International Center for Biosaline Agriculture

Positioning Statement

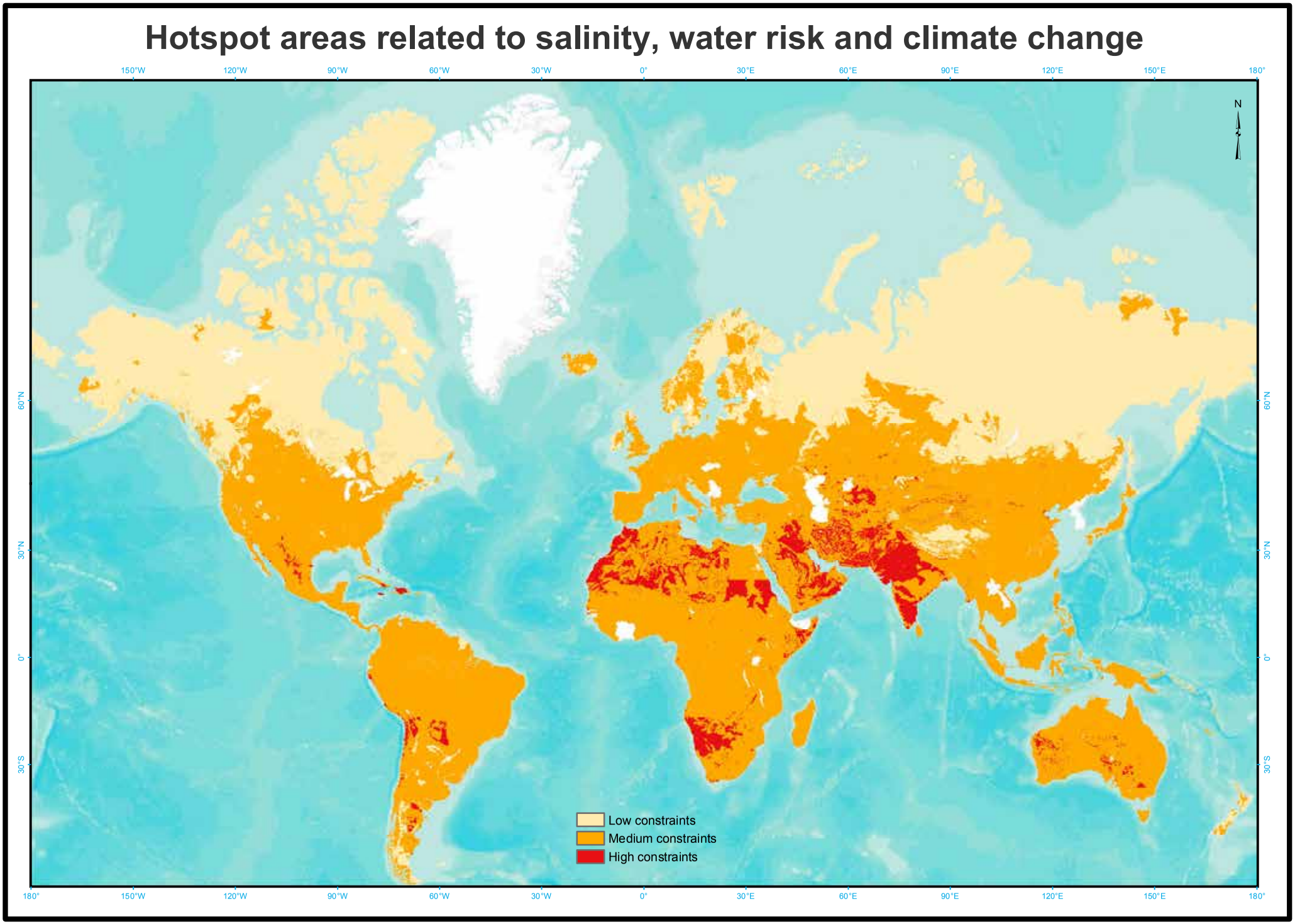
Securing a Better Future for the Poorest Communities in the World's Marginal Areas

