United Nations
Office for South-South Cooperation

CICETE

GLOBAL SOUTH-SOUTH DEVELOPMENT CENTER SMALL GRANTS & PROJECT PRACTICES

SOUTH-SOUTH PATHWAYS FOR DEVELOPMENT

SOUTH-SOUTH PATHWAYS FOR DEVELOPMENT

– GSSDC SMALL GRANT PRACTICES

全球南南发展中心项目

Global South-South Development Center Project

United Nations Office for South-South Cooperation

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FOREWORDS

South-South cooperation is a great initiative of developing countries to unite and strengthen themselves, embodying the spirit of solidarity, cooperation and mutual support. Chinese President Xi Jinping has emphasized that the collective rise of the Global South has become a key force in safeguarding world peace, promoting common development, and improving global governance. China has consistently been a firm supporter, active participant, and important contributor to South-South cooperation.

The China International Center for Economic and Technical Exchanges (CICETE) was established in 1983. Operating under the Ministry of Commerce of China, its core mandate includes partnering with UN agencies on development programs, implementing China-Aid projects across the Global South, and organizing conferences, exhibitions and capacity-building programmes. Through facilitating bilateral and multilateral economic and technical exchanges, CICETE plays an active role in promoting South-South and triangular cooperation.

Since 2008, CICETE has partnered with the United Nations Office for South-South Cooperation (UNOSSC) to implement the China South-South Development Center (SSDC) Project and the Global South-South Development Center (GSSDC) Project. These initiatives have yielded tangible results in areas such as poverty reduction, agricultural technology, industrialization and digital transformation through small-grant projects implementation, knowledge products development and diverse South-South and triangular cooperation activities.

It is worth mentioning that the China South-South Cooperation Network (CSSCN), established in 1995, has provided strong support for the successful implementation of China SSDC and GSSDC projects. CSSCN emerged from the shared commitment to South-South cooperation among a group of technical research and training institutions, which were originally established with support from UN-assisted programs in China. The network currently comprises over 50 member organizations, with its secretariat hosted at CICETE. By delivering expert consultation, information exchange, knowledge sharing and project matchmaking, CSSCN has significantly contributed to technical exchange and cooperation among developing countries. This demonstrates how China's development experience creates valuable pathways for global advancement.

CICETE is honored to jointly present the compendium of South-South Pathways for Development Practices with UNOSSC. This publication highlights key achievements and lessons learned from selected small-grant projects under the China SSDC and GSSDC projects, providing actionable insights to inspire diverse stakeholders across the Global South.

Moving forward, CICETE will continue to deepen cooperation with UNOSSC, further strengthen the CSSCN platform and expand engagement with partners worldwide to advance South-South and triangular cooperation. Together, we will support developing countries in building self-reliant development capacity, sharing development achievements, and jointly catalyzing progress toward the 2030 Agenda for Sustainable Development.

Zhu Xiaoliang

Director General

China International Center for Economic and Technical Exchanges (CICETE)

The United Nations Office for South-South Cooperation (UNOSSC) is proud to present this compendium. For over 15 years, our partnership with the China International Center for Economic and Technical Exchanges (CICETE)—through the Global South-South Development Center Project (GSSDC Project, 2019-2024) and the China South-South Development Cooperation Project (China SSDC Project, 2008-2019), both funded by the Government of China under the UN Fund for South-South Cooperation— has nurtured a powerful ecosystem for practical cooperation across the Global South.

This compendium highlights 19 transformative initiatives among all small grants supported by the two projects—from developing green bamboo concrete board industries in Rwanda, to exploring solar electrification in the Peruvian Amazon, and improving aquaculture systems in Vietnam and Sri Lanka. Each initiative represents a microcosm of broader challenges facing the Global South—be it poverty alleviation, food security, digital transformation, sustainable urban development, or climate adaptation. More importantly, they offer scalable and adaptable solutions rooted in mutual learning and solidarity.

At the heart of this success lies the China South-South Cooperation Network (CSSCN), a 30-year dynamic alliance of over 50 technical institutions from governments, academia, CSOs and the private sector. The small grants modality, as showcased in this compendium, has proven to be a particularly effective mechanism for encouraging experimentation, agility, and multi-stakeholder collaboration. By prioritizing local ownership, adaptive mutual learning, and institutional strengthening, these small grants have delivered a big impact at relatively modest cost—piloting technologies, refining methodologies, and creating ripple effects far beyond their initial scope.

Among the many lessons captured in these pages, one message stands out clearly: development solutions must be adapted to the local context. Technologies and development solutions cannot simply be transferred or copy-pasted; they must be co-designed, co-owned, and aligned with the cultural, institutional and socio-economic realities of the communities they intend to serve.

This compendium is being launched at a critical time. The successes, challenges, and innovations captured in this compendium will serve as a valuable resource for development practitioners, policymakers, researchers, and cooperation partners alike.

Looking ahead, UNOSSC remains committed to expanding and strengthening this modality of support. We will continue to serve as a trusted platform for connecting countries, institutions, and ideas. We invite practitioners, policymakers, and communities to build these pathways together.

Dima Al-Khatib

Director

United Nations Office for South-South Cooperation

ACKNOWLEDGEMENTS

This publication is the result of the collaborative efforts and a shared commitment of the UNOSSC and CICETE to advancing practical South-South and triangular cooperation, through the China South-South Development Center (SSDC) Project and the Global South-South Development Center (GSSDC) Project.

We extend our sincere appreciation to all partners who contributed to the coordination and documentation of the projects' achievements. Special thanks are due to the CICETE leadership for its support throughout the implementation of the SSDC and GSSDC projects. We also wish to thank the member institutions of the China South-South Cooperation Network (CSSCN) for their ongoing technical contributions, commitment to mutual learning, and efforts to promote inclusive, field-based development cooperation.

In particular, we acknowledge with gratitude the contributions of Ms. Li Shuyin, Deputy Director General, Mr. Zhang Yi, former Deputy Director General; Mr. Guo Li, former Chief of Division II of UN Programmes; Ms. Zhu Li, Deputy Chief of Division II of UN Programmes; and Ms. You Jingming, Programme Officer for their invaluable contribution and support.

Credit is also due to the dedicated UNOSSC team who contributed to the coordination, initial drafting, review, and finalization of this publication: Ms. Haoyun Su, Ms. Jialin Zhang, Ms. Ragini Malik, Ms. Dingding Sun, and Ms. Xiaojun Grace Wang for her supervision.

We hope this publication serves as both a record of shared achievements and a source of inspiration for future South-South and triangular cooperation efforts. As we look ahead, UNOSSC remains committed to fostering inclusive partnerships, promoting practical knowledge exchange, and scaling up impactful initiatives that advance sustainable development across the Global South.

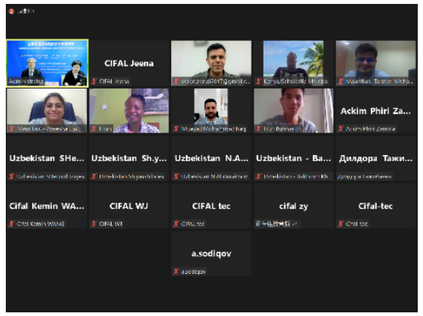
CONTENTS

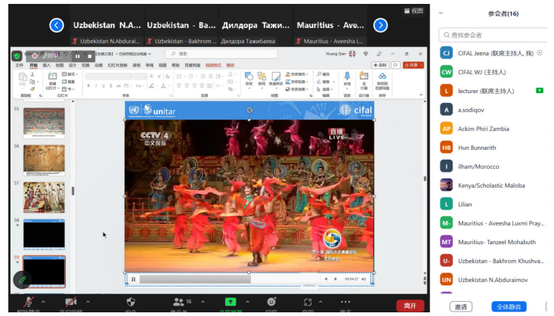
GLOBAL SOUTH-SOUTH DEVELOPMENT CENTER

SMALL GRANT PROJECTS 2019-2024

DEVELOPING CAPACITIES FOR E-GOVERNANCE AND DIGITAL TECHNOLOGY APPLICATIONS IN THE PUBLIC ADMINISTRATION OF LEAST DEVELOPED COUNTRIES

Partner	CIFAL Shanghai International Training Center, Ministry of Finance Planning and Economic Development, Uganda; National College of Information Technology (NACIT), Malawi
Countries Involved	Azerbaijan, Botswana, Cambodia, China, Gambia, Ghana, Iran, Malawi, Mauritius, Samoa, Tanzania, Uganda, Uzbekistan, Zambia
Overview	This project aims to enhance capabilities of government officials, digital application managers and IT service personnel in participating countries (mainly Uganda and Malawi), with a focus on deepening digital application understanding and promoting its wide adoption. Aligned with SDG Goal 9, it is committed to building resilient infrastructure and spurring innovation, covering diverse activities such as training, seminars and webinars on e-governance, geographic information management and IT applications. It also involves developing training curricula, writing case-study reports, researching Asian informatization and Chinese digital applications, as well as analyzing the digitalization of Uganda and Malawi. These measures aim to boost digitalization in least-developed countries, optimize public administration and improve the efficiency and quality of public services by sharing knowledge, experiences and best practices.
Results Achieved	• 65 men and 24 women directly benefited from the project, with their knowledge in e-governance enhanced. • Four thematic training seminars were designed and conducted, combined with cloud culture experiences for knowledge dissemination and cultural exchanges. They covered topics such as e-governmence, geographic information management, and IT applications. • Two comprehensive reports on Asian and Chinese digital development, along with two case-study reports on Chinese digital applications and Malawian-Ugandan IT development, were produced. These improve the knowledge and skills of partner organizations in South-South Cooperation.
Results Achieved	• PowerPoint courseware on e-government, geographic information management, etc., was prepared and translated. Cloud videos on digital applications for specific seminars were recorded, providing rich resources for knowledge dissemination. • A Participant's Manual was developed, a Participants' Evaluation Form was collected, and a Final Report was completed for future reference.
Lessons Learned	• Skill gaps in LDCs' personnel were addressed, by customizing training based on local research, resulting in successful digital project implementation. • Upgrading unstable power and networks in LDCs, along with establishing support systems, led to increased digital adoption in public administration. • By adjusting strategies like making culturally relevant training and seeking partnerships, the project overcame barriers and achieved its goals.
Project Period	August 2023 – September 2024





Exchange of experiences in e-governance capacity development and Cloud Culture

OVERVIEW

With the continuous development of information technology and network technology, digital applications have become the new driving force for continuously upgrading and progressing the urban economy, people's livelihoods, and related security systems. The use of advanced information technology enables cities to be managed and operated intelligently, thus creating a better life for the citizens. However, in the global digitalization process, differences in ownership levels, applications, as well as innovation capabilities of information and network technologies across countries, regions, industries, enterprises, and communities have caused an information gap and further polarization between the rich and the poor. What is even more acute is the digital divide. On the other hand, according to the Doha Program of Action for the Least Developed Countries, 2022-2031, using science, technology and innovation to counter multidimensional vulnerabilities and achieve sustainable development is a key priority for helping LDCs globally.

Digital applications have become a new driving force for continuously upgrading and progressing the urban economy, people's livelihoods, and related security systems. However, in the global digitization process, application and innovation abilities vary across countries, regions, industries and enterprises, creating further of information and network polarization between communities.

CIFAL Shanghai is an international cooperation institution. Founded in 2006, it is an international training center established by the United Nations Institute for Training and Research (UNITAR) in Shanghai, catering to the Asia-Pacific region. It is also a member of the UNITAR Global Training Network. CIFAL Shanghai organizes training courses, seminars and international forums around the world, centered on the Sustainable Development Goals and targeting critical social issues.

Through implementing this project, government officials in participating countries were provided training opportunities to understand the trend of e-governance, as well as knowledge on good practices from other developing countries in utilizing digital applications in public administration. Digital application managers and technicians were also equipped with enhanced skills in planning, construction and maintenance of digital applications in public administration through training and coaching. This improved local digitization, as well as the efficiency and quality of public administration and service delivery.

This project first analyzed global trends of utilizing digital technology and applications in delivering public services, by studying China and other countries such as Singapore and South Korea, to understand their experiences and cases in information technology (IT) and digital applications. Challenges encountered by least developed countries (LDCs) in digital applications and information technology development were then analyzed, with a focus on current informatization in LDCs. Four thematic webinars were designed on e-government, geographic information management, information technology applications, information infrastructure and other informatization, along with digital applications and building capacities.

RESULTS ACHIEVED

The project successfully advanced digital capacity-building among participants from LDCs through expert research, training, and knowledge exchange.

65 men and 24 women gained knowledge and skills in e-governance.

Established a knowledge base:

A multidisciplinary team of 30 experts—including municipal officials, corporate executives, university professors, and engineers—was established. This team conducted field studies and produced key knowledge outputs. Through in-depth research on relevant government, enterprises, and institutions, two comprehensive reports were produced: "Report on Informatization Development-Asia" and "Report on Digital Applications Development-China". These offer in-depth insights into digital development in different regions, providing a solid knowledge base for counterpart organizations.

In addition, two case study reports were developed, namely: "Case Study Report on Digital Applications in China" and "Case Study Report on Information Technology Development-Malawi and Uganda."

These have further deepened the understanding of practical digital applications and technological development in different contexts.

E-Governance capacity building via seminars and experience-sharing:

A comprehensive training curriculum on e-governance and digital applications was developed and delivered. Four thematic training seminars were held:

- The Seminar on E-Government Development and Application hosted 18 participants from Iran's Ministry of Information and Communications Technology, focusing on policy planning and the integration of new technologies in public administration, as well as case analysis of system planning, construction, and operations.
- The Seminar on Information Technology Application engaged 25 participants from eight countries, and covered cutting-edge technologies such as IoT, AI, wireless communication, and cybersecurity.
- The Seminar on Geographic Information Systems involved 13 officials from Cambodia, Mauritius and Uzbekistan. It addressed GIS, remote sensing, navigation, and international cooperation in spatial data applications.
- The Seminar on Information Technology Application Capacity Building hosted over 30 officials, experts and technicians from the Gambia and Uganda.

These training seminars, combined with cloud culture experience exchange, provided a platform for participants of different regions to share experiences and discuss digital development strategies.

Continued learning materials produced:

A series of high-quality learning materials were developed to support the training programmes. A Participant's Manual was produced to guide attendees through the learning process and facilitate active engagement. Pre-recorded cloud-based video lectures on digital applications—along with specialized videos for seminars on GIS and IT application—served as valuable resources for knowledge dissemination and self-paced learning. Participant Evaluation Forms were collected to gather feedback, which will inform the design and improvement of future training.

LESSONS LEARNED

The project initially faced significant skills gaps among government and IT personnel in LDCs, hampering the use of new digital systems. A generic conventional training approach proved ineffective due to cultural differences and varying skill levels across regions. By customizing training programs based on local needs and cultural contexts, the team successfully enhanced digital skills, enabling local personnel to implement digital projects effectively. This highlights the importance of tailoring capacity-building efforts to local realities for greater success.

Inadequate infrastructure, such as unstable power and unreliable networks, hindered the integration of digital systems. The project team collaborated with local partners to improve infrastructure, ensuring a stable foundation for digital applications. With these upgrades, digital technologies enhanced public administration efficiency and service delivery. This emphasizes that robust infrastructure and support systems are vital for successful digital transformation in developing regions.

The project faced several challenges, including cultural barriers, reluctance to emerging technologies, and funding constraints. In response, the team localized training materials, conducted outreach to promote technology adoption, and pursued financial support through strategic partnerships. These adaptive and flexible approaches enabled the project to overcome obstacles and achieve its objectives, highlighting the critical role of adaptability and cross-sector collaboration in international cooperation.

Expert Team giving lectures during thematic seminars

YOUTH EMPLOYMENT AND ENTREPRENEURSHIP SKILLS IMPROVEMENT IN DEVELOPING COUNTRIES

Partner	Fujian Science Technology and Culture Innovation Association (FSTCIA), Universities in Nigeria: Abubakar Tafawa Balewa University (ATBU), Federal University of Kashere, Gembe-Nigeria, Federal University of Dutsin-Ma Katsina State; Universities in Pakistan: Ghazi University, Khawaja Fareed University of engineering and information technology (KFUEIT)
Countries Involved	China, Nigeria, Pakistan
Overview	This project collaborates closely with universities and employment departments in Pakistan and Nigeria. Through surveys, it discovers the high demand of local youth for cross-border e-commerce knowledge, professional skills and guidance, as well as their optimistic outlook on cross-border e-commerce talent demand in the next five years. The project also strengthens connections, establishes training demonstration sites and provides youth with guidance. This helps Nigerian and Pakistani youth to plan careers, start businesses, as well as enhance overall employment and entrepreneurship capabilities of young people in developing countries.
Results Achieved	• The project has directly benefited 173 individuals, including 72 women, and indirectly impacted approximately 1,000 people. • In response to the specific needs of youth in Nigeria and Pakistan, a comprehensive training curriculum was developed. This included the creation of nine cross-border e-commerce video lecture courses, which received positive feedback for their practical approach. • "Youth Employment and Entrepreneurship Skills Improvement Training Demonstration Sites" were set up in Nigeria and Pakistan, helping young people through workshops and mentorship, with some starting e-commerce businesses or getting related jobs.
Results Achieved	• Online training and exchanges have improved young people's cross-border e-commerce skills. Regular training updates them on trends, while biannual exchanges allow them to share experiences, broadening horizons and improving problem-solving. This increases their confidence and global digital economy prospects.

