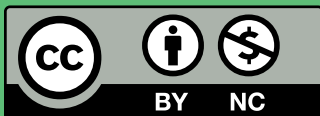




ICBA at 20: Stories of Success

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Celebrating 20 Years of Achievement

Serving People in Marginal Environments

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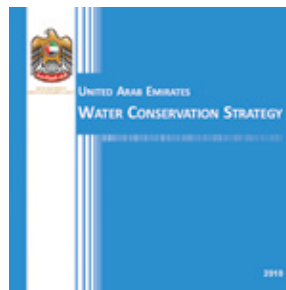
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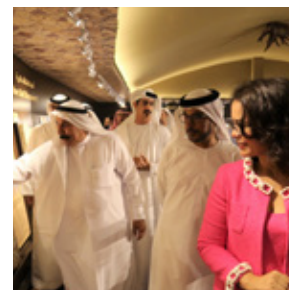
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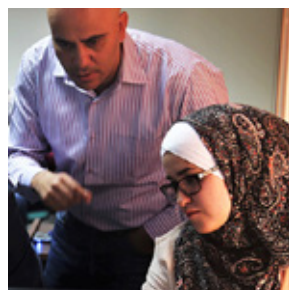
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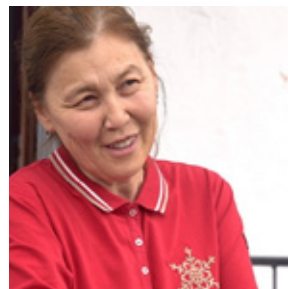
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Dr. Ismahane Elouafi
Director General

Foreword from the Director General

2019 marks a significant milestone in ICBA's history. It has been 20 years since our center was established through the visionary leadership of the Government of the United Arab Emirates and the Islamic Development Bank.

Thanks to continued support from ICBA's founders, as well as many national, regional and international organizations, our center has gone from strength to strength over the past two decades.

Today ICBA has evolved into a world-class research center serving the needs of smallholder farmers and other stakeholders in marginal environments around the world. Our center is in the vanguard of research and development on alternative, non-traditional crops and technologies that help to produce more food, save more resources and protect the environment.

To date our center has conducted research-for-development programs in more than 30 countries in the Middle East, North Africa, sub-Saharan Africa, Central Asia and the Caucasus.

Through their work, our scientists have reached out to and demonstrated best biosaline agriculture practices to more than 30,000 farmers.

Our scientists have developed, tested and introduced a wide range of solutions suited to local conditions in many countries. These solutions range from salt-, drought- and heat-tolerant crops for food, feed and biofuel to technologies for using alternative types of water in agriculture and managing soil and water salinity.

Under our plant genetic resources program, we have distributed 8,572 seed samples to scientists, farmers and other stakeholders in 57 countries.

While smallholder farmers are the main beneficiaries of our research-for-development efforts, we have also supported decision-making in different countries. Our science-based recommendations have informed such policies and strategies as the UAE Water Conservation Strategy, the UAE Agricultural Strategy, the Kuwait Food Security Strategy and the Oman Salinity Strategy.

One of the highlights is our research collaboration with the Environment Agency - Abu Dhabi (EAD) on precise estimates of date palm water consumption using SAP flow, which will have positive effects on sustainable agricultural water management in the country. Our center has been running one of the most long-term studies in the UAE on effects of saline water irrigation on fruit quality and quantity in date palm. The ten most common varieties from the UAE and eight from Saudi

Arabia have been evaluated for production and water use. As a result, ICBA has water productivity data that helps to significantly reduce date palm irrigation requirements. We now plan to work with EAD and the Abu Dhabi Agriculture and Food Safety Authority (ADAFSA) to take joint actions based on this research, which can help to cut down on date palm water consumption across the country by as much as 50 percent.

It is also important to mention that all these successes have been made possible by collaboration with different stakeholders around the world. Over the years, we have built and strengthened partnerships with organizations in over 50 countries.

More importantly, we have been able to deliver on our mission and vision thanks to unwavering support of the many donor and development agencies.

Lastly, I would like to acknowledge the commitment and contributions of all past and current members of ICBA's staff. Our people have always been the main drivers of our center's successes. I sincerely thank each one of them for their hard work and dedication to our shared vision of food security, better nutrition and livelihoods in marginal environments around the world.

Safeguarding plant genetic resources for future generations



ICBA established a unique genebank in Dubai, the United Arab Emirates, in 2000.

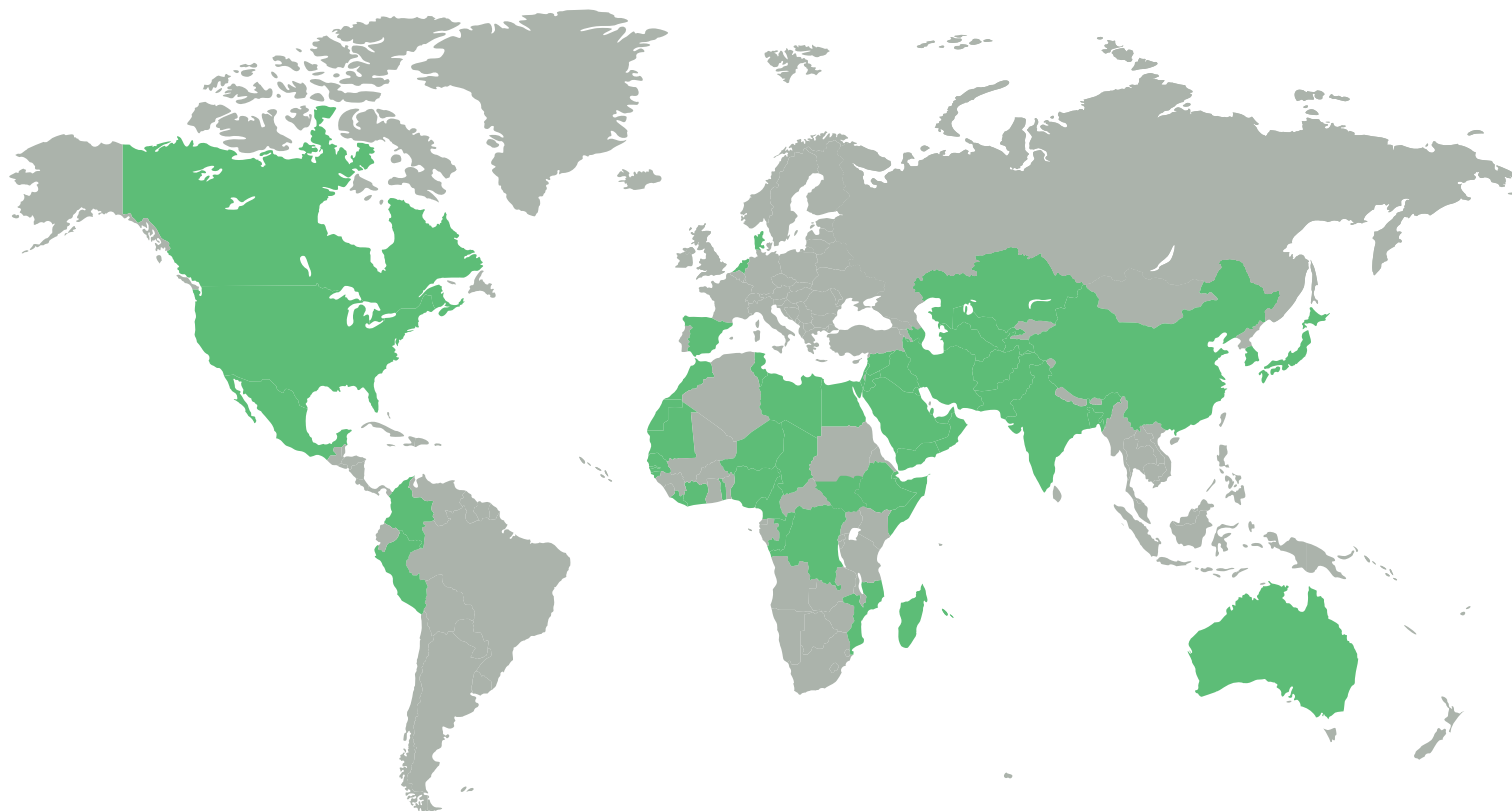
The history of ICBA's genebank dates back to 2000. Its mission is to serve as a unique repository of plant genetic resources suited to marginal environments.

Since then, ICBA has collected and preserved germplasm of plant species with proven or potential salinity, heat and drought tolerance from around the world.

Today the genebank is home to one of the world's largest collections of germplasm of heat- and salt-tolerant plant species. It stores over 14,000 accessions of around 240 plant species from more than 150 countries and territories of the world. There are also around 250 seed samples of 70 wild plant species from the United Arab Emirates, the center's host country.

Under its program on plant genetic resources, ICBA provides seed samples to different institutions around the world for research, breeding and introduction.

Since 2000 ICBA has distributed 8,572 seed samples to partner organizations in 57 countries.



