



Sociotechnical innovations for leveraging systems transformation, water management and food security under climate change: concepts and illustrations in the dry areas

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Plan of the presentation

- System approach is needed for climate change adaptation
- Dual entry for system transformation
- Sociotechnical bundles of innovations vs technology innovations
- Knowledge hubs as leverage for transformation and scaling
- Examples of innovation bundles from ICARDA work

ICARDA in brief



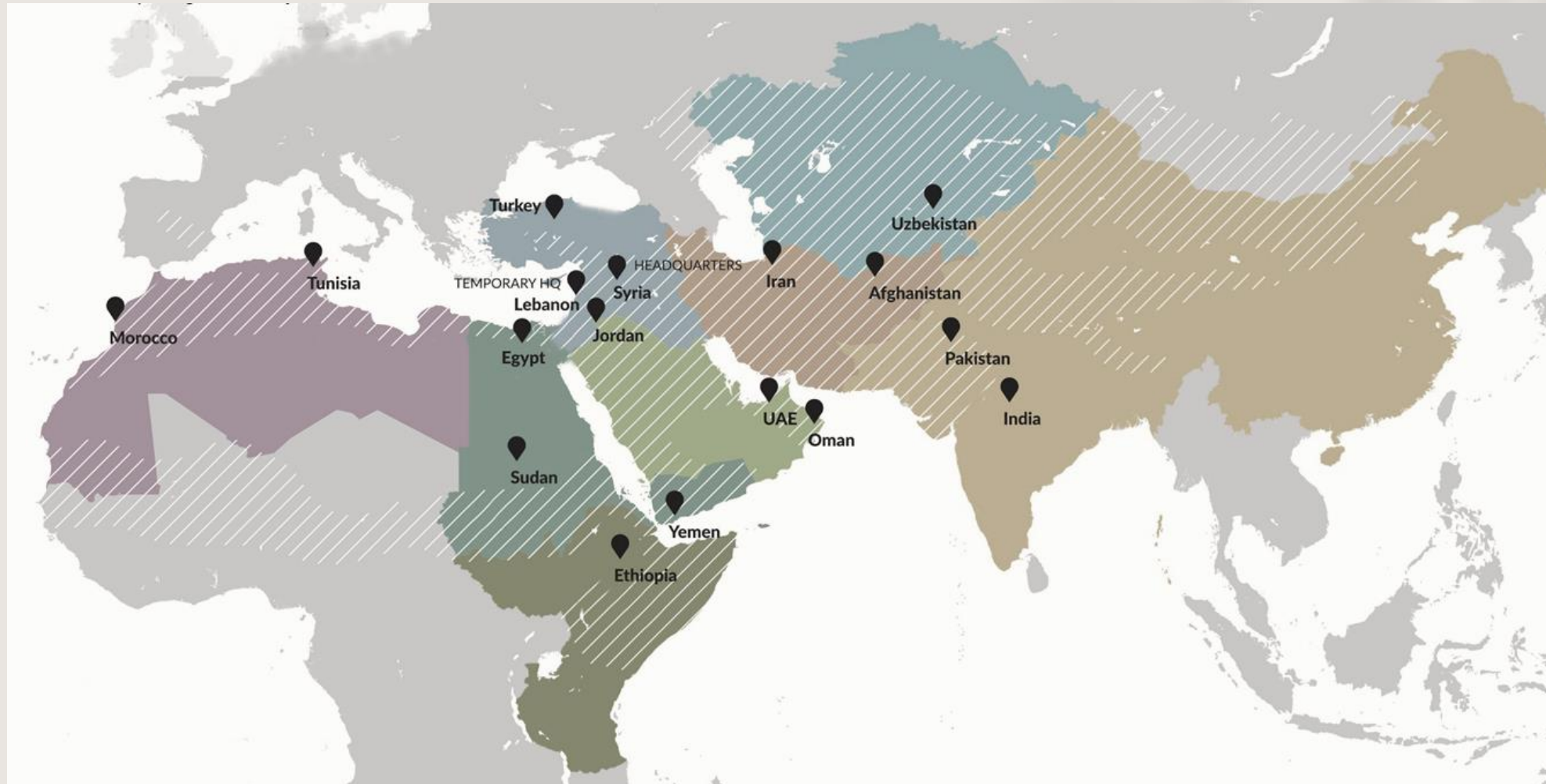


ICARDA is a **Decentralized R4D** International institute focusing on **Dryland Agriculture** that combines **Component** and **Systems Research**



