

The South-South Knowledge Exchange Study Tour in China

Post-Event Report

*MENA Regional Coordination on Improved
Agriculture Water Management Project*

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INTRODUCTION

China has committed itself to be a partner in South-South Cooperation. Over the past forty years, China has pursued a successful path of economic development that has lifted hundreds of millions of its farmers out of poverty. The many lessons from China's experience are relevant to other developing countries as they pursue their own goals of sustainable prosperity and poverty elimination.

Water management and agriculture development have been an important part of China's successful development story, and these sectors have undergone a series of important institutional and management reforms over the past 40 years. Throughout, China has focused on the key goals of: improving agricultural productivity and food security, building rural infrastructure, and raising farmer incomes through development of small farm householder organizations and value chain enterprises.

Various aspects of China's development experience can add significant value to the Bank's client countries. Together, China and the World Bank are able to package and deliver relevant expertise, knowledge, and advanced technologies to partner countries through South-South knowledge sharing platforms, hands-on training workshops, strategic project investments, and practical study tours.

This report summarizes one such recent study tour. A high-level delegation from the *Middle East and North Africa Region (MENA)* visited China from 29 January to 05 February 2018 for a South-South cooperation and knowledge sharing study tour. The MENA region faces many challenges which are similar to those faced in China's arid northwest; and China's experience in agriculture and water resources development and management, as well as in poverty reduction, provide useful lessons for the MENA countries as they look to better manage scarce water resources and improve rural livelihoods back home. The study tour was jointly organized by the World Bank Agriculture GP and the Bank's Beijing office, facilitated by the Foreign Economic Cooperation Center (FECC) of China's Ministry of Agriculture (MOA), and financed by the China-World Bank Partnership Facility Trust Fund (CWPF TF, see more below).

Managing Water in the Countries of the MENA Region: Egypt, Jordan, Lebanon, Morocco, and Tunisia

The arid Middle East and North Africa is one of the most water-scarce regions in the world. Water management is naturally challenged by low levels of rainfall, but hydrologic scarcity is further compounded by inefficient and sub-optimal allocations and management of water. MENA countries are actively seeking new solutions for water management and have been keen to promote and implement a full range of water-saving technologies that can help them to improve water productivity and food security under the conditions of severe water scarcity in the region.

The China-World Bank Group Partnership Facility and the MENA Regional Project

This study tour was one in a series of events organized under the *MENA Regional Coordination on Improved Agriculture Water Management Project* and was financed by the *China-World Bank Group Partnership Facility (CWPF)*. The CWPF's overall objective is to assist Bank developing member countries achieve inclusive and sustainable development. The CWPF leverages different pools of financial and knowledge resources to support replicable and demand-driven activities through enhanced tripartite cooperation between China, recipient countries, and the World Bank. The specific regional objective for this CWPF project is to establish national and regional water management systems in MENA partner countries by transferring advanced Chinese experience and technologies that will help better manage local and regional water resources, improve agricultural resilience, and

reduce the threats from climate change to vulnerable agricultural production systems. Through these efforts, the CWPF project also aims to foster technical and professional cooperation and capacity building between China and the partner MENA countries.

Under this CWPF MENA regional project, several study and training events have already been organized. These events aimed to transfer Chinese experience with new agriculture and water management approaches and technologies, along with how to apply them in the field to solve similar challenges in MENA by farmers, water managers, and line ministry decision-makers. Two, month-long technical training sessions have been organized in China on the use of remote sensing (RS) technology for water and agricultural management. The two training sessions involved 12 technical experts from the relevant line ministries and agencies of the MENA countries (plus from AWC), and were designed to assist in the transfer of Chinese knowledge and technology so that customized and state-of-the-art national and regional RS water-use measurement, monitoring, and management systems and capacity can be built in each of the MENA countries.

However, water consumption monitoring and management needs to be understood and applied by the high-level leadership of the responsible line ministries, and not just their technical agencies...

The South-South Knowledge Exchange Study Tour

The *South-South Knowledge Exchange Study Tour* detailed in this report was a six-day event, which included three days of high-level ministerial meetings held in Beijing, with presentations on development policy and approaches as well as technical discussions for knowledge sharing between the MENA delegates and officials and experts from various Chinese ministries and research institutions, and also from the World Bank. The study tour also included three days of field visits to sites in Hebei and Shandong provinces showcasing China's use of science, technology, and institutional reforms for agricultural and water management and poverty reduction.

The specific objectives of the study tour were to:

- Share with high-level leaders from the national line ministries of the MENA countries how to embed and integrate the RS-based agriculture water management tools into their decision-making processes.
- Share practices and experiences from China's systematic and strategic approach to development in agriculture, water, and poverty reduction; including the experiences and good practices from World Bank projects in China.
- Introduce innovative concepts and good practices; and provide training in advanced Chinese remote-sensing technologies, as applied to agriculture water management.
- Facilitate meetings between Chinese and MENA counterparts to advance partnership discussions and share MENA-country context and priorities.
- Visit key water and agricultural management sites, to allow MENA delegates to see first-hand China's successful approaches and technologies.

Study Tour Participation

The participants in the study tour included a delegation of eight high-ranking officials and five technical experts from the five CWPF project countries in the MENA Region: Egypt, Jordan, Lebanon, Morocco, Tunisia, and the Arab Water Council (AWC). The delegation was led by Mr. Khaled Abdelrahman Mohamed Abdelrahman Madyan, the Vice Minister of the Ministry of Water and Irrigation in Egypt.

The study tour also included participation from high-level government officials and experts from many Chinese ministries and scientific agencies, including: The *Ministry of Agriculture (MOA)*, the *Ministry of*

Water Resources (MWR), the Chinese Academy of Sciences (CAS), the Chinese Academy of Agricultural Sciences (CAAS), the International Poverty Reduction Center (IPRC), and the Foreign Economic Cooperation Center of the MOA (FECC).

Many senior specialists and managers from the Water and Agriculture Global Practices of the World Bank China Office also participated in the study tour.

Note: See Annex 1 for a list of participants



The MENA Region Delegation meets the management and expert team in Chinese academy of agriculture science for the South-South Knowledge Exchange in China

THE WORLD BANK AND CHINA: PARTNERS IN SOUTH-SOUTH COOPERATION

The World Bank has been a key partner in China for about 40 years, cooperating on a wide range of investment projects and strategic studies, covering various technical and economic development sectors. This partnership has accumulated a great deal of experience and achieved significant results. Over time, the World Bank and China partnership has further evolved toward more sharing of China's development experience with other Bank client countries through cooperation, joint investments, and capacity building efforts. In particular, the World Bank has signed MOUs with a number of Chinese ministries and national agencies to support South-South cooperation across a range of important sectors. In 2017, a three-way MOU was signed between the Chinese Ministry of Finance (MOF), the MOA, and the World Bank Agriculture GP to provide analytics, financing, and global knowledge for South-South cooperation in agriculture across the Bank's client countries. The CWPFF Facility is one such vehicle to facilitate this cooperation.

Note: See Annex 2 for additional information on the background and context of the south-south partnership

Key Features of a World Bank China South-South Study Tour

The World Bank's deep operational knowledgebase, both in China and globally, and its global network of country offices make it an ideal partner to share China's development experience. Like the MENA regional study tour of this report, China-World Bank South-South cooperation partnerships can provide knowledge exchange with the offerings listed below. All of these offerings are made to be professional, relevant, and customized to meet the needs of the other bank Client countries.

- **Tailor-made:** China is a large country of diverse landscapes, climates, and development stages. South-South study tours can be tailored to meet the unique needs of visiting delegations. The China-MENA study tour showcased solutions for arid and water-scarce regions with saline/salt soils, groundwater overdraft problems, and persistent poverty.
 - The study tour visited a groundwater irrigation district in Hebei, relevant to required improvement on groundwater management in Egypt, Jordan, Tunisia and Morocco.
 - The study tour visited a site in the Yellow River delta, with similar landscape, water, and soil conditions as the Nile delta area in Egypt.
- **Demand-driven:** Based on the specific interests and requests from visiting delegations, the SSKE study tour introduced the following:
 - The application of remote sensing technology in agriculture water management - applying ET Monitoring and Management System at the farm level
 - Water-saving irrigation technologies and groundwater management practices
 - Climate smart agriculture technologies for CC adaptation and mitigation (e.g. drought-resistance)
 - China's targeted poverty alleviation – policies, trends, approaches and results
 - The latest Chinese salt-tolerant crop production technologies (rice, wheat, cotton, vegetables)
 - Land reclamation technologies for improving saline and arid lands
 - Crop, livestock, vegetables and efficient recycling technologies for Improved eco-farming system, water and agriculture productivity and farmer incomes
 - Crop yield monitoring and forecasting with Remote Sensing
 - Digital agricultural machinery technologies and applications, and smart agriculture monitoring and management techniques
- **Training opportunities:** Setup in-depth training workshops with technical experts in advanced technology transformation.

- **Strategic cooperation:** Setup specific, targeted conversations between MENA countries and China's MOA, MWR, IPRCC, FECC, CAS, CAAS, etc. for specific cooperation initiatives; both sides can present their needs and offerings, and the direct link to any relevant ongoing projects or proposals.

BRIEF ITINERARY OF THE STUDY TOUR

The itinerary for the six-day *South-South Knowledge Exchange Study Tour in China* is briefly outlined here. Further details and key discussion themes can be found in the following section of this report.

