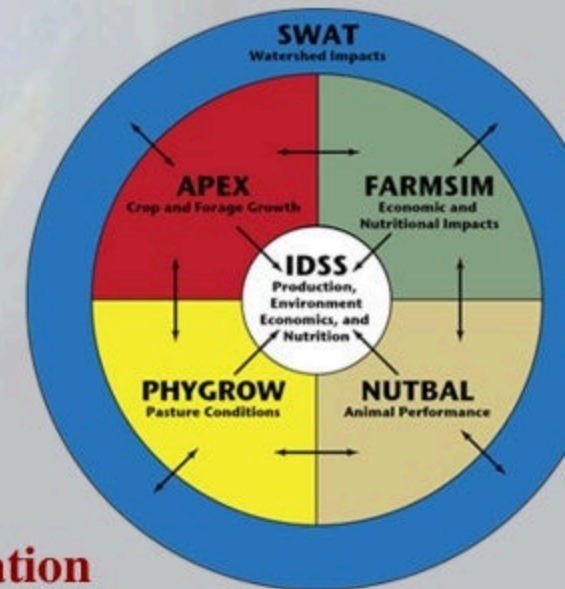
Community,
watershed,
region...

Field, flock, forest



Farm, household,
livelihood...

Integrated Models and Decision Support Systems

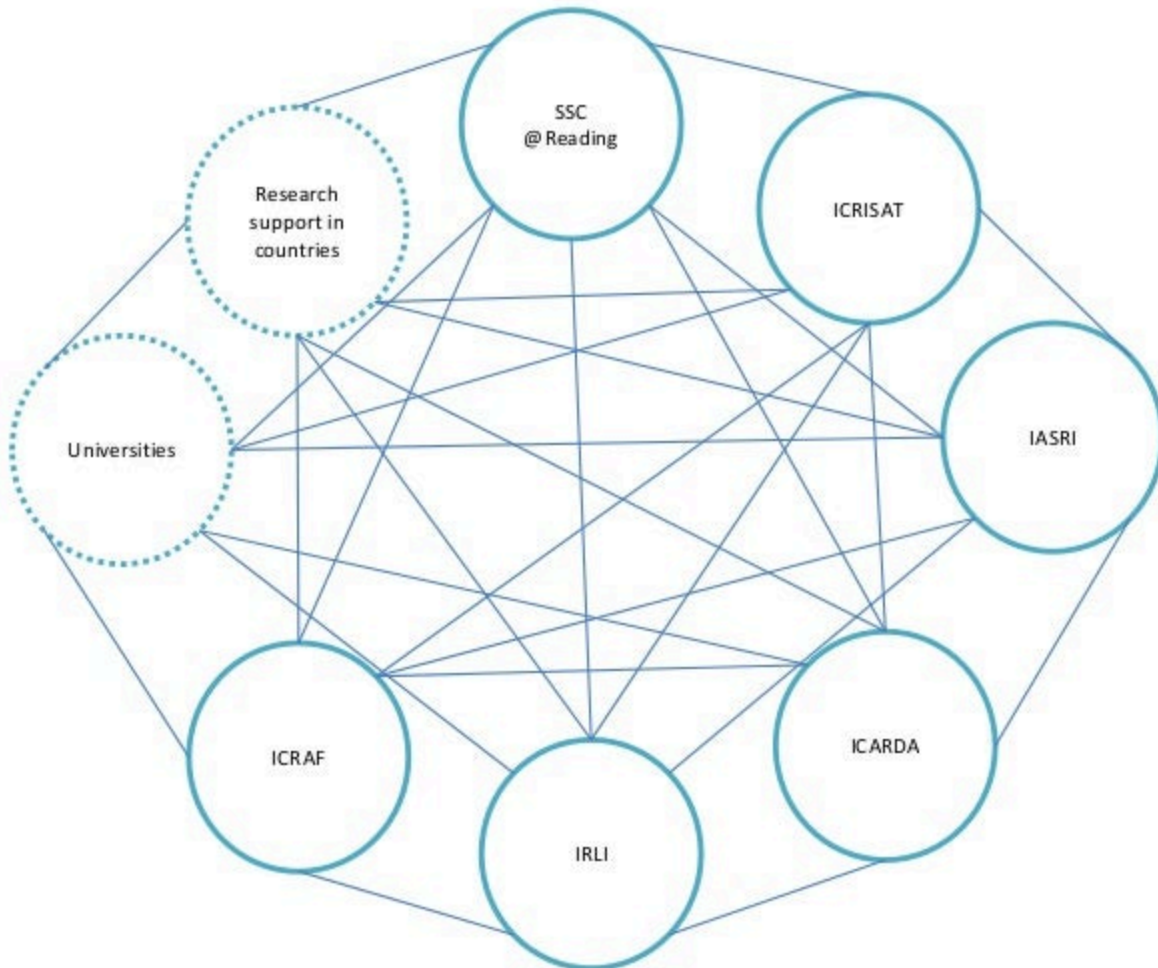


Data
Tools
Training
Collaboration

Microbe-plant



Research Support Network



A network of research support teams that share resources and communicate to make the support available to scientists more effective and efficient.

Initially this includes CGIAR research support teams and statisticians, but is expected to grow to include institutions and units that work in-country so as to help the development of local capacity for research support

The Statistical Services Centre (SSC) at the University of Reading will play a coordination role and will foster the establishment of the network

Notional Budgets

By Period, IDO, and Region

Notional 9 years Budget for Dryland Systems (x \$1,000) by IDOs

Year	IDOs							Total
	1	2	3	4	5	6	7	
2016-2018	7500	4500	4500	3600	3600	3300	3000	30000
2019-2021	8250	4950	4950	3960	3960	3630	3300	33000
2022-2024	9075	5445	5445	4356	4356	3993	3630	36300
Total	24825	14895	14895	11916	11916	10923	9930	99300

Notional 9 years Budget for Dryland Systems (x \$1,000) by Regions

Year	Regions					Total
	WA	E & SA	NAWA	SA	CA	
2016-2018	7200	7200	6000	6000	3600	30000
2019-2021	7920	7920	6600	6600	3960	33000
2022-2024	8712	8712	7260	7260	4356	36300
Total	23832	23832	19860	19860	11916	99300



Risk-averse *and* Sustainably Intensified Farming Systems



Recapitulation of Impact Pathways

Impact goals, outcomes, outputs,
and indicators



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Dryland Systems

Narrative Summary	Objectively Verifiable Indicators
GOAL (IMPACT):	Resilience index: contextualised multiscale assessment of resilience building strategies at household and community levels.