-  Regional/Country Office
-  Non-tropical dry areas

Staff: 400
Scientists: 80



Systems Research

 Rainfed



 Irrigated



 Agro-Pastoral

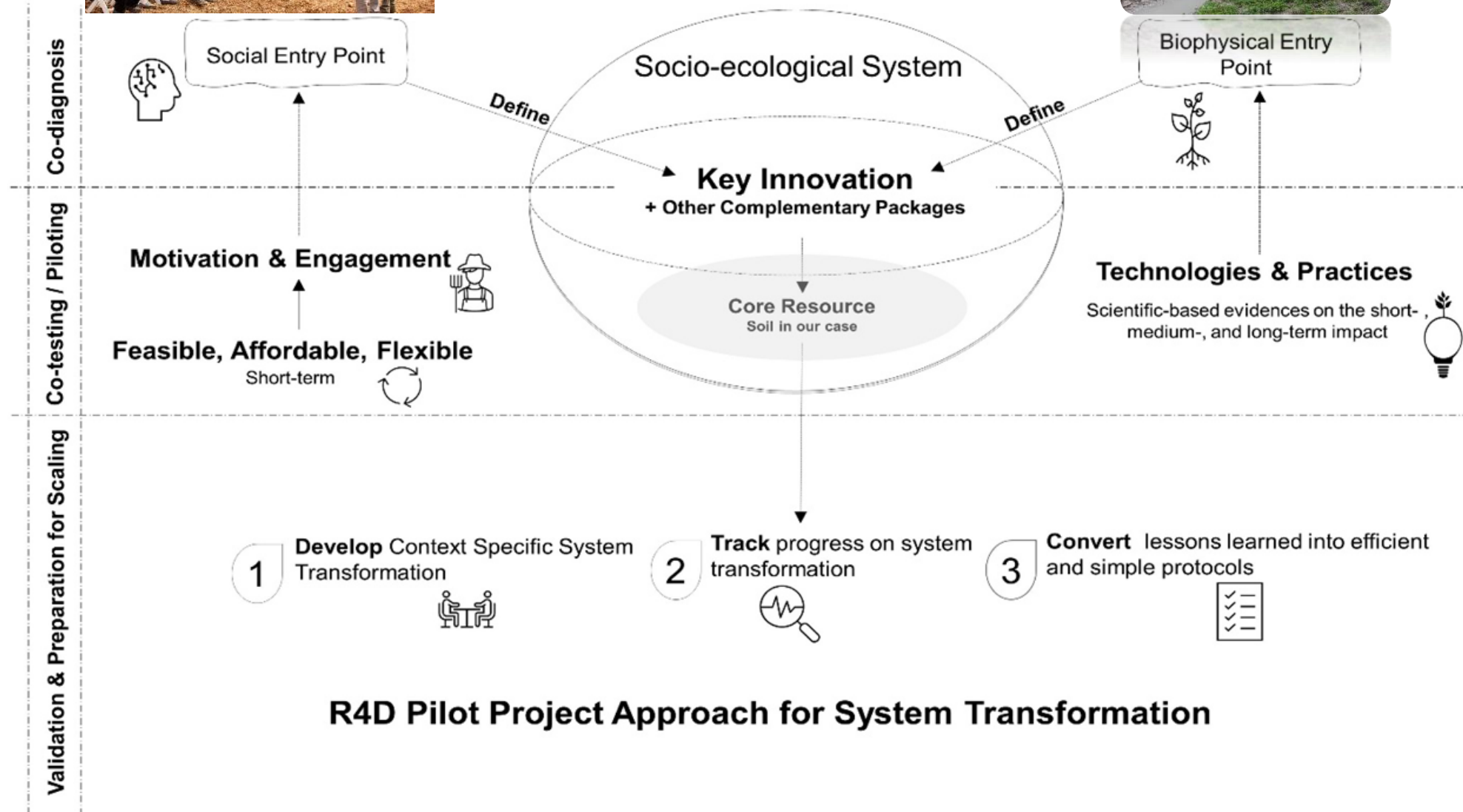


 Desert Farming



Systems transformation needed for climate change adaptation

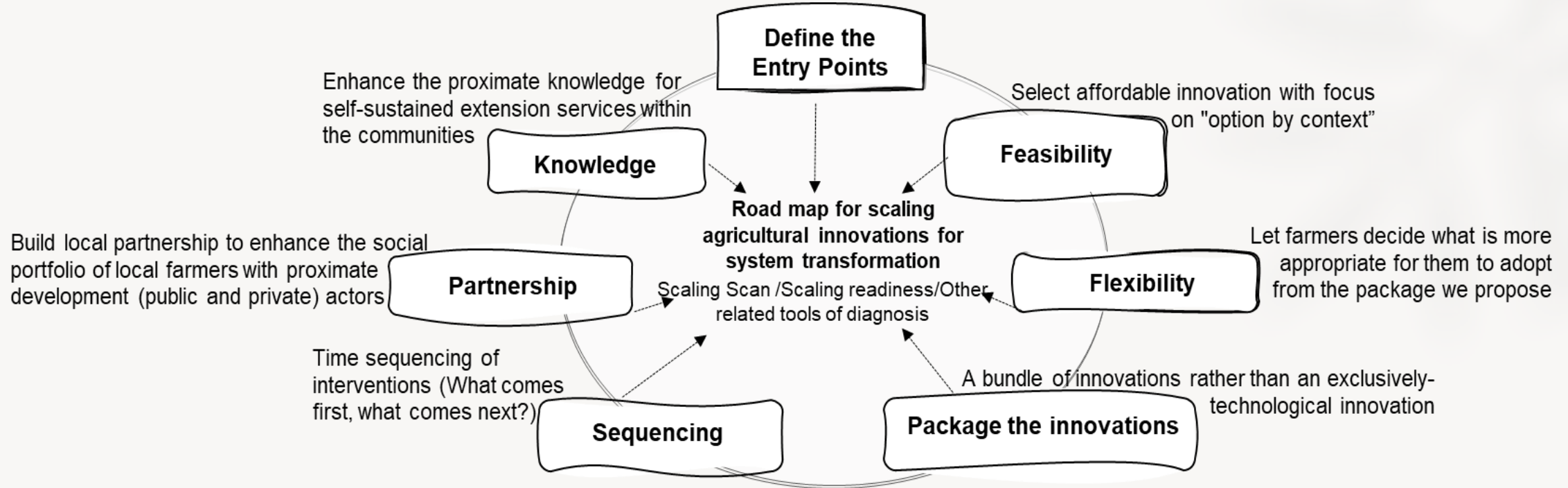
Short versus long terms innovations and interventions



Approche de Mise en Œuvre



Co-design & Prioritize: Consider entry points for social system and for ecological system separately



Refinement and Scaling of Agricultural Technologies and Practices
Frija A., & Idoudi Z., 2022

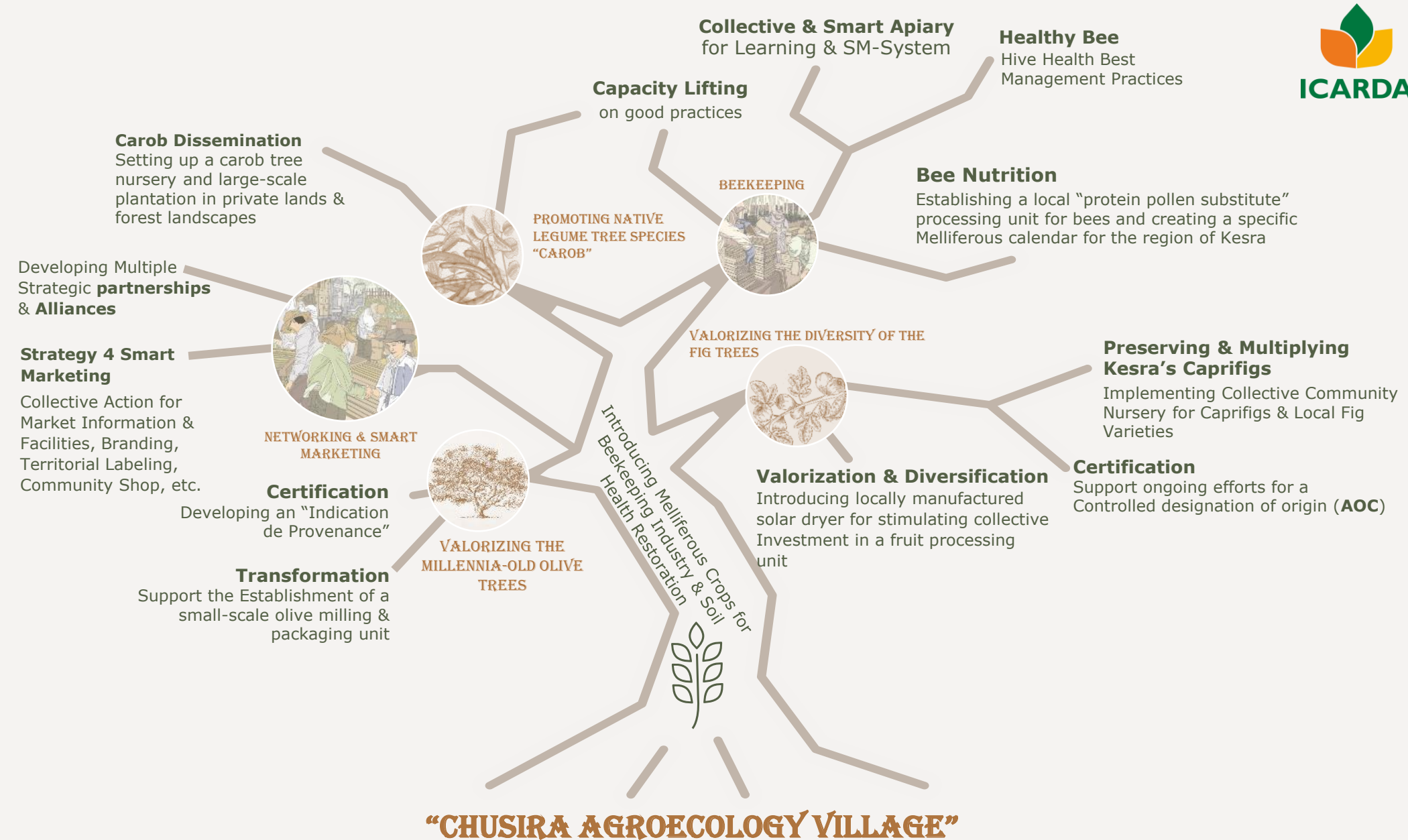


Examples of innovation bundles from ICARDA work

Agroforestry

INCLUSIVE BUSINESS MODEL

To create value and Generate Net Positive Social Impact



To foster participatory learning through co-: Developing, Experimenting and Disseminating Best practices