Day 1: Knowledge Sharing | Water Resources Management

- Introduction to World Bank Agriculture and Water Management Projects in China
- High Level Meeting with the Vice Minister of Water Resources (China's Ministry of Water Resources)
- Meetings and Presentations with China's Ministry of Water Resources (MWR)

Day 2: Knowledge Sharing | Remote Sensing Technologies, and Poverty Reduction

- Meetings and Presentations with the Chinese Academy of Science (CAS)
- Meetings and Presentations with IPRCC

Day 3: Knowledge Sharing | Agriculture Development and Technologies

- High Level Meeting with the Vice Minister of Agriculture (China's Ministry of Agriculture, MOA)
- Meetings and Presentations with the Foreign Economic Cooperation Center (FECC) of MOA
- Meetings and Presentations with the Chinese Academy of Agricultural Science (CAAS)

Day 4: Field Visits | Groundwater Management System and WUAs

- Meetings and Presentations with Hebei Provincial Water Resources Department (PWRD)
- Field Visit: Hydroelectric Power IC Card Smart Controlled Well
- Field Visit: Water User Association (WUA)

Day 5: Field Visits | Applied Research for Agricultural Water Savings & Eco-Farming

- Field Visit: Modernized Irrigated Agriculture Demonstration Area in Yellow River Delta
- Field Visit: National Agroecosystem Experimental Station in Yucheng County
- Field Visit: An Eco-Farm

Day 6: Field Visits | Smart & Digital Agriculture Technologies

- Field Visit: 3S Technology Company

DETAILS OF THE STUDY TOUR

The six-day *South-South Knowledge Exchange Study Tour in China* included three days of knowledge sharing discussions and three days of field visits to relevant agricultural water management sites in China. The knowledge sharing days allowed discussion of MENA country and China national agriculture/irrigation development priorities, water sector challenges, and potential opportunities for collaboration between the World Bank, MOA, MWR and the governments of the delegation countries for joint South-South cooperation. Particular discussions centered around the ongoing project (*MENA Regional Coordination on Improved Agriculture Water Management*) and the newly applied-for *MOA/FAO South-South Cooperation Trust Fund Project*. The field visits allowed the delegation to see first-hand those projects they had learned about during the presentations in Beijing – including the successful technologies, institutional mechanisms, and monitoring systems currently being used for irrigation and groundwater management at the irrigation district and farm scales in China.

Summary notes and key themes discussed during the knowledge sharing sessions and field visits are outlined below.

Note: presentation files (PPT's) and photos from the sessions listed below can be found online at the World Bank knowledge sharing portal. See the numbered attachments listed under each session.

Day 1: Knowledge Sharing | Water Resources Management

■ INTRODUCTION TO THE WORLD BANK AGRICULTURE AND WATER MANAGEMENT PROJECTS IN CHINA

This session provided the opportunity for the MENA delegation to meet and learn from project managers of the World Bank Water and Agriculture Global Practices in the China Office. These experts introduced and discussed the multitude of reforms China undertook over the years in the agriculture and water sectors; and the innovative concepts and designs, implementation experiences, best practices, results, and lessons learned from the World Bank financed agriculture and water operations in China in support of government strategies and reforms going back over 30 years. Topic presentations included the following:

■ **Water Saving Projects, example from Turpan District in Xinjiang western China**

Jiang Liping, Senior Irrigation and Drainage Specialist

Turpan District in far-western Xinjiang, China, is a highly arid and water-scarce region with conditions similar to countries in the MENA region. This presentation showcased a successful Bank project with a holistic water management approach applicable to the MENA delegation countries.

- Turpan faced severe groundwater overexploitation and degradation of lakes and ecosystems, along with low agricultural productivity, low incomes, and a cycle of poverty for local farmers.
- The World Bank-financed project provided a holistic approach for real water savings, increased water productivity, and raised farmer incomes.
- Key elements of the project include:
 - Defining a basin-level water balance and overall sustainable consumption cap.
 - Managing evapotranspiration (ET) with an overall ET target for the basin and allocating ET targets as regulated withdrawal volumes to villages, farmers, and WUAs.
 - Careful design of modern irrigation technologies, agro-economic measures, and institutional reforms to WUAs and water offices to reduce water use and raise incomes.
 - Using advanced satellite remote-sensing (RS) to monitor actual water use (via ET), and regulating the targeted farmer allocations under the water cap.
 - Reforming agricultural water pricing with a tiered tariff system to incentivize savings.

- Groundwater overdraft was significantly reduced, the health of local lakes and streams improved, farmers grew higher-value, higher-quality crops for higher incomes, and real water savings made more water available for domestic and industrial demands.

■ Poverty Reduction in China

Paavo Eliste, Lead Agriculture Economist; and Wendao Cao, Senior Agriculture Specialist

China has had remarkable success in poverty reduction over the past 30 years; and other developing countries can learn from China's systematic approach. The World Bank has been a key technical, financing, and implementing partner for poverty reduction in China through a process of solid analysis, ground-testing of policies, and continuous learning and improvement.

- China's government has consistently made strong commitments to reduce poverty and income disparities, earmarking significant funding from the central government.
- China is in the final stage of reducing poverty and aims to reach zero extreme poverty by 2020.
- A key focus now is on China's western regions, which have the highest populations still in poverty, and these tend to be mountainous areas with large communities of ethnic minorities.
- China holistic poverty reduction strategy is built on five pillars: planned industrialization, labor migration / vocational training, ecological resettlement, environmental protection and sustainable livelihoods, and a minimum living standard guarantee.
- The Bank currently has four active projects in its rural poverty reduction portfolio in China with total investments of \$450 million¹.



DISCUSSIONS AT THE WORLD BANK BEIJING OFFICE

■ Introduction to Comprehensive Agricultural Development in China

Ding Ping, Deputy Director of the Project Management Office, The State Office of Comprehensive Agriculture Development, Ministry of Finance (MOF)

This presentation gave an overview of the evolution of World Bank loan projects under the Comprehensive Agricultural Development (CAD) program in China.

- Since 1998, the CAD program evolved through a series of focus and priority areas defined in partnership between the World Bank and the Government of China.
- The focus of the program has changed over time, from production of main agricultural products, to increasing farmer livelihoods, to improvements in water and agricultural productivity, to sustainable environment and water resources management, and more recently to sustainable and climate-resilient agricultural production systems. The program received highly satisfactory output and outcome results assessed by the Bank IEG.
- The program has strategically coordinated with other funding sources and initiatives (e.g. GEF and DIFID).

¹ Note that at this stage in China's partnership with the World Bank, the financing available from the Bank is less critical than the access to deep knowledge resources and innovations that come from the World Bank funded projects. As such, China maintains a relatively smaller portfolio of projects that are strategically selected and implemented across a number of provinces. These projects are designed to be demonstration of innovative solutions to challenging problems, and the successful projects are scaled up using China's own financial resources.

■ **Food Safety Project Concept**

Sitaramachandra Machiraju, Senior Agribusiness Specialist

This presentation gave an overview of the major trends in global food systems, and the rising importance of food safety for domestic consumers and export markets. China has faced a number of food safety challenges in recent years but has also been taking new steps to resolve and regulate food safety concerns. The World Bank helps China to engage in this issue, through an approach that includes strategy development and diagnostics, applications of good practice, food operator practices, and consumer risk communication. Specific World Bank investments support legal and regulatory frameworks, training for food inspectors, and communication efforts with consumers.

■ **Hexi Corridor Project (Gansu Province, Shule Irrigation District)**

Mr. Yaohua Wang, Shule River Basin Water Resources Management Bureau

This is another World Bank supported project highly relevant to the countries of the MENA region, and especially Egypt. In this project, a targeted beneficiary population living in extreme poverty on barren land with severe saline soil and harsh conditions was given the chance for voluntary relocation and economic development in the Shule River basin, west of the Hexi corridor in Gansu Province (western China). The project provided new infrastructure and economic opportunities to improve their livelihoods, through planned population resettlement and economic development.

- Originally this was a very poor and undeveloped area, suffering from severe water and saline soil problems with no agriculture production. The project started from the land reclamation and development of the large irrigation system and district.
- Now the region is quite wealthy, growing high-value grapes and hops, and is one of the most water-efficient counties/districts in all of China with significantly increased farmers' income.
- The Shule River basin is characterized by rich soil, and ample water resources with effective water and irrigation management system now (with WUAs, FAs, FCs, etc.).
- The project involved a large-scale voluntary resettlement of the vulnerable population. The government committed its support, developed detailed relocation and development plans, and provided a chance for the resettled population to improve their lives.
- The project resettled 75,000 people from 15,585 households, in seven newly established resettlement townships and 52 administrative villages.
- Through the project, the government developed necessary water, energy, transport and social infrastructure, including: paved rural roads in the villages, street lamps, dustbins, schools, clinics, landscaping of various trees, etc.
- The government and farmers have also developed agricultural facilities, including: large-sized greenhouses, fruits trees and orchards, penned housing for animal husbandry and value chain enterprises, which become the national comprehensive agriculture development model.

■ **MEETINGS AND PRESENTATIONS WITH CHINA'S MINISTRY OF WATER RESOURCES (MWR)**

The MENA region delegation met with the *Vice Minister of China's Ministry of Water Resources*, Mr. Xuewen Zhou, along with six Director Generals and five Division Directors from key departments of MWR. The two sides exchanged views on strengthening the cooperation between the Chinese Ministry of Water Resources and the MENA countries through the World Bank's South-South cooperation partnership program. They also exchanged experiences on water resources management, farmland water conservancy, and disaster prevention and reduction.