Lessons Learned	• Some students encountered network and facility challenges. Pre-training workshops and alternative materials solved these, ensuring equal technology access. • The all-Chinese training software was a language barrier. Developing English versions or localizing it is key to improving future learning. • Integrating training into the formal curriculum and giving credits boosted student participation. They take it more seriously when it is part of their academic programme. • Course customization and cultural adaptation matter. Talking with locals helps tailor courses, and adding cultural elements builds trust.
Project Period	August 2023 – August 2024

Opening ceremony and exchange activity of the project in Fuzhou

OVERVIEW

The Fujian Science Technology and Culture Innovation Association (FSTCIA) was established in 2013. The association is based on three main fields: 1) science and technology, 2) culture, and 3) innovation, to enhance the innovation and international competitiveness of members. The association has a diversified innovation platform, gathering high-quality resources in these fields both inside and outside of Fujian. Member units and the leading group have strong scientific research capabilities and extensive international exchanges and cooperation.

The report of the Nigerian Youth Employment Action Plan 2021-24 of the Federal Ministry of Youth and Sports Development published in August 2021, confirms that unemployment rates are increasing. Currently, 33.3 percent or 23.2 million of the about 70 million people in Nigeria who should be working are unemployed, reaching 53.4 percent among working-age youth. The International Labour Organization (ILO) has linked unemployment in Nigeria to the phenomenon of jobless growth, increased school graduates with no matching job opportunities, a moratorium on employment in many public and private-sector institutions, along with continued job losses in manufacturing and oil. Each academic year, universities and polytechnics admit close to 2 million students and produce about 600,000 graduates. The dire unemployment situation that many graduates and those with advanced education in the country face is a cause for widespread concern.

Meanwhile, Pakistan's Institute of Development Economics (PIDE) reported that despite many holding professional degrees, over 31 percent of Pakistan's youth are currently unemployed, among which 51 percent are women. The PIDE report reveals that a large part of the working-age group is not even part of the labor force. They are either discouraged workers, or have other means of income to support them, the report stated.

Through a carefully designed questionnaire survey, this project deeply analyzed employment and entrepreneurship needs of young people in Pakistan and Nigeria. The survey results show that as much as 81.7 percent are eager to master basic cross-border e-commerce know-how. The vast majority (80.2 percent) also said they hope to improve their professional knowledge and skills in employment and entrepreneurship. More than half (55 percent) hope to receive professional employment and entrepreneurship guidance. 63.4 percent of youth in Pakistan and Nigeria believe demand for cross-border e-commerce talent will increase significantly in the next five years. This positive expectation indicates that the industry is generally optimistic about its prospects, foreshadowing continuous expansion and growth of this field, which is extremely attractive to young people.

Based on these findings, this project sought to improve employment and entrepreneurial abilities of young people in developing countries, especially Nigeria and Pakistan, as well as help more Nigerian and Pakistan college graduates to set clear career plans and find entrepreneurial direction. Based on employment and entrepreneurship needs of youth in these two countries, the project set up a team of experts to contact Nigerian and Pakistani universities, youth employment and entrepreneurship sectors and a curriculum training system was tailor-made. By establishing the "Youth Employment and Entrepreneurship Skills Improvement Training Demonstration Sites", young people in Nigeria and Pakistan received guidance on opportunities to boost employment and entrepreneurship skills.

RESULTS ACHIEVED

This project has directly benefited 173 people, among whom 72 are women. It has also indirectly benefited 1,000 people.

Curriculum training system launched:

Based on the in-depth needs survey of Nigerian and Pakistani youth, a comprehensive curriculum training system was successfully built. Through meticulously collecting information on participants' needs, 9 video lecture-based training courses on cross-border e-commerce were developed. These courses received positive feedback from trainees, with many highlighting the relevance and practicality of the content. This not only covered theoretical aspects, but also delved into real-world case studies, equipping youth with the necessary knowledge to navigate the complex landscape of cross-border e-commerce.

Effective demonstration sites established:

"Youth Employment and Entrepreneurship Skills Improvement Training Demonstration Sites" were successfully set-up in both Nigeria and Pakistan. These have become hubs for providing technical training, employment and entrepreneurship guidance. The sites have organized workshops, mentorship programs, and counseling sessions, enabling youth to gain hands-on experience and practical advice. As a result, many have started their own e-commerce ventures, or become better prepared for employment in related fields.

Enhanced skills through online engagement:

Online training and exchange activities have significantly enhanced employment and entrepreneurship skills among youth. The regular online training provided a continuous learning platform, ensuring that the participants stayed updated with the latest trends and techniques in cross-border e-commerce. The online exchange activities, held every six months, fostered a collaborative environment where the youth from both countries could share experiences, insights and challenges. This not only broadened their perspectives, but also improved their problem-solving abilities. Consequently, the youth have shown increased confidence and proficiency in handling e-commerce challenges, improving their prospects in the global digital economy.

Opening ceremony and exchange activity of the project in Fuzhou

LESSONS LEARNED

While the project achieved good results, it also faced several challenges, with technology accessibility being one of the most prominent. The importance of ensuring equitable access to necessary technological resources became clear, especially as some students struggled with weak networks and insufficient facilities. This highlighted the need for proactive interventions, such as offering pre-training workshops to build basic technological competencies. Such initiatives would better equip students to navigate the online learning environment. Additionally, providing alternative learning materials for those with limited internet access is essential to ensure that no one is left behind in the educational process.

Another key lesson was the critical need for software technology localization. The project's international scope revealed that the language barrier, particularly with training software available only in Chinese, posed a significant challenge. To enhance the learning experience and enable students to engage more effectively with cross-border e-commerce, it was clear that translating or localizing the software into English was essential. This change would not only improve accessibility but also deepen participants' understanding of the content, making the material more engaging and user-friendly.

Effective engagement strategies and integrating the course into formal academic curricula and offering credit for completion proved to be a highly effective way to increase student participation. When students recognized the course as an integral part of their academic journey, they were more motivated and invested in the learning process. This approach not only strengthened their commitment but also ensured a more comprehensive understanding of cross-border e-commerce, essential for mastering the skills needed in this field.

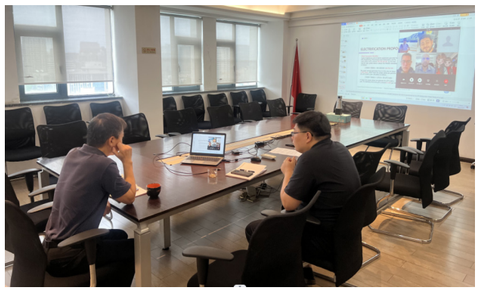
Lastly, the emphasis on local adaptation through continuous consultation with local experts and stakeholders was critical in ensuring the project's relevance and impact. Tailoring course content to the specific needs, values, and interests of youth in Nigeria and Pakistan helped make the material more accessible and engaging. By incorporating cultural sensitivities and local examples, the project fostered trust and built stronger relationships between participants and facilitators. This local adaptation not only enhanced the learning experience but also strengthened the foundation for long-term SSC by promoting cross-cultural understanding and mutual respect.

RESEARCHING RURAL ELECTRIFICATION ENHANCEMENT BASED ON PHOTOVOLTAIC TECHNOLOGIES IN PERU'S AMAZONAS REGION

Partner	National Research Institute for Rural Electrification (NRIRE), Ministry of Water Resources, P. R. China, CROVISA, INDES-CES (Research Institute for the Sustainable Development) at the UNTRM (a public university of Peru)
Countries Involved	Armenia, China, Costa Rica, Czech Republic, Jordan, Laos, Morocco, Nepal, Pakistan, Peru, Tajikistan, Trinidad and Tobago, Venezuela, Uzbekistan
Overview	The project seeks to harness solar resources to boost rural electrification in San Juan de Eñara, a rural town in Peru's Amazon region, north of the Andes. It conducted on-site surveys, joint research and promoted new solar technology. The project's local working group included CROVISA, a Peruvian infrastructure and energy company, and INDES-CES, a research institute for sustainable development. Together with the National Research Institute for Rural Electrification of China, they analyzed rural power use, proposed using small, centralized photovoltaic (PV) power storage system and off-grid PV systems. A consulting report was developed to address power-related challenges in Latin America and other developing regions, offering practical solutions centered on PV technologies. The feasibility of the proposed technologies was acknowledged by experts, and the findings were shared with multiple countries, garnering positive feedback. The project effectively promoted cooperation between China and Peru in rural electrification, bringing significant benefits.
Results Achieved	• This project formed a Peruvian working group with both men and women among the technical and research staff. It also organized online quarterly technical exchange meetings between China and Peru, and achieved full approval for promoting photovoltaic technologies in San Juan de Eñara. The project further supported PV technology in Latin America by holding an online seminar, with relevant institutions participating and experts sharing insights. Many people directly received project support. • Households in the rural town of San Juan de Eñara were surveyed, with feasible photovoltaic technologies to support their energy needs transferred from China to Peru.

Results Achieved	• Demand-driven research was conducted, a consulting service was completed, and a consulting report was approved by authorities and experts of both China and Peru. • Household information was collected, forming a field survey report. Local appliance uses and energy needs were also analyzed, with solar-powered systems and electric fences for livestock recommended based on local needs and technological feasibility.
Lessons Learned	• Energy is crucial for people and a country's economy. In Peru, solar power is a good alternative to diesel-based mini off-grid systems for its cost, technological and environmental advantages. • Residents are keen to use solar panels, especially for living and electric fences for animals. • For effective PV technology use, it is vital to understand local power needs and raise awareness of relevant PV applications. Local development levels must also be considered when enhancing electrification, balancing capacities and consumption for feasible investment.
Project Period	October 2022 – September 2023

Field investigation



Online communication

OVERVIEW

The Amazonas region north of the Andes is one of the poorest regions of Peru. Due to being off the grid, over half of its inhabitants have no access to electricity and mainly rely on burning wood, straw, fossil fuels, etc. This power shortage has seriously hindered socioeconomic development, while the high dependence on traditional energy has caused significant environmental pollution. However, solar resources are relatively abundant in this region, helping the application of photovoltaic technologies as an economic and green alternative energy source.

China's National Research Institute for Rural Electrification (NIRE) and Ministry of Water Resources have accumulated rich experience in applying solar, wind, hydropower and other renewable energy

technologies to provide viable power solutions for underdeveloped regions of the world. Together with CROVISA, a Peruvian partner on developing infrastructure works, NRIRE has installed eight solar pumping systems on an island in Peru's Titicaca Lake, providing irrigation and potable water for the local community.

Electricity access is key to achieving social development and improving living conditions. The remote area is sparsely populated, so additional income due to the upgrade of electrification cannot meet the economic demand of the investment for grid expansion. Low consumption in rural areas results in a very small investment return. Therefore, regular methods of electrification, such as extending the distribution grid to remote areas, is not economic, and public investment from the government is also problematic, due to its financial conditions. As such, it is a challenge to enhance universal electrification from an economic perspective using regular methods. Among the solutions, isolated mini grids have been considered a cost option for rural electrification as they present several benefits, including technical and operational flexibility, as well as wider power operation rates.

Based on positive long-term cooperation with the Peruvian partner, this project carried out research on rural electrification enhancement using photovoltaic technologies in a typical rural town of the Amazonas region. It mainly studied the feasibility of establishing a small centralized PV energy storage system, to strengthen the power supply capacity of the rural grid and using a household off-grid PV system to increase utilization of rural electrical devices. This helped to solve local power shortages, optimized energy allocation, improved people's livelihoods and the local environment, as well as further promoting PV technology and equipment. It also enhanced cooperation between China and Peru, as well as other Latin-American countries. Results of the research were shared with parties involved, to support the SDGs, particularly SDG 7, Affordable and Clean Energy.

RESULTS ACHIEVED

Enhanced capabilities of representatives from participating organizations:

- A working group was successfully established in Peru, comprising five men and five women from the country's technical and research staff, thereby achieving the gender-balanced participation target for the research work.
- Four online quarterly technical exchange meetings between China and Peru were organized as planned.
- A seminar on photovoltaic technology applications in Latin American countries was successfully held online, drawing the participation of 11 relevant institutions. During the seminar, experts shared insights and research findings during five presentations, and results were shared with four Latin American developing countries.
- In terms of project beneficiaries, 40 men and 35 women directly received project support.

Through questionnaire-based interviews, data from 27 households in San Juan de Eñara was collected, serving as a case study for energy demand research in the Peruvian jungle. A field survey report was developed based on these investigations. The final consulting report not only addresses local energy challenges but also promotes the adoption of PV technologies and fosters international cooperation. The findings were shared with government officials and experts from four Latin American countries—Costa Rica, Peru, Trinidad and Tobago, and Venezuela—as well as from Armenia, the Czech Republic, Jordan, Laos, Morocco, Nepal, Pakistan, Tajikistan, and Uzbekistan. The research received unanimous recognition from experts in both China and Peru and offers transferable insights for improving livelihoods in remote areas across Latin America.

The research analyzed survey results of the local village and found that lighting appliances, televisions and mobile phones are commonly used, while cooking, irrigation and agricultural product-processing appliances are lacking. Refrigerators are not widely used, while there is a need for public lighting and peak electricity demand in the morning and evening. Considering local needs and technical feasibility, PV technologies such as solar-powered public street lamp systems, solar water-pumping systems, solar irrigation systems and solar electric fences for livestock, are recommended for local use and promotion.

Meeting for sharing the research results

Photo with Peruvian representatives

LESSONS LEARNED

Context-driven technology selection and design are key to the success of the project. While solar power is a viable and sustainable alternative to diesel-based systems, successful deployment depends on aligning solutions with local socio-economic realities. In low-demand, agriculture-based communities, energy projects must be tailored to support productive use, improve livelihoods, and respond to actual needs—not simply expand infrastructure.

Inclusive capacity building across demographics is critical. In the case of this project, a clear demographic divide—between older, less formally educated residents and younger, more educated but often migratory youth—highlights the need for inclusive training strategies. Blended learning approaches and intergenerational knowledge-sharing are essential to promote local ownership, ensure sustainability, and enable technology adoption across all age groups.

To enhance investment appeal and long-term viability, electrification efforts should be integrated with broader development goals. When energy access is linked to local enterprise and income generation, demand becomes more stable and attractive to both public and private investors. South-South cooperation can support this by facilitating access to proven models, technologies, and expertise.

BUILDING CAPACITIES ON COMPREHENSIVE MANAGEMENT AND INNOVATING ECOSYSTEM INTEGRATION IN LAKE VICTORIA BASIN

Partner	Promotion Association for Mountain-River-Lake Regional Sustainable Development (MRLSD), Friends of Lake Victoria (OSIENALA), Kenya Civic Education is A Solution to Poverty and Environmental management (CESOPE), Tanzania
Countries Involved	China, Kenya, Tanzania
Overview	Lake Victoria, the world's second largest and Africa's largest freshwater lake, supports over 100 million people in Tanzania, Kenya and Uganda. However, it is currently grappling with ecological challenges and poverty caused by deforestation, overfishing and population growth. This situation is similar to Poyang Lake in China 40 years ago, which was since improved. Consequently, MRLSD and its Tanzanian and Kenyan partners launched a capacity-building project funded by the GSSDC. This project shared China's ecological concepts, management policies and agricultural technologies, through tailored training programs for both elites and grassroots communities, via online seminars and ecological agriculture training.
Results Achieved	The project has achieved remarkable results in multiple aspects: • Awareness and capacities of local government officials and scholars on the forest/ river chief system were enhanced: • Through online and offline trainings and on-site investigations, the knowledge and skills of 100 officials and scholars (70 men and 30 women) were improved. Moreover, 35 percent of participants reported that they had applied what they had learned, and 90 percent rated the training as "good" or higher afterwards. One training manual was also completed. • Capacities of local trainers were strengthened (mainly technicians and NGO managers) in circular agroforestry techniques. 55 people (30 men and 25 women) gained greater agroforestry skills through the training, with a training manual on this subject also completed. 35 percent reported using the knowledge and skills they received, and 90 percent gave high evaluations.
Results Achieved	• The forest / river chief system in Lake Victoria basin was implemented, by establishing Village Conservation Teams (VCTs) and Beach Management Units (BMUs). 2,090 farmers (1,250 men and 840 women) improved their forest / river management skills through training. Relevant committees were established, and one policy suggestion was submitted. • Circular agroforestry techniques were supported, through two cooperation agreements or memorandums of understanding signed, attracting media coverage twice.
Lessons Learned	• Tailored technology transfers work best. The large climate difference between China and Africa makes direct technology transfers impossible. Cooperating with local groups like CESOPE and OSIENALA, along with conducting trials, can adapt technologies to local ecosystems, which is key for international cooperation. • Cooperation with local NGOs is key. Grassroots NGOs in Tanzania and Kenya are active, with good government-NGO relations and various funds. Partnering with them allowed the project to tap their local knowledge and influence, helping project implementation and China-Africa cooperation. • Local openness to innovation can significantly accelerate implementation. In both countries, communities have demonstrated a willingness to embrace new methods, creating favorable conditions for the introduction of Chinese technologies and concepts. This not only supports local development but also fosters meaningful cultural exchange.
Project Period	October 2022 – December 2023

Training on circular agricultural techniques in Kenya

OVERVIEW

According to the Swiss bank's 2019 database (Global Wealth Databook2019), per capita wealth in Kenya and Tanzania are among the middle and lower levels in the world, with both recognized as poorer countries. The World Bank database (2021) shows that the proportion of people living in poverty[1] in Kenya is 36.1 percent and 44.95 percent in Tanzania (until 2018), which is considered to be one of the 44 least developed countries by the United Nations (2015 Edition). According to past research and investigations, misunderstandings regarding economic development have caused enormous environment problems and intense poverty in both countries.