More resilient livelihoods for vulnerable households in marginal areas	
PURPOSE (OUTCOMES):	Use of outputs: number and size of organisations using them and their areal and population domains; proportion of sector in targeted areas this represents
NARES use tools, methods and processes to generate and customise improved resilience options for targeted groups of vulnerable households	
	Customised options: number of options and number of hh targeted
OUTPUTS:	
1. Improved resilience options (components, interactions and their management; explicit consideration of buffer functions, managing trade-offs between production and risk; nested scale risk mitigation, including incentives to adopt them)	
2. Tools, methods, processes and capacity of NARES to create and customise improved resilience options to local circumstances across scaling domains	

Narrative Summary	Objectively Verifiable Indicators
GOAL (IMPACT):	
More stable and higher per capita income for intensifiable households.	Increase: i) absolute increase, ii) % increase, iii) % of hh above poverty
	Stability: iv) variance in per capita annual income (nine year rolling); v) trend in iii
PURPOSE (OUTCOMES):	
NARES1 use tools, methods and processes to generate and customise improved intensification options for targeted groups of	Use of outputs: number and size of organisations using them and their areal and population
	Customised options: number of options and number of hh targeted
OUTPUTS:	
1. Improved intensification options (components, interactions and their management; information on investment costs, returns and risk; risk mitigation	
2. Tools, methods, processes and capacity of NARES1 to create and customise improved intensification options to local circumstances across scaling domains	
3. Action research focused on scaling domains rather than pilot sites	