- Afghanistan
- Algeria
- Australia
- Azerbaijan
- Bangladesh
- Cameroon
- Canada
- Chad
- China
- Colombia
- Congo
- Denmark
- Djibouti
- Egypt
- Ethiopia
- Gambia
- Germany
- Guinea-Bissau
- India

- Iran
- Iraq
- Ivory Coast
- Japan
- Jordan
- Kazakhstan
- Kuwait
- Lebanon
- Liberia
- Madagascar
- Mauritania
- Mauritius
- Mexico
- Morocco
- Mozambique
- Niger
- Nigeria
- Oman
- Pakistan

- Palestine
- Peru
- Qatar
- Republic of Congo
- Saudi Arabia
- Senegal
- Somalia
- South Korea
- South Sudan
- Spain
- Syria
- Tajikistan
- Togo
- Tunisia
- Turkmenistan
- UAE
- USA
- Uzbekistan
- Yemen



In 2019 ICBA signed an agreement with the Food and Agriculture Organization of the United Nations (FAO) within the framework of Article 15 of the FAO International Treaty on Plant Genetic Resources for Food and Agriculture.

Under this agreement, the germplasm collection at ICBA's genebank became officially part of the Multilateral System of Access and Benefit-sharing, adding to the world's largest global gene pool of plant genetic material, available to farmers, plant breeders and scientists for the sustainable production of food from plants.

The Multilateral System of Access and Benefit-sharing currently comprises over 2.6m samples of crop germplasm. Material

in this vast global gene pool is exchanged around the world at an average rate of about 1,000 transfers per day to support farmers, plant breeders and scientists in developing new climate-resilient crop varieties to produce more nutritious food from plants.

The FAO International Treaty is a key international legal instrument for the global conservation, sustainable use and sharing of the benefits of plant biodiversity, which it does through its various mechanisms, most notably the Multilateral System, the Global Information System and the Benefit-sharing Fund. It is also the first legally-binding international instrument to acknowledge the tremendous contribution of indigenous communities and farmers to the development and management of crop biodiversity.

Dr. Kent Nnadozie, Secretary of the International Treaty, says: "With this agreement, ICBA's valuable germplasm collection will be more accessible to a broader range of users and ultimately farmers, while affording ICBA new partnerships and involvement in the global governance framework provided by the International Treaty. This is another important step forward in international access and benefit-sharing of plant genetic material, which form the basis for the world's food basket."

Donors and Partners

Donors: The Food Security Office of the United Arab Emirates, EAD and the Islamic Development Bank (IsDB)

Partners: FAO, international research institutions and national agricultural research systems

How ICBA preserves plant genetic resources in United Arab Emirates



Halfa grass was last spotted by ICBA scientists during their expedition to the coastal areas of Ras al-Khaimah in 2007.

As part of the conservation of plant genetic resources in the United Arab Emirates, ICBA conducts regular expeditions to different locations to collect some of the economically important indigenous species which may be under threat due to overgrazing and expansion of human settlements.

This work, for example, has helped to preserve Halfa grass, scientifically known as *Desmostachya bipinnata*, from possible extinction. The plant is a rhizomatous perennial grass and is important for stabilizing soils. It can also be used as fodder.

In a study published in *Tribulus*, a journal of the Emirates Natural History Group, a team of scientists led by Dr. Mohammed Shahid, a geneticist at ICBA, reported that the grass, which had been previously recorded in Kalba in the emirate of Sharjah and in the coastal zone of Ras al-Khaimah, no longer existed in these areas, believed to be the only places in the country where it used to grow.

However, the scientists had collected one plant of the grass from Ras al-Khaimah during one of their earlier scientific expeditions and planted it at the center's research station in Dubai for propagation where it performed well. Thanks to their efforts, the plant is now well-preserved at ICBA and can be used for reintroduction to the wild.

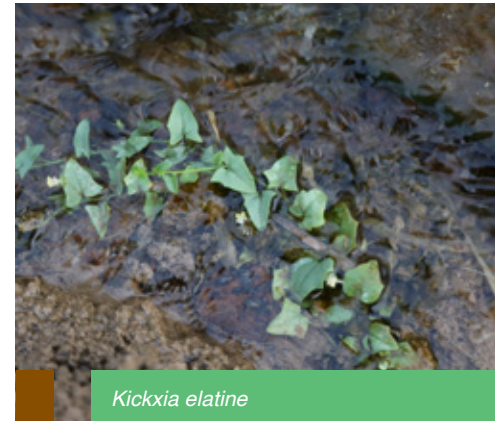


Halfa grass has been preserved at ICBA's research station and can be used for reintroduction to the wild.

During several botanical explorations across the United Arab Emirates in 2013-2015, the scientists also uncovered and documented eight plant species previously unknown to exist in the country. *Bromus diandrus*, *Lolium multiflorum* (Gramineae) and *Diplotaxis erucooides* (Cruciferae) were recorded in the emirate of Abu Dhabi, *Alternanthera sessilis*, *Amaranthus lividus* (Amaranthaceae) and *Commelina benghalensis* (Commelinaceae) in Dubai and *Kickxia elatine* (Scrophulariaceae) and *Cyperus eremicus* (Cyperaceae) in the emirates of Fujairah and Ras al-Khaimah respectively. These findings were also published in *Tribulus*.



Lolium multiflorum



Kickxia elatine



Diplotaxis erucooides



Bromus diandrus



Amaranthus lividus



Cyperus eremicus



Commelina benghalensis

Since its establishment in 1999, ICBA has been collecting and preserving at its genebank germplasm of plants with proven or potential salinity, heat and drought tolerance. The genebank stores currently over 14,000 accessions of around 250 species from some 150 countries and territories.

Over the years, the center has also gathered around 250 seed samples of 70 wild plant species in the United Arab Emirates. This germplasm now serves as a unique source for researchers working with salt- and heat-tolerant plants. For instance, in October 2018 ICBA shared with Dubai Municipality more than 800 seeds of five threatened, indigenous wild plant species from its genebank. The five species - *Ochradenus aucheri*, *Salvia macilenta*, *Indigofera oblongifolia*, *Senna alexandrina* and *Senna italica* - are considered threatened in the country due to different factors, including climate change and urbanization.

Donors and Partners

Donors: The Government of the United Arab Emirates and the Islamic Development Bank (IsDB)

Partners: National government and research institutions



Alternanthera sessilis

ICBA and BGI Group establish genomics center in United Arab Emirates



ICBA and BGI Group, the world's largest genomics institution, signed an initial agreement of intent in Abu Dhabi, the United Arab Emirates, in March 2018 in the presence of Her Excellency Mariam bint Mohammed Almheiri, Minister of State for Food Security of the United Arab Emirates, and Dr. Wang Jian, President of BGI Group.]

To accelerate agricultural research and development in marginal environments, ICBA and BGI Group, the world's largest genomics institution, began establishing a dedicated, cutting-edge genomics center in the United Arab Emirates in 2019.

Named the Desert Life Sciences Center, the new facility will conduct in-depth studies of the genome structure of stress-tolerant crops like quinoa, Amaranthus, Salicornia, and others.

The cooperative agreement to this effect was signed by Dr. Ismahane Elouafi, Director General of ICBA, and Dr. Ren Wang, Senior Vice President of BGI Group, during the 2nd Belt and Road Forum for International Cooperation in Beijing, China, on 25 April 2019.

Dr. Ismahane Elouafi says: “We are happy to sign this strategic agreement with BGI Group. The idea of having the Desert Life Sciences Center in the UAE is to harness the benefits of ‘omics’ technologies (including genomics) to develop crops that are resilient to climate change and can thrive in desert environments. The center, among other things, will enhance biodiversity



The new center will conduct in-depth studies of the genome structure of stress-tolerant crops like quinoa.

conservation and use, improve food security and nutrition, and will contribute towards sustainable development, especially in the marginal environments of the world.”

As a first joint venture between ICBA and BGI Group, the center will promote the application of modern genomics and biotechnologies in developing countries and will nurture young

talent from China, the United Arab Emirates, and developing countries.