How to Deliver on United Nations Sustainable Development Goals

نـزرع للغـد
ICBA
AGRICULTURE FOR TOMORROW

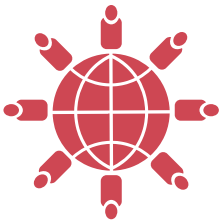
The statement:
ICBA is a unique applied agricultural research center in the world that is focused on marginal areas where an estimated 1.7 billion people live. It identifies, tests and introduces resource-efficient, climate-smart crops and technologies that are best suited to different regions affected by salinity, water scarcity and drought. Through its work, ICBA helps to improve food security and livelihoods for some of the poorest rural communities around the world.

Hotspot areas related to salinity, water risk and climate change



Threats to global food and water security

What the world faces:



Global population

The world will have 9.7 billion people by 2050. Population growth is forecast to be fastest in Africa, Asia and the Middle East.

Climate change

In 2016 global temperatures were the warmest since record-keeping began in 1880. In total, 16 of the 17 warmest years on record have occurred since 2001. As a result, many already dry and water-scarce regions have been hit by increasingly more frequent droughts severely affecting agriculture.

Salinity

An average of 2,000 hectares of irrigated land in arid and semi-arid areas across 75 countries is degraded by salt every day because of poor water management practices according to the UN University's Canadian-based Institute for Water, Environment and Health. The latest estimate is that an area the size of France, or around 62 million hectares (20%) of the world's irrigated lands, are affected, up from 45 million hectares in the early 1990s.

Water scarcity

Water scarcity already affects every continent. The problem is set to worsen due to unsustainable and competing uses for human consumption and agriculture. It is estimated that around 1.2 billion people live in areas of physical scarcity. Another 1.6 billion people face economic water shortage (where countries lack necessary infrastructure to take water from rivers and aquifers).

Undernourishment

According to FAO's The State of Food Insecurity in the World 2015, 793 million people are undernourished globally. This number is likely to grow as the world adds 2.4 billion people by 2050.

Is traditional agriculture enough for global food security?

According to FAO, food production will need to increase by as much as 60% either through greater crop yields per unit area or an expansion in growing land to meet future demand.

Scientists warn that industrial agriculture might be reaching its limits to produce enough food for a growing population. What is more, yields of major crops are projected to fall by 25% and more by 2050 due to climate change and rapid land degradation in a business-as-usual scenario.

Has traditional agriculture peaked?

According to a major study by scientists at the University of Nebraska-Lincoln, prevalence of the declines and plateaus in production of major crops since the 1990s indicates that maximum potential yields under the industrial model of agribusiness might have already occurred. The study points out that some of the causes include land degradation, climate change, and inadequate or inappropriate investment. This raises concerns about whether traditional agricultural methods and crops will be enough to sustain global food production targets as regions which already suffer from undernourishment, water scarcity and soil degradation are forecast to see the largest population growth.

What can be done?

There is a pressing need to identify, test and introduce alternative, non-traditional solutions to sustain and possibly increase agricultural productivity in regions where traditional, mainstream approaches are failing or uneconomical.

In regions affected by salinity and drought, for example, alternative, non-traditional crops like quinoa and pearl millet can be cultivated. And where there is water shortage, alternative types of water such as treated wastewater, saline water and even seawater can be used for agricultural and landscaping purposes, while freshwater resources are reserved for human consumption.

ICBA's research and development work in more than 20 countries in North Africa, Central Asia, Sub-Saharan Africa and the Middle East has demonstrated that alternative crops and forages introduced by the center are being successfully adopted by an increasing number of farmers in areas where major traditional crops like cotton, winter wheat and maize fail to produce economical yields. ICBA's work on forage production in West Asia, North Africa, Central Asia and the Caucasus has benefitted more than 5,000 farmers directly and 3,500 indirectly. The center continues to scale up this approach in Ethiopia and Morocco by engaging 3,000 farmers directly and indirectly.