KNOWLEDGE CO-CREATION



INNOVATION PACKAGE FOR KESRA SITE



INITIATIVE ON
Agroecology

Valorizing the diversity of the fig trees



Preserving & Multiplying Kesra’s Caprifigs
Support ongoing efforts for a Controlled designation of origin (**AOC**)

Introducing locally manufactured solar dryer for stimulating collective Investment in a fruit processing unit

Beekeeping



Introducing Melliferous Crops for Beekeeping Industry & Soil Health Restoration

Establishing a local “protein pollen substitute” processing unit for bees and creating a specific Melliferous calendar for the region of Kesra

Hive Health Best Management Practices

Valorizing the Millennia-Old Olive Trees



Transformation
Support the Establishment of a small-scale olive milling & packaging unit

Certification
Developing an “Indication de Provenance”

Sustainable Agro/Silvopastoral Development to Promote Ecosystem Services

Carob Tree, A great natural Ally against climate change

Setting up **collective community nurseries** for carob tree and large-scale plantation in private lands & forest landscapes

Benefits

- ☐ Tolerates droughts and salinity
- ☐ Its deep root systems allow CO₂ to sink,
- ☐ Grows on a wide range of soils
- ☐ Performs as a multipurpose tree
- ☐ Produces nutritious fruits (carob beans/ pods)
- ☐ Provides shades for livestock during summer



Examples of innovation bundles from ICARDA work

Cactus for reforestation and land restoration

Sustainable Agro/Silvopastoral Development to Promote Ecosystem Services

Cactus Pear for Better Nutrition, Income, and Climate change Mitigation

Location: Jordan, Tunisia, Morocco, India, Pakistan, Arab Peninsula (Oman, UAE, KSA, Qatar), Yemen, Libya

- ❑ A multifunctional crop, mitigating drought and combating desertification and it helps farmers in dry areas cope with climate change.
- ❑ Cactus pear needs few inputs and uses water efficiently and it can replace expensive fodder and the farmer can generate more income.
- ❑ The cactus plants can be a source of water for livestock, particularly during the summer months when high temperatures and water scarcity threaten food security.
- ❑ For humans, edible cactus can serve medicinal and cosmetic purposes.
- ❑ Grown by millions of farmers in dry areas for nutritional and income generating purposes.



Cactus Pear - Jordan



Cactus plantations at farm field under intensive management - Pakistan

Sustainable Agro/Silvopastoral Development to Promote Ecosystem Services

Cactus Pear for Better Nutrition, Income, and Climate change Mitigation

Cactus for Alley Cropping

Benefits of Alley Cropping

- Provides fodder in times of scarcity
- Provides rich and diverse diet for livestock
- Improves soil fertility (increased SOC and nitrogen)
- Reduces erosion and serves as windbreaks
- Improves crop performance
- Provide numerous goods and services essential for the livelihoods of the Agrosilvo-pastoralists.

Before



After



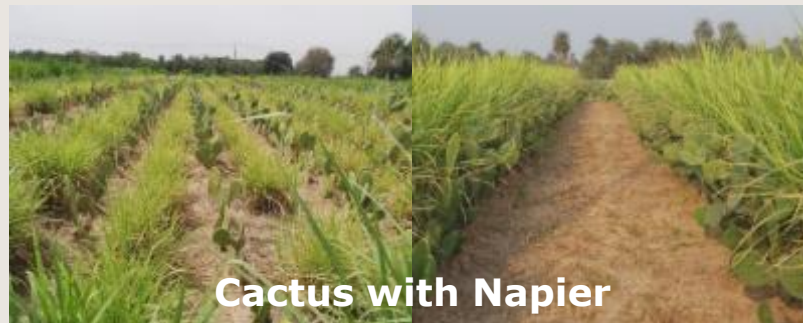
Cactus with Chickpea



Cactus with Date Palm



Cactus with Cluster Bean



Cactus with Napier



Cactus with Maize



Cactus with Barley

Examples of innovation bundles from ICARDA work

**Sustainable intensification packages for agroecological transformation in
mixed cereal-small ruminant systems (Tunisia & Algeria)**

CLCA Socio-Technical Package for Agroecological System Transformation

NA Countries

Clustering Crop-Livestock Integration (CLI) Options Based on the Scale of Implementation (On-Farm, Landscape) and Resource-Orientations.

CLCA Options

No-till on Residues + Forage Diversification+ Livestock Management Interventions

Minimum Tillage+ Forage Diversification+ Alternative Feed Options + Livestock Management Interventions

Conventional Till + Forage Diversification+ Forage Crops Seed Production + Small-Scale Mechanization of feed production

Minimum Tillage + Forage Diversification+ Alternative Feed Options

Cereal-Food Legumes Rotation + No-till on residues + Stubble Grazing Management

Phase-I: Adaptative Research & Options under Piloting

Phase-II: Scaling-Up Full CLCA Packages

Knowledge
Hubs

Forage Diversification to Address Feeding Gap
Minimizing Soil Disturbance

Forage Diversification to Address Feeding Gap
Minimizing soil Disturbance and Improving Herd Management

Conventional forage cropping for biomass and seeds and community-based mechanization for feed production