Narrative Summary	Objectively Verifiable Indicators	Means of Verification
GOAL (IMPACT):	Dietary diversity: i)time	
Women and children in vulnerable households have year round access to greater quantity and diversity of food sources	concentration index of number of food groups and individual foods consumed by women and children in sample hh ii)proportion of women and children above	
PURPOSE (OUTCOMES):		
NARES and health sector organisations work together and adopt diagnostic and systematic research approaches to promoting and developing interventions to improve vulnerable women and children's access to, and control of more and more diverse food	Integration: network strength amongst agricultural and health	
	Adoption: number and size of organisations, their areal and population domains; proportion of	
	Interventions: number of interventions and number of hh they target	
OUTPUTS:		
1.Diagnosis of constraints and opportunities of local food systems leading to identification of constraints and opportunities to improve year round access to food		
2.Systematic research on interventions to address identified constraints and opportunities, leading to a matrix of tested interventions and delivery strategies associated with the contexts in which they work		

Narrative Summary	Objectively Verifiable Indicators	Means of Verification
GOAL (IMPACT):	Area: i)ha and proportion of target area under governance	
More sustainable and equitable management of land and water resources in pastoral and		
PURPOSE (OUTCOMES):		
Multiple stakeholders in pastoral / agropastoral areas, use evidence based ecosystem management, at community level in the governance of common and privately managed land and water resources	Use of outputs: number and size of communities adopting evidence based governance models developed by DS	
	Effect: trends in NVDI over time for areas under and outside new governance models	
OUTPUTS:		
1.Technologies, tools, methods, processes and approaches developed and tested for evidence based ecosystem management		
2.Focus on negotiation support (amongst stakeholders) and governance models		
3		

Narrative Summary	Objectively Verifiable Indicators	Means of Verification
GOAL (IMPACT):		
Better functioning markets underpin intensification of rural livelihoods	Efficiency: trend in average transaction cost for key marketed products	
	Equity: proportion of product value accruing to rural households	
PURPOSE (OUTCOMES):	Access: Gender	
Farmers and pastoralists (especially women) have better access to more diverse, efficient and equitable markets	disaggregated numbers of people and proportions of target population with access to	
OUTPUTS:		
1.Modes of operation to lower transaction costs through development of assembly points and market hubs		
2.More innovative partnership models involving entrepreneurs, marketing commissions, traders and warrantage (inventory credit systems)		
3.Improved market information systems		

Narrative Summary	Objectively Verifiable Indicators	Means of Verification	Assumptions and Risks
GOAL (IMPACT):			
More integrated, effective and connected service delivery institutions underpinning system intensification and resilience	Reach: gender disaggregated numbers and proportions of people and rural households		
PURPOSE (OUTCOMES):			
Service providers adopt innovations to improve their effectiveness, integration and reach	Uptake: Number and proportion of service provider using models and methods developed by Dryland Systems		
OUTPUTS:			
1. Improved and innovative extension methods better targeted to message and context 2. Improved models for interaction amongst service			
3. Innovative public-private partnership models for service delivery			
4			
ACTIVITIES:	Milestones		

Narrative Summary	Objectively Verifiable Indicators	Means of Verification
GOAL (IMPACT): Removal of constraints and incentives lead to rural households engaging in more sustainable practices that	(within target areas) of rural households adopting more sustainable practices	
PURPOSE (OUTCOMES): Policy makers reform and institutions implement policies that remove constraints to, and	Policy: documented change in policies and the number and Implementation: assessment of policy implementation	
OUTPUTS:		
1. Analysis of policy and institutional barriers to adoption of sustainable intensification options		
2. Quantified impact of effectiveness of policy alternatives		
3. Policy briefs providing evidence targeting key fora for policy change		