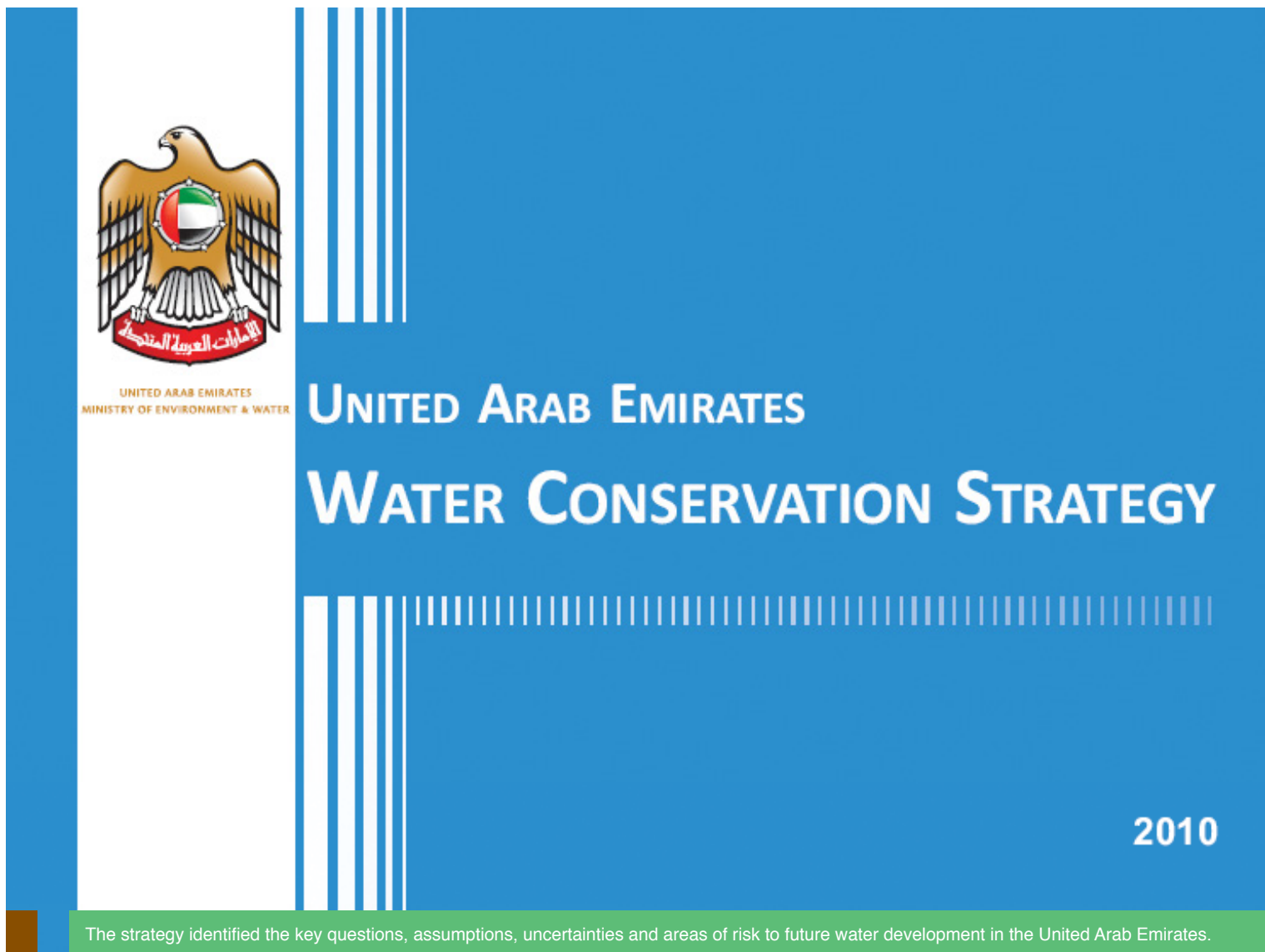
Under this partnership, ICBA and BGI Group will also promote the improved climate-resilient crops in marginal areas of the world, and exchange staff for collaborative research and training in the United Arab Emirates and China.

Donors and Partners

Donors: The Government of the United Arab Emirates and BGI Group

Partners: The Food Security Office of the United Arab Emirates and BGI Group

ICBA advises United Arab Emirates on water management strategy



إستراتيجية المحافظة على الموارد المائية في دولة الإمارات العربية المتحدة



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The sustainable development and use of the United Arab Emirates' scarce water supplies is a major strategic challenge. Managing the country's resources is complicated as it requires not only balancing burgeoning water demands against supply, but also considering policies for economic development, food and energy security, and the environment.

In October 2009 the Ministry of Environment and Water took a decision to prepare a Strategy for Water Conservation. This followed directly from the ministry's vision

of conserving environment and the natural resources for sustainable development and one of its main goals of developing and sustaining water resources. The focus on water conservation was a significant step in the water development process because previous plans had focused primarily on meeting unregulated and unconstrained demand for water. The strategy identified the key questions, assumptions, uncertainties and areas of risk to future water development in the country.

In late 2010 ICBA completed the development of the United Arab Emirates Water Conservation Strategy in collaboration with the Ministry of Environment and Water. Based on a review of the available information, the strategy consolidated highly variable water resource and water use information from each of the seven emirates into a common national framework. The analysis covered present and predicted water resource availability from traditional sources, desalinated water supply, reclaimed water and all water uses including domestic, government, industrial, future mega-projects and agriculture. Based on this comprehensive analysis, the constraints and opportunities affecting future water availability and use were discussed in depth and these formed the basis for the strategy for water conservation. Given that sustainable water development and management requires effective and efficient governance, the strategy provided an overview of the current institutional frameworks, laws, regulations and standards at the federal and emirate levels. The strategy also set out eight initiatives by the ministry to guide implementation.

The strategy provided a framework to sustainably manage the country's water resources over the period to 2021. It highlighted the challenges and opportunities to better manage scarce water resources and provided a range of options to do so.

Donors and Partners

Donors: The Government of the United Arab Emirates

Partners: The Ministry of Environment and Water of the United Arab Emirates

Raising awareness about soils in United Arab Emirates



Generation and dissemination of information and knowledge about the status and importance of natural resources forms a major part of ICBA's work. As part of this work, the center has led, for example, several soil-mapping efforts in the Gulf region. In 2005-2009 the center also collaborated with the Environment Agency – Abu Dhabi to conduct a soil survey of the Emirate of Abu Dhabi, which covered an area of 59,000 sq. km. This work made it clear that it is important to collect and present the information about soils to the general public as well.

In 2010 participants at the international conference titled “Soil Classification and Reclamation of Degraded Lands in Arid Environments” in Abu Dhabi, the United Arab Emirates, put forward the idea to establish the Emirates Soil Museum. And between 2010 and 2016, ICBA had worked to build the museum.

In 2016 ICBA received a grant from the Abu Dhabi Fund for Development to enhance the interior and exterior exhibits and develop augmented reality software.

The Emirates Soil Museum officially opened on 8 December 2016 during a ceremony attended by high-level government representatives and different stakeholders.

The museum is a one-stop shop for everyone who is interested to learn about soils in the country. It is designed to cater to the needs of a variety of visitors, including schoolchildren, students, researchers, professionals and scientists, environmentalists, professional contractors, land use planners, decision-and policy-makers. The museum has both external and internal exhibits that allow visitors to immerse themselves in the world of soil.

H.E. Mohammed Saif Al Suwaidi, Director General of ADFD, says: “ADFD is committed to drive sustainable socio-economic growth in the education and environment sectors within the UAE and abroad. Our newest venture with ICBA exemplifies our dedication to expand our scope of partnerships and bring awareness to agriculture and food security. Our nation’s continuity depends on research, innovation, environmental consciousness and scientific ingenuity. The museum will serve as a pioneering and informative resource and technical hub for the MENA region. Furthermore, it’s vital that our next generations are aware of these important issues and this partnership allows for an interactive platform that will serve the country well.”



The Emirates Soil Museum was inaugurated on 8 December 2016.



Over 3,000 visitors have toured the Emirates Soil Museum since it opened in December 2016.



In addition to serving as an information hub, the museum is a critical element of raising awareness around the issues of soil degradation and loss.

The museum helps visitors learn about the soil story through an interactive augmented-reality mobile application which takes them on a historical and scientific tour, providing information about a wide range of museum exhibits. The museum is also equipped with a library of soil information resources and touchscreens with access to geospatial maps. Moreover, visitors can enjoy tailor-made knowledge programs, workshops, and guided field trips.

Since its inauguration, the museum has welcomed about 3,000 visitors, including high-level dignitaries such as ministers and heads of international organizations, scientists, astronauts; school and university students; and members of the public.

Information and education provided by the museum plays an important role in highlighting threats to soil and engaging everyone to be advocates for policies and practices that will protect the soils nationally and globally.

Donors and partners

Donors: The Government of the United Arab Emirates, Abu Dhabi Fund for Development (ADFD)

Partners: Environment Agency – Abu Dhabi (EAD)

ICBA and IsDB help Uzbekistan create international innovation center



In October 2018 ICBA and the Ministry of Innovative Development of Uzbekistan agreed to establish the International Innovation Center for the Aral Sea Basin with support from the Islamic Development Bank.

The shrinking of the Aral Sea is widely considered as one of the planet's worst environmental disasters. The consequences go far beyond the environment, affecting the lives of millions of people in and out of the region. They range from salt and dust storms, loss of biological productivity and biodiversity,

deterioration of ecosystems, water supply and health risks, and economic losses to climate change.

Once viewed as a problem confined to Central Asia, there is a growing international consensus today on the need to take urgent

action to mitigate its effects and ensure sustainable development in the Aral Sea Basin. As one of the most affected countries, Uzbekistan is mobilizing regional and international support to address the problem through scientific and innovative solutions.

H.E. Academician Ibrokhim Abdurakhmonov, Minister of Innovative Development, says: “The establishment of the international center under the President of Uzbekistan means that the issue of mitigating the consequences of the environmental crisis in the Aral Sea Basin will receive attention at the highest level.”

At the request and initiative of the Government of Uzbekistan, ICBA and the Islamic Development Bank joined forces with the Ministry of Innovative Development in 2018 to establish the International Innovation Center for the Aral Sea Basin under the President of the Republic of Uzbekistan.

In October 2018 ICBA and the Ministry of Innovative Development signed a memorandum of understanding to this effect. As a result, the Government of Uzbekistan set up the center in Nukus at the experimental station of the State Committee on Forestry in Karakalpakstan (an autonomous republic within Uzbekistan).

The center focuses on innovations, technology transfer and education in saline environments with a unique mandate to improve the livelihoods of communities living in the Aral Sea region.



Six senior specialists from the International Innovation Center for the Aral Sea Basin underwent a short-term on-the-job training program at ICBA's head office in Dubai in early 2019.

In collaboration with ICBA and other international research, development and donor institutions, the center will work towards addressing, among other things, the problems of soil and water salinity, water scarcity and climate change impact in the region.

As part of the initiative supported by the Islamic Development Bank, ICBA provided technical and scientific assistance to the Ministry of Innovative Development in establishing and operationalizing the center. The Islamic Development Bank allocated a technical grant of 275,000 USD to support the preparation of an institutional development

study for the International Innovation Center for the Aral Sea Basin.