Forage Diversification to Address Feeding Gap
Minimizing Soil Disturbance

CA in Cereal-Legume Based Systems

CLCA Package/Context

Tested in
Tunisia and
Algeria



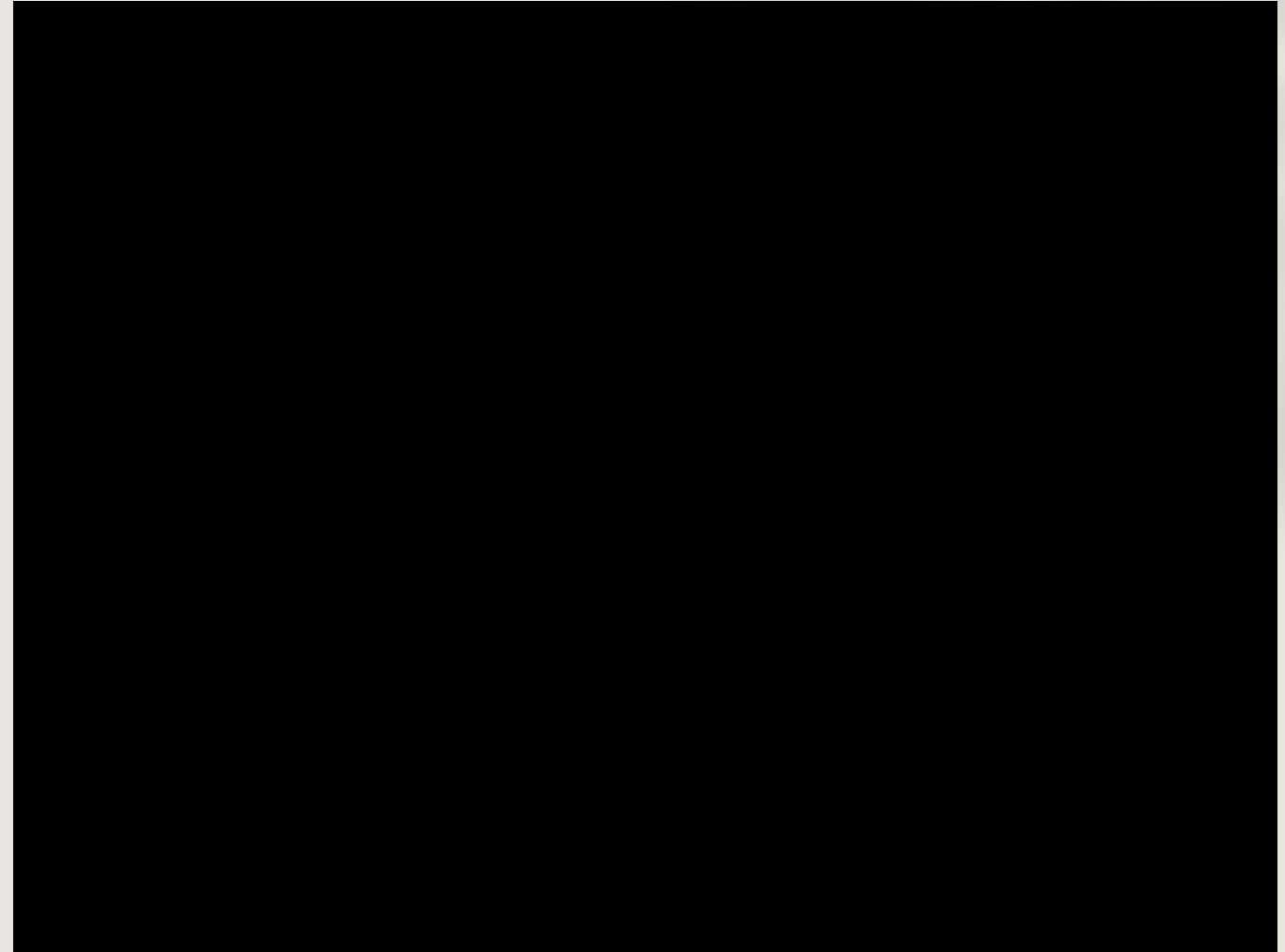
Show Cases of Poverty Alleviation and Food Security

Engagement with Local/Small and Medium Enterprises, which Creates Local Economic and Social Dynamics (Employment, Encouraging Youth Entrepreneurship, women empowerment) in addition to services provision for natural resources management and conservation



**Small-Scale
Mechanization for Better
Crop-Livestock
Integration**

Economic Transformation of Mixed Livestock-Crop Farmers: Improving Production Efficiency, Cost Saving, Enhancing Investment Capacity and Generating Additional Income



Gender Based-Interventions for Innovative Solutions in North African Countries

Reaching out 1,200 Women Farmers

- ❑ Empowerment in Decision Making about Agricultural Production and Use of Productive Assets (SMS/Digital Activities)
- ❑ Enhancing Women Leadership in Communities
- ❑ Enhancing Women Access to Machinery, Reduce Workloads and Encourage Entrepreneurship for Youth and Women

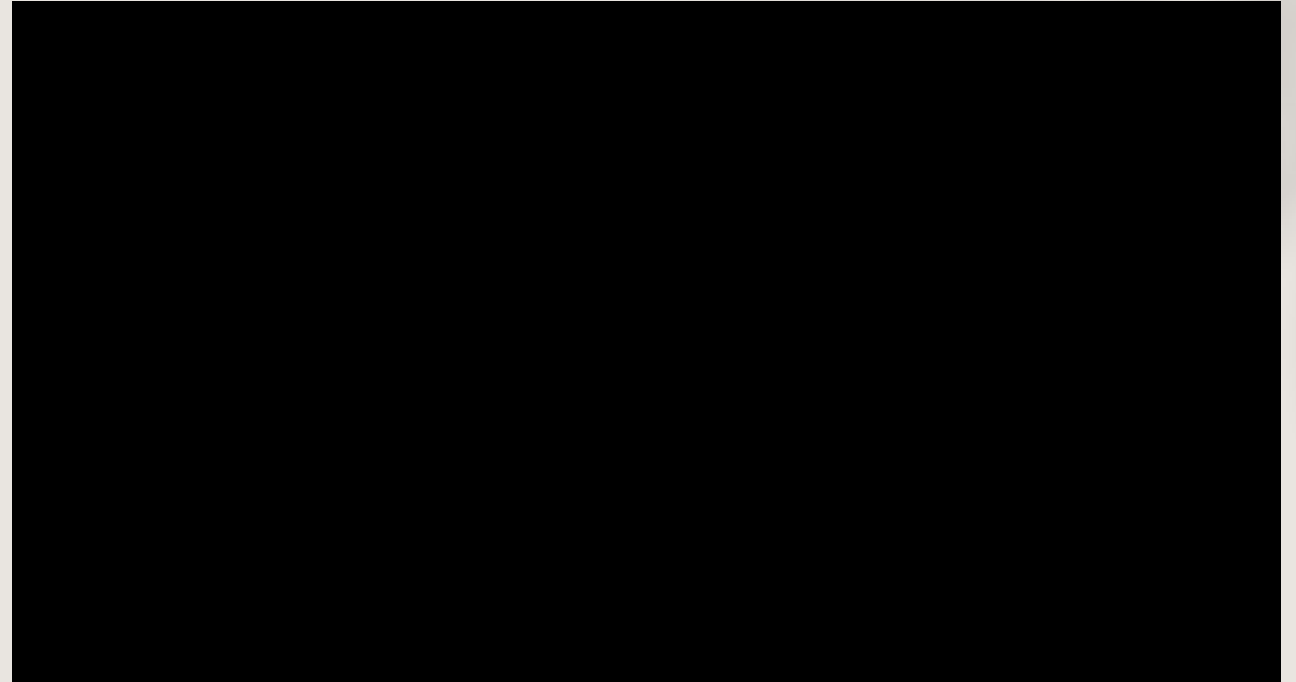


Private Sector Engagement for Natural Resources Management and Conservation

Public Private Partnership for Scaling Forage Crops and Forage Mixtures in Tunisia