ICBA's non-traditional salt- and drought-tolerant forage varieties have produced up to 38% higher yields than local widely grown commercial proso millet, cotton, corn and wheat varieties. Their cultivation on salt-affected and abandoned low productive lands has been shown to increase farm productivity by over 20%. Surveys carried out on 500 farms in the Middle East, North Africa and Central Asia and the Caucasus regions (including 370 on-farm trials) show that introducing non-traditional forage varieties has improved farmers' incomes by up to 50% compared to traditional practices.

What makes ICBA unique

ICBA was founded in 1999 following calls from Organisation of Islamic Cooperation member countries to address the growing problem of salinization in different regions of the world. The center has since conducted some of the longest-running studies on the impact of salinity and water scarcity on trees and crops in marginal conditions, which provide critical data to scientists, social researchers, development agencies and decision-makers as they devise strategies to adapt to a warmer and harsher climate.

As an applied agricultural research center, ICBA has been working to address current and future risks and problems in marginal areas. Over the past two decades the center has been identifying, testing and piloting resource-efficient, climate-smart crops and technologies in salt-affected, water-scarce and drought-vulnerable regions around the world. As a result, ICBA has accumulated extensive applied experience and developed tailor-made solutions to the problems of salinity, water scarcity and drought. The center is uniquely positioned to introduce much-needed climate-smart crops and technologies in different parts of the world to alleviate projected food and water crises.

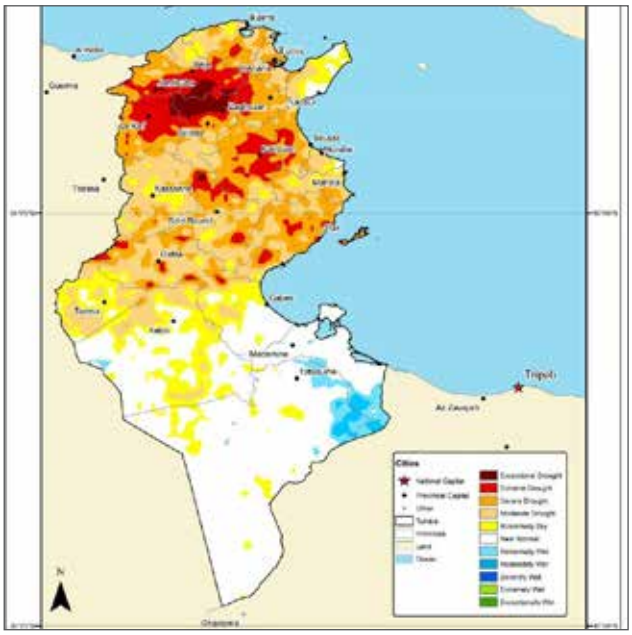
The center stores one of the world's largest collections of germplasm exclusively dedicated to heat- and salt-tolerant plant species. Its gene bank has over 13,000 accessions of some 240 plant species from more than 150 countries and territories of the world. The gene bank also preserves around 250 seed samples of 70 wild plant species from the UAE, the center's host country.

ICBA targets some of the poorest communities in regions where agriculture is the main livelihood but is failing due to salinity, water scarcity and drought and the mainstream interventions by other research and development agencies have not produced effective and lasting outcomes.

What ICBA has achieved

ICBA has been working on long-term effects on fruit quality and quantity in date palm irrigated with saline water. The ten most common varieties from the UAE and eight from Saudi Arabia have been evaluated for production and water use. In the UAE alone, 1 billion cubic meters of water is used annually to irrigate date palm plantations, and similarly large amounts are used in Saudi Arabia and other Gulf countries. ICBA has water productivity data that helps to reduce date palm irrigation requirements by up to 35%. If this information is used by policy-makers and farmers in the region, it can lead to massive water savings. ICBA's work on date palm has been recognized twice by the Khalifa International Award for Date Palm and Agricultural Innovation.