Vice Minister Zhou said that the Ministry of Water Resources of China, the World Bank and the water conservancy departments in MENA countries have long maintained friendly and cooperative relations. Mr. Zhou briefly introduced China's water resources context, water management systems, achievements of water conservancy, and the history of water-related goals and tasks in China's development. He indicated that China is willing to share its experiences in

water management with all countries in the world; and Vice Minister Zhou suggested to deepen the cooperation in the following ways: i) strengthen high-level visits and policy dialogues; ii) encourage expert technical exchanges among national scientific, planning, and design institutes; and iii) explore innovative cooperation models through the World Bank.

Vice Minister Zhou also thanked the World Bank for its support to China and his ministry over the last 30 years, and he stressed how the partnership between China and the World Bank has continuously evolved over the years, and he encouraged the World Bank to now diversify its focus to also facilitate the sharing of China's development experiences (supported by the World Bank) with other countries around the world.

The head of the MENA delegation, Mr. Khaled Abdelrahman Mohamed Abdelrahman Madyan, also gave remarks on the water resources management measures taken by the Chinese government, especially in agricultural water conservancy. He also expressed appreciation for the long-term friendship and cooperation between China and Egypt in the water sector; and he concluded by introducing the current status and challenges of water and agriculture in Egypt.

▪ **Overview of the Status and Strategy of Water Management in China**

Zhiwei Zhou, Division Chief, Department of Planning and Programming

China faces similar challenges to the MENA countries in terms of water scarcity. China has low per-capita water resources, and water in China is unevenly distributed in space and time. But, since the foundation of modern China in 1949, addressing the issues of water scarcity, pollution, ecological degradation, flooding, and droughts has been a top priority for China's government.

- Water security and water management are elevated to national strategies in China.
- China invests in technical solutions – with 172 major water projects identified since 2014.
- China is prioritizing new ecological solutions – with river restoration, water ecosystem connectivity, groundwater management, and source-water protection projects.
- China also uses water pricing reforms and economic incentives to manage water – including water prices, performance contracts, and encouraging public and private investments (PPP).
- China's new River Chief System provides a global model for holistic water systems management and accountability.

▪ **Introduction to Water Resources Management in China**

Bingqiang Qi, Division Chief, Department of Water Resources

This presentation continued the previous discussion and added further details on China's national-level goals and strategies to resolve the urgent water resources challenges of scarcity, wastage, overexploitation, and pollution. The presenter particularly highlighted three high-level initiatives:

- China's "strictest water resources management system", composed of the "Three Red Lines" (use-efficiency, utilization coefficients, and pollution loads) and the "Four Systems" (total-use quantity, water-saving sectors, pollution discharges, and responsibility / assessment systems).
- National efforts for groundwater management, through the National GW Monitoring System, and the drafting of the National Groundwater Management Plan.
- China's goal for a "water saving society", with targeted policies to promote technologies and behavior changes across irrigation systems, industry, domestic water users, and the promotion "non-traditional" water sources (i.e. rain harvesting, desalination, water reuse, etc.).

▪ **Introduction to Flood Control and Disaster Mitigation in China**

Qunzhi Wan, Division Chief, Office of State Flood Control and Drought Relief Headquarters

This presentation provided a brief overview of China's history, challenges, and solution systems for responding to flood disasters. China has made important achievements protecting vulnerable populations and economic infrastructure against flood damage, through a combination of

engineering systems (reservoirs, embankments, sluices, etc.), management systems (institutions, preparedness plans, early warning), and command systems (data collection, forecasting, and emergency response).

- **Introduction to Rural Irrigation and Water Conservancy in China**

Jing Bai, Senior Engineer, China Irrigation and Drainage Development Center, MWR

Irrigated agriculture has been an important piece of China's rural development, poverty reduction and national food security strategies. This presentation gave an overview of the scale and scope of China's rural irrigation development. In recent decades, a relatively complete system of irrigation and drainage has been set up across the whole country, including large- and medium-sized irrigation regions, pumping stations, wells, ponds and dams. Water saving irrigation has been an important part of rural irrigation and is increasingly an objective of further development to respond to urbanization, growing water demand, and climate change.

See attachment 1 for session presentations and photos

Day 2: Knowledge Sharing | Remote Sensing Technologies, and Poverty Reduction

- MEETINGS AND PRESENTATIONS WITH THE CHINESE ACADEMY OF SCIENCE (CAS)

A major objective of this study tour was to share knowledge and provide training in new Chinese innovations in the area of Remote Sensing (RS) for water and environmental management. Several leaders and experts from China's remote sensing institute at the CAS gave an overview of their applications and capabilities with RS. Also, the national RS expert representatives from Egypt, Tunisia and Jordan presented the outcomes and experience of the CWPF Remote-Sensing Training Workshop they attended as part of the ongoing CWPF MENA regional project.

- **Introduction to the Institute of Remote Sensing and Digital Earth (RADI)**

Jie Liu, Director, International Cooperation Office, RADI

A brief introduction to RADI and its capabilities as an institute for remote sensing, applied data analysis, and international cooperation to solve important global issues.

- RADI is an advanced earth observation institute with 1,200 experts across multiple campuses.
- RADI utilizes a range of spaceborne, airborne, and ground-based systems; and key satellite partnerships with the USA, France, India, Thailand, EU, Canada, and Brazil.
- RADI has developed more than 30 spatial information products, for monitoring climate change, natural disasters, cities, energy resources, agricultural production, and food / water insecurity.
- The "Digital Belt and Road" is a RADI's international cooperation effort relevant to MENA.

- **Introduction to Remote Sensing Technical Tools + Applications: ET-Watch & Crop-Watch**

Bingfang Wu, Director/Professor, Division of Digital Agriculture, RADI

This presentation was a technical dive into RADI's flagship ET-Watch and Crop-Watch tools, and practical applications for water and agriculture management projects in China and Egypt. Dr. Wu presented technical details on how the tools work, the validation of data, and the user interfaces.

- ET-Watch has had important applications in China and Egypt, including: the Hai River basin, Beijing city, Tianjin city, Hebei Province, and Turpan District.
- Crop-Watch has important applications for food security early warning, revealing risks related to crop growth stages, meteorological factors, and severe droughts.

- **China-World Bank Partnership Facility (CWPF) Remote-Sensing Training Workshop Presentations from MENA Country Training Participants**

The timing of the study tour corresponded with the parallel “Remote Sensing Technology Training Workshop” (Jan 15 - Feb 5, also in Beijing), which is another China-MENA South-South cooperation initiative under the CWPF.

Five experts from three MENA countries’ training participants gave presentations sharing the outcomes of three weeks of training in Beijing through the CWPF project. They presented the progress of the training workshop, what they learned, and expectations for how the shared knowledge and experience from China can be applied in their home countries. The presenters were:

- *Bassam Mohammed Abdelsalam Abdellatif, Researcher, Supervisor of Digital Image Processing Department, National Authority for Remote Sensing and Space Sciences, EGYPT*
- *Nabil Sghaier, Engineer, National Center for Cartography and Remote Sensing, TUNISIA*
- *Yousri Gafsaoui, Head of Unit, Office of Planning and Hydraulic Balances, Water Resources and Fisheries, Ministry of Agriculture, TUNISIA*
- *Mario Raymond Mhawej, Researcher, Remote Sensing Center, National Center for Scientific Research, LEBANON*
- *Ralph Zoughaib, Engineer, Directorate of Rural Development and natural Resources, Ministry of Agriculture, LEBANON*

[See attachment 2 for session presentations and photos](#)

- **MEETINGS AND PRESENTATIONS WITH IPRCC**

This session was specifically requested by the World Bank Country Director in Egypt, for the MENA delegation to meet with IPRCC and discuss China’s significant achievements in domestic poverty alleviation, as well as China’s programs for international cooperation on global poverty reduction.

- **China's Strategy of Targeted Poverty Alleviation: Achievements, Experiences, & Challenges**

Zhang Guangping, Vice President

China has had well-recognized success in lifting a huge population out of poverty, and this experience is highly relevant to the objectives of the countries in the MENA region. The presentation provided an impressive overview of China’s history of poverty alleviation strategies and measures, documenting key successes and remaining challenges.

- Poverty alleviation has been at the top of China’s policy agenda for the past 30 years.
- China has had an evolving strategy for poverty eradication with important phases having time-bound and measurable goals for both urban and rural poverty alleviation.
- China aims to completely eliminate poverty by 2020.
- Poverty alleviation in China is based on important principles: detailed registration and data to track villages and households in poverty, differentiated measures, a focus on key regions, standardizing mechanisms for exiting poverty, and making sure no one falls back into poverty.
- A range of poverty alleviation measures are used: developing industries, resettling poor populations, exporting workers, transport construction, education, and medical security.
- Resources are mobilized to reduce poverty through a number of channels: central government funds, loans to local governments, microfinance, and having SOEs invest in poor areas.
- A sophisticated assessment, supervision, and inspection system is in place to measure results and ensure efficient and targeted outcomes.
- Thirty years of results have been impressive, and recent results have kept pace: from 2013 to 2016, the impoverished population dropped from 98.99 m to 43.35 m, with per capita rural household incomes seeing annual growth of 10.7%.
- China is not resting: still a large population of 43m will exit poverty by 2020 (11m per year).