INRAT-Cotugrain-CLCA

Contextualized Forage Mixtures



**Forages for Better Soil,
Feed, and Biomass**

**Forage Mixture Corridors Across the Steppe to
Increase biomass, Provide High-Quality Feed,
and Increase Soil Organic Matter**

Retour d'Expérience

Paquet Sociotechnique Intégré:

Transformation des Systèmes Mixtes Culture-Elevage pour une Utilisation plus

Durable des Ressources (Sol, Eau)



Investissement matériel et immatériel bien apprécié par les agriculteurs et visant à générer des transformations positives et un impact durable



Private Sector Engagement for Natural Resources Management and Conservation

Public Private Partnership for Enhanced Conservation Agriculture Practices: Boudour Zero-Till Seeder ITGC-PMAT-CLCA



Local Production of Zero-till Seeders to Significantly Expand Areas under Conservation Agriculture



Examples of innovation bundles from ICARDA work

Smart pack of livestock innovations in Ethiopia



RESEARCH
PROGRAM ON
Livestock

SMALL RUMINANT VALUE CHAIN TRANSFORMATION

Developing an integrated package of interventions to support sheep and goat value chain actors



THE CHALLENGE

Poor Value chain performance:

- Low animal productivity
- Small herds in the highlands
- High market demand but low supply
- Lack of inputs and services

FIELD RESEARCH

to develop, test and evaluate technical and institutional innovations across CRP flagships



Herd health package (Golden egg on Health)

Disease control through vaccinations and scheduled deworming campaigns



Sheep and goat genetics

Community-based breeding program, data management, low input AI, dissemination models, certification



Improved feeding strategies

Strategic supplementation & balanced feeding, low input fattening, local forages



Marketing

Collective action, market information, market facilities



Gender capacity development and transformation

Capacity development tools, community conversations

SMART PACK

SUCCESS FACTORS

- Multi-stakeholder workshops to prioritize research and forge partnerships
- Site level value chain, feed and gender assessments conducted
- Community-based and participatory approaches



GOAL

Better performing sheep and goat meat value chains



EXPECTED OUTCOMES

- Small ruminant producers adopt Smart Pack
- Women value chain actors empowered
- Service suppliers linked to producers and support Smart pack
- National and regional governments are aware and support scaling



EXPECTED IMPACTS

- More productive animals
- Higher incomes for men and women
- More jobs
- Reduced poverty

FACILITATING AN ENABLING ENVIRONMENT

Farmer cooperatives, communities of practice, policy support

Examples of innovation bundles from ICARDA work

Integrated desert farming systems in GCC countries

Transforming deserts into resilient and productive agricultural systems

Introducing the Integrated Desert Farming Innovation Program





Realizing the potential of desert farming for food, feed & water security in GCC countries

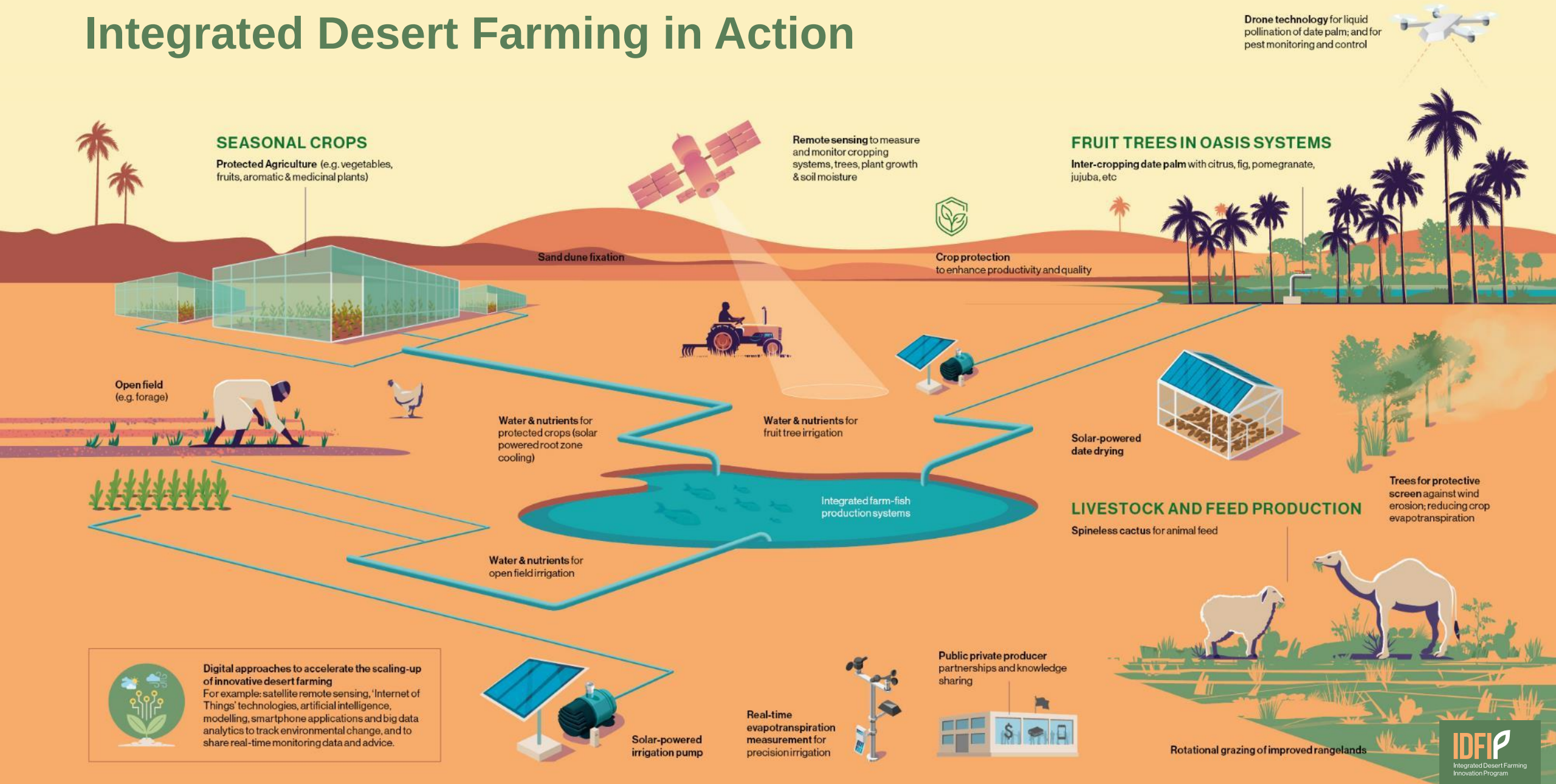
Benefits for GCC countries and their communities

Reducing food and feed imports thanks to increased local production of strategic staple crops

Building lucrative local and export markets for high-value crops and value-added desert farming products – boosting the small business sector and creating new jobs

Realizing significant water saving and reuse, with resilient and sustainable farming

Integrated Desert Farming in Action



Need to speed up technology transfer and scaling

of transformative innovations in smallholder farming systems

Scaling is a hot topic



REACHING MILLIONS: The science of scaling

Special Invitation

Against the backdrop of the World Food Prize 2018, the premier conference in the world on global agriculture, we invite you to join our panel of experts for a conversation on the transformational solutions which are required to deal with today's global challenges.