Under this collaboration, ICBA organized in early 2019 a month-and-a-half-long training program in Dubai for six senior specialists from the International Innovation Center for the Aral Sea Basin.

Donors and Partners

Donors: Islamic Development Bank (IsDB)

Partners: The Ministry of Innovative Development of Uzbekistan, the International Innovation Center for the Aral Sea Basin (IICAS)

ICBA supports Oman in developing salinity management strategy



The Oman Salinity Strategy was launched in October 2012.

The expansion of agriculture in the 1990s, especially the cultivation of perennial forages, and shortages of rainfall, decreases in water resources, deterioration in water quality and soil salinization, resulted in decline in agricultural productivity in Oman, especially in Al-Batinah governorates where many farms were abandoned as a result. These factors also led to the dramatic deterioration and depletion of natural resources and adversely affected agriculture in the governorates.

In response to this situation, the Ministry of Agriculture and Fisheries started developing

in 2008 a national plan to combat salinity and protect water resources from pollution and salinity. The ministry entered into a partnership with ICBA to prepare the strategy in collaboration with other relevant partners in Oman.

In October 2012 Oman launched its national strategy to combat salinity and protect water resources from pollution and salinity.

The scope of the strategy involved comprehensive assessments of the current status of the agricultural systems in Al-Batinah

and Salalah governorates. The assessments included the extent of the salinity problem, distribution of water resources, productivity of different agricultural systems and the impact of salinity on farmers' income, policy and legislation. The strategy also addressed socio-economic aspects and capacity-building needs at all levels. It also identified alternative scenarios for sustainable water resources and production systems to bring about a more efficient and sustainable use of natural resources.

The strategy was a major achievement in support of the vision of His Majesty Sultan Qaboos bin Said Al Said for a sustainable agricultural sector in the country.

ICBA played a major role in leading the formulation of the strategy in collaboration with the Directorate General of Agriculture and Livestock Research of the Ministry of Agriculture and Fisheries of Oman.

Extensive consultations with key ministries, government agencies and local and international specialists ensured that the strategy incorporated the best expert assessment and synthesis to deliver high-quality outcomes.

The assessment indicated that excessive water use was the prime cause of salinization



The Oman Salinity Strategy was a result of extensive collaboration between different national and international stakeholders.

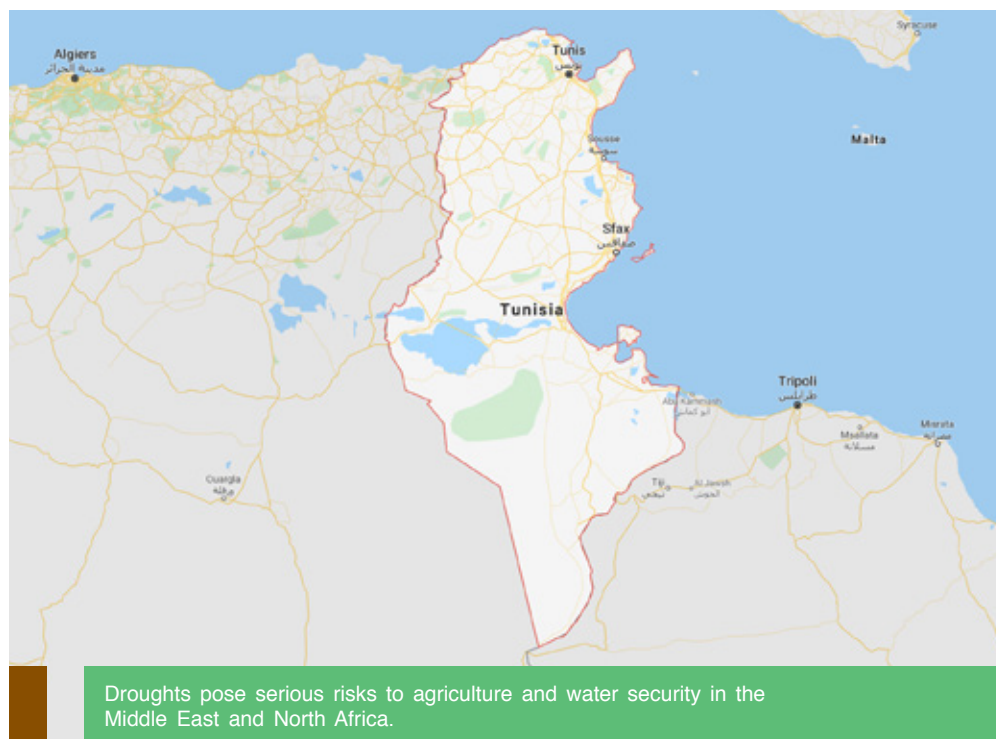
of agricultural soils in the country. It recommended alternative strategies to improve water use and monitoring, soil management and agricultural production in different soil and water conditions, strategic options to reduce seawater intrusion, and short-, medium- and long-term tactics to implement solutions across Oman.

Donors and Partners

Donors: Ministry of Agriculture and Fisheries of Oman

Partners: Directorate General of Agriculture and Livestock Research of the Ministry of Agriculture and Fisheries of Oman

Enhancing drought preparedness in Middle East, North Africa



Periodic drought is a threat to food and water security in the Middle East and North Africa. The region already faces challenges from limited water supply and climate change. Droughts increase pressure on scarce water resources, impacting economic and social development.

Recent droughts have revealed the gaps and limitations in drought management in the region and the urgent need to support the

governments and people in managing the impacts of these extreme events. This need is further underscored by the analysis of future climate conditions in the region. There is rare convergence in the data from the major Global Climate Models, which highlights the likely future increases in temperatures, decreases in rainfall and increases in extreme events, particularly drought. Several strategic assessments have highlighted the need to improve methods for characterizing

and managing drought risks in the region. In 2015 ICBA launched a project funded by the United States Agency for International Development with the aim to provide new insights, management plans and drought resilience strategies that will reduce drought impacts on the food supply and on the quantity and safety of the water supply in vulnerable communities in the region.

To implement the project titled “The Middle East North Africa - Regional Drought Management System”, ICBA joined forces with the National Drought Mitigation Center of the University of Nebraska - Lincoln; the Daugherty Water for Food Global Institute; FAO; the World Meteorological Organization; UN-Water; and government and research institutions in Jordan, Lebanon, Morocco and Tunisia.

As a result of the project, ICBA supported the four countries in establishing state-of-the-art systems to monitor regional drought conditions and assisted with drought planning and coordination activities. ICBA also supported officials who are charged with relief efforts by providing “value-added” information during drought events.

More importantly, ICBA provided capacity development and training in the operation of monitoring and early warning systems,



Under the project, ICBA organized hands-on training courses on drought monitoring for specialists from Jordan, Lebanon, Morocco and Tunisia.

developed communications and information delivery technology, and conducted stakeholder engagement activities.

The project focused on addressing the urgent need to establish an integrated drought management system that will enable a greater understanding of drought conditions, including those under future climates, and the ways to mitigate their effects. This approach

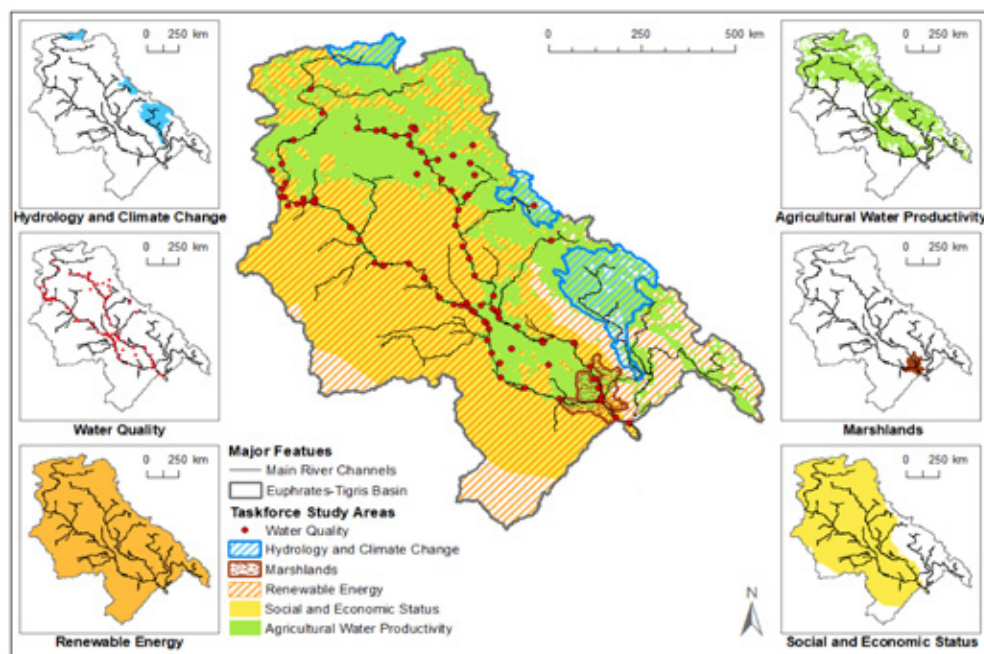
was based on the development of regional and national drought monitoring and early warning systems, vulnerability and impact assessments, and preparedness plans for responding to and mitigating the effects of drought. The project served as a catalyst to improve the region's drought early warning systems and create an environment of proactive drought risk management.