Lake Victoria is the world's second largest freshwater lake and the largest lake in Africa, with a total catchment of 250,000 square kilometers. About 70 percent of it is in Tanzania and Kenya. It is an important ecological resource for the survival of local people. The Lake Victoria basin currently faces serious ecological and poverty challenges. These include: unsustainable rates of fish harvesting (e.g., overfishing) and destructive fishing practices (e.g., use of illegal gear), poor agriculture practices and deforestation. This is compounded by rapid population growth and inadequate government policies, regulations and provision of services, driving a rapidly degrading ecosystem. In addition, ongoing activities such as discharge of untreated sewage and other pollutants into the lake are harming water quality. Nutrient runoff from agriculture practices is also causing eutrophication, while siltation from the erosion of deforested watersheds further threatens the health and livelihoods of millions of people who depend on the lake's natural resources.

Discussions between economic development and environmental protection of Lake Victoria basin has always existed, without significant improvement. This project aims to transform that, through successful management of the forest / river chief system, and implementing innovative technology for circular agroforestry in Tanzania and Kenya. The project will greatly enhance awareness of integrated management for Victoria Lake and motivate locals to build self-help organizations based on the forest/river chief system, to protect their environment and use circular agroforestry techniques to improve their livelihoods and environment. It can be estimated that the project will train 200 people directly and about 2,000 people indirectly, of which 30-40 percent will be women. It will also include more stakeholders, by forming relevant policy suggestions and submitting them to local governments, as well as forging MOUs with governments or enterprises to construct circular agroforestry demonstration sites.



Training on circular agricultural techniques and a seminar on building an ecological civilization in Tanzania

[1] *Defined as living on less than $2.15 a day*

RESULTS ACHIEVED

Key knowledge shared via training workshops:

The project invited local professors to hold training workshops. They lectured officials and scholars from Tanzania and Kenya on the Poyang Lake Basin's comprehensive management, Jiangxi's river/ lake/ forest chief system, circular agroforestry and beekeeping techniques, to offer a "Jiangxi programme" for Lake Victoria Basin's management.

Awareness raised on basin management and agri-circular technologies:

Around 150 people, including government officials, scholars, technicians, and NGO managers, benefited from workshops on the integrated management and circular agriculture technologies of the Poyang Lake Watershed. These were held by MRLSD, which also developed training manuals, based on analysis of Lake Victoria Basin's needs. The training enhanced their awareness of basin integrated management and agricultural innovation, helping with environmental decision-making and ecological farming skills. It also promoted circular agricultural demonstrations. Women comprised 30 – 40 percent of those trained, (about 50 participants), boosting women's participation and leadership in future water management.

Promoted Jiangxi's ecological civilization experience:

The project harnessed online and offline discussions, workshops and on-site visits to promote Jiangxi's ecological civilization construction concepts and experiences. This included ecological mechanism reform; the evolution from Poyang Lake's integrated development to Ecological Civilization Experimental Zone; and environmental governance models. Circular economy models, such as mine restoration and rice-fish symbiosis, interested local officials. They agreed with the ecological concept, admired Jiangxi's policies and achievements, and wanted to learn from Jiangxi. MRLSD assigned tasks and funds to partners (OSINALA

Online training workshops

and CESOPE) to promote these ideas. They conducted further training and publicity in lake and mountain areas, benefiting 2,090 people with new ecological management skills, among which 40 percent are women.

Measures for building the "Poyang-Victoria Basin Community":

Chinese, Tanzanian and Kenyan government departments and research institutions held in-depth exchanges on Lake Victoria's environmental management. They proposed practical suggestions on formulating a unified plan, rectifying lakeside industries and strengthening environmental education. The delegation also planned two South-South cooperation projects with local residents. Tanzania and Kenya were willing to support the "Poyang-Victoria Basin Community" proposal and hoped for future cooperation to balance Lake Victoria Basin's economic and ecological development.,

LESSONS LEARNED

An important lesson learned from this project was the need to adapt technologies to the distinct environmental realities of partner countries. The significant climate differences between China's temperate zones and Africa's tropical ecosystems rendered direct technology transfers ineffective. Instead, a phased approach—centered on localized experimentation and demonstration—proved essential.

Collaborating with local organizations such as CESOPE and OSIENALA enabled the project to tailor technologies effectively to local needs, reinforcing the importance of environmental factors in international cooperation and project design.

The project also highlighted the vital role of grassroots NGOs in Tanzania and Kenya. These organizations, empowered by their active engagement in social development and strong ties with government institutions, proved invaluable. Their staff's commitment to public welfare, coupled with their local knowledge and capacity to mobilize diverse funding sources, made them ideal implementation partners. Deepening collaboration with such organizations strengthens not only project outcomes but also long-term South-South cooperation.

Finally, the high openness of communities in both countries to innovation emerged as a promising factor. Successful trials in organic vegetable cultivation and aligned government support in underserved areas demonstrated local readiness to embrace new ideas. This receptiveness provides fertile ground for transferring China's technologies and development models—offering a pathway for mutual growth, knowledge exchange, and enhanced cultural understanding.

TO DEVELOP A MARKET-DRIVEN GREEN BAMBOO CONCRETE BOARD INDUSTRY IN RWANDA

Partner	China National Bamboo Research Center, East Africa Bamboo Forest Industry Ltd. (EABFI)
Countries Involved	China, Ethiopia, Kenya, Rwanda, Uganda
Overview	The project aims to establish a sustainable green bamboo concrete board industry in Rwanda through public-private partnerships, delivering tailored solutions that address local development needs and market demands.
Results Achieved	• 93 people (37 women, 56 men) gained bamboo concrete board (BCB) production skills, through three comprehensive technical training workshops. • Four packages of bamboo technologies were successfully transferred to Rwanda. • Over 20 small bamboo nurseries were built across Rwanda, with an annual production capacity of 100,000 seedlings. • 291 hectares of bamboo demonstration plantations were established in four provinces of Rwanda. • Two BCB production supply chain models were implemented. • 627 direct job opportunities were generated, benefiting 6,900 individuals. • Over 80 visitors from Rwanda and 120 virtual participants from other EAC countries attended a BCB exhibition organized by the project. • Production and construction applications generated formal interest from three countries in BCB development.
Lessons Learned	When transferring technology to Africa, it is essential to account for specific local circumstances and conditions, to establish a sustainable production-consumption chain. For instance, the design and procurement of processing machinery for BCB production must consider significant differences in machine efficiency between China and Rwanda. Similarly, production technologies must be adjusted to accommodate distinct physical and chemical properties of bamboo in the two regions. The success of a new agro-industry in Africa, supported by technical transfers, largely depends on its ability to generate benefits for all stakeholders, particularly farmers who supply raw materials to value-added processing sectors.
Project Period	September 2020 – April 2023

OVERVIEW

Rwanda, a landlocked nation in eastern Africa at the headwaters of the Nile, faces significant developmental challenges as one of the UN-designated least developed countries (LDCs). The nation's economy is predominantly agricultural, with underdeveloped industrial sectors, high unemployment rates, and severe soil erosion. Rwanda's heavy reliance on imports extends to construction materials, including Bamboo Concrete Board (BCB), for which it currently imports approximately US$1 million worth annually to meet growing construction demands stimulated by China's Belt and Road Initiative.

Bamboo presents a compelling solution to these challenges, offering advantages including rapid growth, short rotation cycles, high yield potential, versatile applications and low initial investment requirements. These characteristics position bamboo as an ideal resource for promoting balanced social, economic and environmental development. BCB manufacturing, as a labor-intensive industry, holds particular promise for expanding local employment, strengthening agro-industrial capacity, enhancing agricultural incomes, as well as improving environmental conditions in Rwanda and neighboring East African nations, which possess abundant, but underutilized bamboo resources due to technical limitations.

The China National Bamboo Research Center (CBRC) – with its triple mandate of bamboo research and development, international collaboration and industrial development, has been instrumental in advancing Rwanda's bamboo sector. Since 2009, CBRC has managed the China Aid Rwanda Bamboo Planting, Processing and Utilization Project (CABP), funded by China's Ministry of Commerce, establishing a robust foundation for the sustainable development of Rwanda's bamboo industry.

In 2019, under the Global South-South Development Center Project, CBRC conducted a comprehensive six-day assessment mission to Rwanda. Two expert delegates evaluated the decades-long impact of the CABP initiative and developed a strategic framework for trilateral collaboration among UNOSSC, CBRC and East Africa Bamboo Forest Industry Ltd., focusing on BCB development in Rwanda.

The project aims to establish a sustainable green bamboo concrete board industry in Rwanda through public-private partnerships, delivering tailored solutions that address local development needs and market demands.

Training on bamboo propagation and planting

RESULTS ACHIEVED

Training on bamboo production and BCB conducted transfer skills and technology:

Three comprehensive technical training workshops, benefiting 93 participants (37 women, 56 men). These included online training in bamboo cultivation and integrated utilization, in-person instruction in Rwanda covering propagation, plantation management and craft skills, as well as specialized training on BCB production equipment installation and operations led by a Chinese expert.

Four packages of bamboo technologies were successfully transferred to Rwanda, including:

- Bamboo propagation technology, to ensure high-quality and quantity bamboo seedling production in a fast and cost-effective way, to meet seedling needs for large-scale plantation establishments;
- Technology for establishing and managing large-scale bamboo plantations, including adjusting and optimizing bamboo age and density structure to sustainable management, as well as measures against dry seasons;
- Innovative green technology to produce bamboo furniture and woven products, overcoming challenges of traditional bamboo weaving and furniture in Rwanda being easily mildewed, deteriorated or moth-attacked, which held back the industry's development; and
- A package of technology to produce BCB in Rwanda. This covers bamboo processing, adhesive production and board pressing. It establishes a sustainable supply chain connecting local farmers, processors and manufacturers. Specially adapted for local climates, the technology includes protective treatments and enables full bamboo utilization, reducing waste. The modular system then helps transform local bamboo into quality construction materials.

Demonstration bamboo nursery and plantation base established:

Farmers took technologies received from training to establish over 20 small and simple bamboo nurseries, with an annual seedling production capacity

Training on bamboo furniture and weaving

of 100,000 across Rwanda. They can sell bamboo seedlings to afforestation projects by the government, private companies and others at around USD 1 /plant, empowering farmers to gain higher earnings.

The demonstration bamboo plantation of 291 ha. in four provinces of Rwanda have been established, including 171 by EABFI, and 120 ha. by Rwanda's government, farmers, etc.

A feasibility study was conducted on BCB's development in East African Community (EAC) Countries:

By surveying EAC bamboo resources, socioeconomic conditions, BCB markets, etc., the project determined that EAC countries have sub-Saharan Africa's largest natural bamboo forests, accounting for around 3-4 percent of the world's total known bamboo coverage, particularly Ethiopia, Kenya and Uganda have about 1.47 million ha, 133, 272 ha., and 54, 533 ha. respectively. These hold three major bamboo species suitable for high value chains of such bamboo plywood as BCB on an industrialization scale. BCB is also well produced by the East Africa Bamboo Forest Industry Ltd. (EABFI) and can be successfully copied and disseminated to other EAC countries from technology and market.

A detailed training evaluation made by trainees:

A systematic training evaluation questionnaire was made out to each bamboo plantation, processing and utilization trainee, held online in China from 26 July to 15 August 2021. It covers the three key areas: (1) Training quality (Subject arrangement, presentation quality, training difficulty, (2) Training management (including communication and organization capacity), (3) Training impact (role of the trainee in future cooperation between China and Rwanda, etc.). It also shows the percentage of Rate 5 (best score) is over 90 percent.

In total, 627 jobs were created, and 6,900 people benefited:

- Around 107 people were working at BCB factory for production, including: three technicians, one manager, three accountants, 100 local operation staff (30 people on the bamboo cutting and transport team; 34 people in woven bamboo curtains, six people for making glue, 10 people for operating machinery, 10 people for wood rotating cutting and 10 people for the bamboo nursery center). At least 400 people indirectly benefited from the BCB production chain.
- At least 200 people directly engaged in seedling production, bamboo plantation management, bamboo harvesting and transportation, along with 800 people who engaged in these areas indirectly.

Hands-on training on bamboo plantation management

- Around 300 local people directly engaged in bamboo furniture production and marketing, while around 500 people indirectly benefited from the bamboo furniture chain.
- Around 20 people employed at the Eco-Park, around 5,000 people per year benefited from eco-tourism.
- EABFI BCB annual designing production value is worth around USD 3 million and can be reached in 2 or 3 years.
- Over 70 percent of all jobs directly created, and people indirectly benefiting from them, are women, while in the bamboo weaving sector, their representation reaches over 90 percent.

LESSONS LEARNED

The design of the project should incorporate essential elements such as clearly defined targets, strategic partner selection, alignment with local socio-economic and labor market conditions, and an emphasis on practical application. Project should also prioritize technological replicability, economic viability, and job creation to ensure both scalability and long-term impact.

When transferring technology to Africa, it is critical to tailor approaches to local contexts in order to establish sustainable production and consumption chains. For example, the design and procurement of processing equipment for bamboo charcoal briquette (BCB) production must account for significant differences in machine efficiency between China and Rwanda. Likewise, production technologies must be customized to reflect the distinct physical and chemical characteristics of bamboo in each region.

The success of new agro-industries introduced through technical cooperation hinges on their capacity to deliver shared benefits, particularly to smallholder farmers who supply raw materials to the value-added processing chain. Furthermore, external variables—such as the COVID-19 pandemic—have demonstrated the importance of embedding contingency planning within project frameworks to build resilience and mitigate risks during implementation. These lessons underscore the value of locally adapted, inclusive and resilient SSC models.

ALLEVIATING POVERTY BY DEVELOPING TANZANIA'S TILAPIA INDUSTRY CHAIN

Partner	Freshwater Fisheries Research Center, Chinese Academy of Fishery Sciences (FFRC/CAFS), Fisheries Education and Training Agency (FETA), Ministry of Livestock and Fisheries, Tanzania
Countries Involved	China, Tanzania
Overview	This initiative encompassed technical demonstrations, training sessions, and the establishment of standardized model tilapia farms. Small grants were provided to model farmers to support the purchase of necessary inputs. The project aimed to effectively transfer China's advanced and practical tilapia farming technologies to Tanzania, enhancing the country's eco-efficient tilapia production while increasing income opportunities for small-scale farmers.
Results Achieved	• 15 representatives from Chinese and Tanzanian organizations participating in South-South cooperation gained strengthened tilapia production skills through training. • Three technical demonstration tilapia farms were developed. • Three tilapia aquaculture technologies were transferred from China to Tanzania. • 45 visits to demonstration farms for hands-on learning were facilitated, with 68 local fish farmers (43 men, 25 women) gaining strengthened tilapia farming techniques through training. • 55 SMEs participated in technical training programs, with 12 Chinese fishery enterprises and Tanzanian SMEs exchanging information. • Three partnerships were established between Chinese fishery enterprises and Tanzanian SMEs. • Four success stories, three high-quality audiovisual materials and three comprehensive reports on the tilapia industry's development in Tanzania were produced.
Lessons Learned	A stable technology transfer platform should be established, so many more practical or upgraded aquaculture technologies can be transferred to more developing countries as early as possible. Without such ongoing updates, local recipients cannot benefit from new knowledge and techniques in time.
Project Period	August 2020 - August 2021

OVERVIEW

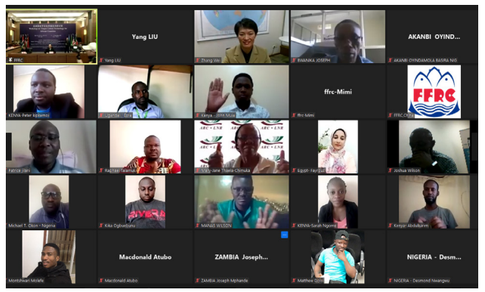
Tanzania possesses remarkable potential for aquaculture development, with extensive land and water resources alongside ready access to essential inputs, including fish feed, premixes and fertilizers. The country encompasses 94.52 million hectares of total land, of which 62 million are covered by water. The freshwater area spans 54,040 square kilometers, primarily comprising Lake Victoria, Lake Tanganyika, Lake Nyasa along with numerous small dams, reservoirs and rivers.

Aquaculture has been instrumental in Tanzania's development for decades, contributing significantly to job creation, income generation and national economic growth. Its importance is reflected both in its inclusion within Tanzania's Development Vision 2025 and the National Strategy for Growth and Reduction of Poverty (2010). While aquaculture productivity remains below its potential, tilapia species dominate the sector, accounting for over 80 percent of the country's total aquatic product output annually.

