A rapidly changing context

Throughout my career I have encountered a multitude of serious challenges to the livelihoods of rural farming communities in the drylands, not least the impact of climate change and declining agricultural resources. As the COVID-19 pandemic, ongoing at the time of publishing this report, is an unprecedented threat that has starkly exposed the fragility of global food systems, I am deeply humbled by ICARDA’s dedicated staff, partners and donors who continued throughout to meet our objectives, and the crisis clearly demonstrates that demand-driven research-for-development for more resilient dryland livelihoods must accelerate.

In 2019 ICARDA continued to pursue that exact goal. Through new approaches that respect the environment, such as crop improvement and water management, conservation agriculture, rangeland protection and soil restoration, integrated livestock/fodder systems, and Farming with Alternative Pollinators, we increased farmer incomes while rehabilitating land for enhanced and long-term use. Our water management projects, critical under a changing climate, along with innovations like the raised-bed wheat systems and improved climate/disease resistant crops and livestock, helped farmers in water-scarce, hot surroundings, achieve ‘more with less’. And seed multiplications from our International Nurseries and Genebanks were scaled up in time for well-prepared 2019 planting seasons, the products of which now help to provide safety nets for communities hit by COVID-19.

As the only CGIAR center headquartered in the non-tropical drylands we can play a critical role in ensuring the viability of existing and resilient livelihoods in the dry areas of the developing world, many of which lack adequate electrification. A future where small-scale farmers can achieve adequate incomes, secure access to food, markets and nutrition, and have the capacity to manage natural resources in equitable, sustainable, and innovative ways.

Who we are

The International Center for Agricultural Research in the Dry Areas (ICARDA) is a non-profit international organization undertaking people-centered research-for-development to provide innovative science-based solutions that improve the livelihoods of communities across the non-tropical dry areas. In partnership with research institutions, governments, NGOs, and the private sector, our work advances global, knowledge, shapes practices, and informs policy.

Since its establishment in 1973, ICARDA has implemented research collaborations in 30 countries across the world’s dry areas. We have engaged on-ground teams with a range of specialized skills, our scientists draw from unique collections of the world’s major food crops, extensive research funding networks, and forty years of trust from within the countries where we work. Our scientists design, implement, and evaluate transition-oriented scientific solutions that are applied across the CGIAR System Level Outcomes, the UN SDGs, and the priorities of the countries we work in. We focused on technologies proven and scale up in time for well-prepared planting seasons, the products of which now help to provide safety nets for communities hit by COVID-19.

A people-centered vision

Our approach puts the knowledge, experience and challenges of the communities we serve at the center of our research. We believe this is the only way to ensure the robustness and resilience of livelihoods in the dry areas of the developing world, many of which lack adequate electrification. A future where small-scale farmers can achieve adequate incomes, secure access to food, markets and nutrition, and have the capacity to manage natural resources in equitable, sustainable, and innovative ways.

SUSTAINABLE DEVELOPMENT GOALS

CGIAR SYSTEM LEVEL OUTCOMES

CROSS CUTTING THEMES

SCIENTIFIC RESEARCH PRIORITIES

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Our vast and diverse basket of proven technologies can address many dryland challenges

Aly Abousabaa
Director General, ICARDA
Our international mandate for research-for-development in non-tropical dry areas

Our international mandate for research-for-development in non-tropical dry areas

Global dry areas cover some 47 percent of the world’s land and are home to 30 percent of the global population. Non-tropical dry areas are characterised by hot, dry summers and cool or cold winters with precipitation primarily in the cool season, often accompanied by dry spells. Rainfall is marginal and its distribution and reliability are highly variable.

The charter of ICARDA was signed in 1975 by the International Bank for Reconstruction (IBRD), the Food and Agriculture Organization of the United Nations (FAO), and the United Nations Development Programme (UNDP) and, on behalf of the Consultative Group on International Agricultural Research (CGIAR).

ICARDA was assigned international responsibility for the improvement of barley, lentils, and faba beans and regional responsibility, in cooperation with other CGIAR centers, for research in wheat, chickpea, and other crops of major importance to the region, such as grasspea, pasture, and forage legumes, as well as associated farming systems. ICARDA is also mandated to undertake research into small ruminant (sheep and goat) production systems.

How we work

We provide innovative, science-based solutions for communities in the non-tropical dry areas of the developing world. We work together with a wide network of national agricultural research systems (NARS) and advanced research institutions to enhance their efforts and competencies so they can drive their own research and development agendas. We also work closely with other CGIAR research centers, NGOs, governments, and the private sector. We aim to provide communities with:

- **Better biodiversity and crops**
  - We conserve and use landraces and crop wild relatives in our Genebank and breeding programs to develop new germplasm and breeds.