Donors and Partners

Donors: United States Agency for International Development (USAID)

Partners: The National Drought Mitigation Center of the University of Nebraska-Lincoln, the Daugherty Water for Food Global Institute, FAO, the World Meteorological Organization (WMO), UN-Water, national government and research institutions

Boosting cooperation in Euphrates-Tigris River Basin



The Euphrates and Tigris River Basin is a region that is highly vulnerable to climate change impacts.

The Euphrates and Tigris River Basin is a region that is highly vulnerable to climate change. The riparian countries are interdependent and rely on water from the Euphrates - Tigris river system to maintain ecosystem services, agriculture and energy production, municipal and industrial water supply. However, the system is affected by salinity, land degradation and deterioration of marshlands and ecosystems.

To varying degrees, these problems are common to the countries that share the

Euphrates - Tigris River Basin (Jordan, Iran, Iraq, Saudi Arabia, Syria and Turkey). As it is a transboundary river system, it is important to ensure effective regional collaboration to address the current and future challenges. This was the main idea behind the Collaborative Programme Euphrates and Tigris (CPET), a regional initiative funded by the Swedish International Development Cooperation Agency (Sida).

ICBA implemented CPET along with several partners in Iraq, Syria and Turkey from

2013 to 2018. The three countries represent 80 percent of the basin's total area. The program aimed to improve, among other things, dialogue and cooperation among the three countries through increased access to information and transfer of knowledge on water management in the region.

It provided a rigorous evidence base to evaluate transboundary impacts and enable the identification of a range of water management options and a regional investment program. The thematic priority areas included hydrology and climate change, hydropower, water quality, agricultural water productivity, marshlands and socioeconomic aspects.

The program also supported the countries in generating and using commonly agreed evidence-based information on regional water use and services. CPET succeeded in bringing together experts from Iraq, Syria and Turkey to work towards addressing the challenges that face transboundary water management. The program provided a neutral scientific platform supported by international experts that helped the country partners to work transparently and exchange knowledge.

A good level of dialogue was achieved through several meetings, workshops and capacity- building programs. National experts learnt about new technologies that provide a transparent analysis of water resources at the national and basin levels.

Ms. Esse Nilsson, Senior Programme Manager at the Regional Water, Environment, Climate Change, Renewable Energy and Food Security Unit for MENA at Sida, says: “Sida finds it very important to build upon the regional and national experiences and partnerships that are created in programs addressing water, natural resources, environment and climate change, of the kind that the CPET program has been developing and where regional and national priorities are reflected in the generation of knowledge. In this way, the CPET has fostered opportunities to share regional data, information and knowledge with the purpose to build relationships and trust, not the least, among the stakeholders.”



These include satellite remote sensing, modelling complex water-energy-food systems, climate change predictions following various emission scenarios, and the integration of the concept of water productivity. CPET was also successful in getting the countries to share knowledge and best practice. The impartial and neutral forum provided by CPET, with the support of Sida, was key to bringing the countries together to share data, provide direction for regional development under the ethic of shared rivers, and facilitate the building of foundations that would support collaborative research in the future.

Donors and Partners

Donors: Swedish International Development Cooperation Agency (Sida)

Partners: Stockholm International Water Institute (SIWI), American University in Beirut (AUB), Stockholm Environment Institute (SEI), International Center for Agricultural Research in the Dry Areas (ICARDA), the Swedish Meteorological and Hydrological Institute (SMHI), national government and research institutions

Helping smallholder farmers in West Asia, North Africa produce and earn more



The project helped thousands of smallholder farmers in the West Asia and North Africa region.

West Asia and North Africa is one of the most water-scarce areas of the world. Yet agriculture consumes over 75 percent of freshwater resources. Renewable water resources are nearly fully exploited and non-renewable water resources are being rapidly depleted. To meet the growing agricultural demands, the region depends on aquifers, municipal wastewater and saline water resources.

Recent climatic changes such as prolonged droughts and extreme temperatures have exacerbated the situation and increased the vulnerability of rural populations. Over the past decades, many smallholder farmers have experienced a sharp decline in agricultural productivity.

To help smallholder farmers cope with the challenges posed by climate change, water scarcity and salinization, ICBA launched a major five-year regional project in 2010. Funded by the International Fund for Agricultural Development, the Arab Fund for Economic and Social Development, the OPEC Fund for International Development and the Islamic Development Bank, the project aimed to introduce resilient forage and food crop production and management systems that utilize saline and wastewater resources.

Under the project, ICBA worked with national partners to develop integrated management packages for forage and food crop production at the farm level.

Scientists screened and evaluated nearly 8,000 accessions of more than 20 forage species to identify genotypes with better stress tolerance and productivity under marginal conditions. Crops like safflower and quinoa were also introduced in several countries. A total of 17 seed production facilities were established in the project countries.

As a result of project interventions, forage yields increased by 70 percent and grain yields by 30 percent. Based on the evaluations, farmers' preferences and field performance, each country identified a list of winter and summer annual and perennial salt-tolerant forages and field crops that can help to secure forage supply throughout the year for multiplication and distribution to farmers. The project also demonstrated on-farm techniques for forage processing and use to more than 1,500 farmers. More than 600 tonnes of silage was produced in the project countries.

More importantly, the project enhanced the capacity of many farmers in dairy production. For example, it established a dairy processing unit in Sahl El-Tina of North Sinai, Egypt. Around 45 rural women in the area were trained in making yoghurt, cheese and other dairy products.

During the project, 670 farmers attended various training courses and over 5,000 farmers benefitted from a wide range of capacity-building events including field days.

Donors and Partners

Donors: International Fund for Agricultural Development (IFAD), Arab Fund for Economic and Social Development (AFESD), OPEC Fund for International Development (OFID), Islamic Development Bank (IsDB)

Partners: National agricultural research systems in Egypt, Jordan, Oman, Palestine, Syria, Tunisia and Yemen

Long-term date palm research shows irrigation savings possible



Date palm is an important fruit tree in the Arabian Peninsula in both economic and cultural terms. There are currently over 1,500 known date palm varieties, and nearly 250 of those are cultivated in the Arabian Peninsula.

The United Arab Emirates is estimated to have the largest number of date palms in the world. However, date palm consumes a large amount of water. Date palm irrigation currently accounts for about one-third of all

groundwater abstraction in the country. As groundwater has varying degrees of salinity, the growth and productivity of date palms is affected negatively. To address the gap in the knowledge on the salinity tolerance of



To determine how salinity affects date palm trees, ICBA began in 2001 a major program using ten date palm varieties from the United Arab Emirates and eight from Saudi Arabia in an area of nearly 2.5 ha. The purpose is to evaluate the impact of three levels of salinity (5, 10 and 15 dS/m) on date palm growth, productivity, fruit mineral and sugar contents, and water use.



In 2016 ICBA was presented with the Khalifa International Award for Date Palm and Agricultural Innovation in recognition of the center's continued efforts on agricultural research and innovation.

date palm varieties and the impact of long-term use of marginal water on soil, growth, productivity and fruit quality, ICBA launched a long-term date palm experiment in 2001.

As part of this experiment, scientists worked, for example, with their counterparts from the Environment Agency – Abu Dhabi and Plant & Food Research, New Zealand, on a three-year study (2014-2017) to determine actual date palm water use in local conditions and thus improve irrigation management and efficiency.

The study found that date palm trees use, on average, 50 liters of water per day in winter and 150 liters per day in summer. It showed that large water savings are possible if irrigation supply is matched with actual water requirements of the date palm trees. The findings indicated savings of 25–50 percent compared with the current practice are possible depending on salinity levels of groundwater.

Published in *Science and policy: nutrient management challenges for the next generation*, the findings can help to inform decision-making on sustainable water allocation in the country. ICBA's work on date palm research has been recognized twice by the Khalifa International Award for Date Palm and Agricultural Innovation.

Donors and Partners

Donors: The Government of the United Arab Emirates and the Islamic Development Bank (IsDB)

Partners: Environment Agency – Abu Dhabi (EAD) and Plant & Food Research, New Zealand

Powering decision-making through drone technology



Agriculture is one of the most resource-intensive sectors. It requires a lot of water and other resources that are getting ever scarcer in many parts of the world. To make it sustainable and efficient, it is important to cut down on inputs while maximizing outputs. In other words, it is necessary to make farming

more accurate and controlled. This is the idea of precision agriculture, an approach based on the use of an array of technologies such as GNSS-based systems, sensors, robots and drones. As drones are becoming ubiquitous in different industries, their uses in agriculture are expanding as well. They are being used

to check crop health, track livestock and survey farmland. They also help collect more accurate crop-related and other data than satellites can.

To integrate drone technology into its research-for-development programs, ICBA



As a result of the strategic partnership with the Falcon Eye Drones, ICBA started organizing training programs in drone technology.

began collaboration in 2017 with the Falcon Eye Drones, a specialized private company based in Dubai, the United Arab Emirates.

As a result of this collaboration, ICBA hosted an international training course in March 2017 on unmanned aerial vehicles for remote sensing and photogrammetry – the first of its kind in the Gulf region. Over 25 specialists from four countries completed the specialized course organized in partnership with the Arabian Gulf University, Bahrain; BCN Drone Center, Spain; and Falcon Eye Drones.

In 2018 ICBA and the Falcon Eye Drones entered into a strategic partnership. This partnership helped to expand the center’s

research and development capabilities and created new synergy.