Date and time: October 17, 2018 from 19:30 to 21:30 PM at Downtown Des Moines Marriott, Dubuque Room

Transformational solutions are required for the complex challenges facing the global food supply. Agricultural research is an essential component to ending hunger, achieving food security, improving nutrition and promoting sustainable agriculture.

We will explore how CGIAR is working with partners to make significant progress in agricultural research and in scaling up innovations to contribute to the Sustainable Development Goals (SDGs). What are the unique challenges and opportunities in the science of scaling to ensure that improved agricultural practices and technologies are adopted by the largest number possible.

Spaces are limited. Please RSVP to v.pezzi@cgiar.org

www.cgiar.org

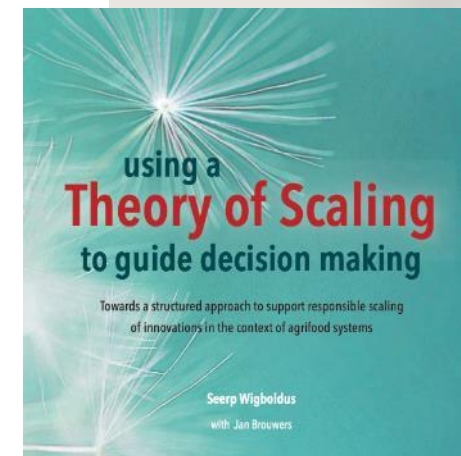
[#CGIARatWFP](https://twitter.com/CGIARatWFP)



www.worldfoodprize.org

Scaling Up NUTRITION

ENGAGE • INSPIRE • INVEST





Scale Up: A Necessity for Transformative Development

KEYNOTE SPEAKER

Dr. Akinwumi Adesina
President, African Development Bank

Tuesday, 25 September 2018 | 4:00pm
Loeb Playhouse

SCALE UP
conference

IDEAS FESTIVAL

IF

150 YEARS OF GIANT LEAPS
PURDUE UNIVERSITY

Gap between research and development ?

- lack of appropriate and highly performing “innovation system”



Pilot R4D projects: “Simple key elements for scaling”

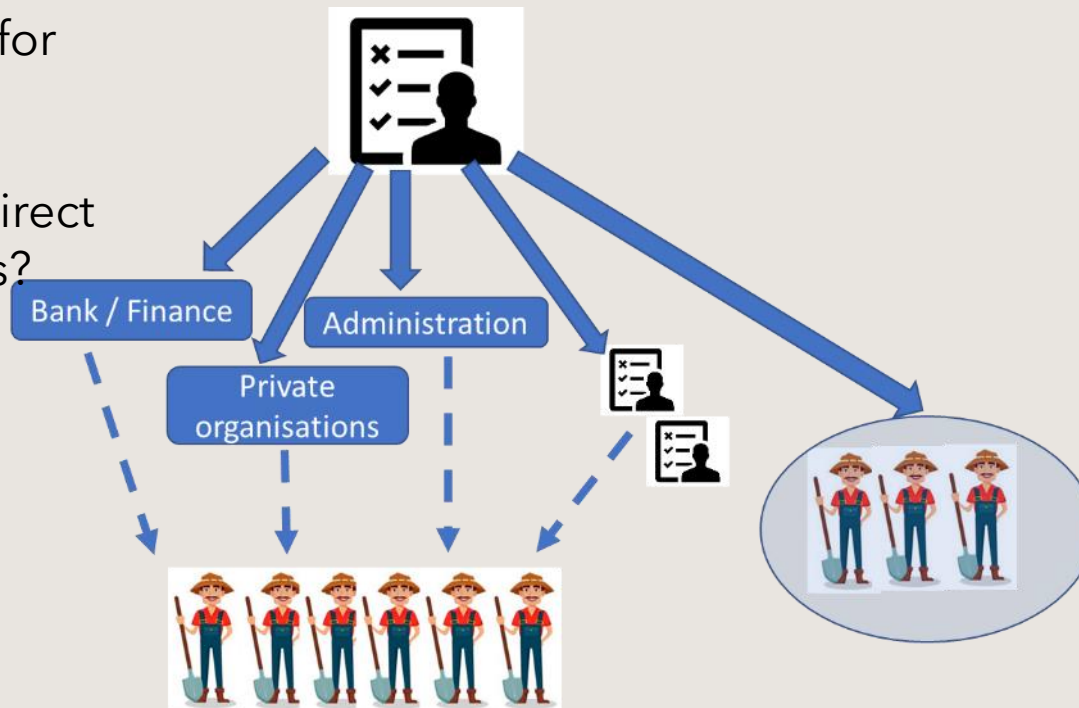
- Successful adoption of **technological** innovations depends on **complementary non-technological innovations** (access to credit, markets, knowledge and services) (based on Sartasea, 2017).
- They need to scale as well in a **sufficiently coherent and interrelated**.
- This can be even to a ratio of 10% technology, to 90% non-technological (pers. comm. Larry Cooley).



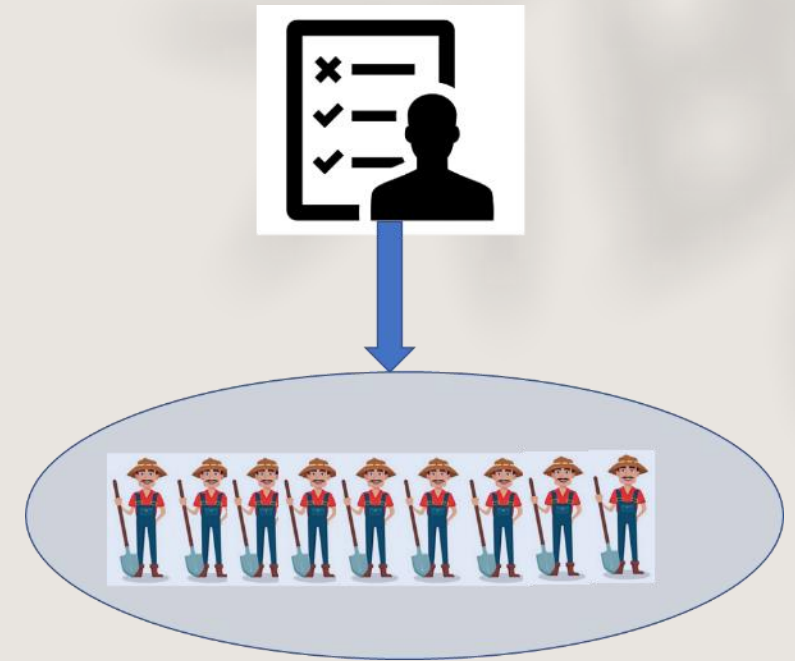
Few approaches!