- **Climate-adapted livestock systems**
  - We search for adaptive traits in indigenous sheep and goat populations and build our breeding programs on adapted livestock. We utilize innovative technologies and approaches to increase sheep and goat productivity and promote climate-smart feed and precision feeding systems.

- **Sustainable land, soil and water management**
  - We deliver practical technologies and solutions that protect environments and help smallholder farmers produce ‘more with less’ through integrated packages that enhance water, land, and workforce productivity in the face of water scarcity, limited resources, and severe land degradation.

- **Improved farmer livelihoods**
  - We develop sustainable value chains that prioritize smallholder farmers and households in dry areas. The value chains target our mandate crops – barley, lentil, faba bean, wheat, chickpea, and grasspea – and sheep and goats.

Dryland Communities

40 percent of the world’s food is grown on just 10 percent of the land. Yet, of the 3.7 billion people who live there, almost 20 percent live in chronic poverty. As climate change intensifies, farmers face serious water scarcity, climate variability, severe environmental degradation, and extreme temperatures and drought.

Unless the drylands are better utilized and livelihoods improve, widespread poverty, political instability, and unemployment will force ever-growing populations to leave their homes in search of better opportunities elsewhere, placing pressures on cities, governments, and other countries.

Our unique scientific expertise, vast network of partners, and our decentralized model of operation put us in a unique position to deliver the innovative solutions needed to transform agriculture and achieve sustainable and resilient livelihoods in non-tropical dry areas.

Better biodiversity and crops

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Climate-adapted livestock systems

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Improved farmer livelihoods

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ICARDA strengthened its role as a global leader and collaborator in research-for-development in non-tropical dry areas through its partnerships, open-access data, and proven successes.

**33 countries**

**50 projects in**

**innovations**

**14 new**

**publications**

**889 total**

**with ex ante assessment and suitability mapping (assessing remote sensing and artificial intelligence to support the scaling of interventions in arid and semi-arid regions).**

In India, ICARDA developed innovative tools based on remote sensing to support adaptation to climate change.

In the MENA region, integrated management systems with conservation agriculture practices, and livestock grazing have been developed to improve productivity and resilience of low rainfall rangeland areas.

In collaboration with FAO, NARS partners, and the University of Cordoba, ICARDA established an international network to improve water management and increase productivity of a wide range of crops in farmers’ fields across the MENA region.

ICARDA is also being used as a framework to restructure ICARDA Research Programs into more strategic research teams. ICARDA significantly advanced the implementation of its 2017–2026 Strategic Plan, supported by key partners and donors in the countries where we work. ICARDA’s partnerships with these stakeholders, as well as with other CGIAR Centers and Research Development Institutes, have created strong bonds and enhanced our integration with scientific communities that cover a wide diversity of disciplines.

With the support of the CGIAR Excellence in Breeding Platform and after an independent review of ICARDA’s breeding programs, ICARDA is fully engaged in the modernization and upgrading of its facilities.

In collaboration with other CGIAR Centers, ICARDA made significant contributions to the development of the Two Degree Initiative in which ICARDA leads the MENA Grand Challenge, the Livestock Initiative, the CGIAR GENDER Platform, and the Excellence in Agronomy Initiative.

ICARDA continues to coordinate development of the DryArc Initiative, in collaboration with seven other CGIAR Centers. The DryArc, with its systemic approach of innovation in dryland agriculture systems under water scarcity and climate change, will make significant contributions to the Sustainable Development Goals (SDGs)

More than 7,000 germplasm accessions and elite germplasm of our mandate crops were shared in 46 countries to support adaptation to climate change and sustainable intensification.

ICARDA’s online training platform and the ICARDA alumni group were expanded.

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During 2019, the Capacity Development Unit continued its expansion with special support provided by The Arab Fund for Social & Economic Development (AFESD) for the training of Master and PhD students from Arab countries. More than 1,250 trainees from national programs (42 percent of them women) were supported at 60 special courses.

ICARDA’s long-term partnership with the International Centre for Advanced Mediterranean Agronomic Studies (CIHEAM) was further developed with four international courses on Food Loss and Waste, Livestock and Climate Change, Big Data in Agri-Food Systems, and Farming Systems Design.

ICARDA Board members and Management are actively engaged in the reform process designed to create a more integrated CGIAR, known as One CGIAR.

ICARDA Director General Mr. Aly Abousabaa was appointed as Director General and Co-Convenor to the CGIAR General Assembly and coordinated the engagement of all 15 Centers/Alliances in the future One CGIAR General Assembly and coordinated the engagement of all 15 Centers/Alliances in the future One CGIAR. ICARDA’s Board and Management continue to engage in the One CGIAR process at different levels, through the System Management Board, Transitional Consultation Forum, Transition Advisory Groups, CGIAR Communities of Practice, and working groups. Through regular meetings of various groups, constructive feedback is provided by ICARDA on a continuous basis.
Increased and reliable agricultural production in dryland areas is vital to global food security and addresses growing dependence on costly food imports amid the challenges presented by climate change, diminishing natural resources, and rapidly growing populations. Conserving and utilizing dry area crops, landraces and wild relatives can improve agricultural production by securing genetic gains, allowing adaptation of crops to climate change, and addressing market-related challenges such as grain quality and costs of production.