As one of the first steps, ICBA, the Falcon Eye Drones and Zayed University organized Drones Synergies 2018, a global conference focused on building the capacity of different stakeholders in drone technology, in Dubai in November 2018. The two-day conference showcased the latest drone technologies and their uses in various fields such as precision agriculture and environmental and natural resource management.

Through 20 capacity-building workshops and field trials, more than 150 participants from governmental and non-governmental

Mr. Rabih Bou Rashid, Managing Director at the Falcon Eye Drones, says: “Drones Synergies is a unique conference that allows top regional stakeholders realize unmanned aerial vehicles’ (UAVs) and systems’ full potential. It is the only conference in the GCC region that features a project-based learning approach while allowing event delegates to gain practical UAVs knowledge based on real field trials using the latest drone technology and processing techniques.”

organizations, universities and private companies learnt about drone and artificial intelligence-based solutions that facilitate decision-making in farming and other sectors. They also enhanced their skills in operating hyperspectral drones to collect data from the field.

Donors and Partners

Donors: The Government of the United Arab Emirates and the Islamic Development Bank (IsDB)

Partners: Falcon Eye Drones (FEDS)

Kyrgyz-grown quinoa makes its way into global markets



Mr. Azamat Kaseev, a smallholder farmer in Issyk-Kul Region, started growing quinoa back in 2012. With the help of ICBA and the Food and Agriculture Organization of the United Nations, it took him some five years to adapt quinoa to local conditions and turn his small company AgroLead into a major producer of the crop in the region.

A few years ago, no one knew about quinoa in Tong District in Kyrgyzstan's eastern Issyk-Kul Region. But today the village of Bokonbaevo in the district is regarded as the birthplace of Kyrgyz quinoa cultivation.

The pioneer farmer who started growing quinoa in the area is 44-year-old agronomist Azamat Kaseev. His company AgroLead is a major producer of this super crop in the region. It all began in 2012 when he received first seeds of quinoa varieties "Regalona" and "Titicaca" from the Food and Agriculture Organization of the United Nations (FAO). It took him around five years to test and adapt the crop to local conditions.

*Mr. Azamat Kaseev says:
"The yield of this crop is quite high; 2.5 kg of seed sown on one hectare of land can provide up to three tonnes of quinoa."*

ICBA also started introducing its own varieties of quinoa in Kyrgyzstan in 2015 with the financial support of the Islamic Development Bank. The seeds of five improved salt- and drought-resistant quinoa varieties from the ICBA's genebank were distributed to scientists and farmers in the country.

Since then quinoa has been sown in all regions of Kyrgyzstan: Chui, Talas, Jalal-Abad, Batken and others. Several years of experimentation has shown that Tong District of Issyk-Kul Region, Bakay-Ata District of Talas Region and the foothills of Jalal-Abad Region with certain temperatures, when it is hot in the day and cold at night, have the most suitable conditions for the crop. More and more farmers are also jumping on the quinoa bandwagon as the crop offers high profits. Today Mr. Azamat Kaseev sells his produce to buyers in Ukraine, some local farmers, as well as shops and restaurants specializing in organic food products. The retail price of quinoa goes up to 700 Kyrgyz soms per kilogram (1 USD is around 70 Kyrgyz soms), while seeds can fetch up to 2,000 Kyrgyz soms per kilogram.

Local researchers are also upbeat about the crop's future in the country. For example,

scientists at the Kyrgyz National University have developed various recipes and a beverage drink from locally grown quinoa. And a team of researchers at the National Academy of Sciences and the Kyrgyz National Agrarian University have even patented recipes for a quinoa-based drink and a quinoa-based muffin cake.

Thanks to Mr. Azamat Kaseev's unwavering enthusiasm and capacity-building events organized by ICBA scientists, dozens of Kyrgyz farmers started cultivating the crop. Quinoa fields have expanded across Kyrgyzstan: 14 hectares on highlands in Issyk-Kul Region, and 56 and 80 hectares in Talas and Jalal-Abad regions. This is no mean feat given that only a few years ago quinoa was literally unknown in this Central Asian country.

Donors and Partners

Donors: Islamic Development Bank (IsDB)

Partners: The Food and Agriculture Organization of the United Nations (FAO), The Kyrgyz National University, The National Academy of Sciences, The Kyrgyz National Agrarian University

Kazakh farmers slowly warm to sorghum and pearl millet



Pearl millet shows promise as an alternative crop for salt-affected areas in Kazakhstan.

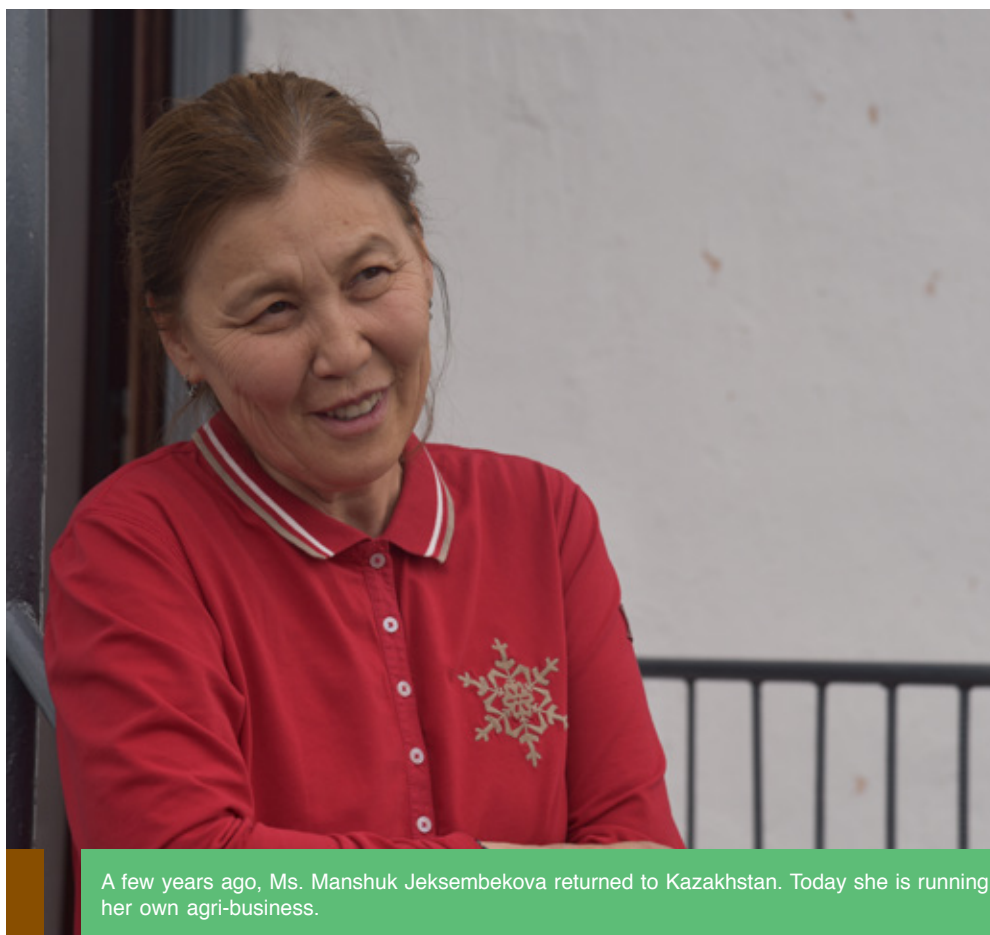
In recent years, Kazakhstan has been experiencing a fall in production and export of wheat, the country's main cash crop. The decline is not only due to the reduction of cultivated areas caused by salinization, but also unusually cold spring weather.

With more than 80 percent of its territory covered with steppes and deserts, Kazakhstan is the largest country in Central Asia. It is the sixth largest wheat producer in the world, exporting to over 70 countries. However, the changing climate patterns and rising salinity have forced the government to take alternative measures and encourage crop diversification. And farmers are following suit.

Ms. Manshuk Jeksembekova is a scientist with extensive work experience; she worked as a research assistant at the University of Texas, the USA, and at the Vienna Bio Center, Austria. After pursuing her Ph.D. degree in biology, she returned to her village and opened a laboratory to analyze the composition of the soil and determine the level of its fertility.

At the same time, she owns a farm, specialized in seed production of winter wheat, barley, soybean, safflower and corn. ICBA has collaborated with her farm since 2014 on introduction and cultivation of new drought- and salt-resistant crops such as sorghum and pearl millet in Kazakhstan.

As a result of this work supported by the Islamic Development Bank, two varieties of sorghum and one variety of pearl millet have been released and patented by Kazakhstan's Ministry of Justice.



A few years ago, Ms. Manshuk Jeksembekova returned to Kazakhstan. Today she is running her own agri-business.

*Ms. Manshuk Jeksembekova says:
“Unfortunately, we are losing our soils to salinization. Growing traditional crops such as winter wheat becomes impossible due to a reduction in yield. We want to replace it with new crops.”*

ICBA has also trained hundreds of farmers in the cultivation and use of the crops. As more and more farmers realize the benefits of these crops, it is hoped degraded lands will be viewed as assets that can be capitalized on in the near future.

Donors and Partners

Donors: Islamic Development Bank (IsDB)

Partners: National agricultural research systems

Solar-powered irrigation systems give hope to small-scale farmers in sub-Saharan Africa



Scientists from ICBA introduced a low-cost irrigation system, known as the Californian irrigation system, in Mali and other countries among groups of smallholder farmers who grow a variety of crops.

