Our vision
A food-secure future, equitable and sustainable natural resource management, and better livelihoods for the world’s rural dryland communities.

Our mission
To improve the lives of 1.6 billion rural people, and to mitigate land and resource degradation in 3 billion hectares covering the world’s dry areas through integrated agricultural systems research.
The majority of farmers in arid and semi-arid regions of the developing world grow crops and/or raise livestock on a small scale. They face daunting challenges – from infertile and degraded land, scarce water, and frequent drought, to authorities struggling to support them, poor marketing intelligence, and limited opportunities to try out innovations and new technologies. The result is low agricultural productivity that perpetuates a cycle of deep poverty and food insecurity.

To break the cycle of poverty and improve food security in the world’s dry areas, CGIAR – the global research partnership for a food-secure future – brings together eight of its centers worldwide and other partners in its ‘Research Program on Dryland Systems’, led by the International Center for Agricultural Research in the Dry Areas (ICARDA).

**Breaking the cycle of poverty and food insecurity**

The World’s Dry Areas

**The facts1**

- Cover 41% of the world’s surface
- Inhabited by 30% of the world’s population (2.5 billion people)
- Support 50% of the world’s livestock
- Grow 44% of the world’s food
- Account for the majority of the world’s poor, with around 16% living in chronic poverty
- Most of the world’s poor live in dry areas – with 400 million living on less than US$1 per day
- Drylands lose 23 hectares per minute to drought and desertification – a loss of 20 million tonnes of potential grain production every year.

**The challenges**

- Limited natural resources
- Harsh environments
- Low and erratic precipitation
- Scarce water resources
- Infertile soils
- Frequent drought
- Degraded agroecosystems
- Loss of cropland
- Salinization
- Loss of biodiversity
- High risk of crop and animal pests and diseases as the climate changes
- High unemployment.

**The potential**

- Rich plant biodiversity
- Vast underutilized groundwater resources
- Opportunities to diversify and intensify crop and livestock production systems
- Millions of hectares of degraded land to restore
- Opportunities to re-green drylands
- Opportunities to develop renewable solar and wind power
- Sound prospects for economic development.

“The complex challenges facing dry areas cannot be solved with one silver bullet, but will require an integrated approach involving sustainable natural resource management, crop and livestock genetic improvement as well as socio-economic innovation.”

*Frank Rijsberman, Chief Executive Officer, CGIAR Consortium*

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Photo: ILRI/S. Mann
Why drylands matter

Roughly 2.5 billion people – 30% of the world’s population – live in the dry areas. Failure to achieve sustainability in the drylands will mean failure for the global community. The challenges to sustainability are manifest in the drylands: in poverty, inequity, and human well-being; the effects of globalization; unbalanced private-public shares in development; damage to the environment; conflict and competition for resources; and poor governance.

The drylands are likely to suffer disproportionately from the impacts of climate change – because of their vast area, land use in the drylands affects atmospheric circulation and carbon fluxes. In proportion to their size, population, and importance for global sustainability, drylands ecosystems (in poor countries) receive less scientific and developmental attention, less investment than other major ecosystems, and are poorly understood by policy makers.1

Our approach

Agricultural research has helped improve the lives of smallholder farmers in the dry areas of many countries over the past three decades. But much more needs to be done to roll out practical ways to help rural communities on a wider scale. Our approach combines crop agronomic improvement, natural resources management, and socio-economics in research that considers agricultural livelihood systems in an integrated and ‘holistic’ way. This systems approach is important because scarce water resources, land degradation, urbanization, commodity price shocks, and climate change are affecting dry areas particularly harshly.

Resilience systems

We work with rural communities to reduce vulnerability in drylands where resources are scarce or lacking, and where agriculture is risky, uncertain, and offers farmers little or no potential for making a profit.

Pastoral livelihood systems constrained by over-grazing, land degradation, climate variability, and seasonal gaps in feed supply.

Agropastoral livelihood systems constrained by overgrazing, rangeland and forage feed imbalances, land degradation, soil erosion, conflicts between pastoralists and crop growers, and climate variability.

In resource-lacking agricultural livelihood systems, we work to build resilience and provide farmers with innovative practices and technologies to deal with risks and minimize losses.

Intensiﬁable systems

We work with rural communities to sustainably intensify agricultural production in drylands that are rich in resources, where conditions for agriculture are favorable, and where farmers have opportunities to produce more from their land.

Tree-based livelihood systems constrained by rapid degradation by humans, livestock overgrazing, land degradation, and climate change.

Irrigated livelihood systems constrained by groundwater depletion, salinization, and heat stress.