In 2019, ICARDA continued to play a critical role in the conservation, development, improvement, and dissemination of climate-resistant, market-driven crop varieties that provide a critical defence against extreme temperatures, water scarcity, and the emergence of new pests and diseases.

In Ethiopia, Nigeria and Sudan, the ICARDA-coordinated Technologies for African Agricultural Transformation (TAAT) project, funded by the African Development Bank, has used an innovation platform to build networks and partnerships for the release of improved crop varieties with traits such as high grain yield and quality, abiotic (drought, heat) and biotic (rust, fungal) stress tolerance, and early maturity. In partnership with FAO we laid the groundwork for a future program to support the recovery of Syria’s food system by vastly multiplying basic wheat, barley, chickpea, and lentil seed, and our seed health programs in Lebanon and Morocco help monitor and quarantine pests and diseases. Our research in West Asia, and North and East Africa. Ranked among the most important worldwide, these genebanks hold more than 143,000 accessions (seed ‘lots’), gathered mainly from Central and South America, the Pacific, and countries of the Global South – a valuable collection of resources for drylands agriculture.

Within this project, ICARDA helped organize the First International Experts Workshop on Pre-breeding Utilizing CWR Varieties, bringing together representatives from 45 countries, including the representatives of CGIAR centers, universities, and national partners. Pre-breeding is the process of identifying favorable genetic traits from landraces and crop wild relatives, and introducing them into breeding programs to develop modern crop varieties. Better seeds for all who need them

ICARDA’s mandate within CGIAR is to improve barley, lentil, and chickpea in West Asia and North Africa, and grasspea and six wild Lathyrus species with resistance to major insect and disease. The genebanks hold more than 143,000 accessions, conserved in genebanks for safekeeping.

In 2019, new sources of resistance to major insects and diseases were discovered for barley, lentil, and wheat, one of which is fast disappearing species essential to global food security. Within this project, ICARDA helped organize the First International Experts Workshop on Pre-breeding Utilizing CWR Varieties, bringing together representatives from 45 countries, including the representatives of CGIAR centers, universities, and national partners. Pre-breeding is the process of identifying favorable genetic traits from landraces and crop wild relatives, and introducing them into breeding programs to develop modern crop varieties.
BETTER AGRICULTURAL BIODIVERSITY AND CROPS

In response to rapidly changing climatic conditions across non-tropical dry areas, ICARDA applies conventional and molecular breeding strategies to develop highly adapted crops and livestock with resistance or tolerance to major biotic constraints such as disease and pests, and abiotic constraints such as heat, salinity, drought, and cold spells.

Speed-breeding protocol for cool-season food legumes

Speed-breeding under controlled conditions – daily exposure to artificial light – shortens the growth-time of one generation of a plant. This reduces the generation advancement time from five years to one, significantly reduces field and labor costs, and shortens the overall time needed to release a new variety.

In 2016, ICARDA established a fully automated pilot facility in Rabat for speed breeding with a capacity for 3,000 entries. This facility successfully develops and optimizes speed breeding protocols, including screening for diseases. In 2020, within the framework of the Modernization of ICARDA Breeding Programs initiative, supported by the AFESD and the Templeton World Charity Foundation, among others, ICARDA will scale-up the facilities and increase capacity to more than 100,000 entries.

ICARDA’s barley and wheat program

In 2019, ICARDA’s wheat and barley breeding programs, supported by CIMMYT, have released 18 ICARDA improved crop varieties contributing to food security. It is a highly valued partner in our collaboration for improving crops that will actually produce in these environments that ICARDA targets.

ICARDA’s supply of high-quality germplasm under development testing environments is a major pillar in our collaboration for improving crops that will actually grow in this country generating many food legumes and cereals varieties contributing to food security. It is a highly valued partner in our collaboration for improving crops that will actually grow in this country generating many food legumes and cereals varieties contributing to food security. It is a highly valued part-

In Egypt, the outbreak of faba bean necrotic yellow vi-
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tries where the weed originated and Ethiopia and Sudan where it has since spread. Heat-tolerant faba bean seeds were also identified and dissected for components. These lines can survive at 35°C during the flowering stage. Breeding efforts.

ICARDA’s faba bean breeding profiles were developed

Improving faba bean yields through integrated agricultural packages

ICARDA’s integrated packages of knowledge and new innovative approaches to soil, land, and water manage-
ment, backed-up by the buy-in and trust of the local communities where we work, offers dryland countries a route to self-sufficiency in the production of their stra-
tegic crops.