- **International Cooperation for Poverty Reduction: China-Tanzania Village-Based Poverty Reduction Learning Center: A Brief Introduction**

Tong Lang, Director, International Cooperation Team

This presentation showcased an example of a Chinese-international cooperation effort for rural and agricultural development. As an important part of the poverty reduction cooperation between China and Africa, in 2011 IPRC setup a small demonstration project and sent a working group to the small rural Peapea Village, in Kilosa County of the Morogoro region in Tanzania. The project was designed to showcase the essential lessons from China's poverty reduction practices based on agriculture and rural growth and put them into practice in Tanzania. This would show how the Chinese model of poverty reduction can be applied to countries in Africa.

- Project components included: 1) Agriculture: planting demonstration, stockbreeding, crop straw into livestock feed; 2) Water management: small scale irrigation and drinking water facilities; and 3) Capacity building and public services.
- The community service center built under the project has become a well-known local multi-functional site. The building has become a place for both work and leisure.
- Households participating in the project have significantly enhanced production capacity; and by 2015, cash income of participating farmers was 87% higher than for non-participants.
- China's experience in agricultural development has proven to be applicable in Tanzania and is worth further promotion.

[See attachment 2 for session presentations and photos](#)

- **Policy Design and Implementation of 'Poverty Alleviation through Industrial Development' in China**

Xu Jianmin, Deputy Director of Department of Development Guidance, LGOP

Since the 18th Congress of CPC, the campaign against poverty in China has elevated to a new high. China has reduced the poverty-stricken people by at least 10 million every year and lifted more than 55 million people out of poverty, the income growth rate of the rural residents in poor areas is above the national average.

Poverty alleviation linked to strategic industrial development is one of the five major anti-poverty measures in China and aims to further lift 30 million people out of poverty. These goals are specifically emphasized in the "13th Five-Year Plan for Poverty Alleviation" and have been identified as key to the solutions for long-term, sustainable poverty alleviation. This presentation provided a thorough introduction to the innovations China has used to reduce poverty by leveraging industry and market mechanisms.

The presentation introduced three major areas important to poverty alleviation through industrial development:

- 1) The significance and impacts of industrial poverty alleviation in China
- 2) Major work and achievements of industrial poverty alleviation in China
- 3) Ideas and plans for promoting industrial poverty alleviation in the future

[See attachment 3 for session presentations and photos](#)

Day 3: Knowledge Sharing | Agriculture Development and Technologies

■ HIGH LEVEL MEETING WITH THE VICE MINISTER OF AGRICULTURE (CHINA'S MINISTRY OF AGRICULTURE, MOA)

The delegation met with Mr. Dongyu Qu, the Vice Minister of the Ministry of Agriculture of the People's Republic of China. The two sides exchanged ideas for strengthening cooperation on water-saving technologies and dryland farming practices.

Vice Minister Qu introduced the important role that agricultural development played in China's overall national development success, and the long-time focus on advancing water-saving agriculture in China. Forty years ago, China was a poor and predominantly rural agricultural economy. Agricultural development was a core focus in China's early economic development, and the country made deliberate and scientific efforts to systematically improve China's agricultural productivity through far-reaching agriculture extension programs, applied research to improve agriculture inputs, and strategic investments in rural infrastructure (such as access roads, electricity development, and irrigated agriculture facilities). The result was comprehensive rural and agricultural development that ultimately led to a tripling of food production capacity in a relatively short period of time. The Vice Minister also noted that MENA is an important region, with climate and agriculture characteristics similar to those of Northwest China. Water savings and water management have been an important part of China's agriculture development, and China's MOA is willing to strengthen cooperation and exchanges on water and agriculture management with countries of the MENA, notably under China's *Belt and Road Initiative* and through cooperation with the World Bank.

The MENA delegation emphasized that their region, like China, have a long history of agricultural development. Their delegation appreciates China's achievements in agriculture in recent years and is eager to learn from China's advanced technology and management experiences. Particular areas of interest include: the development and introducing of new water-saving and salt-tolerant crop varieties; and opportunities to strengthen cooperation with the MOA with the support of the World Bank and other international institutions.

Following the meeting with ministers, specific technical discussions and presentations were delivered by Chinese high-level government officials and national experts. The specific topics presented were identified and selected based on the MENA country needs and the relevant Chinese experience. Highlights are briefly summarized below.



THE MENA DELEGATION (EGYPT, TUNISIA, LEBANON AND JORDAN, AND AWC), LED BY MR. KHALED ABDELRAHMAN MOHAMED ABEDRAHMAN MADYAN, THE VICE MINISTER FOR IRRIGATION AFFAIRS OF EGYPT MET WITH VICE MINISTER QU DONGYU FROM THE MINISTRY OF AGRICULTURE IN CHINA

■ MEETINGS AND PRESENTATIONS WITH THE FOREIGN ECONOMIC COOPERATION CENTER (FECC) OF MOA

These discussions were a very important part of the MENA delegation study tour. The FECC will be a key partner in current and future international collaboration efforts. And this in-person discussion allowed the MENA delegates to meet and develop relationships with their counterpart leaders and experts from China.

■ **Introduction of China's Agricultural South-South Cooperation Programs**

Mr. Feng Yong, Deputy Director General of FECC

The FECC of China's MOA will be a key partner for implementing the CWPf regional cooperation project. This discussion and presentation provided the opportunity for the MENA delegation to meet with the leadership and experts from the FECC, to learn how China has partnered for agricultural and economic development with international partners in the past. This presentation specifically shared existing international cooperation programs in MOA and the results achieved through various TAs and capacity building activities in different beneficiary countries.

- FECC success stories were shared from Nigeria, Malawi, Zambia, Mozambique, and Zimbabwe.
- The China-FAO South-South Cooperation is managed by the FECC. This began in 1996 and has evolved into a comprehensive strategic cooperative partnership by 2016, with initiatives in 28 countries conducting demonstrations, trainings, and benefiting farmers on the ground.
- In September 2017, an MOU was signed between China's MOA, MOF, and the World Bank to support China-Africa knowledge sharing, technology cooperation, and investment cooperation for agriculture development.



MEETINGS AND DISCUSSIONS WITH THE MOA AND FOREIGN ECONOMIC COOPERATION CENTER (FECC) OF MOA

See attachment 4 for session presentations and photos

■ MEETINGS AND PRESENTATIONS WITH THE CHINESE ACADEMY OF AGRICULTURAL SCIENCE (CAAS)

This session provided a comprehensive introduction for knowledge sharing and exchange on China's agriculture extension programs, and the application of new high-technology solutions developed by the CAAS in China, in the areas of Climate-Smart Agriculture at CAAS. The presentations specifically covered topics that were requested in advance by the MENA delegation, including: new water-saving technologies and varieties of Chinese Hybrid Rice.

■ **Water-Saving Agriculture Tech-Extension in China**

Xiangzhao Gao, Professor/Principal Expert, National Agro-technical Center, MOA

This presentation provided a brief overview on China MOA's efforts to promote water savings and productivity improvements through its agriculture extension programs. In certain parts of China, moisture-deficient and nutrient-deficient soils are a major challenge to agriculture production and food security. Agriculture extension efforts have been carefully designed and applied to work on these related challenges across China. The presentation introduced some of the efforts using "fertigation", and the use of fertigation with different types of irrigation technologies (flood, sprinklers, pivots, drip, and microjets). The presentation also discussed important water saving

practices promoted through China's agriculture extension programs, including: highly-efficient "film mulching" to greatly reduce evaporation and moisture loss from soils (for rice, vegetables, and other crops), as well as practices such as water harvesting and crop-optimized temperature control.

- **Utilization and Improvement of Saline-Alkaline Soil via Planting Salt-Tolerant Crops**

Xingyu Jiang, Professor, Institute of Tropical Agriculture and Forestry, Hainan University

The MENA delegation had a strong interest in Chinese technologies and experience improving crop yields in severely salinized soil environments. These salt soil challenges are common in MENA countries. This presentation introduced China's experience developing new salt-tolerant crops of rice, corn, cotton, beets, and spinach. These salt tolerant crops have been planted and tested in post-typhoon fields of Hainan Province, as well as in saline soil regions of Vietnam.

- **A Detailed Progress Report of Innovation and Utilization of Salt Tolerant Plants**

Jingwen Zhu, Professor, Jiangsu Academy of Agricultural Sciences

Related to the presentation above, this discussion provided an overview of 40 years of scientific research into salt-tolerant rice for coastal regions at the Jiangsu Academy of Agricultural Sciences. Studies have involved a detailed coastal plant survey, field testing and long-term observations, breeding of salt-tolerant varieties, and studies on the effects on sowing time and harvesting.

- **Chinese Hybrid Rice Technology Promotion and Application**

Xianwen Yin, Professor, Yuan Long Ping High-Tech Agriculture CO., Ltd

China has become a global leader in the development of high-yield hybrid rice varieties, with aims to help the world feed growing populations on limited areas of land. Chinese hybrid rice mixes indica and japonica varieties to produce high-yielding Super Hybrid varieties. Chinese development of super hybrid rice has passed through five phases, with yields increasing from 8.3 t/ha in 2000, to more than 16 t/ha in 2016. Chinese hybrid rice is being exported outside China to India, Bangladesh, Indonesia, Vietnam, Philippines, Brazil, Pakistan, Egypt, Madagascar, Liberia, and Mozambique.

- **Climate Change and Drought-Resistant Technologies**

Weiping Hao, Deputy Director General, Department of International Cooperation, CAAS

This presentation shared efforts by the MOA to respond to climate change effects on China's national food production system. It is anticipated that dry areas in the Global South will face significant challenges with crops and livestock from climate change induced drought and salination. At the same time, to meet global food demands, agricultural outputs will need to increase by 5-10% by 2030. Drought mitigation is an important part of China's food security strategy. China applies a range of measures to plan and prepare, including: monitoring, early warning, strategic vulnerability assessments, and development of mitigation technologies (water harvesting, mulching, etc.).