Rainfed livelihood systems constrained by land degradation, nutrient deﬁciencies, climate variability, and water scarcity. Rainfed livelihood systems can also be high risk and subject to severe drought, in which case they may be somewhere between high risk and intensiﬁable.
In intensifiable agricultural livelihood systems, we work to provide farmers with innovative practices and technologies to intensify sustainable production.

Our research provides policy makers with scientific evidence to develop policies that will benefit marginalized farming communities living in the world’s dry rural areas.

To complement what we learn at action sites, we bring our partners together in ‘innovation platforms’ to develop an understanding of what works best and where, and to explore how to boost productivity, manage natural resources, improve value chains, and adapt to climate change.

How we work

We work with scientists, agricultural and social extension workers, farming communities, policy makers, regional and international organizations, development agencies, and the private sector.

Our research

Our research validates practical ways to help agricultural communities in drylands to spread their risks and raise their incomes. We combine improved and new plant and animal varieties with sustainable land and water management, and integrated disease and pest management. We consider socio-economic issues, particularly relating to women and youth. Our holistic approach also examines opportunities for policies and institutions to scale-out solutions to rural communities across countries.

Our research in the program’s five flagship projects addresses the following aspects of dryland agricultural livelihood systems:

- **Well-functioning innovation platform/value chains** – the program is developing and progressing its research work through over 45 innovation platforms established in various agricultural livelihood systems
- **Assessments, methods, approaches, publications** – the program is strengthening the Dryland Systems evidence base
- **Resilience and intensification options and approaches for communities** – the program is packaging and testing options for building resilience with communities in areas lacking resources and for the intensification with communities in resource-rich intensifiable agricultural livelihood systems

Our global partnership

As the global research program on dryland agroecosystems, we draw on partners worldwide to come up with innovative solutions to dryland challenges:

- Eight CGIAR Centers
- Advanced research institutions
- Regional and sub-regional organizations
- National research and extension systems
- Development agencies
- Farming communities
- Civil society organizations
- Private sector.

We tackle whole agricultural livelihood systems, considering crops, livestock, rangeland, trees, soils, water, and livelihoods rather than focusing on individual aspects of agriculture.

We foster innovation platforms to address challenges collectively and deliver combinations of technologies, innovative partnerships, and market opportunities to improve the lives of smallholder farmers.

We encourage changes in governance and policies to meet the daily realities of rural communities.

We test and validate integrated technological, institutional, governance, and policy solutions that are specifically tailored to agricultural livelihood systems in the dry areas. We search for solutions that similar agricultural livelihood systems in other regions can adapt.

We integrate gender equity and youth in all our research.

We build capacity both within the program and of stakeholders across all our research.

Photo: IWMI/N. Palmer
Putting knowledge sharing and learning into action – the program is progressing a strategy and approaches to ensure continuous learning, to synthesize and exchange information, and to link the program’s flagship projects and agricultural livelihood systems

Partnership and capacity strengthening – the program is progressing and strengthening a range of partnership and capacity building activities.

The difference we expect to make

We expect our research to make a real difference in overcoming key development challenges faced by dryland communities and to achieve concrete improvements in:

- Resilient livelihoods – better knowledge, skills and capacities for vulnerable rural households living in dryland areas lacking resources
- Wealth and well-being – higher and sustainable incomes, and improved well-being of households in resource-rich intensifiable agricultural livelihood systems
- Food access – women and children in households have year-round access to a greater quantity and diversity of food sources
- Natural resources management – more equitable and sustainable management of land, water, resources, energy, and biodiversity
- Gender and youth empowerment – women and youth have better access to and control over productive assets, inputs, information, and market opportunities, and capture a more equitable share of improved incomes, food supplies, and other benefits
- Capacity to innovate – increased and sustainable capacity to innovate within and among low income rural dryland communities, allowing them to seize new opportunities and meet challenges to improve livelihoods, and bring solutions to scale.

By 2025, we expect to see that our research work has contributed to improved food security, increased incomes and opportunities, and a more equitable and sustainable management of land and natural resources for:

- 137 million people living rurally in the West African Sahel and Dry Savannas
- 191 million in North Africa and West Asia
- 237 million in East and Southern Africa
- 39 million in Central Asia and
- 978 million in South Asia.
Where we work

We work in five flagship projects covering agricultural livelihood systems in over 3 billion hectares across drylands. In each of the flagship projects, much of our work takes place in what we call ‘action sites’.

Our action sites reflect the main agricultural livelihood systems in each flagship project. This means that practices that prove successful in an action site can be applied rapidly or ‘scaled out’ right across similar dryland systems.

