DryArc: a framework for a Sustainable Transformation of Dryland Agri-food systems under Climate Change

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ICARDA in the One CGIAR: sustainable dryland agri-food systems under climate change

Partnership with NARS

Family Farming
The DryArc Region is a third of the world population and agricultural land.
We need to move Fast

A systemic crisis requires a Systemic System of Innovation

High unemployment, unrest and migration
Food and nutrition insecurity
Demographic change, gender inequality
Urbanization and heat islands
Land degradation and desertification
Loss of agrobiodiversity
High water scarcity and low efficiency
Double impact of climate change; increasing temperature and reducing precipitation

We only have 10 harvests
There is large portfolio of Component Innovations

<table>
<thead>
<tr>
<th>Agro-ecosystems</th>
<th>Area (m ha)</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Irrigated systems</td>
<td>312</td>
<td>15</td>
</tr>
<tr>
<td>Rainfed systems</td>
<td>512</td>
<td>25</td>
</tr>
<tr>
<td>Agropastoral systems</td>
<td>873</td>
<td>43</td>
</tr>
<tr>
<td>Desert farming Potential</td>
<td>342</td>
<td>17</td>
</tr>
</tbody>
</table>

Data(s): Bread Wheat, Durum Wheat, Barley, Forages, Water(s), Soil(s), Model(s): Faba bean, Chickpea, Lentils, Grass pea, Goat, Date Palm, Cactus, Remote Sensing, ICT, Gender, Socio-economy
Four approaches to food security and sustainability in the Drylands

Irrigated
17%
More job per drop

Agro-pastoral
58%
Land Degradation Neutrality and Livelihood

Rainfed
22%
More food per drop

Desert farming
3%
Socio-ecological Resilience

NENA Agricultural Land (2.5 M km²)
We need Systemic Innovation for a Sustainable Transformation of Agri-food Systems

Resilience with Farm Diversity

Sustainability with Landscape management

Livelihoods with Market Linkages

- Rainfed
- Irrigated
- Agro-Sylvo-Pastoral
- Desert Farming
Five MODULES to Design and Manage R4D Projects

SHARE Knowledge, Technologies and Data

COMBINE Technologies in Systemic Innovation

ACCELERATE co-design with Farmers Communities

ENABLE Policies and Institutions for Systemic Innovation

INTEGRATE Innovations and Methods

icarda.org
Module COMBINE – technologies in systemic innovation

‘Restored’ vs. ‘Degraded’

125 mm Rainfall

3 years

4.5 T/ha of barley

Upstream
Water Harvesting and Biodiversity Restauration

Downstream
“Marab”

- Community-based
- Livestock Management
- Land Governance
Module COMBINE – technologies in systemic innovation

Laser assisted precision land leveling: a silent water revolution with impact at scale through science and partnerships

- Introduced through partnerships between CGIAR and NARS through eco-regional program, The Rice-Wheat Consortium (RWC)
- Best example of impact at scale in NRM with large private investments (~US$ 500 million) with public and private benefits

- Introduced in India during 2000-01 (RWC/CIMMYT-IRRI, ICAR/NARS)
- Adoption: ~6 million ha in India
- Direct employment generation: 350 person days/unit/yr
- At current level (40000 units) employment generation: 14 million person days/yr
- Indirect employment: manufacturing, transport, services
- Yield gains in RW system (5 mha, 0.5 t ha⁻¹ yr⁻¹) >2 mt yr⁻¹;
- Water saving in RW system (5 mha, 18 ha-cm ha⁻¹ yr⁻¹) = 10 km³ yr⁻¹
- Other benefits- GHG mitigation, savings in subsidy bill etc

Electricity saving for irrigation
Module ACCELERATE: Co-design with farming communities

Addressing the challenges of the Sahel

- Build partnership to scale-up innovations
- Adopt efficient systemic approach
- Improve system productivity and efficiency
- Promote options for agribusiness to youth and women
- Build capacity of partners
- Leading to improve livelihood and increased resilience of people
Module ACCELERATE: Co-design with farming communities
Linking farmers in community of practices
Scaling innovations through planned comparison

**ICRISAT**
INTERNATIONAL CROPS RESEARCH INSTITUTE FOR THE SEMI-ARID TROPICS

**DryArc**
Systemic Innovation for Dryland Family Farming

2019  >300
villages/2300 local innovators reaching
~20,000 farmers

2018  - 162 Villages /2047
local innovators

2017  -107 Villages /1260
local innovators
Module – INTEGRATE: Innovation and methods

The Innovation Process

- Learn
- Scope
- Plan
- Implement
- Observe
- Assess
- Continue
- Re-develop
- Refine

From Public and Private Sectors
Module – ENABLE: Policies and institutions for systemic innovation

Multisectoral models at country level to support policy and investments (e.g. AIDA)
Module SHARE Knowledge, Technologies and Data

AOI - Area of Interest; APIs - Application Program interface; KMT - Knowledge Management Tools; IMF - Integrated Modelling Framework; MEL - Monitoring and Evaluation Platforms; GeoOC - Geoinformatics Option and Context; GeoAgro - Geoinformatics for Sustainable Agroecosystems; TEDs - Technology Extrapolation Domains;
Next Steps

• Co-design the DryArc Interface and Modules:
  • Avoid duplication and create synergies for Dry Regions (FAO, GYGA, CSIRO…)
  • Define provision of services with stakeholders and governments
  • Accelerate knowledge sharing on innovations for the DryArc agro-ecosystems
  • Identify Hot-Spots for Systemic Innovation
• Co-design and raise funding for targeted R4D projects with countries and international Organisations
  • Regional or Country Level
  • Consideration of One or several of the Agro-ecosytems
  • Define targets in SDGs considering trade-offs and synergies
  • Engage with stakeholders and policy makers
• Participatory implementation of projects:
  • With local communities
  • Public-Private Partnership
  • Capacity development, Gender and Youth
  • Feed back to the DryArc Knowledge base for other regions
Thank you