ICBA has developed and tested many annual and perennial varieties of forage under extremely saline conditions (the equivalent of 60% of seawater salinity) in the UAE and many partner countries in Central Asia and the Caucasus, Gulf Cooperation Council, Middle East and North Africa, and Sub-Saharan Africa. Annual forages include sorghum, pearl millet, barley, the grass distichlis and many others that have been widely adopted by farmers. Eight genotypes bred with local varieties in Central Asia have been released to hundreds of farmers. Perennial forages have been very successful on highly salinized farms in Abu Dhabi and many partner countries, and produced up to 30 tonnes of dry matter per ha (the equivalent of alfalfa grown with good quality water).



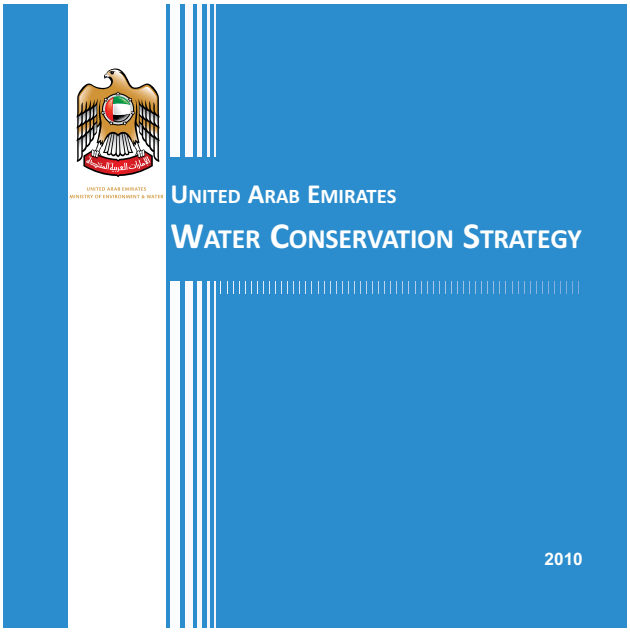
ICBA's expertise on climate change ranges from computer modeling to predict the nature and character of future climate as well as its impacts on water resources and crop yields to developing packages of new farming practices that will help not only to maintain but also to increase production. ICBA has downscaled global climate change model data to the national level to help identify areas, sectors and communities vulnerable to climate change impacts on water and agriculture in Egypt, Lebanon, Jordan, Mauritania, Morocco, Tunisia, Senegal, Yemen, Iraq and the UAE. More than 50 new maps showing predicted change in various climate indicators that are pertinent to agricultural activities in these countries have been produced and shared with the governments. ICBA has also trained more than 150 in-country scientists to undertake climate analysis on future projections so that the maps they produce can be used to support and guide the development of climate change adaptation strategies.

ICBA has led several soil-mapping efforts in the Gulf region. For example, the center collaborated with the Environment Agency – Abu Dhabi to conduct a soil survey of the Emirate of Abu Dhabi that covered an area of 59,000 sq. km. Soil data collected and maps generated over many years are now presented as part of a unique collection at the Emirates Soil Museum which was inaugurated in 2016 and is maintained by ICBA.

What ICBA has achieved

ICBA has been studying biological and other amendments to improve soil fertility, moisture retention and organic matter in arid and semi-arid regions, including the UAE. For example, ICBA's research findings show that arbuscular mycorrhizae fungi can enhance the growth of date palms (Phoenix dactylifera L.) by 50% under low nutrient and saline conditions. ICBA's research on the soil amendment biochar has demonstrated that it improves soil fertility, saves 30-35% of water and soil nutrients, and mitigates greenhouse emissions.

Following nearly two decades of research, ICBA has released eight salt-tolerant genotypes of pearl millet, sorghum, alfalfa and Atriplex to farmers in Central Asia and the Caucasus. These genotypes have been adopted by farms in Uzbekistan, Kazakhstan, Tajikistan and Azerbaijan.