Ensuring food security in sub-Saharan Africa is no easy task. It is even more difficult to achieve the United Nations Sustainable Development Goal on ending hunger by 2030. The region suffers from poor agricultural conditions. Partly as a result, malnutrition and poverty are common.

Most of the irrigated farms in the region rely on groundwater extraction or run-off river pumping systems. But a continuous decline

in precipitation has affected both the quantity and quality of available water for irrigation, making local food markets more volatile and increasing the rate of malnutrition in poverty-stricken areas. Transporting water from the main streams to the fields is the major hurdle for smallholder farmers. However, low-cost and effective irrigation systems and technologies can help farmers to water their small plots and boost crop yields and incomes. Moreover, appropriate advanced small-scale

irrigation technologies for horticultural crops can help to minimize risks and improve agricultural productivity and income.

To address these problems, ICBA joined forces with several national partners, including national agricultural research systems, in seven sub-Saharan African countries - Burkina Faso, Gambia, Mali, Mauritania, Niger, Nigeria and Senegal - and launched in 2012 a project called "Improving Crop and Seed Production Systems Under Water/Irrigation Management in sub-Saharan Africa".

Funded by the Islamic Development Bank, the project was aimed at, among other things, developing a water resources database for West Africa; identifying technologies suitable for sub-Saharan African communities based on water availability, water quality, land and crop suitability, improved crop and seed production, and socioeconomic conditions; identifying packages of diversified crops under different water quality conditions and promoting multiple uses of water; and enhancing research capabilities, agricultural extension services, and skills of rural farmers in water and crop management.

The project was successful in assisting farmers with adopting small-scale irrigation technologies and sustainable crop and



The system saves about 40 percent of irrigation water compared with traditional surface irrigation systems and uses solar energy.

seed production systems to increase farm productivity and year-round agricultural production.

As a follow-up to the project, ICBA carried out an analysis of other constraints that farmers face in terms of irrigation. Results showed that smallholder farmers experience regular interruptions while running the irrigation systems that use diesel, which is expensive and unaffordable for many, or electricity, which is not available in many parts of the region. The region faces an acute shortage of electricity, mainly in rural areas where around 80 percent of the population lives and of which 70 percent depends on farming.

To tackle this challenge, ICBA partnered with the OPEC Fund for International

Development to implement a project called “Scaling up small-scale irrigation technologies for improving food security in sub-Saharan Africa”.

Under this project, which began in January 2017, a low-cost irrigation system, known as the Californian irrigation system, was piloted among a group of smallholder farmers in Mali and Burkina Faso to grow vegetable crops. The system saves about 40 percent of irrigation water compared to traditional surface irrigation systems. More importantly, it runs on solar energy. The system was initially installed in an area of 2,500 sq. m. In Mali, the experimental site for the system is jointly managed by a group of 100 smallholder farmers - 77 women and 23 men. Each farmer in this area is allotted a small field and

a schedule to use water through the irrigation system. For the first growing season, the farmers were provided with several types of gardening tools, including wheelbarrows, rakes, fittings, sprays, as well as agricultural inputs such as fertilizers and seeds. Seeing the benefits of the new system, other farmers in neighboring villages also got interested in the system and offered to introduce the system across all villages.

Similarly, in Burkina Faso, the system was installed in the Yako region and is shared by a group of five farmers. The system extracts groundwater from a shallow well for irrigation. During the first cropping season, farmers decided to grow vegetables such as onion, eggplant, tomato and sweet pepper. In the following season, ICBA introduced more crops, including some salt-tolerant species. These systems demonstrated great potential for improving the livelihoods of smallholder farmers in the region. But adoption is key to success. Judging by the growing interest among farmers, it looks like many more will follow suit.

Donors and Partners

Donors: Islamic Development Bank (IsDB) and OPEC Fund for International Development (OFID)

Partners: National agricultural research systems in Burkina Faso, Gambia, Mali, Mauritania, Niger, Nigeria and Senegal

Supporting smallholder dairy farmers in Morocco



Blue panicum has proven itself to be a great alternative forage plant under saline conditions in Fom El Oued, Laayoune Province, Morocco.

Fom El Oued, an area in Laayoune Province, Morocco, is home to many small-scale livestock farmers. Most of them make a living from dairy production. But rising soil and water salinity is negatively impacting traditional forages they grow. Yields of forage corn and alfalfa - the main feed in the area - are falling. Their main source of income is thus at risk. Some even choose to abandon lands that have been affected by salinity. Scientists point to overexploitation of aquifers and inefficient management of agricultural inputs as the chief causes of worsening salinity.

In 2015 ICBA launched a four-year project funded by the Phosboucraa Foundation to introduce salt-tolerant plants in the area as a means to tackle the decline in forage production.

To implement the project, the center joined forces with Morocco's Ministry of Agriculture, Fisheries, Rural Development, Water and Forests and the National Institute of Agricultural Research. The project selected the Halib Sakia El Hamra Cooperative, a local association of 52 livestock farmers who produce 22 tonnes of milk daily, as the main recipients of technical and other support.

After small-scale pilot trials in the first year, scientists tested several salt-tolerant plants



As part of the project, ICBA trained more than 30 smallholder farmers and extension specialists in cultivation of alternative crops.

Dr. Abdelaziz Hirich, a horticulture scientist at ICBA, says: “Our findings are quite encouraging. Our project demonstrated that there are effective low-cost solutions to soil and water salinity. If these salt-tolerant plants are grown, farmers will have enough feed for their livestock.”

on six farms and at experimental plots of the National Institute of Agricultural Research in Foug El Oued. They compared the performance of Sesbania, blue panicum, quinoa, fodder beet, quinoa, pearl millet, sorghum, barley and triticale with that of forage corn and alfalfa.

They found that the alternative crops did much better than their traditional counterparts at low salinity levels (below 3 grams per liter) and high salinity levels (between 8 and 10 grams per liter). Results indicated that blue panicum and Sesbania were the top performers and their potential fresh biomass yields could

reach up to 130 tonnes per hectare per year. Barley and quinoa also showed a lot of promise for cultivation for feed and food in local conditions. Blue panicum, Sesbania, quinoa and fodder beet were determined to be highly salt-tolerant, while barley and triticale exhibited medium tolerance to salinity and pearl millet and sorghum low tolerance.

Under the project which ended in 2018, scientists also trained over 30 smallholder farmers and extension specialists in cultivation of alternative crops. They also supported the National Institute of Agricultural Research in assessing the feasibility of transforming the institute’s experimental station in Laayoune Province into a laboratory for soil and water tests.

To take these results further, it is important to establish a seed production and processing unit so that local farmers have a continuous supply of high-quality seeds of the new crops. As many farmers extract groundwater, they also need solar-powered irrigation systems.

Donors and Partners

Donors: Phosboucraa Foundation

Partners: The Ministry of Agriculture, Fisheries, Rural Development, Water and Forests of Morocco, the National Institute of Agricultural Research of Morocco and the Halib Sakia El Hamra Cooperative

Farming with reject brine and seawater in United Arab Emirates



ICBA's innovative inland and coastal modular farms make use of reject brine and seawater to grow fish, vegetables and halophytes in desert environments.



Salicornia can be used as a food, forage and biofuel crop.

Water scarcity means many countries, especially those in the Middle East and North Africa, have to resort to desalination to meet their freshwater needs. This causes a big salty problem: reject brine. Globally, desalination plants discharge some 142m cubic meters of hypersaline reject brine every day. This is a serious environmental threat. ICBA, however, views reject brine and seawater as

Dr. Dionysia Angeliki Lyra, a halophyte agronomist at ICBA, says: “One of the main goals of our research experiment is to develop a cost-effective production model that transforms reject brine and seawater into profitable sources for local farmers.”

resources for food production and develops technologies that make better use of them.

Since 2013 ICBA has operated innovative inland and coastal modular farms in the United Arab Emirates to study the use of reject brine and seawater for farming. The inland farm uses desalinated water for vegetables, reject brine for tilapia and seabream, and then fish effluent for halophytes. The coastal farm uses seawater directly to grow fish and the resultant effluent to irrigate halophytes such as Salicornia, a multi-purpose salt-loving plant.

In 2017 ICBA won a grant from the Expo 2020 Dubai’s Expo Live Innovation Impact Grant Programme to conduct further research on inland and coastal modular farms.

Following some modifications in 2018, scientists managed to get one of the highest biomass densities for tilapia - 30 kilograms per cubic meter - using reject brine on the

inland farm based at ICBA’s research station in Dubai. And the coastal farm, managed jointly with the Marine Environment Research Department, recorded an increase from 0.62 kilograms per cubic meter to 5 kilograms per cubic meter for tilapia. The modifications also helped to speed up weight gain, making it possible to raise fish twice a year. They also reduced the fish feed requirement from 2 kilograms of feed per 1 kilogram of fish to 1.1 kilogram of feed per 1 kilogram of fish.

As part of this research, scientists also achieved a major breakthrough in increasing yield potential of Salicornia. Working closely with national partners, the scientists recorded a bumper seed yield of 3 tonnes per hectare using seawater passing through an aquaculture system. That was the first time Salicornia had produced such high yield under local conditions.

They also began a pilot project in 2018 to grow halophytic vegetables using reject brine from desalination units treated with fish effluents. It was the first time that halophytic vegetables had been grown in the country, both in the open field and a simple net-house structure, without using fresh water. The idea is to save fresh water and introduce these vegetables into the local diet.