The sustainable development of Tanzania's aquaculture sector hinges on advancing the tilapia industry, particularly through increased participation of small-scale farmers across the value chain. This approach can substantially contribute to alleviating poverty and hunger in the country. China's tilapia aquaculture sector, having evolved over 70 years, has developed sophisticated technology and specialized production methods. This extensive experience and technical expertise can significantly enhance Tanzania's tilapia farming efficiency.

This project deployed six senior Chinese experts in tilapia culture to Tanzania for a seven-day program. The initiative encompasses technical demonstrations, training sessions and the standardization of demonstration tilapia farms. Small grants were provided to model farmers for input procurement. The project aims to effectively transfer China's advanced and applicable tilapia industry technologies to Tanzania, enhancing the country's eco-efficient tilapia production, while increasing income opportunities for small-scale farmers.

The expert team provided ongoing guidance to three model tilapia farms, monitoring their technology applications, production outcomes and demonstration effects on other farmers. They produced a comprehensive report on Tanzania's tilapia industry development, serving as a valuable



Over 40 participants from 12 African countries attended the online workshop on tilapia culture techniques

Technical consultancies with experts from Zhongzhi Tilapia Farm

reference for stakeholders interested in cooperation and investment opportunities.

The project aims to expand participation in the tilapia industry, while advancing multiple SDGs. These include eliminating poverty, ending hunger, ensuring food security, improving nutrition, promoting sustainable agriculture, along with strengthening global mechanisms and partnerships for sustainable development.

RESULTS ACHIEVED

Technical needs survey for tilapia industry development in Tanzania:

To fully understand the current development and technical requirements of aquaculture in Tanzania, and to provide technical guidance and training more effectively, FFRC experts organized online talks with Tanzanian fishery practitioners and managers of China-invested aquaculture enterprises in Tanzania. To survey Tanzania's aquaculture history, organization, local research and technology institutions, along with current status, development prospects and aquaculture bottlenecks, experts organized technical seminars for local personnel in fishery research, management and technology promotion. These were coordinated with officials from the Tanzanian Ministry of Livestock and Fisheries, with cooperation from Tanzanian fishery authorities and previous trainees.

FFRC experts successively held technical consultations and exchanges with experts from the Fisheries and Aquaculture Division of FAO, Zhongzhi Tilapia Farming Base in Tanzania, FETA and the Tanzanian Embassy in China. They communicated with local fishery enterprises on the design, water quality and farming facilities of tilapia farms. They also exchanged views with technicians and farmers on selective tilapia breeding, seed production and management, grow-out farming techniques, water quality management, feed techniques, labor costs, market demand and marketing. Major difficulties and technical problems in production were also discussed. Additionally, they consulted with officials from FAO and Tanzanian institutions regarding Tanzania's industrial development policies, market demand, main challenges and development potential. According to survey data, they adjusted the technical guidance and training content in a timely manner, improving the effectiveness and quality of the project.

Produced a series of knowledge products for Tanzania technical officers:

A technical book for this training was compiled covering several key areas, including selective breeding technology of tilapia brooders, tilapia seed production, feed development, inspection and quarantine, aquatic product quality and fishery development. Videos on tilapia breeding for virtual lab-work practices and technical books for consultancy on grow-out culture of tilapia were also made. These allowed Tanzania technicians and officers to understand key breeding technologies of tilapia. To further help participants and partners better gauge the industry chain and value chain development, technical references on construction and practices of aquaculture parks were compiled, while a video case study of an aquaculture park was produced. The reference covers aquaculture status in the world, principles of aquaculture parks, along with planning, design, operations, management and cases studies on tilapia, rice-fish farming, etc. These knowledge products will help in laying strong foundations for the tilapia industry to grow.

Improved knowledge and technology on tilapia farming as well as industry development through training, education and technical consultancy:

Development realities of fisheries in Tanzania and a survey report on the industry's progress guided the project's direction. These include a lack of fisheries monitoring technology, primitive techniques in feed, breeding and disease control, along with a shortage of technical talent due to education system lags. As a result, FFRC experts provided quotas for fishery officers recommended by the Tanzanian Ministry of Livestock and Fisheries to study a 2-year master's degree in fishery development. Additionally, they conducted three technical consultancies in cooperation with experts in Zhongzhi Tilapia Farm in Tanzania. Due to pandemic conditions, they also adopted more innovative modes of implementation by organizing trainings online, instead of offline.

In total, 49 technical and management fishery officials from Tanzania gained strengthened tilapia production capacities by participating in the online trainings. These covered key areas including industry development, selective breeding, seed production, feed development, high-yield farming, inspection and quarantine, aquatic product quality and safety, resource conversation, etc. To fully harness FFRC's advantages in joint education programs and improve capacities for fishery technology innovation, the experts decided to recruit eight fishery officers to undertake 2-year master's degrees in fishery development.

To guarantee the smooth implementation of the trainings, educational program and technical consultations, FFRC bought advanced facilities and equipment related to virtual exchanges and internet connections for the webinar. Moreover, to keep in line with development requirements of the tilapia industry in countries along the Lake Victoria Basin, FFRC organized two technical seminars on the December 13th-17th, 2021, along with November 14th-23rd, 2022. 68 technicians, scholars and management officials from 15 African countries gained improved technical capacities for fish farming through the seminars.

The experts conducted technical trainings in close alignment with tilapia technical requirements and local fishery conditions of African countries, especially Tanzania. Based on practical technical measures and operational essentials, they explained the profound theories regarding tilapia breeding and culture technologies, as well as encouraged trainees to actively share their perspectives and experiences, which received great interest among trainees.

During trainings and seminars, the trainees followed up on every technical link and sought advice from the Chinese experts on production difficulties they encountered. The trainees said that they benefited a lot from the training. To help solve technical constraints

Producing knowledge products for Tanzania technical officers

at Tilapia Farming Bases, the expert team prepared a Chinese-language book on tilapia farming for technical guidance, which was translated into an English version. They also said that with the help of Chinese experts, through project cooperation and government promotion, Tanzania will improve its aquaculture development, harnessing its rich resources in this area.

LESSONS LEARNED

The COVID-19 pandemic underscored the need for adaptive communication strategies to sustain collaboration under challenging conditions. To ensure uninterrupted engagement, a variety of online platforms—including webinars, emails, WeChat, and WhatsApp—were effectively utilized to facilitate timely and efficient exchanges among partners.

Equally important was the need to deepen research on the pandemic's impact on the aquaculture sector, particularly on small-scale fish farmers. Such studies are crucial for developing targeted interventions that mitigate long-term disruptions and support the sector's recovery—thereby contributing more meaningfully to global food security.

The project also introduced innovative training models, including the integration of pre-recorded instructional videos, demonstrations of new equipment, and virtual farm tours. These immersive, tech-enabled approaches not only enhanced knowledge transfer but also offered participants an opportunity to experience aspects of Chinese aquaculture practices and culture remotely. This blended learning model—combining online instruction with in-person sessions for hands-on, interactive problem-solving—proved highly effective and should be adopted in future capacity-building initiatives to maximize reach and impact.

Looking forward, the establishment of a stable, dedicated platform for technology transfer is essential. Such a mechanism would facilitate the timely dissemination of practical and upgraded aquaculture technologies to developing countries, ensuring that knowledge remains relevant and actionable. To enhance the impact and sustainability, it is also critical to broaden stakeholder engagement by involving private sector partners, including enterprises and value chain actors.

BUILDING CAPACITIES FOR HIGH PERFORMANCE DEVELOPMENT, STANDARDIZATION AND TESTING IN CONSTRUCTION MATERIALS AMONG BELT AND ROAD COUNTRIES

Partner	The International Centre for Materials Technology Promotion (ICM), China Building Materials Academy (CBMA), Uzbekistan Bureau of Standards & Algerian STG Cement Co., Ltd
Countries Involved	Algeria, China, Uzbekistan
Overview	Based on comprehensive needs assessments and preliminary consultations regarding the building materials sector in Uzbekistan, Algeria, and other Belt and Road countries, this project implements five targeted activities to enhance South-South Cooperation. The initiative focuses on conducting seminars and capacity-building programs in state-of-the-art technologies, as well as standardization to improve building material performance.
Results Achieved	• Conducted development status assessments of building materials and standards in two developing countries, and undertook targeted research on high-performance technology applications for Uzbekistan • Organized and executed a major symposium for sharing best practices and experiences, engaging 120 participants (105 men, 15 women) and disseminating specialized training materials • Conducted specialized capacity-building and on-site training in Uzbekistan on 2nd June 2021 • Enhanced the knowledge and skills of 32 participants, by deploying four experts for training courses and two experts for on-site instruction • Provided expert guidance through three International Centre for Materials Technology Promotion (ICM) / China Building Materials Academy (CBMA) specialists for high-performance technology implementation and testing methods • Resolved technical challenges in admixture production and application, including process parameter optimization and water consumption management

Results Achieved	• Established an operational admixture production facility in Uzbekistan with 2,000-ton annual capacity, employing six skilled personnel • Created a comprehensive testing laboratory staffed by nine professionals, enabling advanced materials analysis and quality control
Lessons Learned	More training workshops should be carried out for more people, like researchers, managers, officials as well as policy makers. In the long-term, more training in combination with practical applications is needed, to improve R & D abilities and technologies for the sector in Uzbekistan. This can deepen innovative development, as well as enhance mutual understanding and promote more extensive, in-depth SSC.
Project Period	September 2020 - August 2021

Symposium on standardization in building materials across developing countries held by ICM in Uzbekistan

Capacity-building on testing technology and high-performance technology in building materials held by ICM in Uzbekistan

OVERVIEW

The building materials sector has experienced significant growth in developing countries along the Belt and Road, particularly in Uzbekistan and Algeria, as these nations have actively sought foreign investment to strengthen their infrastructure. Uzbekistan has emerged as Central Asia's leading cement producer, with surplus production enabling exports to Russia, Kyrgyzstan and other regional markets.

Despite this growth, the sector faces challenges in achieving high-quality development due to disparate production methods and standards across countries, coupled with inadequate testing systems, equipment, and standardization. Many developing nations currently rely on ISO or European standards, which often fail to address local conditions effectively. Consequently, internationalizing standards and enhancing testing capabilities have become strategic priorities for the building materials sector in these developing economies.

Admixtures play a crucial role in concrete enhancement, reducing water requirements for fresh cement paste by 20-30 percent, thereby reducing the total pore volume in hardened paste. This can also triple concrete strength while substantially improving durability through reduced permeability. The impact of admixtures extends beyond immediate construction benefits, contributing significantly to technological and socioeconomic progress in both developed and developing nations. Notably, admixtures advance construction sustainability through resource conservation and environmental protection, as they enable partial cement substitution with supplementary materials, reducing CO2 emissions in cement manufacturing.

China's journey in admixture development began in the 1950s, with rapid advancement through the 1970s. By the 1990s, Chinese concrete admixture technology had achieved international standards of excellence. The country has since developed approximately 300 types of admixtures, with an annual production capacity of 700 thousand tons. Furthermore, China has established the world's largest testing capacity for building materials, recognizing testing technology as fundamental to material innovation and construction safety.

Based on a comprehensive needs assessment and preliminary consultations regarding the building materials sector in Uzbekistan, Algeria and other Belt and Road countries, this project implements five targeted activities to enhance South-South Cooperation. It focuses on conducting seminars and capacity-building programs applying state-of-the-art technologies and standardization, to improve building material performance and standardization efforts.

The project aims to enhance capacities in high-performance technologies and standardization within the building materials sector, promoting inclusive and sustainable industrialization while strengthening global development partnerships.

RESULTS ACHIEVED

R&D on high performance technologies of building materials:

Three topics were researched to develop the most suitable admixture production technology using local raw materials for Uzbekistan. Namely: 1) R&D on characterization of superplasticizers; 2) impact of types and quantities of admixture on workability, strength, shrinkage and creep of concrete; along with 3) effects of admixture on sulphate attack, salt scaling and broader durability.

This will directly contribute to the sustainable development of infrastructure in Uzbekistan by improving its strength and durability, as well as enhancing the ability of this sector to innovate, with high levels of R&D in science and technology.

Symposium on standardization development of building materials in developing countries:

The symposium focused on four main topics. These included: 1) developing building materials standards in China Building Materials Academy (CBMA), China and the world; 2) enhancing the quality and applications of building materials; 3) how standards are developing in Uzbekistan; and 4) Standard transformation cooperation opportunities. Seven distinguished guests and speakers, as well as 120 participants from China and Uzbekistan, attended this seminar.

Experts from China and Uzbekistan shared advanced knowledge and experience in these key areas, as well as discussed standard development in Uzbekistan in-depth, along with measures to promote South-South cooperation.

The symposium greatly enhanced access to science, technology and innovation, as well as also strengthening knowledge-sharing in the

standardization development of building materials in Uzbekistan. More importantly, it aroused the awareness of standardization development of the building materials sector.

Capacity building and on-site training in testing technology and high-performance technology in building materials:

This training focused on four main topics. These included: 1) development of high-performance and testing technology in China; 2) application of admixture in cement and concrete in China and the world; 3) suitable technology of admixture production in Uzbekistan; and 4) testing methods for microstructure and performance of cement and concrete. Four experts were dispatched to deliver training courses and two experts for on-site training. About 32 participants attended the workshop.

Through the training, awareness and understanding of local researchers, managers and experts regarding testing methods and high-performance development of cement and concrete was enhanced. This also will improve the ability of Uzbekistan to innovate in building materials.

Technical assistance for testing methods and high-performance technology of building materials:

International Centre for Materials Technology Promotion (ICM) / China Building Materials Academy (CBMA) dispatched three experts to provide on-site technical guidance for high performance technology of building materials and testing methods, including chemical analysis and performance evaluation in Uzbekistan.

A demonstration line for high-performance admixture production was built:

An admixture production line in Uzbekistan has been built with the guidance of ICM experts. According to local market needs, the production line with an annual capacity of more than 2,000 tons, has produced 358.6 tons of water-reducing admixture.

A new testing laboratory for building materials was built:

A building materials testing laboratory, with the ability to test and analyse the composition, performance and quality of materials, has been built in Uzbekistan. Nine people now work for this lab. It's main business areas focus on technical services such as testing, inspecting and certifying building materials and construction projects, as well as R&D on energy saving and emission reduction technology.

ICM/CBMA dispatched three experts to provide on-site technical guidance in Uzbekistan

LESSONS LEARNED

Training workshops conducted during the project have proven to be an effective means of enhancing the technological innovation capacities of engineers. Building on this success, future efforts should broaden the scope of training to include a wider range of stakeholders, such as researchers, managers, government officials, and policymakers. These workshops not only facilitate technical knowledge transfer but also strengthen institutional capacity and regional ownership of innovation.

Sustained commitment is needed to further develop transferred technologies and maximize the long-term project impact. While the project has successfully introduced locally adaptable technologies and established a demonstration production line in Uzbekistan—with corresponding personnel training—these achievements represent only an initial phase. To fully realize their potential, continuous investment is required to advance practical applications and improve local capacities for innovation, research, and development.

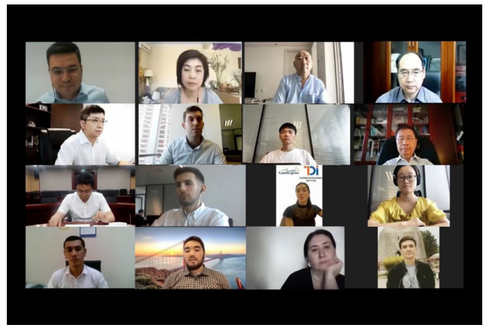
Future efforts should focus on three strategic areas to enhance Uzbekistan's technological advancement:

- Localization of technologies through the development of regional standards and testing protocols tailored to Central Asia's unique environmental and market conditions;
- Capacity-building through targeted technical training for engineers and researchers;
- Ecosystem development by strengthening linkages between government, industry, and academia, while optimizing supply chains to support industrial growth.
- Demonstration projects and verification mechanisms should be embedded in implementation to track progress and facilitate iterative learning; and
- Ongoing international collaboration—including digital knowledge exchange and South-South resource-sharing platforms—will be vital to this process. Importantly, all interventions must be closely aligned with Uzbekistan's national development priorities and policy frameworks to ensure relevance, ownership, and long-term sustainability.

Continued cooperation will not only reinforce these efforts but also deepen mutual understanding and unlock new opportunities for broader, more impactful South-South engagement.