- **Remote Sensing Monitoring for Regional Agricultural Management**

Zhongxin Chen, Professor, Institute of Agricultural Resources and Regional Planning, CAAS

This presentation was highly relevant and appreciated by the MENA delegation countries. The CAAS experience with remote sensing has many lessons, and the technologies and expertise are useful for MENA countries to learn from, with specific applications that are much needed back home.

- The China Agriculture Remote Sensing Monitoring System (CHARMS) was established in 1998.
- CHARMS monitors seven major crops in China (accounting for 90% of all production).
- CHARMS monitors key crop parameters: acreage, soil moisture, yield, environment conditions.
- CHARMS can be used to monitor and provide early warning on issues important to policy-makers and planners: cropland flooding, drought monitoring, low temperature hazards, and crop diseases and migrations, among others.

- **Current Situation and Development of China's Ecological Recycling Agriculture**

Hongmin Dong, Deputy Director, Inst. of Environment & Sustainable Development in Agriculture, CAAS

This presentation provided an overview of China's leading efforts to encourage nutrient and waste recycling within farm and food production systems for a sustainable and ecological food system. The problems of water scarcity, agricultural productivity, livestock waste pollution, and fertilizer and pesticide residues are only increasing, and there is a need for new holistic, closed-loop management solutions. CAAS is conducting research, experimental trials, and demonstrations to develop new technologies and management practices in these areas.

See attachment 5 for session presentations and photos



THE MENA DELEGATION MEMBERS MEET VISITING CHINA'S ACADEMY OF SCIENCES (CAS)

Day 4: Field Visits | Groundwater Management System and Water User Associations

The first field visit was to a groundwater irrigation district managed by the county water resources bureau in Cheng'an County of Hebei Province. This is an extremely water-scarce county in China's "3H" river basin, i.e. the Huang-Huai-Hai rivers. The field visit gave participants the opportunity to speak directly to beneficiaries and stakeholders to showcase the successful application of two China-developed RS technologies (ET-Watch and Crop-Watch systems) for agriculture water saving management. The visit especially allowed the MENA delegation to see local experience and actual practices in how to address water scarcity challenges through an integrated approach to groundwater management. The solution approach included reforms to agricultural water rights and water tariffs, which were successfully implemented at the farm level by the local irrigation management bureau and the water user associations (WUAs) in Cheng An County. The delegation visited two sites and had discussions with the Hebei Provincial Water Resources Department.



MEETING AT CHENG AN COUNTY TO INTRODUCE THE GROUNDWATER MANAGEMENT SYSTEM AND RELATED REFORMS TO WATER CHARGES

■ FIELD VISIT #1: HYDROELECTRIC POWER IC CARD SMART CONTROLLED WELL

This site showcased the system used for pre-payment of water charges and electricity fees using a "smart" IC-card linked to a farmer's account, and which can remotely turning-on and -off groundwater pumping wells. All of the data and information are automatically collected and transmitted to the water management center. The operation, maintenance and management of this electronic system, as well as the on-farm water works, are carried out by the WUAs.

■ FIELD VISIT #2: WATER USER ASSOCIATION (WUA)

The second site was to the Wangjiaying WUA, where local officials and the WUA chairman shared information with the MENA delegation about the water-saving management practices; institutional arrangements; the WUA charter, rules and regulations; and the reformed system of water tariffs that have been successfully adopted and implemented by the association.



TECHNICAL DISCUSSION AND Q&A WITH WUA MANAGERS AND FARMERS AT WANGJIAYING WUA

■ MEETINGS AND PRESENTATIONS WITH HEBEI PROVINCIAL WATER RESOURCES DEPARTMENT (PWRD)

The Cheng'an County field visit also included meetings with Hebei Provincial Water Resources Department (PWRD), and experts from the China Irrigation and Drainage Development Center (CIDDC). These meetings introduced the provincial water-saving and groundwater management system, including: management policies/regulations, comprehensive water-saving technologies, on-farm practices, implementation results, and lessons learned. The discussions also introduced the design and application of the agriculture water right and volumetric water charge system. During the questions and answer period, the MENA delegation were interested to know more about: the agricultural water right and water tariff system, the cost for the system, how often should it be updated, how to run a WUA, how to collect water charges, how many members are in one WUA, how the WUA chairman is selected, and how long she/he serves; and other questions relevant to bringing the Chinese experience back to the MENA countries.

See attachment 6 for session presentations and photos

Day 5: Field Visits | Applied Research for Agricultural Water Savings and Eco-Farming

The second field visit was to a surface water irrigation system in Yellow River delta area of Yucheng County in Shandong Province. Here, the MENA delegation met with the Party Secretary, vice mayors, and other local leaders and officials to learn about the *Yucheng Comprehensive Experiment Station*, operated by the Chinese Academy of Sciences.

The MENA delegation members learned how China uses leading scientific institution and extension centers for applied research that can be directly applied to the agriculture sector to improve productivity, water management, and waste recycling. These institutions exist to produce research, but China organizes them to address the most important national and regional priorities, to produce new technologies, new methods, and new practices. The MENA delegation saw great value in this approach and raised a number of technical questions to inform their ability to take the knowledge back to their home countries. The delegation visited three sites.

■ FIELD VISIT #3: MODERNIZED IRRIGATED AGRICULTURE DEMONSTRATION AREA IN YELLOW RIVER DELTA

Improved efficiency of agricultural water use was a key focus of this visit. Technical experts from the local government and water bureau explained to the delegation in detail how the Yucheng Comprehensive Experiment Station conducts focused and applied research on comprehensive water-saving irrigation methods that reduce total crop water consumption. The local leaders and experts accompanied the MENA delegation to visit an irrigation district and learn about field management systems for surface water and groundwater. In both cases, the field level water works are managed by WUAs. At the site, technical discussions focused on how the WUA schedule and manage their irrigation, water distribution, and the sequencing of water delivery for different crops to different farmer households. This coordination is done through the integrated water management system developed by the *Geographical Institute of CAS*.



TECHNICAL SITE VISIT TO THE WUA WATER MANAGEMENT SYSTEM AT XINGZHAI TOWNSHIP WUA, YUCHENG COUNTY IN SHANDONG

■ FIELD VISIT #4: NATIONAL AGROECOSYSTEM EXPERIMENTAL STATION IN YUCHENG COUNTY

The director of the station, Ouyang Zhu, introduced the history of Yucheng Station, including its applied agricultural research and demonstration activities, and its leading position during the key stages of China's agricultural development. The vice-director, Prof. Sun Zhigang, introduced the main research facilities, recent research findings, and the programs for international cooperation of the Yucheng station. The MENA delegation visited the remote sensing application laboratory, soil and water analysis laboratory, long-term nutrient balance experiment field, surface evaporation field, large-scale lysimeter, and SPAC system integrated observation field. The delegation gained a deep understanding of the research progress and achievements in nutrient transport, potential evaporation, and crop water consumption conducted at the Yucheng station.



A LARGE-SCALE LYSIMETER AT CHINA'S NATIONAL AGROECOSYSTEM EXPERIMENTAL STATION

■ FIELD VISIT #5: AN ECO-FARM

The delegation also visited the Beiqiu Efficient Recycling Ecological Farm at the Yucheng station. A detailed introduction was given, and in-depth technical discussions were held with the MENA delegation, including topics such as: planting crops, feedstuff and forage grass processing, livestock and poultry farming, the utilization of agricultural waste, and green vegetable planting.



A PLASTIC GREENHOUSE AT THE ECO-FARM IN YUCHENG COUNTY

See attachment 7 for session presentations and photos

Day 6: Field Visits | Smart & Digital Agriculture Technologies

■ FIELD VISIT #6: NATIONAL PRECISION AGRICULTURE RESEARCH & DEMONSTRATION STATION, XIAOTANGSHAN TOWN, BEIJING

The final field visit of MENA delegation study tour was to the *National Precision Agriculture Research and Demonstration Station* in Xiaotangshan Town in Beijing. This research station is a center for China's development of "digital agriculture" and "smart agriculture" technologies and applications. During the visit, the leading innovations and the core research functions of the demonstration base were introduced, including the laboratories, experimental facilities, and large-scale agro-machinery shop. The visit also included greenhouses, smart-water-efficient orchards, the GPS base station, soil moisture monitoring stations, automatic meteorological stations, and precision fertilization. Members of the MENA delegation were particularly interested in technical questions, related to: online ag-products quality detection, remote monitoring systems for agricultural machinery, precision agriculture technologies, different kinds

of irrigation facilities, and other topics. Touring the research base, the delegation specifically saw the following experimental technologies and practices:

- **Balcony farming:** a system of beneficially cycling nutrients and wastes for fish and vegetable farming that people can install to produce food on their balconies at home. The produce taste better and is more nutritious, and at the same time can beautify urban environments.
- **Precise fertilizer application system:** a fully automatic application optimized fertilizer to crops, including the whole process of soil sample collection and testing.
- **Automatically regulated greenhouses:** high-tech greenhouse where temperature, light, moisture, and air are continuously monitored and controlled, including control instructions to farmers.
- **Fully automatic rice seedling greenhouse:** auto-controlled facilities for accelerated germination, seeding, and nursery under optimal and regulated environment conditions.
- **Lab for smart farm equipment:** showcasing R&D for self-driving farm vehicles/machines, automatic quality monitoring and testing systems, and control systems for precise fertilization.
- **Device for rice fertilization equipment:** the device can be pre-set to deliver fertilizer 3 to 5 cm from the mud, so as to efficiently use fertilizer; to reduce its use and prevent water pollution.
- **Air tunnel for drone testing:** facilities used to simulate different wind patterns and velocities in the design of pesticide spraying drones; to spread chemicals more evenly and prevent drifting.
- **Lab for fruit testing, sorting and grading:** using near-infrared spectrum sensors to test the size, color, shape, and sugar content for quickly grading fruits in a damage-free manner.
- **Vegetable grafting machine:** used to quickly and accurately graft cucumber, sweet melon, and watermelon seedlings with a high survival rate.
- **Pesticide spraying machine with paired target sensors:** infrared and ultrasonic sensors detect the positions and sizes of trees in an orchard to automatically control (start / stop) spray application of pesticides in order to be efficient and reduce costs to farmers.
- **Eight-span walking sprinklers machine:** pumps water from an adjacent canal, while ‘walking’ along the field to apply fertigation (irrigation water filled with precise doses of fertilizer).
- **Fertigation systems with hose reel sprinklers for micro-irrigation:** filled with water and fertilization.
- **Buried telescopic irrigation device:** an underground telescopic tube that can extend to certain height to irrigate crops and/or apply precise dosing of fertigation.