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CLIMATE-ADAPTED LIVESTOCK SYSTEMS

Low productivity in livestock farming is a significant constraint on farmers’ earning potential in drylands, representing a lost opportunity to strengthen their food security and reduce poverty. ICARDA’s approach to genetic improvement – community-based breeding programs – is a practical and low-cost way to enhance farmer access to improved genetics. It combines farmer training to improve breeding methods; the pooling of community herds to create larger gene pools; farmer-scientist interactions to evaluate different breeding options; and monitoring the breeding performance of individual animals. In Tunisia, our small ruminant program integrates climate-smart crop production, precision feeding systems, and monitoring on tick-borne diseases.

ICARDA’s integrated approach to crop-livestock systems enhances the sustainable management and use of natural resources. It increases soil organic matter and nutrient cycling, fosters biodiversity, through the adoption of CA, promotes diversification and improves soil health, by implementing cereal-forage legume rotations, and uses the strategic planting of shrubs and vegetation to restore degraded agro-pastoral land.

AniCloud For Faster Data

A platform called AniCloud was developed for data collection and management in community-based livestock programs in collaboration with Abacus Bio and EM-Farming. The platform captures and stores data, and integrates with the AniCapture BRAPA. The platform is designed for rapid data collection and management by farmers and livestock owners, and allows for faster decision-making.

In Ethiopia, the impact of CLCA resulted in a 30–40 percent reduction in irrigation water-use and a two- to three-fold increase in barley and wheat production. In Algeria, the impact of CLCA was measured at 62 kilograms per hectare (kg/ha) under CLCA technology, which has received a US$560,000 investment to upscale implementation. The platform also assesses the impact of CLCA on natural resources, especially soil health and water efficiency. Preliminary results in Tunisia showed that soil loss due to erosion reduced by 14 percent, some 42 kilograms per hectare (kg/ha) under CLCA technology, compared to conventional practices.

Integrated crop–livestock conservation agriculture farming systems

Through an initiative funded by the International Fund for Agricultural Development (IFAD), use of crop-livestock conservation agriculture (CLCA) in the Drylands, ICARDA offers smallholder farmers in Algeria and Tunisia flexible technology packages to implement CLCA and alternative feed resources, and animal health interventions. The integrated Organization for Scaling approach brings together professional farmer groups and private seed companies to develop multiple strategies for the promising forage seeds and avoid availability bottlenecks.

At three sites – in Bonga, Horro and Menz – the project has given Ethiopia’s livestock farmers a critical enabling the groups to build capital from investments. The programs target 3,200 households in 40 villages.

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ICARDA’s developing guidelines on the CLCA can be adopted and scaled up in similar conditions globally through a ‘Livestock for Profit’ strategy under CLCA systems. This encompasses viable grazing, forage and alternative feed resources, and animal health interventions. The integrated Organization for Scaling approach brings together professional farmer groups and private seed companies to develop multiple strategies for the promising forage seeds and avoid availability bottlenecks.

Climate-adapted livestock systems for community resilience in Ethiopia

In 2019, we strengthened our partnership with the International Livestock Research Institute (ILRI), the University of Natural Resources and Life Sciences, and Ethiopia’s National Agricultural Research Organization (NARS). Farmers designed and implemented flexible technology packages targeting 2,200 households in 40 villages.

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HERE WE WORK

1. Irrigated farming
   A wide diversity of crops less dependent on seasons. ICARDA irrigated approaches protect the environment through crop rotations and intercropping. Also integrates high yielding crop varieties, land preparation and irrigation systems for efficient water use, solar-powered irrigation, fertilizer efficiency, salinity management.

2. Rainfed
   Producing more food in an uncertain climate. ICARDA reduces rain dependency through ‘more-for-less’ innovations - drought-resistant crops and livestock, mechanization, better land, soil and water management and conservation agriculture.

3. Agro-sylvo-pastoral farming

4. Desert farming
   Resilient livelihoods without rain - ‘More-for-less’ innovations such as date palm and multi-layer systems, protected agriculture, soil-less agriculture, solar-powered irrigation, salinity management, canals and heat-tolerant livestock for efficient forages, shrubs.

Limited irrigation may be used for some crops and at some periods in rainfed and agro-sylvo-pastoral systems. ICARDA can support implementation of all four farming systems in any dryland country.
Better Land, Soil, and Water Management for Food Production and Diversified Diets

Nowhere in the world is water scarcity a more direct threat to the lives of millions of people than in dryland countries. In on three diversified and sustainable practices for family and large-scale farming.

ICARDA solutions allow farmers to plant and manage crops at the optimal time, without being at the mercy of unpredictable rainfall. The RBM can prepare an acre of agricultural land in 30 minutes, a task that would otherwise take 10 farmers a full working day to complete manually. The RBM, initially used for wheat, has also been tested on berseem clover, maize, cotton, and faba beans.