Pilot R4D projects: Impact for many people

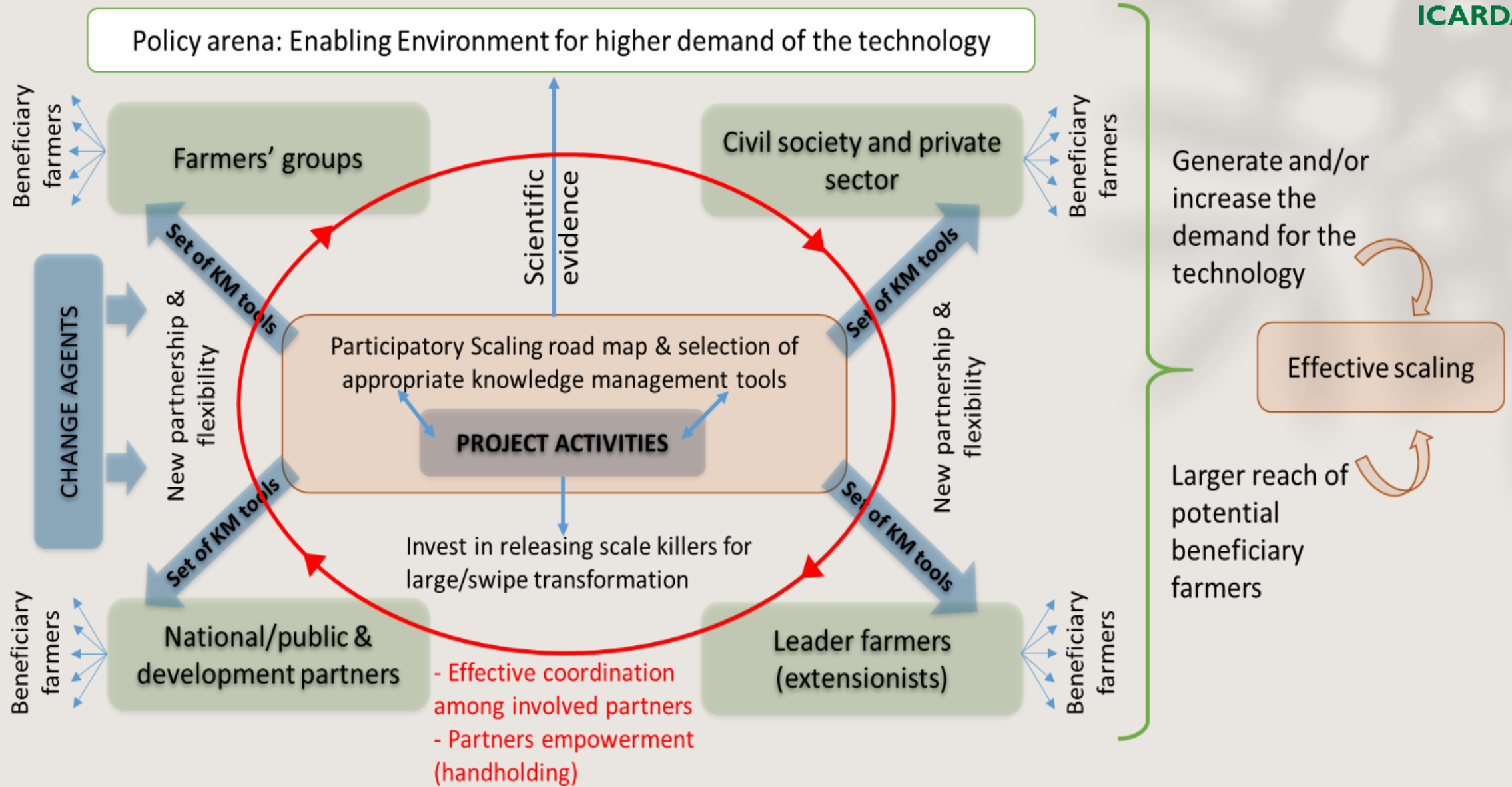
- **Collaborate** with those who share the same vision for change
- Target?
- Direct vs indirect beneficiaries?