See attachment 8 for session presentations and photos



PRECISION AGRICULTURE DEMONSTRATION TECHNOLOGIES, INCLUDING (TOP TO BOTTOM): PRECISION AGRICULTURE TESTING LABORATORY, SMART CROP HARVESTING MACHINERY, SELF-DRIVING TRACTORS, AND BALCONY FARMING PROTOTYPE

FEEDBACK FROM STUDY TOUR PARTICIPANTS

Overall, *The South-South Knowledge Exchange Study Tour in China* was a successful event. The field visits and technical discussions with Chinese counterparts were highly relevant and impressive to members of the MENA delegation. At the conclusion of the study tour, participants walked away inspired by the technologies and innovative ideas presented and discussed. Following the event, a number of participants provided positive feedback about their experience; and some selected quotes from participants are presented here.

"We would like to thank the World Bank for the excellent preparation and organization of such an important study tour. We would like also to extend our thanks and appreciation to His Excellency the Vice Minister of Water Resources and His Excellency the Vice Minister of Agriculture and also the Head of the Chinese Academy for Science and the Head of the Chinese Academy for Agricultural Science, as well as the International Centre for Poverty Reduction, and all of the other officials whom we met for their kind reception and hospitality."



"We are looking forward to putting into action the already-signed MoU with Ministry of Water Resources and intend to sign a similar MoU with the Ministry of Agriculture. We are also looking forward to cooperating in many fields, including the exchange of experience and experts under the auspices of the World Bank for the welfare of our populations in Egypt, the North African countries, as well as the Middle East."

Eng. Khaled Madyen

Vice Minister of the Egyptian Minister of Water Resources and Irrigation, Egypt.

"We would like to thank the World Bank Group for the excellent organization of the study tour. We have to extend our gratitude and thanks to His Excellency the Vice Minister of Water Resources, His Excellency the Vice Minister of Agriculture, and all of the Chinese officials that we met for their hospitality and the very valuable information that was presented to us. We are serious to execute and activate the already-signed MoU between the Egyptian and Chinese Ministries of Water Resources."



Eng. Khaled Bekheit

Director-General, Ministry of Water Resources and Irrigation, Egypt

"We were really amazed by the unlimited support and technical assistance that were generously offered by the Chinese experts in all sectors and how they were really capable of utilizing science to improve the lives of millions of people."



Eng. Heba Al-Hariry

Business Development Manager, Arab Water Council (AWC), Egypt

"It was useful to visit and learn about China's experience in managing water and agriculture. What I liked best was how well studies and research in China have been applied on the ground through models and, when successful, have been disseminated nationwide, efficiently and with strong commitment."

Eng. Adel Y. Alobeiaat

Director of planning Sector, Ministry of Water and Irrigation, Jordan

"The study tour has given a very unique opportunity to take a closer look to the great leaps that China has made to reduce poverty over the last three decades. China and Arab countries are facing the same challenges, and the same concerns on water scarcity. Arab countries can draw important lessons from the ways in which China achieved this steady trajectory of agriculture growth."

Eng. Ghaleb Faour

Director, Lebanese National Center for Remote Sensing, Lebanon

“For us as developing countries, it was great experience to learn about the extraordinary achievements of China in the agricultural sector, food security, livelihood improvement and scientific advancements. I gathered knowledge about the different cultural practices, scientific studies for agriculture development, smart agriculture experience, ecological farming and socioeconomic enhancements.”

Eng. Ihab Jomaa

Head Department of Irrigation & Agro-Meteorology, LARI, Lebanon

“Our trip to China has been very beneficial. We were able to gain knowledge of Chinese experiences in the application of new technologies to ensure food security. These experiences could be beneficial for our countries, for example the use of new technologies for supplementary irrigation.”

Prof. Hamadi Habaieb

Directeur Général de la Planification et des Équilibres Hydrauliques (BPEH), Ministère de l'Agriculture, des Ressources en Eau et de la Pêche, Tunisia.

“I was pleasantly surprised by the scientific and technological level that has been achieved by China in the sectors of agriculture, water resources management, and poverty reduction. Remote-sensing is used operationally in the field for monitoring crop status. A lot of progress was achieved in such a short time. It is an example to follow in the MENA region.”

Eng. Sinan Bacha

Director, Regional Centre for Remote Sensing of North African States (CRTEAN), Tunisia

SUMMARY AND PROPOSED NEXT STEPS FOR COOPERATION

As noted, *The South-South Knowledge Exchange Study Tour in China* was a success. The three days of knowledge sharing meetings in Beijing, and the three days of field visits to important agriculture and water management sites were highly informative and valuable to the members of the MENA delegation. The study tour provided an important opportunity for MENA delegates to meet their counterpart officials from China's ministries and experts from China's scientific institutions. This study tour advanced the ongoing South-South cooperation and knowledge sharing efforts to bring Chinese technologies, experience, and expertise to the benefit of developing countries in the Global South.

Overall, the study tour provided a unique opportunity for MENA delegates to look closer at the great progress China has made to reduce poverty and improve agriculture and water productivity over the last three decades. Agriculture development has been a vital component of China's development story and was achieved by keeping a clear focus on increasing farmer incomes through targeted innovations in institutional reform, technology development, agriculture industrialization, market reforms, and investment in smart, water-saving agriculture. Because, countries of the MENA region face some of the same challenges and the same concerns over water scarcity that China has faced, the MENA countries can draw important lessons from China's steady and significant achievements in agricultural management and economic growth.

Finally, the study tour further boosted cooperation between the MENA countries and the Chinese government (specifically MWR, MOA, and their related technical research institutes, such as CAS and CAAS). The World Bank China Office was able to facilitate this South-South cooperation activity; and at the conclusion of the study tour, parties from both sides reached preliminary agreements to cooperate on future knowledge sharing, capacity building, and training programs. Each of the MENA country delegations proposed a list of areas for further cooperation with China, including:

Lebanon - The National Council for Scientific Research (CNRS)

Cooperation with China should focus on long-term approaches for sustainability and development.

- Launch long-term research programs (through an MOU) between the Institute of Remote Sensing and Digital Earth (RADI) and the centers for remote sensing in Arab countries; and between the Chinese Academy of Agriculture Sciences (CAAS) and Arab research institutes.
- Long-term capacity building and training in China for stakeholders in Arab countries.
- Host Chinese technical experts to assist Arab countries design strategies for water scarcity.
- Participation in regional workshops organized by the Arab Water Council.
- Encouraging and facilitating economic investment to spread Chinese innovations.

Egypt – Ministry of Water Resources and Irrigation (MWRI)

Possible cooperation between Egypt and China can be done using the already-signed MoU between the Egyptian and Chinese Ministries of Water Resources, and under the WB umbrella. Including:

- The application and use of modern irrigation methods and techniques, including capacity building and knowledge transfer to engineers.
- The application and use of remote sensing technology for water management, crop production, crop monitoring, and groundwater monitoring.
- Development and introduction of new salt-tolerant and water-saving crop varieties.
- Establishing a Water Accounting Unit in Egypt that can also serve the MENA region.

Tunisia – Regional Center for Remote Sensing of North Africa States (CRTEAN)

Cooperation between China and Tunisia can focus on the following areas:

- Irrigation management: application and use of modern irrigation techniques, capacity building, and transfer of knowledge.
- Water management: monitoring of actual water-use for crop production, and GW extraction.
- Research, joint projects, and training between the Institute of Remote Sensing and Digital Earth (RADI), Chinese Academy of Sciences (CAS), National Centre for Cartography and Remote Sensing (CNCT), and the Regional Centre for Remote Sensing of North African States.
- Cooperation on water saving, water harvesting, and agriculture monitoring using RS, between Chinese Academy of Agriculture Sciences (CAAS) and the National Centre for Cartography and Remote Sensing (CNCT) and Tunisian agriculture research institutes, and the Regional Centre for Remote Sensing of North African States (CRTEAN).