Furthermore, under the project, Enhancing Water Productivity by Improving On-farm Irrigation Management (Phase IV) conducted field school days, workshops, and seminars. Enhancement of water and land productivity, and soil use efficiency at the farm level, improved nutrition at the household level.

Innovative Agriculture for Small Holder Resilience (INASHR)

This project aims to scale up a combination of best agronomic and agronomic practices in Egypt, including water-saving, mechanized raised bed, crop rotation, and water and land management strategies to improve wheat and faba bean production. Adoption of the proposed package will contribute to improved soil fertility and water use efficiency at the farm level, improved water quality for downstream users, and improved nutrition at the household level.

Enhancing water and land productivity in Egypt

In 2019, in collaboration with Agricultural Research Center, Zagazig University, and Tanta Momen of Egypt, ICARDA developed an improved version of the Raised Bed Machine (RBM) to expand the adoption of a mechanized raised bed system (MRB) among smallholder farmers in Egypt for multiple crops. The RBM can prepare an acre of agricultural land in 30 minutes, a task that would otherwise take 10 farmers a full working day to complete manually. The RBM, initially used for wheat, has also been tested on berseem clover, maize, cotton, and faba beans.

The RBM can grow different crops simultaneously, improving water productivity and increasing yields in diversified wheat-based farming systems. Since 2010, farmers using the RBM in Egypt have experienced a 25 percent saving in applied water, a 25 percent reduction in farming costs, and a 30 percent increase in the efficiency of fertilizer use, and a 25 percent increase in crop yields.

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ICARDA’s Arabian Peninsula Regional Program (Phase IV)

In a country where approximately 10 percent of wheat production – by more than 1.5 billion cubic meters per year by 2025. In addition to strengthening national food security, the technology could also save irrigation water – by more than 12 million cubic meters per year by 2025. In addition to strengthening national food security, the technology could also save irrigation water – by more than 1.5 billion cubic meters per year by 2025.
BETTER LAND, SOIL, AND WATER MANAGEMENT

TO PROTECT RANGELANDS

ICARDA’s research team on soil, water, and vegetation management works with agro-pastoral communities to protect rangeland health through unique and integrated soil and water conservation technologies, landscape afforestation with indigenous multi-purpose species (herbaceous, shrubs and trees), and better livestock management programs (grazing management). Together, these are essential to ensure the stability and resilience of communities’ agro-pastoral production.

ICARDA’s research team on soil, water, and vegetation management works with agro-pastoral communities to protect rangeland health through unique and integrated soil and water conservation technologies, landscape afforestation with indigenous multi-purpose species (herbaceous, shrubs and trees), and better livestock management programs (grazing management). Together, these are essential to ensure the stability and resilience of communities’ agro-pastoral production. Protecting rangelands is critical to protecting ecosystems, enhancing productivity, and enhancing ecosystem services.

Threatened rangelands = threatened communities

Three years into ICARDA’s rangeland and Marab rehabilitation activities in Jordan, efforts to help one locality achieve micro-water harvesting while enhancing rangeland vegetation survive current 5 percent pressure to improve vegetation and biodiversity. Though average rainfall in the region is 200 millimeters (mm), soil degradation is a concern and technology is needed to improve these conditions. Marab rehabilitation has since been adopted by the state and local communities.

ICARDA’s ambitious rehabilitation project using Marabs and ICARDA technology has been a model for outscaling best silvopastoral practices. The project is now being monitored and managed with support from ICARDA and local communities. The improved site is owned by the state (forestry commission) for use by surrounding communities with grazing access. However, these farmers have also requested access to seeds (for the sulla forage legumes) and seeds (for the shrubs and trees) for their own private land, demonstrating the adoption and scalability potential of the technology.

Integrated watershed management in Jordan

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Promoting silvopastoral practices to protect rangeland in Tunisia

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A pilot silvopasture site established in 2017 in central Tunisia quickly became a center of national attention and a model for outstanding best silvopastoral practices. The focus of the project is on remerging degraded areas using indigenous forages and woody species. It is now being monitored and managed with support from CRP Livestock. The remerging, using native forage legumes (sulla) and native shrubs, has completely changed the landscape and improved access to seeds (for the sulla forage legumes) and seeds (for the shrubs and trees) for their own private land, demonstrating the adoption and scalability potential of the technology.