Figure 1: Flagship projects

<table>
<thead>
<tr>
<th>Flagship and region</th>
<th>Countries</th>
<th>Target population</th>
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<tbody>
<tr>
<td>Flagship 1: West African Sahel and Dry Savannas</td>
<td>Burkina Faso, Ghana, Mali, Niger, and Nigeria</td>
<td>137 million people</td>
</tr>
<tr>
<td>Flagship 2: North Africa and West Asia</td>
<td>Algeria, Egypt, Iran, Iraq, Jordan, Libya, Morocco, Oman, Palestine, Saudi Arabia, Syria, Tunisia, Turkey, and Yemen</td>
<td>91 million people</td>
</tr>
<tr>
<td>Flagship 3: East and Southern Africa</td>
<td>Ethiopia, Eritrea, Kenya, Malawi, Mozambique, Somalia, South Sudan, Sudan, Tanzania, Zambia, and Zimbabwe</td>
<td>237 million people</td>
</tr>
<tr>
<td>Flagship 4: Central Asia</td>
<td>Kazakhstan, Kyrgyzstan, Tajikistan, Turkmenistan, and Uzbekistan</td>
<td>39 million people</td>
</tr>
<tr>
<td>Flagship 5: South Asia</td>
<td>India and Pakistan</td>
<td>978 million people</td>
</tr>
</tbody>
</table>
Flagship Project 1: West Africa Sahel and the Dry Savannas (WAS&DS)
Farming communities in the WAS&DS struggle with drought, soil erosion, and poor infrastructure. Poverty and a lack of support services make things worse. Cropped areas are expanding and pastures are shrinking making pastoral and agropastoral livelihoods less viable.

In this flagship project we work to develop links between smallholder farmers and regional livestock markets. We introduce new ways to manage land and water to make scarce resources more productive. In two innovation platforms, in Mali and Ghana, we work to help farmers raise crop yields and diversify production into vegetables.

Flagship Project 2: North Africa and West Asia (NAWA)
Climate change is likely to hasten degradation of aquifers in NAWA. Agropastoral lifestyles are dying out as young people migrate from rural areas and as farms fragment and become too small to be viable.

We work to help those who remain on the land to add value to their produce and take advantage of nearby European markets. Our work in five innovation platforms in North Africa and West Asia, Morocco, Tunisia, Egypt, Jordan, and Iran, helps farmers to improve the production of small ruminants, cereals, and food legumes, and to make the best use of scarce water.

Flagship Project 3: East and Southern Africa (ESA)
The arid and semi-arid agricultural systems in ESA suffer recurrent drought. Poor infrastructure, poor services, and weak connections with markets exacerbate rural communities’ vulnerability to drought.

Here we work to help farmers adapt to adverse environmental conditions. Our work in four innovation platforms in East and Southern Africa helps farmers improve production of cattle, goat, maize, and groundnut.

Flagship Project 4: Central Asia (CA)
In CA we work to help mechanize the relatively large farms. We help farmers learn irrigation techniques that will make the most of the region’s significant saline water resources while preventing land salinization and degradation.

We work in three innovation platforms in CA to help farmers improve water use and manage salinity. Our scientists work to develop crop varieties that are tolerant to drought, heat, and salinity.

Flagship Project 5: South Asia (SA)
SA is another region where we work to help farmers mechanize. This region has a major problem with salinity in irrigated areas. We work to introduce practices to use water resources sustainably to raise productivity. Our innovation platform in SA, and three in India, promote packages of improvements that have proved to be effective. Here, we also encourage women and youth to set up their own micro-enterprises.

“We can now identify the right combination of genes to produce the resilience to grow crops in arid conditions. To this end, a new integrated breeding platform that CGIAR Centers and national partners are establishing in Morocco is expected to have particular relevance for the dry area environment.”

Frank Rijsberman, Chief Executive Officer, CGIAR Consortium
The CGIAR Research Program on Dryland Systems aims to improve the lives of 1.6 billion people and mitigate land and resource degradation in 3 billion hectares covering the world’s dry areas.

Dryland Systems engages in integrated agricultural systems research to address key socioeconomic and biophysical constraints that affect food security, equitable and sustainable land and natural resource management, and the livelihoods of poor and marginalized dryland communities. The program unifies eight CGIAR Centers and uses unique partnership platforms to bind together scientific research results with the skills and capacities of national agricultural research systems (NARS), advanced research institutes (ARIs), non-governmental and civil society organizations, the private sector, and other actors to test and develop practical innovative solutions for rural dryland communities.

The program is led by the International Center for Agricultural Research in the Dry Areas (ICARDA), a member of the CGIAR Consortium. CGIAR is a global agriculture research partnership for a food secure future.

For more information, please visit drylandsystems.cgiar.org