TOURISM PROMOTES POVERTY REDUCTION, EMPLOYMENT AND WOMEN'S DEVELOPMENT IN UZBEKISTAN

Partner	Chongqing Training Center for International Cooperation (CTCIC), Uzbekistan State Committee for Tourism Development, Uzbekistan State Tax Committee, Uzbekistan Committee on Women and Gender Equality
Countries Involved	China, Uzbekistan
Overview	The project contributed to promoting China-Uzbekistan tourism exchanges and cooperation, as well as forming and evaluating tourism policies of Uzbekistan's State Committee for Tourism Development. It also enhanced best practices and experiences and professional skills among managers in Uzbekistan's tourism development, while creating jobs and promoting gender equality. The project has enhanced collaboration between Chinese and Uzbekistan counterparts, supporting this project's success, and future cooperation.
Results Achieved	• Established a cooperation mechanism covering multiple departments in China and Uzbekistan by organizing more than five seminars and consultation meetings • Produced five expert reports analyzing Uzbekistan's current status, policies, challenges and opportunities related to poverty reduction, gender equality and promoting tourism employment • Implemented a comprehensive needs assessment survey targeting Uzbekistan tourism managers (53 participants, generating two analytical reports) • Developed a customized, demand-driven training program for tourism managers • Organized the "Cultural Heritage Preservation and Tourism Promotion in Uzbekistan: from Theory to Action" symposium, featuring 20 leading industry experts. This attracted nearly 300 participants from government, industry and academia across China, Uzbekistan, and other nations • Strengthened management capacities through training for nine Uzbekistan tourism managers, which developed management skills and encouraged gender equality • Produced seven detailed evaluation reports identifying lessons learned and areas for improvement
Lessons Learned	In addition to the cultural and historical values, investing in cultural heritage generates important social and economic returns. In the context of a country like Uzbekistan, cultural heritage investments can serve as a driver of future tourism development, employment, poverty alleviation, gender equality and economic growth.
Project Period	September 2020 - August 2021



Experts meeting and online seminars

OVERVIEW

Uzbekistan, at the heart of Central Asia, holds a distinguished position as a crucial trading hub along the historic Silk Road. The nation possesses an extraordinary wealth of cultural heritage and tourism assets. Recognizing tourism's strategic importance, the government has prioritized it as a cornerstone of national development. Recent policy reforms have enhanced the country's tourism appeal through streamlined visa processes, infrastructure improvements and elevated service standards. These initiatives have yielded significant results, with inbound tourism growing from 1.9 million visitors in 2014, to 6.23 million in 2019.

Despite this progress, outdated infrastructure and inadequate service delivery continue to impede both visitor experiences and the sector's broader development. As of late 2018, the country maintained only 886 hotels, while the tourism workforce numbered fewer than 200,000, with many employees lacking professional qualifications due to insufficient training.

Uzbekistan faces significant demographic pressures, with a rapidly expanding working-age population. However, formal sector job creation has remained stagnant in recent years. This disproportionately affects young people and women, who often face unemployment due to limited educational and skill development opportunities. Consequently, many citizens seek employment abroad, particularly in Russia, Kazakhstan, and Southeast Asian nations.

Gender disparities in Uzbekistan remain pronounced, particularly in educational and professional spheres. The nation ranks 127th globally in gender equality indicators, according to the Silk Road New Observation. Women's representation in government leadership is notably low, comprising less than 2 percent of official positions.

The national economy, currently balanced between manufacturing, mining and agriculture, experiences modest growth in both economic output and employment. However, Uzbekistan's strategic location and abundant tourism resources present substantial development opportunities. As a labor-intensive sector, tourism offers the dual benefit of stimulating infrastructure development, while generating significant employment opportunities.

China's economic transformation since 1992 provides valuable insights, particularly in service sector development, which now represents over half of its economy. The past decade has witnessed remarkable tourism growth in China, with regions such as western and southern China successfully leveraging tourism for poverty alleviation. These experiences offer valuable lessons for Uzbekistan's tourism stakeholders.

Collaborating with China presents an opportunity for Uzbekistan to optimize its tourism resources for socioeconomic advancement, contributing to poverty reduction, employment creation, gender equality, economic growth and regional stability. According to the World Tourism Organization's Global Report on Women in Tourism (2nd Edition), tourism holds strong potential for advancing gender equality, with women comprising 54 percent of the global tourism workforce, experiencing smaller gender wage gaps than other industries and enjoying greater leadership opportunities.

The project aims to promote sustainable and responsible tourism development in Uzbekistan as a catalyst for socioeconomic growth, gender equality advancement, and cultural heritage preservation.

RESULTS ACHIEVED

Through comparative studies and communication, feasible solutions were proposed to reduce poverty, create jobs and boost gender equality under a new Uzbekistan tourism industry framework.

Through more than five seminars and consultation meetings, the project established a new cooperation mechanism involving multiple departments between China and Uzbekistan. This produced five expert reports analyzing Uzbekistan's current status, policies, challenges and opportunities related to reducing poverty, gender equality and creating employment in tourism.

Through a questionnaire distributed among Uzbekistan tourism industry players, it identified the main factors that still limit development of tourism in Uzbekistan. These include: difficulties in combining development with cultural conservation; low quality of tourism services; poor transportation infrastructure; and lower levels of professionalism among sector employees. Other challenges identified include a lack of diversification of the tourism offer and a need to develop new tourism segments; poor digitalization of tourism services and cultural heritage; a risk of standardization among tourism services and tourist experiences; and a need to improve hygiene and sanitation.

The project contributed to a deeper understanding of structural conditions that negatively affect the sector, along with considerations and concerns of Uzbekistan tourism managers. These factors will be the main focus of the project's future efforts of the Uzbekistan State Committee for Tourism Development.

Bilateral exchanges to reduce poverty, create jobs and improve gender equality took place through the following activities:

- Implemented a comprehensive needs assessment survey targeting Uzbekistan tourism managers (53 participants, generating two analytical reports)
- Developed a customized, demand-driven training program for tourism management professionals
- Organized the "Cultural Heritage Preservation and Tourism Promotion in Uzbekistan: from Theory to Action" symposium. It featured 20 leading experts and attracted nearly 300 participants from government, industry, and academia across China, Uzbekistan and other nations

Building capacities through training for Uzbekistan tourism managers:

The capacity-building training for Uzbekistan tourism managers focused on needs of Uzbekistan tourism managers, highlighted by the dialogue between Chinese and Uzbekistan counterparts and findings of the questionnaire. During the training, Chinese experts shared knowledge, best practices and suggestions on the basis of their professional backgrounds. This can improve Uzbekistan tourism managers' management skills and make tourism development a major driver for poverty alleviation, gender equality, and economic growth in Uzbekistan.

- Strengthened capacities of nine Uzbekistan tourism managers through training, including developing management skills and promoting gender equality
- Produced seven detailed evaluation reports identifying lessons learned and areas for enhancement

Knowledge and lessons generated from the project were documented and disseminated:

- Four detailed success stories and one high-quality audio-visual presentation were produced.
- Training materials and presentations were distributed to tourism managers to ensure sustainable knowledge transfers.

Experts meeting and online seminars

Experts meeting and online seminars

LESSONS LEARNED

This project underscores the critical role of international cooperation and knowledge exchange in advancing sustainable development goals—particularly in reducing poverty, promoting gender equality, creating decent work opportunities, and fostering inclusive economic growth. It also reaffirms the value and relevance of South-South cooperation in delivering context-specific, impactful development solutions. Tourism, as highlighted by the project, holds immense potential to generate both direct and indirect employment—including for rural and less-educated populations—while fostering social inclusion and stimulating economic activity.

A key lesson emerging from the project is the significant socio-economic return on investment in cultural heritage. Beyond preserving cultural and historical assets, such investments in a country like Uzbekistan can serve as powerful catalysts for tourism development, job creation, poverty alleviation, and gender equity. The project demonstrates that cultural heritage, when strategically developed, can be a dynamic driver of long-term economic and social transformation.

Equally important is the role of targeted capacity-building and professional training programs in shaping a skilled workforce capable of delivering high-quality cultural heritage management and tourism services. By establishing a stable and enduring cooperation framework between Chinese and Uzbek partners, the project lays the foundation for continued, mutually beneficial collaboration. This ongoing partnership has the potential to yield sustained results and contribute meaningfully to the broader goals of SSC and sustainable development.

PROMOTING SMALL HYDRO POWER IN NEPAL AND SOUTH ASIA

Partner	International Center on Small Hydro Power (ICSHP), Nepal Academy of Science and Technology (NAST)
Countries Involved	China, Nepal
Overview	This project focused on conducting joint research and pilot demonstrations to showcase relevant technologies and standard systems for clean energy from small hydropower. It aimed to eliminate barriers to small hydropower technology transfer and raise awareness to improve management and technical capacity within the framework countries of the proposal. The project initially centered on Nepal, developing appropriate green small hydropower mechanisms that enabled recipient countries to better understand the relevance of innovative technologies for regional development. These efforts supported the promotion of inclusive and sustainable growth, in alignment with the United Nations 2030 Sustainable Development Goals (SDGs).
Results Achieved	• Successful practices and experiences of small hydropower development in China were introduced. • Stable relations were established and strengthened between China and local Nepalese counterparts for long-term cooperation. • Capacity supported of local stakeholders to develop small hydropower through professional and specific training, as well as on-site technical exchanges and consultations. • Technology transfers on small hydropower have been realized by demonstrating innovative Chinese technologies and establishing a joint research platform for small hydropower technologies between China and Nepal. • An online platform for small hydropower was established as a hub for technology transfer and project cooperation, aiming to enhance small hydropower development in Nepal and neighboring countries. Through the demonstration project in Nepal, successful experiences and outcomes were disseminated and replicated in other developing countries, further promoting green SHP, facilitating technology transfer, and strengthening South-South cooperation.
Lessons Learned	During the project's implementation, insufficient policy guidance on both supply and demand sides was the main factor hindering progress in the next stage. There was also insufficient motivation, lack of understanding and absence of effective measures. In future project designs, local managers will need capacity training to raise their awareness of South-South cooperation and sustainable development.
Project Period	July 2019 - December 2020

OVERVIEW

Small hydropower (SHP) represents a significant yet largely untapped renewable energy source worldwide. In developing countries, it serves as a vital solution for electrifying remote, rural communities. SHP has demonstrated considerable success in rural electrification, enhancing living standards and production capabilities, driving rural economic development, alleviating poverty, and reducing emissions. Its economic efficiency has made it particularly attractive to the international community, especially developing nations.

Nepal, a mountainous landlocked country, possesses over 6,000 rivers and numerous rivulets, totaling more than 45,000 kilometers in length. Despite its substantial hydropower potential (84 GW theoretical and 43 GW economic potential), Nepal continues to import electricity from other countries to meet growing demand. While 74 percent of the population has grid access, annual per capita power consumption remains notably low, at approximately 132 kWh.

Small / Micro hydropower has emerged as the primary source for rural electrification. Although SHP technology is robust – with a potential lifespan of 50 years and low maintenance requirements – plants in Nepal often face premature operational challenges.

The local SHP industry requires enhancement in three key areas: i) capacity building in technology and management; ii) technology transfers focused on safe production and optimizing equipment, particularly abrasion-cavitation protection for hydraulic machinery; and iii) establishing a comprehensive technical standard system.

China's success with rural SHP electrification demonstrates that decentralized development can effectively address rural energy needs and poverty mitigation, presenting one of the most suitable solutions for fostering inclusive and sustainable industrialization. China has also established a comprehensive technical system for small hydropower projects, which can be applied here.

The project aimed to jointly research and pilot relevant technology and standard systems for SHP clean energy, eliminate barriers to SHP technology transfers and raise awareness to improve SHP management and technology within the countries of this proposal.

The project initially focused on Nepal to develop appropriate green SHP mechanisms, enabling recipients to understand the innovative technology's relevance in regional development and promoting inclusive, sustainable growth, aligned with the SDGs.

The China-Nepal Joint Research Center for Small Hydropower Technology, inaugurated in 2019

RESULTS ACHIEVED

Currently, data on small hydropower in Nepal and neighboring South Asian countries – including hydro resources, development potential, policy framework, capacity-building, as well as technical barriers – is collected by implementing this GSSDC small-scale project through site visits, surveys and joint research. The project reports have been developed to serve as future guidelines for promoting and replicating similar initiatives in other target countries.

Successful practices and experiences of small hydropower development in China were introduced and shared with Nepal counterparts. In particular, advanced Chinese concepts on policy incentives, laws and regulations, management models, project engineering, financing, as well as technical innovations, which are of great value for promoting the small hydropower industry in target countries.

Strengthened stable relations and promoted long-term cooperation between China and local Nepalese counterparts, through this GSSDC small-scale project. It has opened pathways for continued dialogue, personnel exchanges, and further advanced collaboration in small hydropower development.

Local stakeholder capacities to develop small hydropower have improved through this project, by organizing professional and specific trainings, as well as on-site technical exchanges and consultations. Related results from joint research and key reports were also achieved, to further promote small hydropower in target countries.

Successfully facilitated technology transfer in small hydropower by showcasing innovative Chinese technologies and establishing a joint research platform between China and Nepal. These local platforms focus on practical innovations to promote small hydropower in target countries. Welcomed by local stakeholders, this approach holds strong potential for replication across the region. In turn, such efforts will strengthen South-South cooperation and extend the impact of the GSSDC project to benefit even more communities in the future.

Technical training workshop on small hydropower development

LESSONS LEARNED

A key lesson from this GSSDC small-grant project lies in the value of continuous, adaptive communication to bridge gaps in expectations between partners. Differences in perspectives between the demand and supply sides were resolved through sustained dialogue—beginning with collaborative project design and extending into stakeholder engagement throughout implementation.

Despite challenges posed by the COVID-19 pandemic, the project leveraged online tools and hybrid approaches, including surveys, virtual trainings, and the strategic use of local experts for fieldwork and facilitation. The project's core objective was to promote Small Hydropower (SHP), yet its progress was constrained by limited policy support and weak institutional understanding on both ends. This underlines the critical need for future South-South initiatives to invest in capacity-building—particularly for local policymakers and managers—ensuring greater awareness, ownership, and alignment with sustainable development goals.

COMPREHENSIVE TECHNOLOGICAL SOLUTIONS FOR CITY WASTE MANAGEMENT IN SENEGAL

Partner	China-Africa Business Council, Zoomlion Environmental Industry Co. Ltd, Senegal Solid Waste Management Bureau, Senegal Embassy to China
Countries Involved	China, Senegal
Overview	The main objective of the project was to improve waste management in Senegal, by initiating a professional waste management solution plan. In particular, by promoting solid waste management conditions and encouraging waste management companies to invest there. This benefits the host government by providing a policy reference, as well as the local community, by helping to create jobs and clean the environment.
Results Achieved	• Collected data through public resources and stakeholder engagement regarding waste management practices, policies and exemplary cases • Executed field research through site visits and online webinars with Senegalese waste management officials and Chinese waste management companies • Organized expert discussions on research findings, including conference calls among Chinese, Senegalese and international consultants for final report review • Facilitated online and offsite discussions on financing African waste management solutions • Analyzed findings to develop a proposed solution plan • Presented waste management solution proposals to the Embassy of Senegal • Organized seminars on China-Africa waste management development
Lessons Learned	Laws and system structures on waste management are unclear in Senegal. New policies and acts need to be passed to enforce strict regulations on waste management, especially on solid waste management.
Project Period	December 2019 - November 2020

Consultations with the Senegal Embassy to China to promote implementation.

OVERVIEW

Senegal, a West African nation bordering Guinea-Bissau, Mali and Mauritania, encompasses its smaller Anglophone neighbor, Gambia. The country's relatively dry terrain extends along the Atlantic Ocean at the westernmost point of the Sahel. Nearly half of its 15.4 million population (2016) is concentrated in Dakar and other urban areas.

Since gaining independence in 1960, Senegal has emerged as one of Africa's most stable countries, achieving three major peaceful political transitions. The nation has maintained strong economic growth, exceeding 6 percent since 2014, with particularly robust performance of over 7 percent in 2017. Economic forecasts remain optimistic, especially with anticipated oil and gas production commencing in 2022.

Dakar, the capital and largest city, has a population of 1,030,594, with its metropolitan area reaching approximately 2.45 million residents. Like most African cities, Dakar's household and business water provision, solid waste management and environmental services are delivered through a combination of municipal technical services, businesses and Non-Governmental Organizations (NGOs).

The primary environmental challenges in Senegal center on management, infrastructure and regulation. Current waste management, predominantly handled by private companies or civil society organizations, are hampered by underpaid workers and operational inefficiencies. The system suffers from disorganized garbage collection, outdated transportation, potentially polluting treatment methods, creating an urgent need for more efficient and effective solutions.

The Senegalese government has demonstrated foresight in recognizing sustainable development's importance across all aspects of civic life. The concept of sustainability continues to evolve, encompassing environmental, economic and social equity considerations. Environmental quality, whether in natural or built settings, represents a unique form of capital, as it fundamentally connects to all goods, services and human health conditions, necessitating proper conservation and management.

This project supports Senegal in addressing urban and industrial development challenges, aligning with the Sustainable Development Goals, including to "make cities and human settlements inclusive, safe, resilient and sustainable" (SDG 11). Additionally, it promotes community education regarding responsible consumption and production (SDG 12), contributing to a circular green economy.

RESULTS ACHIEVED

Conducted comprehensive mapping of local waste management conditions:

- The project collected data through public resources and stakeholder engagement regarding waste management practices, policies and exemplary cases.
- It executed field research through site visits and online webinars with Senegalese waste management officials and Chinese waste management companies.

Policy advice formulated to local administrators

- Raw materials and primary research were analyzed to establish Senegal's current waste management status.
- Discussions on research findings were organized, including conference calls among Chinese, Senegalese and international experts for final report review.

Developed a preliminary waste management solution plan:

- Advanced waste management practices were researched, including relevant policies and successful case studies through public resources.
- Visits to the sanitation equipment and service facilities were held.
- Discussions regarding financing for African waste management solutions were facilitated
- All findings were analyzed to develop a structured solution proposal.
- The proposal for waste management solutions was presented to the Embassy of Senegal.
- Seminars on China-Africa waste management development were organized, to grow this key area for the continent further.