The Rangeland Restoration Toolbox

The Rangeland Restoration Toolbox website is designed to enhance the sustainability of Marab-based management. It features best delivery models and tools for Marab implementation, based on biophysical assessment tools, allowing water for targeted field crop support. ICARDA optimizes the concept through advanced site location and implementation, based on biophysical assessment tools, technology, and help countries achieve land degradation neutrality.
The ultimate goal of our research in global drylands is to break the cycle of poverty, improve food and nutritional security, halt or reverse the alarming process of resource degradation, and help communities living in non-tropical dry areas adapt to the impacts of climate variability and change. We envision thriving and sustainable agricultural sectors that generate adequate incomes, provide secure access to food, markets, and nutrition, and support communities so they can manage their natural resources and sustain their own livelihoods.

Although agriculture has the potential to generate income and provide financial stability for rural households, this potential is often not reached as food production systems are not fully developed, and targeted investments—in new technologies, infrastructure, and markets—are low.

Enhancing farmer access to markets requires efforts to improve the business management and marketing skills of smallholder farmers, ensuring they have the knowledge and expertise to meet quality standards. ICARDA researchers assess and evaluate value chains for major dryland crops and commodities, such as durum wheat, barley, legumes, and small ruminants, and we work closely with key stakeholders along each chain to allow agriculture to generate income for poor households and stimulate wider economic activity.

**Demand-driven selection of durum wheat varieties for Africa**

In 2019, ICARDA identified that food legume-cereal rotations have clear economic advantages over cereal monocropping in a study covering 21 major wheat growing provinces in Morocco.

The study demonstrated that adoption of rotations, as well as integrating ICARDA improved faba bean varieties, led to a two-year average gross margin 48 percent higher than wheat monocropping, making rotations an economically beneficial option. Faba bean rotations can also improve the economic value of cereal crops by enhancing yields and protein content, key for industry buyers.

Past economic analyses on crop rotation used data from experimental stations or small-sized farmer surveys over one season. Uniquely, the ICARDA study examined two-year data from a large sample of 1,230 households.

Increasing farmer income through food legumes

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**ICARDA’s projects and innovations improve the incomes of farmers wherever they are adopted**

"ICARDAs projects and innovations improve the incomes of farmers whenever they are adopted"

**Increasing farmers income by Farming with Alternative Pollinators (FAP)**

Much of ICARDA’s crop research focuses on cereal and mandate crops such as wheat, barley, chickpea and lentil, all of which are self-pollinating. However, since 2013, the FAP approach has been tested with other crops such as faba bean, cucumber, brassica, melon, pumpkin, tomato, eggplant and apple. FAP highly increases productivity and income per surface area by attracting wild pollinators and natural enemies.

The common pollinator protection approach in high-income countries is to subsidize strips of wildflowers in fields. FAP however uses marketable habitat enhancements plants such as (wildflowers, suflowers, food crops, etc.) to increase the economic value of pollinator habitats and to pay for their net income from the use of FAP fields, with that of non-managed control fields. FAP has consistently demonstrated significantly higher income per surface area motivating farmers to enhance habitats in their fields.

After a successful FAP pilot in 2013-2014 in Uzbekistan, a joint initiative was established between ICARDA and the Ministry of the Environment, Nature Protection and Landscape Protection, supporting the implementation of the FAP project in the Fergana region, with global components. The “Conservation of pollinator diversity by integrating Habitat Enhancement Program (FAP) into the agroecosystem” was launched during the SE Mediterranean. In 2019 Morocco strengthened its commitment to pollinators by joining the Coalition of the willing on pollinators, the first Arab country to do so.

"Animal pollinators are vital for global food security," says Dr. Stefanie Christmann, ICARDA Senior Scientist FAP, who developed this new agro-ecological approach 10 years ago. "Their protection is critical to ensuring sustainability of pollinator-dependent crops. "

"Pollination services stimulate crop growth and increase productivity. A 20-year study on tomato and pepper crops in Angora, Algeria, showed that the tomato yield increased by an average of 39 percent and pepper yield by 52 percent, due entirely to pollinator visits. "

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**Food from fallow Land**

In Southern Asia, several scaling initiatives on improved pulse production technologies are carried out by ICARDA (e.g. in Pakistan, India and Bangladesh). Pulse production technologies have directly benefitted across India, Bangladesh and Nepal. Farmers harvested an average of 923 kg/ha of lentil grain from fallow lands worth US$54/kg ha. Additionally, lentil and mustard highlighted technologies and soil enrichment was enriched to provide a sustainable rice-based crop system.

**Pollinators (FAP)**

FAP highly increases productivity and income per surface area by attracting wild pollinators and natural enemies.

"ICARDA’s projects and innovations improve the incomes of farmers wherever they are adopted"
A PEOPLE-CENTERED APPROACH

As the only CGIAR center headquartered in the non-tropical dry areas and having been present across the region for over four decades, ICARDA is uniquely attuned to the challenges and needs of the people we support. Our research and the knowledge we generate is centered on the experiences and challenges of the men, women, and youth who live in the areas where we work, and their valuable knowledge contribution makes sure that our solutions are properly targeted, field tested, and scalable. The cutting-edge innovation we create together, with a special focus on women and youth, will spur agricultural transformation for millions of people in the driest areas of the world.