Jordan - Ministry of Water and Irrigation (MWI)

Areas for cooperation and Chinese experience exchange for the Jordanian context include:

- Groundwater management and governance methods to reducing groundwater over-draft.
- Using crop selection as a tool to reduce risks of droughts.
- Drought monitoring using tools like Crop-Watch (for agricultural droughts).
- Estimation of crop requirements based on satellite data and models.
- Building the capacities of WUAs and providing them with technology-based solutions.
- Training and transfer of the remote-sensing-based models (ET-Watch, Crop Watch).
- Providing equipment needed to calibrate remote sensing models.

The Arab Water Council (AWC)

A framework for cooperation between the Chinese Government and the Arab region can add value through disseminating knowledge, and sharing experiences, success stories, and lessons learned. This can be done through a mutual Memorandum of Understanding between mutual organizations, and will enhance cooperation to transfer Chinese knowledge, experience, and skills in integrated water resources management as well as promote dialogue and experience sharing between both regions. Under such an MoU, collaborative activities in joint regional and research projects in the water sector can be undertaken and can allow participation in regional research programs and projects.

Annex 1 – List of Workshop Participants

Participation in the study tour included a delegation of high-ranking officials and experts from the CWPF project countries in the MENA Region: Egypt, Jordan, Lebanon, Morocco, Tunisia and the Arab Water Council (AWC). The delegation was led by Mr. Khaled Abdelrahman Mohamed Abedrahman Madyan, the Vice Minister for Irrigation Affairs of Egypt.

The study tour also included participation from high-level government officials and experts from a number of Chinese ministries and scientific agencies, including: The Ministry of Agriculture (MOA), the Ministry of Water Resources (MWR), the Chinese Academy of Sciences (CAS), the Chinese Academy of Agricultural Sciences (CAAS), the International Poverty Reduction Center (IPRC), and the Foreign Economic Cooperation Center of the MOA (FECC). These officials shared China's own story of national and sectoral development challenges, development strategies, implementation policies, approaches, and related technologies based on the needs and requests of the MENA delegation.

A number of senior specialists and managers from the Water and Agriculture Global Practices of the World Bank China Office also participated in the study tour.

MENA Region Delegation Members

- Khaled Abdelrahman Mohamed Abedrahman Madyan, Deputy Minister, Irrigation Affairs, Egypt
- Eng. Khaled Bekhit, Director-General, Ministry of Water Resources and Irrigation, Egypt
- Ms. Heba Al Hariry, AWC, Business Development Department Manager, Arab Water Council, Egypt
- Dr. Ghaleb Youssef Faour, Director, National Center for Remote Sensing, Lebanon
- Ihab Mohsen Jomaa, Head of Department Irrigation & Agrometeorology, Ministry of Agriculture, Lebanon
- Dr. Hammadi Habaieb, General Director, Ministry of Agriculture, Water Resources and Fisheries, Tunisia
- Mr. Sinan Bacha, Director, Regional Center for Remote Sensing of North African States, Tunisia
- Mr. Adel Yahya Attallah Albeit, Director, Ministry of Water and Irrigation, Jordan

High Level Officials from MWR

- Zhou Xuewen, Vice Minister
- Wang Annan, Director General, Department of Planning and Programming
- Liu Guangzhi, Director General, Department of International Cooperation, Science and Technology
- Liu Jianming, Director General, General Office
- Chen Mingzhong, Director General, Department of Water Resources (National Water Conservation Office)
- Wang Aiguo, Director General, Department of Rural Hydropower & Reservoir Resettlement Development
- Li Kungang, Director, Office of State Flood Control and Drought Relief Headquarters
- Xu Jing, Director, Department of International Cooperation, Science and Technology
- Wang Xin, Director, Minister's Office
- Wang Jinsu, Deputy Director, Department of International Cooperation, Science and Technology
- Li Ge, Deputy Director General, Department of International Cooperation, Science and Technology

High-Level Officials from MOA

- Qu Dongyu, Vice Minister
- Tang Shengyao, Deputy Director General of Department of International Cooperation
- Li Bo, Deputy Director General of Department of Science, Technology and Education
- Yang Lisheng, Deputy Director General of Department of Crop Production
- Feng Yong, Deputy Director General of Foreign Economic Cooperation Center
- Zhao Lijun, Director of Department of International Cooperation
- Xu Xuewan, Deputy Director of Department of International Cooperation
- Gao Xiangzhao, Professor, National Agro-technical Center
- Tan Qianyuan, Interpreter of Center of International Cooperation Service, MARA

MENA Country Participants of ET-Watch Training Workshop

- Bassam Mohammed Abdelsalam Abdellatif, Researcher, NARSS, Egypt
- Ralph Zoughaib, Engineer, Ministry of Agriculture, Lebanon
- Mario Mhawej, Researcher, Center for Remote Sensing, Lebanon
- Mr. Yousri Gafsaoui, Head of Department, Ministry of Agriculture, Water Resources & Fisheries, Tunisia
- Dr. Nabil Sghaier, Head of Department, National Center for Cartography and Remote Sensing, Tunisia

Managers and Experts from the World Bank, China Office

- Bert Hofman, Country Director, China, Mongolia and South Korea
- Harold L. Bedoya, Operations Manager
- Bekele Debele Negewo, Program Leader
- Qun Li, Senior Agriculture Economist
- Paavo Eliste, Lead Agriculture Economist
- Wendao Cao, Senior Agriculture Economist
- Sitaramachandra Machiraju, Senior Agribusiness Specialist
- Liping Jiang, Senior Irrigation and Drainage Specialist
- Qi Tian, Water Resources Mgmt. Specialist
- Chenming Li, Program Associate
- Jianxin Chen, Interpreter
- Alek Cannan, Water Resources Specialist (consultant)

Ministry of Finance

- Ding Ping, the Deputy Director of the Project Management Office, The State Office of Comprehensive Agriculture Development

Shule Irrigation District Management Bureau in Gansu Province

- Ma Leping, Director, Irrigation Division
- Wang Yaohua, Director, Finance Division

Longping Hightech Group Company

- Yin Xianwen, Secretary-General of the Board

Hunan Hybrid Rice Research Centre (HHRRC)

- Xin Yeyun, Longping's Secretary
- Cao Mengliang, Chief of the International Dept.

Institute of Remote Sensing and Digital Earth Chinese Academy of Sciences

- Liu Jie, Director, International Cooperation Office, RADI
- Chen Mingmei, Officer, International Cooperation Office, RADI
- Duan Xiaonan, Division Chief, Bureau of Frontier Sciences and Education, CAS
- Zhuang Yan, Deputy Chief, Division of Asian and African, Bureau of International Cooperation, CAS
- Yan nana, Associate Professor, Division of Digital Agriculture
- Zhu Weiwei, Associate Professor, Division of Digital Agriculture
- Xing Qiang, Associate Professor, Division of Digital Agriculture
- Wu Bingfang, Director/Professor, Division of Digital Agriculture, RADI

International Poverty Reduction Center in China

- Zhang Guangping, Vice President
- Tong Lang, Director
- Xu Jianmin, Deputy Director of Department of Development Guidance, LGOP

Chinese Academy of Agricultural Sciences

- Wu Kongming, Vice President
- Hao Weiping, Deputy Director General, Department of International Cooperation
- Chen Zhongxin, Professor, Institute of Agricultural Resources and Regional Planning
- Dong Hongmin, Deputy Director, Institute of Environment and Sustainable Development in Agriculture

Hainan University

- Xingyu Jiang, Professor, Institute of Tropical Agriculture and Forestry

Jiangsu Academy of Agricultural Sciences

- Jingwen Zhu, Professor

Hebei Provincial Department of Water Resources

- Zhang Baoquan, deputy director general
- Zhao Yongjun, division chief

Yucheng County

- Ouyang Zhu, Research Fellow, Institute of Geographical Resources, Chinese Academy of Sciences
- Sun Zhigang, Research Fellow, Institute of Geographical Resources, Chinese Academy of Sciences, Deputy Director of Yucheng Station
- Liu Honggui, deputy secretary of the Licheng City Committee of Shandong Province
- Gao Rui, Deputy Mayor of the Municipal Party Group
- Guo Qiang, deputy mayor of the municipal party group
- Yin Jianping, Director of Agriculture Committee of Gaocheng City, Shandong Province
- Wang Chunjing, Senior Engineer, Institute of Geographical Resources, Chinese Academy of Sciences
- Jin Yong, Engineer, Institute of Geographical Resources, Chinese Academy of Sciences
- Yu Yanchun, Engineer, Geographical Resources Institute, Chinese Academy of Sciences

Miyun County, Beijing

- Cheng Ming, Meng Fanyu, Beijing Agricultural Technology Extension Station

Annex 2 – China and MENA Regional Context and Background for the Study Tour

China has committed itself to be a partner in South-South Cooperation. Over the past thirty years, China has pursued a successful path of deliberate and scientific economic development that has lifted hundreds of millions of its citizens out of poverty and into a modern economy. The many lessons from China's experience are relevant to other developing countries, including those in the Middle East and North Africa, as they pursue their own goals of sustainable prosperity and poverty elimination.

Managing Water in the Countries of the MENA Region: Egypt, Jordan, Lebanon, Morocco, and Tunisia

The arid Middle East and North Africa is the most water-scarce region in the world. Water management is naturally challenged by low levels of rainfall; but hydrologic scarcity is further compounded by inefficient and sub-optimal allocations and management of water. MENA countries are actively seeking new solutions for water-use efficiency and water management.