Online brainstorming meeting among multi stakeholders to prepare policy advice.

LESSONS LEARNED

At the time of the project implementation, Senegal's waste management system reveals critical disparities in collection rates between urban and secondary cities—84 percent in Dakar versus just 22 percent elsewhere—due to irregular departmental divisions and fragile service infrastructures.

A key lesson is the importance of institutional coordination and decentralized planning. To address service inconsistency, local governments must reconfigure municipal boundaries based on standardized criteria and expand the reach of waste collection circuits. In tandem, institutions should invest in structured training for waste workers and establish formal collection points to ensure service quality and consistency across regions.

Project implementation has also faced logistical setbacks due to aging and unsuitable waste transport vehicles, many of which are retrofitted imports in poor condition. This highlights a need for context-appropriate technological solutions—a core principle of successful South-South initiatives. Investing in the development of new fleets designed for local terrain and operational realities is crucial for reliable waste collection. Furthermore, improved financial planning and timely payment systems are essential to sustain these assets and maintain service delivery.

From a policy and local governance perspective, the absence of a clear legal framework on solid waste management impedes progress. Effective regulatory reforms—such as stricter enforcement mechanisms and incentives for private sector engagement—are necessary to strengthen accountability and drive innovation. The introduction of a Pay-As-You-Throw (PAYT) system offers a promising shift towards results-based management. By aligning citizen behavior with service efficiency, PAYT not only improves revenue collection but also promotes a culture of environmental responsibility—an approach that could be replicated across the Global South.

CHINA SOUTH-SOUTH DEVELOPMENT CENTER

SMALL GRANT PROJECTS 2008-2019

TRAINING STAKEHOLDERS IN FOREST-FUNGI SYSTEM AGROFORESTRY IN NEPAL, INDIA AND CHINA

Partner	Center for Mountain Ecosystem Studies (CMES), Kunming Institute of Botany, Chinese Academy of Science; Balipara Traet and Frontier Foundation; Department of Natural Resources, Ministry of Forests & Environment, Government of Nepal
Countries Involved	China, India, Myanmar, Nepal
Overview	Through a series of technical training sessions, demonstrations, and promotions, the project aimed to contribute to restoring the ecological environment in project areas of Assam, India and the Patan Basin, Nepal. This enhanced the agroforestry and fungal cultivation skills of farmers, improve living standards, and promote sustainable development among local agricultural communities.
Results Achieved	• **Knowledge on Forest-Fungi agroforestry:** Understanding the potential of Forest-Fungi System agroforestry. • **Capacity building:** Local agro-technicians trained during the project will master the technology on a different type of edible and medicinal mushroom cultivation. They will set requirements for cultivating commercially viable mushrooms and train small-holder farmers, especially women, in their communities. • **Training video:** A full mushroom cultivation training video was recorded during the training workshop, uploaded onto the ICRAF website and made available for public access. The video will enhance the ability of visitors to apply what they learned during the visit, by serving as a reference when mushroom cultivation is undertaken. • **Training manual:** A handbook on economic mushroom cultivation will be finalized and published. • **Needs Assessment of forest-fungi system technology Systems Report:** A comprehensive report was produced in collaboration with a Chinese private-sector company, analyzing the current state of Yunnan's mushroom agroforestry systems, along with opportunities for improvement and development.
Lessons Learned	The Community-Supported Agriculture (CSA) model offers a promising approach to alleviating poverty through forest-mushroom technology projects. This model aligns well with small-scale farming initiatives typically found in mountainous regions.
Project Period	June 2018 – November 2018

Staff from the Kunming Institute of Botany pose for a group photograph with visitors from India, Nepal & Myanmar.

Expert fielded questions from the visitors after a presentation on Ganoderma cultivation.

OVERVIEW

Globally, there has been a significant rise in mushroom consumption, driven by their nutritional benefits and immune-boosting properties. Over the past three decades, research has highlighted mushrooms' importance as a food group, making their cultivation increasingly popular. Mushroom farming has emerged as a sustainable means of rural development, offering alternative income streams and improving household nutrition for impoverished communities.

Agroforestry, a traditional farming practice in India, Nepal and China, involves the use of trees in agricultural systems. However, the rise of commercial monocultures has diverted attention and resources away from this indigenous method. Modern scientific research has demonstrated that combining multipurpose trees with economically significant crops revitalizes traditional agroforestry systems. Yet, time and cash investments required for tree crop production pose challenges, typically taking three to four years before yielding results. This waiting period is particularly difficult for smallholder farmers, who lack sufficient resources.

Integrating mushroom cultivation with agroforestry offers a solution. Seasonal and annual mushroom harvests from the first year of planting can provide immediate income, making agroforestry systems more viable. This approach not only addresses economic challenges faced by farmers, but also enhances ecological benefits of agroforestry systems.

This project focused on training extension officers and community forest members in high-value mushroom cultivation technologies. These trained individuals then educated women in their respective communities, enabling knowledge transfers to affiliated villages. Farmers in India, Nepal, and Myanmar benefited from the Kunming Institute of Botany's expertise in mushroom cultivation, collection, seed production, drying and storage. High-value mushrooms like morels (Morchella) will provide additional income opportunities for these farming communities.

The Centre for Mountain Ecosystem Studies (CMES) at the Kunming Institute of Botany has developed a unique agroforestry system where medicinal plants and mushrooms are cultivated alongside multipurpose trees. This climate-smart technique is designed to enhance rural livelihoods and contribute to ecological restoration.

Under its Rural Revitalization Strategy, the Chinese government is making significant investments in rural community development, including agroforestry systems in Honghe County. These initiatives aim to improve livelihoods and restore ecosystems. Similar practices can be introduced to other countries like India, Nepal and Myanmar, leveraging China's expertise and mushroom consumption trends.

China's high and increasing mushroom consumption, coupled with global demand, presents excellent economic opportunities for farmers in developing nations. Sustainable mushroom cultivation can help lift communities out of poverty, while preserving the environment.

The project aimed to:

- Provide technical training, demonstrations and promotional activities to farmers;
- Restore ecological environments in Assam, India, along with the Patan Basin, Nepal;
- Enhance agroforestry and fungal cultivation skills among farmers, and;
- Improve living standards as well as promote sustainable development in local agricultural communities.

By integrating modern mushroom cultivation practices with agroforestry, the project addressed economic, ecological and social challenges, ensuring long-term sustainability and prosperity for participating communities.

RESULTS ACHIEVED

Field study visits to India:

The team from the Centre for Mountain Ecosystem Studies (CMES) and Kunming Institute of Botany visited Northeast India. Facilitated by the Balipara Foundation, experts visited several sites in Assam, Nagaland, and Meghalaya, to assess the current status, challenges and practices of mushroom cultivation in the region. This knowledge will help guide future endeavors to further improve and develop the mushroom industry in the region, by providing technical support, quality materials and market development assistance.

Assessment of mushroom production and field study visits to Nepal:

A number of programs in South Asia are currently implementing training and demonstration practices for mushroom cultivation in villages, including developing the tree-fungi agroforestry system.

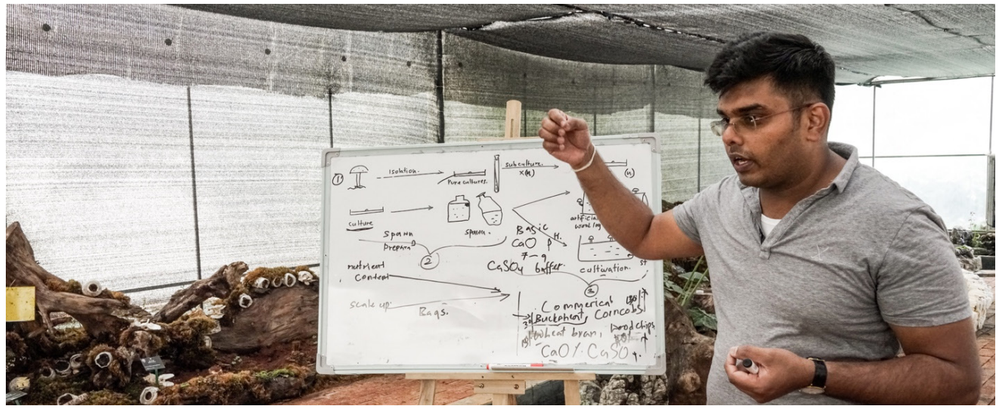
Led by the Kunming Institute of Botany, together with Nepalese collaborators, researchers visited different parts of Nepal to observe and understand existing cultivation/production of Ganoderma and Morchella. In addition to that, various organizations and individuals involved in mushroom cultivation were contacted to obtain information on cultivating and promoting mushrooms in a community forest. The aim was to assess the current status, challenges and practices of mushroom cultivation in the country. This will help to guide any future activities to further improve and develop the mushroom industry in the region, by providing technical support, quality materials and market development assistance.

Training program on selected mushrooms' cultivation:

With support from China SSDC Project, representatives from India, Nepal and Myanmar were invited to the Kunming Institute of Botany to spend five days training intensively in the cultivation and production of mushrooms deemed viable for growing in their country of origin.

To aid the tangible mushroom cultivation initiatives in host countries of the visitors, it was also essential to conduct hands-on training in our laboratory and greenhouses. During the week of the 22nd–26th of October 2018, representatives from Nepal, India and Myanmar visited KIB and witnessed first-hand methods and procedures proven to work at the Kunming Institute of Botany and its partner mushroom cultivation institutions. The training covered both solid state cultivation (e.g. bag cultivation method) and liquid state cultivation, with a particular emphasis on cultivating Ganoderma lucidum and Morchella.

Training in these two high-demand species was meant to serve as a foundation for growing countless other mushroom varieties, whose cultivation methods are compatible with those featured during the training sessions. As such, the visitors are now trained in a variety of mushroom cultivation techniques. In addition, a video was recorded of the entire training and will be made available for public consumption, enhancing rural development capacities through mushroom cultivation globally.



Expert talked the visitors through the complete life cycle of Ganoderma cultivation, from genetic isolation to harvest.

Nepalese visitor posed a question at the Morchella facility.

LESSONS LEARNED

The Community-Supported Agriculture (CSA) model offers a promising approach to poverty alleviation through forest-mushroom technology projects. This model aligns well with small-scale farming initiatives typically found in mountainous regions. By adopting CSA for forest-mushroom projects, several benefits emerge:

- Sustainability and Market Assurance: CSA involves establishing direct partnerships between farmers and local consumers, ensuring a consistent market for mushroom producers. This reduces risks associated with fluctuating market prices and provides a stable income for smallholder farmers.
- Enhanced Farmer Motivation: Guaranteed sales through the CSA model boost the enthusiasm and productivity of mushroom farmers, encouraging them to adopt and expand innovative cultivation practices.
- Community-Centric Development: CSA fosters strong local networks, where community members actively support sustainable agricultural practices, reinforcing the social and economic well-being of participating farmers.

By integrating CSA into forest-mushroom projects, not only can the production and incomes of smallholder farmers improve, but broader goals of ecological sustainability and poverty alleviation can also be advanced significantly.

DEVELOPING UNTAPPED SMALL HYDROPOWER POTENTIAL IN SELECTED AFRICAN COUNTRIES

Partner	The International Network on Small Hydro Power (INSHP), Common Market for Eastern and Southern Africa (COMESA), Federal Ministry of Science and Technology of Nigeria (FMST), Energy Commission of Ghana (GEC)
Countries Involved	China, Ethiopia, Ghana, Nigeria, Zambia
Overview	The project aimed to overcome barriers to small hydropower (SHP) technology transfers and enhance awareness in participating countries. It sought to improve SHP management and technology in Zambia, Ghana and Nigeria, representing the COMESA region in Eastern Africa and Western Africa, respectively. The initiative helped these countries understand the importance of SHP technology for regional development and support inclusive, sustainable growth. By developing appropriate mechanisms, the project enabled these countries to leverage small hydropower as a tool for advancing energy access and economic development.
Results Achieved	The project conducted a workshop on China-Ghana RET Transfers and a demonstration site promotion project. It also enabled a Technical Visit to INSHP for the Nigeria Delegation; a consultation mission on SHP development to Ghana and Zambia, along with; a seminar on International SHP Cooperation and Technical Exchange for Belt & Road Countries.
Lessons Learned	Providing key data (such as geology, hydrology and flood records) can improve the accuracy of field survey reports and facilitate SHP site selection.
Project Period	November 2017 – November 2018

GEC delegates visited an operating small hydropower plant in the south of Zhejiang province.

OVERVIEW

Small hydropower (SHP) is a renewable energy source with significant untapped potential worldwide. In many developing countries, SHP plays a crucial role in providing electricity to remote rural communities, offering a sustainable solution for energy access. According to the World Small Hydro Power Report (2016), Eastern and Western Africa have substantial, underdeveloped small hydropower potential, which, if harnessed, could greatly improve access to electricity across the continent.

Eastern Africa holds the highest potential for small hydropower in Africa, representing 37 percent of the continent's potential (6,759 MW capacity). Despite the development of large hydropower projects to meet the region's energy demands, rural areas continue to face electricity shortages, due to limited access to the national grid. In Zambia, which is rich in renewable resources, the country heavily relies on hydroelectric generation. However, new small hydropower projects are needed to support rural electrification and make use of the region's vast hydropower potential.

Western Africa, with the second-largest renewable energy potential in Africa, still faces major challenges in providing electricity to its rural populations. Despite regulations from ECOWAS supporting renewable energy development, the region's small hydropower potential of 3,113 MW remains largely untapped, with only 3 percent developed to date. Nigeria, while leading the region in installed small hydropower capacity, only utilizes 6 percent of its potential. In Ghana, hydropower remains the most important renewable energy source, yet small hydropower remains underdeveloped. The country has identified 85 potential small hydropower sites, with a total capacity of 110 MW, but these projects have yet to be implemented.

Small hydropower has become a more attractive solution for many African countries, especially in rural areas where electricity access is limited. It offers a sustainable and scalable energy option that could help alleviate energy poverty and reduce dependence on fossil fuels. However, to unlock this, significant investment, regulatory support and technological advancements are required.

FMST delegation visited Hanergy Holding Group Ltd. for renewable energy information exchange & cooperation.

The project aimed to overcome barriers to small hydropower (SHP) technology transfers and enhance awareness in participating countries. It sought to improve SHP management and technology in Zambia, Ghana, and Nigeria, which represent the COMESA region in Eastern Africa and Western Africa.

The initiative helped these countries understand the importance of SHP technology for regional development and support inclusive, sustainable growth. By developing appropriate mechanisms, the project equipped these countries to leverage SHP as a tool for advancing energy access and economic development.

RESULTS ACHIEVED

Increased knowledge-sharing and partnership development

The Workshop on China-Ghana Renewable Energy Technology Transfer and Demonstration Site Promotion Project took place in the cities of Hangzhou and Yueqing in Zhejiang Province during 9-11 December 2017. The INSHP organized meetings and site tours for the Ghanaian EC delegation to meet with technical experts, institutions and manufacturing companies to evaluate cooperation opportunities to develop the sector in Ghana.

Invited by the Ministry of Science and Technology of Nigeria, in November 2016, INSHP dispatched SHP experts' team to Nigeria to carry out 6 small hydropower projects inspection. A technical visit was organized by INSHP for the delegation headed by the Director of the Department of Renewable and Conventional Energy at the Ministry of Science and Technology of Nigeria (MOST). The delegation participated in the training and visited SHP equipment manufactures. The study tour promoted the Chinese SHP technology and expertise transfers to Nigeria.

During 28-29 January, the **Seminar on International SHP Cooperation and Technical Exchange for Belt & Road Countries** was held in Hangzhou. SHP knowledge was shared among 25 representatives from Europe, Africa, Asia and about 40 Chinese representatives from INSHP bases, INSHP firms, SHP authorities, universities and SHP equipment manufacturers participating. An MOU between INSHP and the Albania Energy Association was signed on the spot, to advance SHP in Albania.

The **8th Hydropower for Today Forum** "Hydropower Promotes Industrial Development in Africa" was organized in Lusaka, Zambia, in a cooperation of ICSHP, COMESA, UNIDO, the Chinese Ministry of Water Resources, as well as the Ministry of Energy and Ministry of Water Development, Sanitation and Environmental Protection of Zambia. SHP cooperation potential in Africa grew, with about 150 representatives from 12 African countries and 3 International Organizations attending. On the sidelines of the forum, a capacity-building workshop on renewable energy technology transfer for technicians and managerial staff was held, organized by ICSHP, UNIDO, and COMESA.

Selection of Demonstration SHP project

- Site Instruction and Field Survey to the Pilot Project and Other Potential Hydropower Sites in Ghana:

After cooperation framework formed under the MOU, and following Ghana's request, the delegation conducted a field survey of eight potential sites from November 27 to December 8, 2017, including: one site on the Nuboi River of the Volta Region, two sites

on the Tano River of the Western Region, two sites in the Brong-Ahafo Region, one site in the Eastern Region, and two irrigation stations subordinate to Ghana Irrigation Development Authority (GIDA).