Supporting Syria’s recovery

Although the crisis in Syria continues, investing in the recovery of the country’s agriculture sector will help reduce humanitarian assistance, stem migration, and encourage the return of displaced communities. A potential six-year investment approach will lift 1.5 million rural people out of poverty and improve their working conditions and strengthen their food security, increase their income, and provide training programs, efficient irrigation techniques, and access to market and financial inputs. Capacity strengthening and access to new innovations and technologies have increased the income of women who now make more products from wheat flour, and youth, who have been trained in entrepreneurial skills, have increased the income of their households. For both groups it means reduced workloads, stronger decision-making power, and more control over their incomes. Some of this research has been used in high-level policy workshops.

We also recognize that young scientists are critical to research-for-development. Many are women and ICARDA is supporting their contributions through the ALWA Women in Science Mentorship program, supported by CRP Wheat. Their impact will produce benefits for decades to come – ensuring that countries and institutions have the right combination of skills and knowledge to meet future challenges. A crop science capacity strengthening partnership with INRA-Morocco is also helping to meet future challenges. A crop science capacity strengthening partnership with INRA-Morocco is also helping to meet future challenges.

Supporting Farmers and Refugees in Lebanon

Since 2018, in collaboration with FAO, ICARDA continued to rehabilitate Syria’s seed sector, producing 43.6 tons of basic seed of wheat, come, and improve their working conditions and training facilitators. The outstanding success of the TAAT Wheat Initiative enhanced women’s productivity and income in Sudan, Nigeria, and Ethiopia, and led to its adoption by leading NGOs such as CARE and the Aga Khan Foundation. Meanwhile, the TAAT Wheat Initiative enhanced women’s productivity and income in Sudan, Nigeria, and Ethiopia, and led to its adoption by leading NGOs such as CARE and the Aga Khan Foundation.

In 2020, ICARDA also implemented two FAO-funded projects, Efficient Irrigation Techniques and Rainwater Harvesting, and a CA project was launched to support Syrian refugees in Lebanon. These projects are helping to improve the livelihoods of agricultural workers and refugees, while managing increasing pressures on land and water.

In 2018 and 2019, more than 600 farmers, local community members, and agricultural technicians received training in entrepreneurship, through Comprehensive Agricultural Support for Refugee Host Communities – targets better water productivity, rainfall crop management, and improved irrigation systems. This study concluded that targeted investments in high-value commercial agriculture, or efforts to strengthen the entrepreneurial skills of young people, could be options for less-starting a youth-led agricultural transformation across the non-tropical dry areas.
PARTNERSHIPS IN RESEARCH-FOR-DEVELOPMENT

Central to the success of ICARDA's Strategic Plan 2017–2026 is our collaboration with a diverse set of partners with common goals. We engage with NARS, academic institutions, development partners, governments, the private sector, and a range of other stakeholders. Most important is the value we place on the knowledge contribution from on-the-ground NARS partners, and dryland communities themselves.

We link with a wide network of stakeholders to ensure that the knowledge we generate is field-tested, available to all who need it, and versatile for global scaling.

E-Learning at ICARDA

ICARDA has also responded to the growing demand for online learning. In partnership with the UN Food and Agriculture Organization (FAO) and the Arab Fund for Economic & Social Development (AFESD), ICARDA provides a range of agricultural subjects to a global audience on its E-Learning Website.

Courses address global agricultural topics and broader SDGs. Most of the content is currently offered in English, French, and Arabic. ICARDA's partnership with CIHEAM helped AFESD fund free courses to prepare women and 31 interns. Around 1,372 people attended ICARDA’s E-Learning Platform, and 1,425 trainees benefitted, including 22 new students and 291 PhD students. In 2019, training activities were implemented and over 390 people attended ICARDA’s E-Learning Platform.

ICARDA's capacity development initiatives are intended to increase the capacity of local institutions to deploy the communities we work with and help them adapt to changing social, economic, and environmental challenges.

DryArc – partnerships to strengthen the resilience of dryland agriculture

In September, 2019, ICARDA had the privilege of hosting the DryArc Co-Design Workshop at its Rabat office. The Initiative addresses the 2030 Agenda for Sustainable Development in a comprehensive way, accounting for trade-offs and maximizing the potential to strengthen resilience of dryland environments and knowledge obtained from the community who live there, can, in return, offer invaluable input to academic agricultural research by providing the data and experience for realistic modeling and risk analysis.

Dr. Sterhan continued in his role at Utrecht University as the chair of the Training and Researching students with external Senior Expert Supervision. He will be extending his work on training and hosting the United Nations University's cross-appointments and the United Nations University's cross-appointments and the "Our long and rewarding partnership is very important because not only do we share resources, innovation and unique expertise towards a common goal, but it brings young, bright minds, with fresh new ideas and approaches, to dryland science."