-Project mind-set-
I need to reach all



The need for partnership for scaling frameworks





Approche d'intervention

- Approche d'intervention du projet PROSOL ICARDA basée sur

1 Co-design de quelques **expérimentations** sur l'érosion et la fertilité des sols (générer des évidences)

2 Multitudes de parcelles et activités de **démonstration** (sur les bonnes pratiques et bonnes rotations)

3 Priorisation et ciblage des activités de **développement des capacités** (agriculteurs leaders, agents de proximité)

4 Activités de **réseautage** de l'association (réseau social est un élément de résilience)

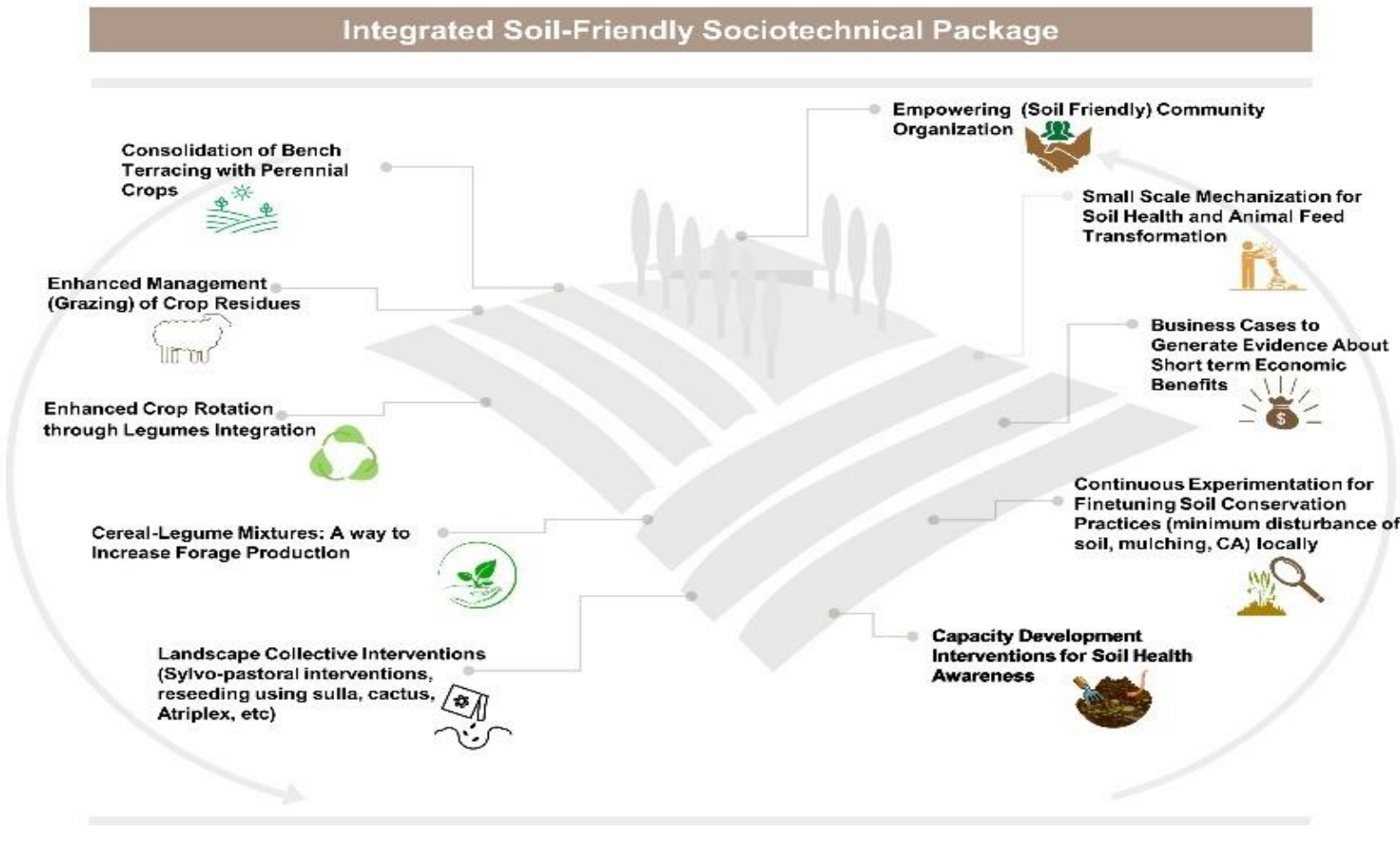


Photo credit: ICARDA, 2021,



Approche de Mise en Œuvre

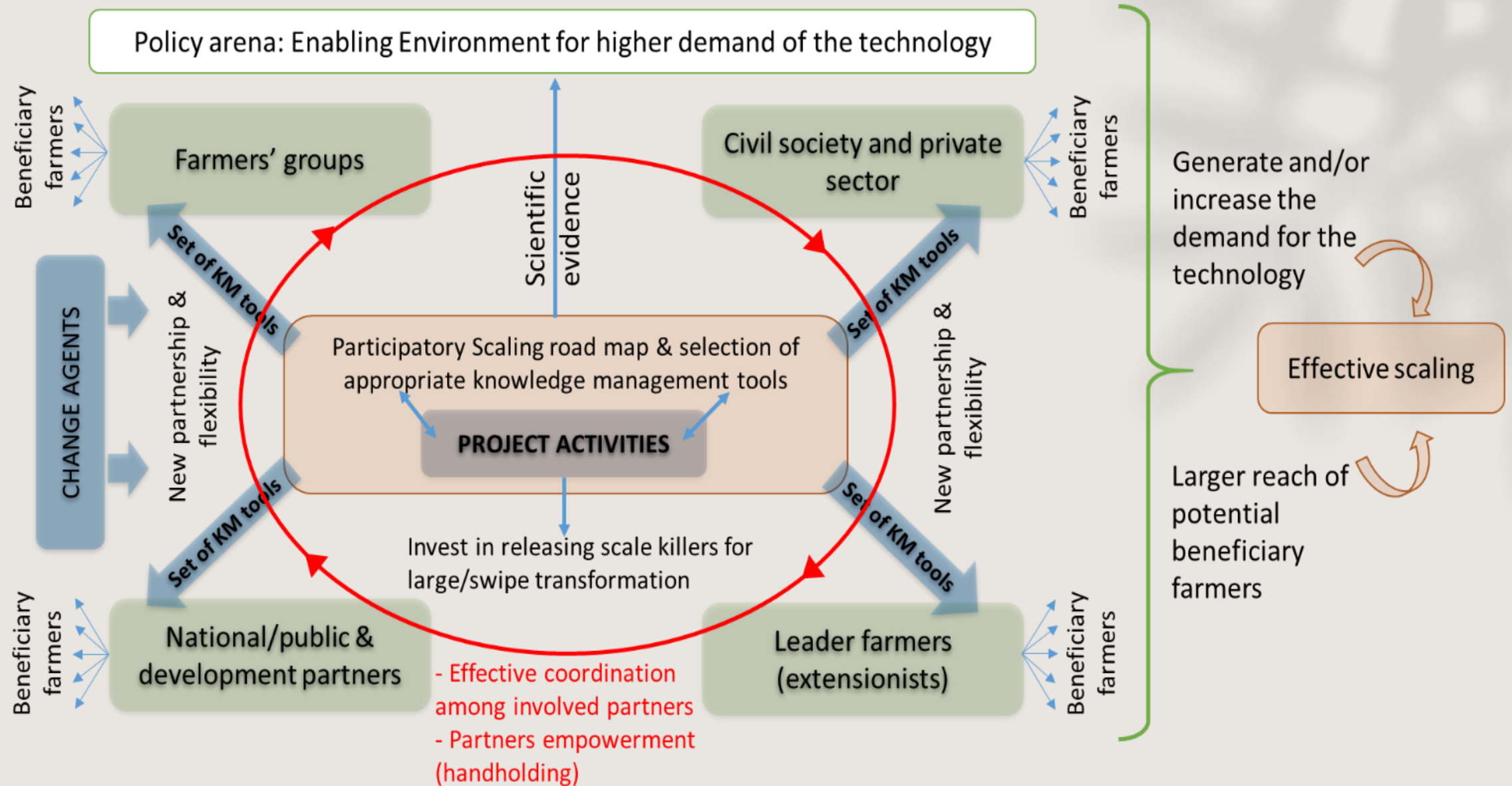
Paquet sociotechnique intégré respectueux du sol



- **Des innovations techniques complémentaires**
- **Des innovations sociales, et organisationnelles**

1- EXPERIMENTATION 2- DEMONSTRATION 3- DEVELOPPEMENT DES CAPACITES 4- RESEAUTAGE





Engage Effective Partnership & Deliver at Scale

**A project
of 2 Mio
USD
budget**



1,200

5,600

Gender Based-Interventions for Innovative Solutions in NA
reaching out 1200 women farmers

Dissemination of the Integrated Improved Crop-Livestock Management
Packages to 5,600 Mixed, Smallholder Farmers in NA and LAC Countries

20,000

Farmers are indirectly reached through broader CLCA
initiatives

6,000

Hectares were Implemented under CLCA
Farming Systems in NA and LAC Countries

125\$

A cost per beneficiary ratio of US\$125
compared to the average of US\$246 in
IFAD's 2016-2018 portfolio.

5,000

knowledge Provision & Capacity Lifting to more
than 5,000 Farmers, National and Local Extension
Agents, Students, Young Scientists, and Policy
Makers – in NA and LAC Countries

02

Private Public Partnerships

05

Knowledge Hubs for Leveraging the democratization
of knowledge and Communities Empowerment of
Contextualized CLCA Systems (CA, Forage,
Livestock) in Algeria and Tunisia

- ❑ **ITGC – PMAT-CLCA** in Algeria to Locally Produce Zero-till Seeders and Expand areas Under CA
- ❑ **INRAT-Cotugrain-CLCA** to scale forage crops and forage mixtures in Tunisia

Conclusions and recommendations

- Technology transfer to smallholder farms in the developing world need to be accelerated with the support of all national and international intervening parties,
- A more comprehensive approach of technology transfer need to be adopted by all, thus focusing of packaging relevant sociotechnical innovations (rather than a single technology) which have higher scaling scope and transformative impact,
- Agroecology practices and principles can be good illustration and guiding éléments for transformative innovation packages,
- A stronger partnership of the IOFS with the CGIAR system worldwide can only enhance and contribute to such transfer and experience sharing programs.

Thank you



INITIATIVE ON
Agroecology



INITIATIVE ON
Livestock and Climate