Donors and Partners

Donors: The Government of the United Arab Emirates, the Islamic Development Bank (IsDB), United States Agency for International Development (USAID) and Expo 2020 Dubai
Partners: International Water Management Institute (IWMI), Ministry of Climate Change and Environment of the United Arab Emirates (MoCCaE)

Strengthening quinoa value chains in Morocco



Mrs. Hafida El Filahi is general secretary of a cooperative which employs 30 women.

At first glance Mrs. Hafida El Filahi, Mrs. Kenza Laghchaoud and Ms. Fatiha Rostan look no different from any other rural women in Morocco. They live in a far-away area called Bourrous in Rehamna Province, about 320 km from Morocco's capital of Rabat, and lead a mundane country lifestyle, looking after their households. But that is what appears on the surface. Unlike most of the rural women in the country, they are more independent and proactive in many ways. Above all, they enjoy a degree of financial independence and can support their families.

Their lives changed when a women's cooperative was established in their area in 2008. What started as a small initiative involving just four women has grown into a business employing 30 women from nearby villages. Aptly named 3ème Millénaire (or the 3rd Millennium in English), the cooperative produces, markets and sells a range of value-added products such as couscous - a national dish usually made of several crops including wheat, rice, maize and cactus. Led by Mrs. Hafida El Filahi, general secretary of the cooperative, all women who work here have different stories to share but one common

Mrs. Hafida El Filahi says: "Under the project, the cooperative received quinoa seeds and processing equipment. Also, the project provided training in quinoa production and processing and helped to promote our products, including quinoa-based couscous. The project also facilitated our participation in fairs and exhibitions such as the Salon International d'Agriculture de Meknes - SIAM (International Agricultural Exhibition in Meknes), where we showcased our products and services. We were also able to support many young women who dropped out of school due to financial constraints."



ICBA scientists are also working with researchers from the Mohammed VI Polytechnic University to evaluate the quinoa genotypes.

goal: to make a living for themselves and their families and create employment opportunities for other women in their community.

For a long time, a variety of locally grown cactus was a basic ingredient in many of their products. But due to an attack of insect called cochineal which completely devastated the cacti in the area, they had to look for alternatives. And then quinoa came about. Though it was first introduced in Morocco back in 2000, quinoa reached the province in 2009. But it did not take off due to limited access to well-adapted and high-yielding varieties, inappropriate crop management practices, weak value chains, and limited market demand.

That was when ICBA reached out to the cooperative through its Rehamna quinoa project to introduce best-performing quinoa genotypes developed after years of research by ICBA scientists. As these genotypes did well in local conditions, the demand for the

crop rose. Many women from the cooperative, including Mrs. Hafida El Filahi, started growing these genotypes on their farms.

Quinoa is both highly nutritious and stress-tolerant. Dubbed a super crop, it contains all eight essential amino acids and many micronutrients. It is also gluten-free and has twice as much protein as maize, barley, and wheat. Quinoa can also grow in extreme soil and climatic conditions and is thus a great choice for smallholder farmers in marginal areas like Bourrous.

Funded by Canada's International Development Research Centre, the project is implemented in Rehamna Province by ICBA in collaboration with the Mohammed VI Polytechnic University and the Ministry of Agriculture, Fisheries, Rural Development, Water and Forests of Morocco.

ICBA scientists are also working with the Mohammed VI Polytechnic University to

Mr. Youness Jnaoui, of the Mohammed VI Polytechnic University, says: "We found out that ICBA's genotypes are well adapted and perform very well; they are drought- and salt-resistant. I am very optimistic about the future of the crop, which is increasing year after year in terms of area and production. I hope that farmers adopt quinoa to improve their income. These genotypes, especially Q 5, were very productive, and we are trying to develop best cropping practices."

evaluate the genotypes at the university's experimental station in Ben Guerir, the capital of Rehamna Province, and other farms.

It is expected that more than 1,000 farmers and their family members will have benefitted by the end of the project.

Donors and Partners

Donors: The International Development Research Centre (IDRC)

Partners: The Mohammed VI Polytechnic University (UM6P) and the Ministry of Agriculture, Fisheries, Rural Development, Water and Forests of Morocco

Building individual and institutional capacities in Africa



Since 2007 ICBA has conducted ten capacity-building programs supported by BADEA for African scientists, extension specialists and government officials.

Many African countries suffer from water scarcity and land degradation caused by salinization. As a result, agricultural productivity is low. On the one hand, smallholder farmers lack resources and technologies to deal with the problems. On the other hand, they do not have adequate knowledge and skills to better manage water and land resources and cope with the effects of salinization on their farmlands. This means their main source of livelihood is undermined. For more than a decade ICBA has closely worked with the Arab Bank for Economic Development in Africa (BADEA) on a wide range of programs to address these challenges. Individual and institutional capacity development has been an integral part of this collaboration.



ICBA's capacity-building programs have helped to improve the knowledge and skills of African scientists and extension specialists in land rehabilitation.

Since 2007, BADEA has funded ten ICBA-led capacity-building programs for African scientists, extension specialists and government officials on, among other things, small-scale irrigation technologies in saline areas and reclamation of salt-affected lands. These programs have benefitted 212 specialists from 41 African countries and enhanced their knowledge and skills in land rehabilitation through integrated soil, irrigation and crop management, small-scale irrigation and biosaline agriculture.



A total of 212 specialists from 41 African countries have benefitted from BADEA-funded capacity-building programs.

In 2018 BADEA supported two major regional training courses in Ghana and Benin respectively. The courses focused on enhancing food security in salt-affected areas in Africa through integrated land, water and crop management.

In 2019 ICBA launched a four-year project funded by BADEA and the International Fund for Agricultural Development. The project is aimed at improving food security and incomes of smallholder farmers, particularly women, in salt-affected areas of seven sub-Saharan African countries: Botswana, The Gambia, Liberia, Mozambique, Namibia, Sierra Leone, and Togo.

Donors and Partners

Donors: The Arab Bank for Economic Development in Africa (BADEA)

Partners: National agricultural research systems

- Angola
- Benin
- Botswana
- Burkina Faso
- Burundi
- Cameroun
- Cape Verdi
- Chad
- Congo
- Congo DRC
- Eritrea
- Ethiopia
- Gambia
- Ghana
- Guinee
- Guinee Bissau
- Guinee Equatorial
- Ivory Coast
- Kenya
- Lesotho
- Liberia
- Madagascar
- Malawi
- Mali
- Mauritius
- Mozambique
- Namibia
- Niger
- Nigeria
- Rwanda
- Sao Tome
- Senegal
- Seychelles
- Sierra Leone
- South Sudan
- Swaziland
- Tanzania
- Togo
- Uganda
- Zambia
- Zimbabwe

Empowering Arab women scientists



Funded by the Bill & Melinda Gates Foundation, the Islamic Development Bank and CGIAR Research Program on Wheat, AWLA is a regional leadership and research development program led by ICBA.

Bringing more women into science is a sure way to spur agricultural research and innovation in the Middle East and North Africa. Alas, gender stereotypes still hold strong in the region, putting many women off careers in science. And low financing for research and development means there are not many plum jobs on offer. There are also few training and development opportunities for women scientists.

Empirical evidence indicates that a disproportionately low number of women work in senior research and leadership positions in the region. The average share of women researchers across the region stands at 17 percent - the lowest in the world. This gap is most visible in the staffing of agricultural research and extension organizations, despite women making up more than 40 percent of the labor force in the sector. This means that policy and investment measures in agriculture might not be as effective as they could be because they do not fully reflect gender perspectives.

To address this gender disparity, ICBA began a new initiative in 2016 to empower Arab women scientists in the region. ICBA partnered with the Bill & Melinda Gates Foundation and the Islamic Development Bank to roll out a regional fellowship program called the Arab Women Leaders in Agriculture (AWLA).

A year later ICBA joined forces with the African Women in Agriculture Research and Development program to pilot a training course for a group of women researchers from Algeria, Egypt, Jordan, Lebanon, Morocco, Oman and Palestine.

And on 30 June 2019 ICBA launched AWLA's first edition with an eight-day workshop in Tunis, Tunisia, for an inaugural cohort of 22 women scientists from Algeria, Egypt, Jordan, Lebanon, Morocco and Tunisia.

Dr. Mounira Azouz, a food scientist at Algeria's National Institute of Agricultural Research, says: "The AWLA fellowship is a huge opportunity for me to improve my skills and learn new tools to enhance my capability for leadership roles in the food and agriculture sector."

AWLA aims to facilitate fellows' access to leadership roles and promote research excellence and impact, encourage gender-responsive working cultures and enabling environments, and provide Arab women researchers with platforms to showcase their intellect, capability and contribution.

Dr. Hasna Ellouzi, an assistant researcher at the Center of Biotechnology of Borj Cedria in Tunisia, says: "Through this first workshop, I have started to find myself; I have started to find Hasna!"

Now I believe that every step, every second of my journey depends on me. I now see my goals; they are in my hands now. I am sure that through AWLA, I will be able to achieve these goals."

The program directly contributes to the United Nations Sustainable Development Goal on Gender Equality (SDG 5). AWLA's long-term goal goes beyond capacity development and includes improved food security and nutrition, a better research and development landscape, and economic and social benefits of a narrowed gender gap in the region.

Donors and Partners

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