Dr. Asadullah NAZAR, President of Tottori University, Japan

ICARDA's longstanding relationships with Tottori and Utrecht universities

In 2019, Dr. Stefan Sterhanke, ICARDA Associate Scientist for Soil and Water Conservation, recruited recently retired ICARDA scientist, Dr. Theob Owens, at Tottori University’s cross-appointments. Meanwhile, Dr. Vany Nampa, ICARDA Research Team Leader for Soil, Water, and Agromony, continued his role at Tottori as Professor for the International Platform for Dryland Research and Education. Both are trained to advise on the curriculum and research studies valuable to both ICARDA and Tottori. Dr. Nampa also co-organized several conferences and UM meetings to present and promote joint projects developed by researchers at ICARDA and Tottori. Both institutions have played an active role in securing the next steps for this work.

Monitoring, Evaluation and Learning (MEL)

ICARDA’s capacity development initiatives are intended to increase the capacity of local institutions to deploy the communities we work with and help them adapt to changing social, economic, and environmental challenges.

Monitoring, Evaluation and Learning (MEL) is an open access online platform hosted by CGIAR centers, such as ICARDA, co-developed by several CGIAR Centers and hosted by CGIAR.

MEL enables faster and more informed decision-making for organizations. Different for each organization, it can be a shared or a private environment, and be used by all stakeholders. MEL helps stakeholders to plan, manage, monitor, evaluate, report and share actions and their results.

“E-Learning at ICARDA...”

"DryArc – partnerships to strengthen the resilience of dryland agriculture...”

"ICARDA’s longstanding relationships with Tottori and Utrecht universities...”

"Monitoring, Evaluation and Learning (MEL)..."
### Financial Information

#### Statement of Activity (In thousands of US dollars)

<table>
<thead>
<tr>
<th></th>
<th>2019</th>
<th>2018</th>
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<td>Net Surplus/(Deficit)</td>
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<td>(2,614)</td>
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<tr>
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<tbody>
<tr>
<td>Assets</td>
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<tr>
<td>Current assets</td>
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<td>Total liabilities and net assets</td>
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<td>22,044</td>
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### Donors

- Afghanistan Ministry of Agriculture, Irrigation, and Livestock
- African Development Bank
- Aid Fund for Economic and Social Development
- Agriculture Development Agency
- Cereal Advisory Council, Switzerland
- Caritas Switzerland
- Ceva Sante Animale S.A.
- Charles Sturt University
- Cooperative for Assistance and Relief Everywhere
- Cornell University
- Deutsche Gesellschaft für Internationale Zusammenarbeit GmbH
- Directorate of Agriculture and Food Production, State Government of Odisha, India
- Directorate of Soil Conservation and Watershed Development, State Government of Odisha, India
- Empresa Brasileira de Pesquisa Agropecuária (Brazilian Enterprise for Agricultural Research)
- Eritrean Federal Ministry of Agriculture
- European Commission
- Federal Ministry of Agriculture and Rural Development, Nigeria
- Food and Agriculture Organization of the United Nations
- German Federal Ministry for the Environment, Nature Conservation, and Nuclear Safety
- Global Crop Diversity Trust
- Indian Council for Agricultural Research
- Institut National de la Recherche Agronomique
- International Center for Tropical Agriculture
- International Crops Research Institute for the Semi-Arid Tropics
- International Food Policy Research Institute
- International Institute of Tropical Agriculture
- International Livestock Research Institute
- International Maize and Wheat Improvement Center
- International Water Management Institute
- Japan Water Cooperation Agency
- Kuwait Fund for Arab Economic Development
- Massachusetts Institute of Technology
- New South Wales Department of Primary Industries
- OCP Foundation
- OPEC Fund for International Development
- PRIMA Foundation
- Regional Environmental Center for Central Asia
- Société des Boissons du Maroc
- State Government of Madhya Pradesh, India
- State Government of Maharashtra, India
- Swedish University of Agricultural Science
- Templeton Charity Foundation
- United Nations Development Programme
- United Nations Environment Program
- United States Department of Agriculture
- University of Nottingham
- University of Western Australia
- World Agroforestry Centre
- World Bank

### Expenditures by Natural Classification

- Personnel Cost
- Supplies and Services
- Collaborators - Partners
- Travel
- Other Costs
- Collaborators - CGIAR Centers

### Expenditures by Program and Activities

- Research Programs
- Cross Program Research
- Corporate Services
- Resource Mobilization and Project Office
- Management

### Expenditures by Research Programs

- Biodiversity & Crop Improvement
- Recent Agricultural Livelihood Systems
- Water, Land and Ecosystems

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