The delegation gave technical instructions on planning adjustments and project site construction, based on their original design plans and actual site conditions, as well as advice on preliminary planning specific to natural conditions of the eight sites to build SHP stations. Due to a lack of basic information, such as the local landform, geology, hydrology and weather, all comments and suggestions proposed in this report are just for reference. Physical development of the above sites, thorough scientific and technical works, shall be conducted in accordance with standards on the planning and design of a hydropower station.

- Consultation to selected SHP sites for pilot SHP projects in Zambia:

INSHP dispatched a delegation composed of four experts in SHP to provide on-site technical instruction and personnel training for the Kapamba Falls Hydro Power project in Zambia. Chinese experts met with more than 50 participants from local authorities, companies and communities, while introducing Chinese experiences on SHP development and SHP technology in detail.

A training workshop was organized in Lusaka, Zambia, by ICSHP and ZESCO from May 2nd-4th, 2018. 25 engineers from ZESCO participated in the training. The training workshop can be considered as a platform to share China's insights and experiences in its successful SHP development, adjusting appropriate methods to the African background. It provided participants with necessary knowledge and tools to reach hydropower development needs.

- COMESA SG's visit to INSHP and related partners for future cooperation:

Following the signing of the MOU, several training activities were implemented. COMESA-INSHP Co-offices were also opened at the INSHP, in Hangzhou, China in November 2017 and at COMESA, Lusaka, Zambia in May 2017, respectively.

COMESA SG's engagement included INSHP Headquarters, Holley Group in Hangzhou, Zhejiang University – including the China Academy of Western Regional Development – and the Institute for Overseas Safety and Security (OSS). It also included the People's Government of Huzhou City, Zhejiang Province, Tianneng Group, Fejian Group, Voith Shanghai company for hydropower equipment, along with Shanghai United Assets and Equity Exchanges.

- Site Instruction and field survey to the Walga River Site in Ethiopia:

Upon the cooperation framework formed under the MOU, and the request of the Ethiopia side, the delegation has conducted a field survey at the Walga River site from October 10 to 16, 2018, including field survey, training and discussion.



Mission on SHP Development to Ghana, Zambia and Ethiopia

The delegation gave technical instructions on the total work plan of Walga River project based on actual conditions of the site, along with key advice on preparation of preliminary planning specific to build pilot small hydropower stations at this site. Due to the site's location, the signal of the metrology equipment was weak, so the delegation established additional focal points during the field survey to ensure accuracy of the topographic map. Due to a lack of geology, hydrology and flood records, the delegation requested that the Ethiopian side provide more detailed data for the site, or relevant nearby areas.

LESSONS LEARNED

Key data shortages in geology, hydrology and flood records led the delegation to request survey side data from the site or relevant nearby areas, as well as to set more focal points during field surveys to ensure accuracy. Thorough scientific and technical work shall be conducted in accordance with hydropower station planning and design.


Seminar on International SHP Cooperation and Technical Exchange for Belt & Road Countries

VALUE-ADDED BAMBOO PROCESSING DEVELOPMENT IN VANUATU

Partner	China National Bamboo Research Center (CBRC), Department of Industry under the Ministry of Trade, Tourism, Commerce and Industry, Vanuatu, UNIDO
Countries Involved	China, Vanuatu
Overview	The project aimed to enhance awareness of sustainable bamboo management, processing, products and marketing. This included creating a bamboo development strategy; conducting on-site bamboo training workshops on bamboo furniture and curtain processing; setting up a high value-added bamboo product showroom and promoting bamboo business and marketing. It also sought to transfer experience obtained from Vanuatu to Fiji and Tonga, which are similar to Vanuatu in terms of forest cover, particularly bamboo.
Results Achieved	• Hands-on Bamboo Furniture Production Training in Vanuatu • Hands-on Bamboo Development Training in China • A high value-added bamboo product showroom in Vanuatu was set up, boosting awareness of sustainable bamboo processing techniques and uses. • A Vanuatu Bamboo Development Strategy was developed.
Project Period	November 2017 – November 2018

Left: Training workshop on bamboo harvesting; Right: Training on bamboo furniture making

Closing ceremony of bamboo training in Vanuatu

OVERVIEW

Vanuatu, classified as one of the Least Developed Countries (LDCs), is a small island nation where rural populations exceed 80 percent, and unemployment stands at 12 percent. The economy is heavily reliant on the service sector, while primary and secondary industries, such as agriculture, fisheries, forestry, and manufacturing, contribute minimally. Over 90 percent of commodities are imported, reflecting a weak domestic industrial base.

The country faces multiple challenges, including food security, unsustainable natural resource management, ecosystem degradation, and the increasing impact of extreme weather events such as cyclones, floods and rising sea levels. While Vanuatu has rich forest resources, they are primarily used for subsistence, fuelwood and charcoal, due to limited industrial processing capacities. Bamboo, while abundant in Vanuatu, is largely underutilized and restricted to low-value applications such as rural housing, where it constitutes over 90 percent of housing materials on islands like Malekula.

Bamboo is a fast-growing, short-cycle and high-biomass resource, with diverse applications, along with significant ecological and economic benefits. Recognized as a vital Non-Wood Forest Product (NWFP) and dubbed the "Second Forest," bamboo can address several key challenges in Vanuatu:

- Ecological Benefits: by mitigating over-logging and promoting sustainable forest management.
- Resource Substitution: through reducing dependence on wood imports, by meeting domestic demand for wood products.
- Agroforestry Potential: by introducing bamboo as part of inter-planting systems, to maximize land use and control pests.

- Renewable Energy: in serving as a sustainable alternative to wood charcoal, easing deforestation pressures.

China is the world leader in cultivating, processing and using bamboo. In 2017, its bamboo sector generated production value exceeding $35.2 billion, highlighting its critical role in social, economic, and environmental development. The China Bamboo Research Center (CBRC), entrusted by the Chinese government, has been at the forefront of bamboo research, international cooperation, and industrialization. Since 1992, CBRC has successfully conducted over 130 international technical cooperation among developing countries (TCDC) training workshops, training more than 3,800 participants from 112 countries.

Building on past efforts, the "Bamboo Value-added Agro-Industry Center Establishment and Demonstration in Vanuatu" project (2016–2018), funded by UNIDO, laid the groundwork for the bamboo sector's development. This project involved collaboration with the Department of Industry (DoI) under the Ministry of Trade, Tourism, Commerce and Industry (MTTCI), along with the Department of Forests (DoF) under the Ministry of Agriculture, Livestock, Forestry, Fisheries and Biosecurity (MALFFB).

This initiative aimed to build on existing facilities and equipment provided by the UNIDO project to further develop the bamboo sector in Vanuatu by:

- Raising awareness about sustainable bamboo management, processing, uses and marketing;
- Formulating a national bamboo development strategy;
- Conducting on-site training workshops for bamboo furniture production and bamboo curtain processing, and;
- Establishing a showroom for high-value bamboo products, to promote marketing and business opportunities.

By leveraging Vanuatu's bamboo resources and China's expertise, this project fostered sustainable development, enhance local capacities, and create economic opportunities, while contributing to environmental conservation and climate resilience.

RESULTS ACHIEVED

Hands-on training in Vanuatu and China:

In cooperation with UNIDO, and partnership with DoI, two Chinese experts visited Santos, the second-largest island, famous for its rich bamboo resources, to give hands-on training in how to process local bamboo. 20 local artisans and small business owners learned how to produce furniture like bamboo sofas – compatible with local island style – through the 21-day training.

Four people from Vanuatu's handicraft sector participated in a 2-month-long training at CBRC. The course comprised in-class lectures, special presentations and field study visits. It covered a variety of Chinese forestry and bamboo-themed topics, including up-to-date forestry development and its trends in China, Chinese forestry development theories, bamboo cultivation and sustainable management theories, along with practices such as seedling cultivation, nursery construction, bamboo propagation, bamboo classification, ecological characteristics, oriented bamboo forest development, sustainable management and Bamboo preservation. It also introduced processing technologies, such as harvesting techniques, antiseptic treatment, bleaching and dying, along with bamboo weaving. These support bamboo furniture, crafts, charcoal, fiber, buildings, bamboo shoot processing and bamboo boards. It also demonstrated how bamboo enables biomass energy, carbon sequestration of bamboo forests, bamboo's contribution to combating global climate change, as well as bamboo industry policies and marketing.

In addition, field study visits to bamboo plantations and processing factories in Zhejiang, Jiangsu and Guangdong provinces will be arranged, to learn about bamboo's impact on promoting economic development, elevating rural livelihoods, providing employment opportunities, ensuring social balance and coordinating ecological systems. The study tour will enhance their capabilities for developing and utilizing bamboo resources in Vanuatu.

A special interview arranged by China International Center for Economic and Technical Exchange (CICETE) was held with four Vanuatu trainees on from July 5-7, 2018, during their training at CBRC. This contributed to project publicity for the South-South Cooperation Summit of the United Nations Office for South-South Cooperation in Argentina in 2019.

Set up of a high value-added bamboo product showroom in Vanuatu:

The newly established showroom should enhance people's awareness of how bamboo can be used and processed. Bamboo products were made and shipped to Vanuatu for the showroom's set-up.

Formulating bamboo development strategy in Vanuatu:

Through five visits to Vanuatu, including a Bamboo resources survey of 3 main islands where bamboo is mainly distributed, seven Vanuatu nationals have been invited to China to attend a training program conducted by CBRC, sponsored by the Chinese government. With support from China's Ministry of Commence, discussions including all stakeholders from government, handicrafts sectors, tourism, to farmers have been held in Vanuatu and China. These also took place in correspondence with Vanuatu nationals who we met during our visit to Vanuatu and who have been at CBRC. Through all these inputs, the Strategic Planning for Vanuatu Bamboo Sector Development (2018-2028) strategy was successfully formed.

Training Manuals produced:

To further enhance capabilities and know-how to develop the bamboo sector, four training manuals have been compiled as below:

- Bamboo Furniture Skill Training in Vanuatu
- Bamboo Furniture Training Manual
- Bamboo Construction Manual in Vanuatu
- Propagation Technology for Sympodial Bamboo

Practical session on bamboo processing

PROMOTING INDUSTRIAL CONSTRUCTION TECHNOLOGIES IN ETHIOPIA

Partner	China-Africa Business Council, HuaJian Group, Ministry of Housing and Urban-Rural Development, Ministry of Industry, Ethiopia
Countries Involved	China, Ethiopia
Overview	Capacity Building and Training: • Four Ethiopian technicians received 45 days' training in China, focusing on theoretical and practical knowledge of prefabricated wooden construction. • Subsequently, these technicians trained 100 local construction workers in Ethiopia, creating a foundation for skilled labor in the local construction sector. • The project promoted interactions between Ethiopian trainees and Chinese experts, enhancing knowledge transfers and skills development. The implementation of wooden structures demonstrated the suitability of prefabricated housing technology for Ethiopia's climatic and economic conditions.
Results Achieved	Conducting research and fostering cultural exchanges have been pivotal to the project's implementation. Initial research offered an in-depth understanding of Ethiopia's economic conditions, housing needs, architectural characteristics, availability of construction materials and expertise of local technicians. These insights directed development of rapid-assembly, low-cost housing, tailored to the Ethiopian market.
Project Period	December 2017 – November 2018

Two-day seminar on promotion and application of wooden architecture in Ethiopia, held in Addis Ababa

OVERVIEW

Ethiopia is experiencing rapid population growth and industrialization, with housing demand increasing by at least 15 to 20 percent annually. As of November 25, 2018, the country had a population of 108,529,361, with 20.6 percent living in urban areas, according to the latest United Nations estimates. Urbanization is expected to further drive growing housing demand.

Agriculture remains Ethiopia's economic backbone, accounting for approximately 45 percent of GDP, 85 percent of employment, and 86 percent of foreign earnings. The country's Agriculture-Led Industrialization Strategy aims to foster investment-led growth and sustainable development. Coffee is the leading export, followed by oil seeds, chat, leather products, gold, pulses, live animals, flowers, meat products, fruits and vegetables. In 2017, Ethiopia's GDP was valued at $80.56 billion.

With support from the Belt and Road Initiative (BRI), Ethiopia's economic and industrial development has grown rapidly. Industry has become the second-largest contributor to the economy. Ethiopia's advantages, including a relatively affordable labor force, vast market and improving infrastructure, position it well for industrialization, amid global industrial restructuring and transfers. However, challenges persist due to a weak industrial base, limited engineering capacity, and a shortage of skilled professionals to meet construction market demands.

China's industrial construction technology has evolved over nearly 50 years, incorporating advanced techniques and achieving a standardized, professionalized system. These mature, efficient prefabrication technologies are well-suited to Ethiopia's current needs for rapid industrial and residential construction.

In alignment with the BRI, China proposes transferring its industrial construction expertise and professionals to Ethiopia. This not only addresses Ethiopia's immediate housing and construction needs, but also helps establish a standardized construction market and cultivates a skilled local workforce to support the country's long-term economic growth.

The project involved collaboration with Ethiopian national authorities to conduct research in Addis Ababa, focusing on natural geography, population demographics, economic conditions, living costs, and the current state of the construction industry. Based on these insights, a comprehensive solution for promoting low-cost, rapid-fabrication housing has been designed.

This project aimed to improve housing conditions in Ethiopia, promote adoption of prefabricated wooden houses, and train professionals in the construction industry. It also contributed to Ethiopia's economic development by enhancing building efficiency, reducing costs and fostering sustainable development. Furthermore, the initiative strengthened China-Africa cooperation, deepening grassroots understanding of China's role in Africa's growth.

RESULTS ACHIEVED

Capacity building and training

The project provided extensive technical training to Ethiopian technicians, including:

- 45 days of training in China, focusing on theoretical and practical knowledge of prefabricated wooden construction.
- Subsequently, these technicians trained 100 local construction workers in Ethiopia, creating a foundation for skilled labor in the local construction sector.

The project promoted interactions between Ethiopian trainees and Chinese experts, enhancing knowledge transfers and skills development.

Promotion of sustainable construction solutions

The implementation of wooden structures demonstrated the suitability of prefabricated housing technology for Ethiopia's climatic and economic conditions. The advantages include:

- Speedy construction, reduced costs and suitability for local climatic conditions;
- A focus on low-cost housing solutions, aimed at improving living conditions for low- and middle-income groups.

Enhanced economic opportunities

The project created employment and increased earning opportunities for local workers. It also promoted inclusion of prefabricated wooden housing in Ethiopia's construction industry, encouraging foreign investments and improving the investment environment.

Cultural and market adaptation

The project emphasized understanding of local housing preferences, leading to adaptations such as:

- Incorporating features like prayer rooms and coffee corners into designs and;
- Developing aesthetically appealing wooden fences, aligning with local cultural preferences.

Strategic engagement and partnerships

The project fostered collaboration with Ethiopian government entities, such as the Ministry of Housing and Urban Development, and engaged in dialogue with local and Chinese stakeholders. This collaboration facilitated a deeper understanding of market dynamics and policy alignment.

Pilot implementation and demonstration

A pilot project was successfully completed at the Huajian Light Industry Park in Addis Ababa, serving as a demonstration of the prefabricated wooden housing model. The pilot provided critical insights and feedback, setting the stage for future scaling.

LESSONS LEARNED

The Wood Structure Construction Project in Ethiopia has generally progressed smoothly, albeit slowly, largely due to inefficiencies within the local institutional setup and system.

Work survey and cultural exchange

Conducting thorough research and fostering cultural exchange have been pivotal to the project's implementation. The initial research offered an in-depth understanding of Ethiopia's economic conditions, housing needs, architectural characteristics, availability of construction materials and level of expertise among local technicians. These insights directed the development of rapid-assembly, low-cost housing tailored to the Ethiopian market. However, addressing issues in Ethiopia often takes significant time, due to procedural delays.

Interaction as a catalyst for success

Interaction during project implementation has been key to its achievements. Local participation was encouraged through systematic technical training sessions for Ethiopian construction technicians, showcasing advantages of rapid and cost-effective housing solutions. These efforts helped accelerate local awareness and technological adoption. Additionally, two experience-sharing meetings were held, inviting stakeholders from various Ethiopian sectors and Chinese construction experts. These provided opportunities to refine the project based on feedback, ensuring practical outcomes, aligned with local needs.

Adapting to local preferences

Despite efforts to introduce popular designs from the Chinese market, feedback revealed that these standard housing types were not fully embraced by Ethiopian consumers. Cultural and functional requirements, such as incorporating "prayer rooms" and "coffee corners," were highlighted as essential. Plans are underway to design new building types specifically tailored to Ethiopia's unique cultural and functional needs, making prefabricated wooden houses more appealing to local consumers.