Through its capacity-building programs, ICBA has directly reached over 5,000 beneficiaries in different regions. These programs have worked with national centers. As a result, gradual changes in farming practices have been achieved. For example, a seed system was initiated in Central Asian countries to strengthen farmers' capacity to locally produce high quality seed for commercial production. Six seed production districts in Kazakhstan, Uzbekistan and Tajikistan started producing elite grade seed of pearl millet variety Hashaki 1; alfalfa variety Kyzylkesek; and sorghum variety Keshen on marginal lands.
ICBA has directly helped more than 4,000 farms to test and introduce alternative, non-traditional crops and technologies in the Middle East, North Africa, Central Asia and the Caucasus. More than 20,000 farmers have indirectly benefitted and more continue to benefit from model farms established by ICBA in partner countries, involving around 30 national partner institutes.

ICBA has supported several governments in agricultural, water and food security policy formulation, including the UAE, Oman and Kuwait. The evidence provided and the recommendations described have resulted in policy changes such as the reduction in Rhodes grass grown in the UAE, saving at least 30% of irrigation water compared to other forages grown. ICBA has introduced its improved, resilient crops and forages, and sustainable water management solutions to more than 30 countries. For example, inspired by the results of ICBA's work on forages, women farmers have created Rural Women's Learning Alliances to join forces with ICBA scientists to identify and promote strategies for diversifying household incomes through forage production for Karakul sheep in the Aral Sea Basin in Karakalpakstan.

What ICBA has achieved

ICBA has distributed more than 7,000 seed samples from its gene bank to various research organizations and other stakeholders including farmers, agriculture ministries, and seed companies around the world. ICBA's gene bank plays an important role in preserving plant genetic resources that are vital to cope with the current decline in agricultural productivity due to environmental deterioration and climate change. ICBA has been working with a global collection of 50 Salicornia genotypes for large-scale introduction in the Gulf region. Salicornia is a halophyte that can grow with extremely saline water and seawater and produce seeds for aviation biofuel as seeds contain 35% of very light oil.

Following nearly a decade of research, ICBA has developed five quinoa genotypes that produce up to 3 tonnes of seed per ha. The genotypes have been tested and introduced in countries of Gulf Cooperation Council, Central Asia and the Caucasus, as well as Egypt and Yemen. ICBA is also working with the private sector in India, Pakistan, Egypt and Kuwait on grain production and the whole value chain of quinoa. ICBA has been working on new greenhouse and net-house technologies to improve production, water and energy efficiency in the Gulf region. ICBA's greenhouse model using a misting system saves 95% of energy and 75% of water in comparison with the conventional cooling pad and fan system used extensively in the region.

ICBA has accumulated unique and extensive experience in facilitating transboundary water management in politically sensitive environments. For example, the center's long-running Collaborative Program in the Euphrates and Tigris river basins is helping to improve dialogue and trust between Iraq, Syria and Turkey on transboundary water management.

ICBA has an outstanding record of research output focused exclusively on issues of salinity, water scarcity and drought. ICBA scientists have published to the tune of 145 papers in leading international peer-reviewed scientific journals.

How ICBA can contribute to United Nations Sustainable Development Goals

The United Nations Sustainable Development Goals (SDGs) came into effect in January 2016 following endorsement by 193 countries. They provide direction for research and development programs around the world until 2030. They call for new, integrated approaches to tackling global problems such as poverty, hunger and climate change.

ICBA believes there is a need for a paradigm shift in regions with the least favorable environmental and/or economic conditions where previous research and development work under the Millennium Development Goals did not produce effective and lasting outcomes.

As an estimated 1.7 billion people live in these regions, SDGs cannot be achieved without addressing their challenges. Under its mandate, ICBA is fully committed to working towards the SDGs, particularly SDGs 1 and 2 on poverty and hunger, as well as SDGs 5, 6, 13, 15 and 17.

Therefore, ICBA will intensify its efforts in these regions to:

- Increase livelihoods of the poorest communities dependent on small-scale agriculture through ICBA-generated climate-smart crops and technologies
- Ensure effective and efficient soil and water management through integrated farming approaches
- Improve technology and knowledge transfer among smallholder farmers
- Provide technical support to national research centers and governments on climate change adaptation and mitigation

ICBA is uniquely positioned and prepared to serve as a lead research and development organization of the Organisation of Islamic Cooperation and Islamic Development Bank member countries in their contribution to the SDGs.

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