The MENA region has only around 1,000 m³ of renewable water resources per person per year. With population growth, by 2050, this value is expected to be 550 m³ per person per year. An area is considered 'water scarce' if its per-capita renewable water supplies are below 1,000 m³ per year; and 'absolute scarcity' is defined at a level below 500 m³ per person per year. For comparison, the current global average is 8,900 m³ per person per year. These highly-scarce freshwater resources in MENA are also highly variable across time and geography. In response, during the twentieth century, countries throughout the region invested huge sums in large-scale, supply-side infrastructure (such as storage reservoirs, dams, conveyance pipelines, and canals). These efforts were to ensure that limited water resources could be made available when needed to different users. But with limited supplies, as water demands grow, and as climate change increases variability, new solutions will be required.

Inefficient allocation and management of water resources is the biggest challenge in MENA. Currently, up to 85 percent of water is used for agriculture. Most of this is in the form of inefficient flood irrigation for the production of relatively low-value agricultural staples. These practices limit the water available to grow higher-value crops, or for higher-value industrial or commercial uses in the region's growing cities. At the same time, many water management agencies lack the capacity to carry out the reforms that would help manage water more productively. New innovations in information systems, water saving technologies, and market and pricing reforms are needed.

Transboundary water sharing, trade, and agriculture production are also important factors in MENA countries' water resources management. It is estimated that 60 percent of the regional water supplies come from upstream, transboundary sources. Therefore, regional solutions and regional cooperation will be key to all future water management in MENA.

Finally, water scarcity is a major constraint on expanding food production and ensuring food security in the region (most food is produced on irrigated land and irrigation accounts for 85 percent of total water consumption). MENA countries, exposed to chronic shortages of water, rely on food imports and trade in "virtual water" to overcome difficult agroecological conditions. Periodic food shortfalls and steep spikes in food prices can be triggered by extended droughts. These exacerbate poverty and can lead to forced migration, both internally and across borders. Additionally, with growing competition for water between agriculture and other uses, with continued groundwater depletion, and with climate change, water supplies and agricultural risk resilience are further threatened in the fragile region. MENA needs new solutions for improved water efficiency in irrigation and agriculture.

The MENA country governments have been keen to promote and implement a full range of water-saving technologies that can help them improve water productivity under conditions of severe water scarcity in the region. In recent years, several regional efforts were carried out in partnership with international development organizations to promote efficient use of surface and ground water resources and improved agriculture production.

The China Experience: agricultural development, water management, and poverty reduction

China is globally recognized for its remarkable development over the past 30 years. China's large-scale economic and agricultural development has lifted hundreds of millions of people out of poverty in rural areas. Through successful implementation of its targeted poverty reduction program; and with continued and concerted efforts at all levels of government, and across all sectors, China expects to eradicate poverty by 2020. In this way, China presents a compelling development story, and the experiences and lessons learned during this development period can become a good reference for other developing countries.

Water management and agriculture development have been an important part of China's successful development story, and these sectors have seen a number of important institutional and management reforms over the years. Throughout, China has focused on the key goals of: improving agricultural production and food security, building rural infrastructure, and raising farmer incomes through development of small farm householder organizations and value chain enterprises. A large part of achieving these goals has been through the extensive achievements in water resources management and irrigated agriculture expansion.

Another key factor in China's development success has been its continual emphasis on building strong institutional capacity that supports long-term efforts to strengthen capabilities in governance, planning, science, and technology. These institutions have been crucial to supporting China's systematic and strategic development, through laws, regulations, policies, technological research, and strategic applications.

However, China's rapid development has not come without costs. Accumulating environmental pressures now require serious and urgent solutions. Water scarcity in particular is a major challenge in China. China supports 21 percent of the world population with only 6 percent of the world's freshwater resources; and with rapid urbanization, economic growth, and changing lifestyles, demands for water will only increase in the future. Water scarcity in China is further exacerbated by water pollution, climate change, and inadequate water management. About 63 percent of its water resources is currently used in agriculture, and the water conservation, particularly in agriculture, has the potential to greatly improve water availability and improve China's overall water productivity.

These elements of China's development story, and the familiar challenges to water management in the China's arid northwest, are highly relevant to countries of the MENA region.

Key Features of a World Bank China South-South Study Tour

China has a wealth of on-the-ground experience, innovative technologies, and expert institutions; and the World Bank has a global network of knowledge experts and project managers around the world. Through bilateral and regional cooperation efforts, the World Bank China Office can be a bridge between China and other Bank client countries to facilitate South-South cooperation.

China has made significant efforts to share knowledge, promote technologies, and make development investments in poorer countries across the Global South. Recently, in 2015 at the UN Sustainable Development Summit, Chinese President Xi Jinping confirmed China's ongoing

commitment to increase investment, relieve debts, and promote channels for international knowledge exchange in developing countries to eliminate poverty and implement the “post-2015” development agenda. In line with these goals, China has setup numerous bilateral and multilateral partnership instruments in support of South-South cooperation. Specifically, China has committed US\$ 50 million for CWPf South-South cooperation projects with the World Bank.

It is the World Bank's deep knowledge-base and global network of country offices and technical experts that makes it an ideal partner to share China's development experience. Through bilateral and regional cooperation efforts, the World Bank China Office can be a bridge between China and other World Bank client countries to facilitate South-South cooperation with the following offerings:

- Identifying and packaging relevant lessons from China’s development story into knowledge products for dissemination across the global network of World Bank country offices.
- Organizing study tours and training activities for Bank client countries to visit and learn first-hand from the China development story.
- Facilitating introductions and relationships to connect other Bank client countries to the right institutions, experts, and companies in China.

All of these World Bank China Office offerings are tailor-made to be relevant and useful to meet the needs of the other Bank Client countries. This China-MENA South-South cooperation study tour is a good example.

Annex 3 – Six-Day Annotated Itinerary of the Study Tour

The itinerary for the six-day South-South Knowledge Exchange Study Tour in China is briefly outlined here. Further details and key discussion themes can be found in the following section of this report.

Day 1: Knowledge Sharing | Water Resources Management Beijing

- **Introduction to World Bank Agriculture and Water Management Projects in China**
Topics: Water Saving Project in Turpan • Poverty Reduction in China • Comprehensive Agricultural Development in China • Food Safety Project • Hexi Corridor Project (Gansu Province, Shule Irrigation District)
- **High Level Meeting with the Vice Minister of Water Resources (China’s Ministry of Water Resources)**
- **Meetings and Presentations with China’s Ministry of Water Resources (MWR)**
Topics: Overview of Water Conservancy Development in China • Intro to Water Resources Management in China • Intro to Flood Control and Drought Relief in China • Intro to Water Conservancy in China

Day 2: Knowledge Sharing | Remote Sensing Technologies, and Poverty Reduction Beijing

- **Meetings and Presentations with the Chinese Academy of Science (CAS)**
Topics: Introduction: Institute of Remote Sensing + Digital Earth (RADI) • Remote Sensing Technical Tools and Applications • Introduction: Crop-Watch • Training Progress & Expectations from MENA Countries
- **Meetings and Presentations with IPRCC**
Topics: Achievements, Experiences, and Challenges in China’s Poverty Alleviation • International Cooperation on Poverty Reduction: China-Tanzania Village Based Poverty Reduction Learning Center

Day 3: Knowledge Sharing | Agriculture Development and Technologies Beijing

- **High Level Meeting with the Vice Minister of Agriculture (China’s Ministry of Agriculture, MOA)**
- **Meetings and Presentations with the Foreign Economic Cooperation Center (FECC) of MOA**
Topics: China’s Agricultural South-Sough Cooperation Programs • MENA Country Presentations on National Agriculture & Irrigation Development Priorities, Challenges, and Opportunities for Collaboration
- **Meetings and Presentations with the Chinese Academy of Agricultural Science (CAAS)**
Topics: Water Saving Agriculture Technical Extension in China • Utilization and Improvement of Saline-Alkaline Soils via Salt-Tolerant Crops • Innovation and Utilization of Salt-Tolerant Plants • Chinese Hybrid Rice Technology: Promotion and Application • Climate Change and Drought Resistant Technology • Remote Sensing for Regional Ag Management • Agricultural Waste Treatment and Recycling Ag Tech

Day 4: Field Visits | Groundwater Management System and WUAs Hebei

- **Meetings and Presentations with Hebei Provincial Water Resources Department (PWRD)**
Visits/Topics: Hebei Integrated Groundwater Overdraft Management System • Cheng’an Country Agriculture Water Rights and Volumetric Water Payment System
- **Field Visit: Hydroelectric Power IC Card Smart Controlled Well**
- **Field Visit: Water User Association (WUA)**
Visits/Topics: On-Farm Management and O&M System for Irrigation and Drainage Infrastructure

Day 5: Field Visits | Applied Research for Agricultural Water Savings & Eco-Farming Shandong

- **Field Visit: Modernized Irrigated Agriculture Demonstration Area in Yellow River Delta**
Visits/Topics: Surface Water Irrigation System • Upgraded Water Saving Irrigation and Drainage Infrastructures • Integrated Comprehensive Engineering, Agronomic and Institutional Water Saving
- **Field Visit: National Agroecosystem Experimental Station in Yucheng County**
Visits/Topics: Experimental Facilities, Long-Term Observations, and the History of Agricultural Development Innovations
- **Field Visit: An Eco-Farm**
Visits/Topics: Crop, Livestock, Vegetables and Efficient Recycling Technologies for Improved Water and Agriculture Productivity and Farmer Incomes

Day 6: Field Visits | Smart & Digital Agriculture Technologies Beijing

- **Field Visit: 3S Technology Company**
Visits/Topics: Digital Agricultural Machinery Technologies and Applications, and Smart Agriculture Monitoring and Management Techniques