Field visit and technical discussion

TECHNICAL DEMONSTRATION OF STANDARDIZED RICE-FISH FARMING SYSTEM IN MYANMAR

Partner	Freshwater Fisheries Research Center, Chinese Academy of Fisheries Sciences (FFRC/CAFS), the Department of Fisheries, Ministry of Livestock, Fisheries and Rural Development (DoF/MLFRD), Myanmar
Countries Involved	China, Myanmar
Overview	The project used the technical demonstration area as a foundation to promote development of rice-fish farming technology in surrounding areas, raising the overall level of rice-fish farming in Myanmar. This involved cultivating fish and rice concurrently, to mitigate risks, maximize land and water use, increase yields, as well as reduce the need for harmful chemicals.
Results Achieved	The center organized five rice-fish farming technical training sessions. Nearly 80 people working in rice-fish farming gained enhanced technical skills through the training and consultation sessions. They included technical officers, extension staff and rice farmers from local fishery promotion stations, major rice-growing communities, state-run seedling farms and rice-fish demonstration farm representatives. With the support from the Ministry of Agriculture, in 2015, the center sent four well-known experts with extensive experience in foreign aid to Myanmar to provide technical assistance. Based on preliminary research, and in line with conditions of rice planting regions in Myanmar, two standardized technical demonstration fisheries were established in Yangon and Naypyidaw.
Lessons Learned	The establishment of a China-Myanmar agricultural cooperation coordination group will be instrumental in overseeing and coordinating cooperation projects between the two countries. While short-term technical training and guidance can improve skills and knowledge of technical personnel in recipient countries, to make technical assistance truly effective—especially for demonstration projects targeting ordinary producers—initial support in technology, funding and supervision is essential.
Project Period	July 2014 – December 2015

OVERVIEW

As a circular economy-based ecological agriculture model, rice-fish farming has received significant attention from the Myanmar government. The country started demonstrating rice-fish farming in the mid-1990s and implemented a pilot program in 2003, covering 2,200 hectares of rice fields and stocking 2.75 million juvenile fish. However, rice-fish farming in Myanmar has developed slowly, due to inadequate farming infrastructure, weak technical capacities and a limited selection of farmed species.

China, the birthplace of rice-fish farming, has developed mature management experience and production technology. The Freshwater Fisheries Research Center of the Chinese Academy of Fishery Sciences boasts a team of experts with outstanding capabilities in scientific research, technical guidance and commercializing rice-fish farming. To date, the center has trained over 70 fisheries technicians and management officials from Myanmar. In 2002, the center was funded by the Ministry of Agriculture's Asia Regional Cooperation Special Fund to train 20 professionals for Myanmar's Ministry of Livestock, Fisheries and Rural Development's Fisheries Department. The center is well-equipped to provide Myanmar with technical and theoretical guidance on rice-fish farming, and is committed to actively promoting South-South cooperation in fisheries, as well as fostering sustainable aquaculture worldwide.

This project selected four Chinese experts to visit Myanmar in stages, each for 10 days, alongside one international expert in rice-fish farming, to guide the standardization of fish farming in rice fields, the selection of high-quality farming species and the establishment of two demonstration bases. These aimed to showcase "high-yield, high-efficiency and high-profit" rice-fish farming technology.

Through lectures, experiments, on-site technical guidance and other methods, the project aimed to improve technical skills and management experience of 40 Myanmar officials and technicians in the rice-fish farming sector. Additionally, one Myanmar project officer was appointed to coordinate, manage, and follow up on project implementation. Nine Myanmar fisheries management and project execution personnel were invited to China for 10 days of specialized training, field visits and technical exchanges related to rice-fish farming.

The project used the technical demonstration area as a foundation to promote development of rice-fish farming technology in surrounding areas, raising overall rice-fish farming standards in Myanmar.

Left: Project progress reporting. Right: Expert group discussing priority areas of cooperation

RESULTS ACHIEVED

Over the course of three years, the center organized five rice-fish farming technical training sessions. Among these, nine officials and technicians participated in a 10-day training program in China, while two additional sessions were held in Yangon and Naypyidaw. In these locations, nearly 80 rice-fish farming actors gained enhanced capacities through the training and consultations. They include technical officers, extension staff and rice farmers from fishery promotion stations, major rice-growing communities, state-run seedling farms and representatives of rice-fish demonstration farms.

With Ministry of Agriculture support, in 2015, the center sent four well-known experts with extensive experience in foreign aid to Myanmar to provide technical assistance. Based on preliminary research, and in line with the rice planting regions in Myanmar, two standardized technical demonstration fisheries were established in Yangon and Naypyidaw. At the demonstration site in Yangon, summer-season fish fry were released into 1.6 hectares of paddy fields. At the Naypyidaw demonstration site (0.8 hectares), a comprehensive integrated farming model was adopted, with banana trees, tomatoes, chili peppers and other vegetables planted along the field ridges.

From December 19 to 28, 2016, the center's expert team conducted an evaluation of the rice-fish technology demonstration sites established in 2015. In Yangon, without any supplementary feeding and without reducing rice yields, 160 kg of large-sized fish were harvested after four months of cultivation. In Naypyidaw, rice yields had increased by more than 60%. Over 1,700 large-sized fish grew well, with an average length of over 15 cm, and the projected fish yield exceeded 260 kg. In response to specific conditions of the rice-fish project, the center planned to expand the demonstration area and, building on the 2015 foundation, standardize 30 acres of rice-fish fields.

Participant receving certificate of training

Additionally, high-quality fish species would be selected, and two more "high-yield, high-efficiency, high-profit" rice-fish farming technical demonstration bases would be established. This would be complemented by lectures, experiments and on-site technical guidance to improve technical and managerial skills of related officials and rice-fish farmers.

To ensure effective project publicity, the center produced project banners and printed over 200 technical manuals, prominently displaying the project name and category. In coordination with the Myanmar Fisheries Bureau and local fisheries officials, the center in Yangon and Naypyidaw organized project introduction sessions, during which they displayed banners, distributed technical manuals and provided an overview of the project's background, main activities and objectives.

The team ensured that significant project activities were promptly summarized and sent back to China. Additionally, progress of the project was shared on the center's and Fishery Science Institute's websites, further enhancing its visibility and impact.

The expert group provided guidance to farmers in Yangon rice fields on how to carry out fishpond transformation.

LESSONS LEARNED

Agriculture is a pillar industry in Myanmar, contributing 30 percent to the country's GDP. Agricultural cooperation has always been a key area of China-Myanmar collaboration. The establishment of a China-Myanmar agricultural cooperation coordination group will be instrumental in overseeing and coordinating international cooperation projects between them. This ensures that Myanmar consistently provides a "green light" for project implementation, facilitating high-level coordination and enhancing the quality and outcomes of these projects. It also allows for the expansion of the scope and depth of agricultural cooperation between the two nations.

While short-term technical training and guidance can improve the skills and knowledge of technical personnel in the recipient country, to make technical assistance truly effective—especially for demonstration projects targeting ordinary producers—initial support in terms of technology, funding, and supervision is essential. This approach ensures that the benefits of demonstration farms are fully showcased, encouraging more people to transition from mere interest to active participation, which can in turn promote an entire industry's development.

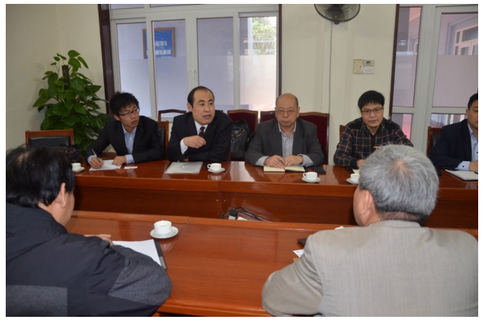
To further enhance bilateral agricultural cooperation, it is suggested that China and Myanmar leverage their respective strengths and actively pursue collaboration in aquaculture to achieve complementary advantages. Areas for potential cooperation include:

- Breeding Collaboration: Myanmar's breeding technology is underdeveloped, with many brood stocks collected from wild populations for propagation. In contrast, China has a solid foundation in breeding for species such as tilapia, grass carp, silver carp and giant river prawns. China could send breeding experts to guide Myanmar in updating brood stocks and selecting species suited to local conditions. This collaboration would help improve Myanmar's breeding technology and its ability to meet future demands for seed stock in both rice and pond aquaculture.
- Species Introduction Collaboration: Myanmar has abundant natural aquatic resources, including wild species such as giant river prawns, carp and green crabs. China could collaborate with Myanmar in introducing suitable species and conducting research on breeding and species improvement. This would benefit both countries by enhancing the genetic potential of local aquaculture species.
- Aquaculture Feed Development Collaboration: Myanmar's pond aquaculture techniques are relatively outdated, with feeding primarily relying on rice bran and minimal mechanization. This leads to low yields. On the other hand, China has advanced technologies for intensive pond farming. China could assist Myanmar by promoting high-efficiency aquaculture feed and advanced pond farming techniques, thereby improving production and increasing yields in Myanmar's aquaculture industry.

Capacity training in Wuxi, China

ENHANCING VIETNAM'S AQUACULTURE SYSTEM THROUGH TECHNICAL TRAINING

Partner	Freshwater Fisheries Research Center (FFRC), Chinese Academy of Fishery Science, Ministry of Agriculture, P.R. China; the Directorate of Fisheries, Ministry of Agriculture and Rural Development (DF/MOAR), Vietnam
Countries Involved	China, Vietnam
Overview	This project aimed to raise awareness among Vietnamese practitioners about water conservation and to promote ecological techniques for restoring aquaculture environments.
Results Achieved	Vietnamese fisheries officials and technicians visited China for training and conducted field visits and inspections. The South-South Cooperation Department of the China International Economic and Technical Exchange Center, along with experts from the Freshwater Fisheries Research Center, visited Vietnam to implement the United Nations Global South-South Development Center project. 59 Vietnamese trainees gained enhanced aquaculture capacities through the training. The team also visited the Fisheries Bureau of the Ministry of Agriculture and Rural Development of Vietnam, as well as the Research Institute for Aquaculture No.1(RIA 1) and No.2 (RIA 2).
Lessons Learned	To promote the rapid development of aquaculture in Vietnam, the most pressing issue is to address gaps in aquaculture facilities and equipment. It is recommended to expedite establishment of a tilapia breeding demonstration base in Vietnam, and to focus on advancing full-blooded shrimp farming technology through collaborative research.
Project Period	September 2013 – August 2014



Chinese experts discussing the implementation plan during meetings with the Vietnam Fisheries Department

Exchanges between the Chinese team, and researchers as well as officials from the Vietnam National Institute of Aquaculture

OVERVIEW

Vietnam has a coastline stretching over 3,260 kilometers, with 112 estuaries and more than 3,000 islands of various sizes. Fisheries play a significant role in Vietnam's economic development, with fish accounting for 30-40 percent of animal protein intake in the daily diet of the Vietnamese people. The natural conditions in Vietnam are highly favorable for the development of aquaculture. Local species, such as the Basa catfish (Pangasius catfish), have become one of the highest-yielding aquaculture species in the world. However, traditional pond-based aquaculture in the country relies on irrigation and drainage methods, which do not optimize water resource utilization and increase environmental pressure. This has led to undesirable patterns in production. The foundations for sustainable aquaculture lie in experienced practitioners and the effective use of natural resources, particularly through innovation in modern aquaculture practices and their sustainable development.

In recent years, some aquaculture enterprises in Vietnam have participated in training programs offered by the center, promoting related knowledge and technologies. The government has also strongly advocated for and actively encouraged adoption of closed and semi-closed production systems, as well as recirculating aquaculture systems (RAS). However, development of recirculating aquaculture has been slow, due to a lack of qualified technicians and management personnel. This creates an urgent need for advanced technology and management experience to enable progress.

This project aimed to raise awareness among Vietnamese practitioners about water conservation and to promote ecological techniques for restoring aquaculture environments.

Chinese aquaculture experts training Vietnamese fishermen

RESULTS ACHIEVED

Vietnamese fisheries officials and technicians receive training and field visits in China

From December 2 to 8, 2013, five Vietnamese fisheries officials and technicians visited China for training and conducted field visits and inspections. The project was successfully launched at the Freshwater Fisheries Research Center.

During the training, the Vietnamese delegation visited the tilapia breeding base in Yixing, Jiangsu, and the modern fisheries industry park in Baoying, where they observed demonstration models of intensive pond recirculation aquaculture. They also visited the Jiangyin Pangda Microbubble Oxygenation Equipment Manufacturing Co., Ltd. to see several microbubble oxygenation systems in operation.

Vietnamese participants praised China's use of integrated biological and wetland technologies for intensive pond water quality purification, along with the organizational and management models of modern fisheries industrial parks. They expressed interest in inviting experts from the Freshwater Fisheries Research Center to Vietnam for field inspections and technical guidance to promote sustainable development in Vietnam's aquaculture.

Collaboration between Vietnamese and Chinese enterprises

During the field visits, the Director of the Hanoi Fisheries Department and Director of Phu Tho

Chinese experts conducting field assessments in Hanoi Province

Exchanges between Vietnamese and Chinese experts

Fisheries Department, developed a strong interest in the microbubble oxygenation equipment. They decided to introduce this equipment from Jiangsu Pangda and engaged in preliminary discussions on how to further cooperate.

Chinese experts visit Vietnam for technical training and on-site guidance

From February 24 to March 3, 2014, the South-South Cooperation Department of the China International Economic and Technical Exchange Center, along with experts from the Freshwater Fisheries Research Center, visited Vietnam. With guidance and support from the Ministry of Commerce's China International Economic and Technical Exchange Center, they implemented the United Nations Global South-South Development Center project.

The project aimed to improve technical capacities for recirculating aquaculture in Vietnam, through training and on-site guidance. 59 Vietnamese trainees gained strengthened skills in this key area after participating in the training. The team also visited the Fisheries Bureau of the Ministry of Agriculture and Rural Development of Vietnam, as well as the National Institute of Aquaculture in Vietnam and the National Second Aquaculture Institute.

To ensure that subsequent project recommendations align with Vietnam's technical development needs and accelerate improvements in its aquaculture industry, experts from the Freshwater Fisheries Research Center also visited four major fisheries institutions and farms in northern and southern Vietnam.

Through discussions with officials, researchers, technicians and fish farmers, the team conducted a comprehensive analysis of the opportunities and challenges of Vietnam's aquaculture development. Based on the findings, both parties agreed to expand the experimental scale and apply region-specific technical guidance and training, to effectively address local aquaculture challenges and promote further cooperation over subsequent projects.

LESSONS LEARNED

Despite the enormous potential for aquaculture development in Vietnam, and significant government support, the scale of development remains very small. Many fish farms are struggling to survive, with relatively low profits. Through technical training provided by experts from the Freshwater Fisheries Research Center, it has become evident that key challenges lie in the lack of aquaculture infrastructure and equipment, as well as related products. The root cause of these issues is the weak foundation of aquaculture research in Vietnam, and the need to enhance the capacities of researchers. While the National First and Second Aquaculture Institutes in Vietnam possess relatively advanced research facilities, there is a severe shortage of researchers and basic research is progressing slowly.

To promote rapid development of aquaculture in Vietnam, the most pressing issue is to address gaps in aquaculture facilities and equipment. It is recommended that all stakeholders expedite establishment of a tilapia breeding demonstration base in Vietnam and focus on advancing the development of full-blooded shrimp farming technology through collaborative research.

IMPROVING FISH SEED PRODUCTION PERFORMANCE IN SRI LANKA THROUGH A TECHNICAL STAFF TRAINING AND STUDY TOUR

Partner	Freshwater Fisheries Research Center, Chinese Academy of Fisheries Sciences (FFRC/CAFS); the National Aquaculture Development Authority (NAQDA) , Ministry of Fisheries and Ocean Resources, Sri Lanka
Countries Involved	China, Sri Lanka
Overview	The project's primary goal was to strengthen Sri Lanka's fisheries and aquaculture capacity, through technical assistance and training.
Results Achieved	The expert team conducted a series of technical needs assessments in Sri Lanka through exchanges, on-site visits and discussions with fishermen. The expert team visited four aquaculture extension stations, two carp breeding and farming facilities, one tilapia farm, along with two ornamental fish breeding and farming sites, to conduct technical research and provide guidance. The experts organized technical training and study tours for six Sri Lankan experts visiting China. In Sri Lanka, the expert team hosted fisheries technical training sessions in the Kalawewa and Udawalawa regions. About 100 technical officers and extension staff, along with fishermen from fish seed breeding centers, aquaculture extension stations and fisheries, gained strengthened fish production capacities by participating in the sessions. To enable continued progress in this key area, more than 500 technical manuals were distributed during the training, along with water quality testers and dissolved oxygen meters, donated to breeding centers and fisheries.
Lessons Learned	It is key to strengthen follow-up services and technical tracking by staying in close contact with Sri Lankan trainees and NAQDA, to ensure continuous support and guidance for further development.
Project Period	October 2013 – September 2014

OVERVIEW

Fisheries represent a vital industry in Sri Lanka, contributing significantly to the national economy. According to the Sri Lanka Statistics Bureau, the sector generates an annual output that accounts for 1.5 percent of the country's GDP. The sector directly employs over 300,000 individuals, representing around 2 percent of the total workforce, and earns nearly $200 million annually from exports, contributing over 2 percent of total export revenues.

Recognizing the importance of this sector, China has supported Sri Lanka's efforts to enhance its fisheries production capacity. On September 28, 2012, Chinese Ambassador, Wu Jianghao met with Rajitha Senaratne, Sri Lanka's Minister of Fisheries and Aquatic Resources Development, to discuss strengthening bilateral cooperation in the fisheries sector. Since 1981, China has trained over 70 Sri Lankan fisheries management and technical personnel through human resource development programs. Many of these trainees now hold senior positions in Sri Lanka's Ministry of Fisheries and Aquatic Resources Development, playing an increasingly influential role in advancing the sector.

In 2013, the National Aquaculture Development Authority of Sri Lanka formally requested China's assistance in enhancing the country's fisheries production capacity, particularly through technical guidance and capacity-building initiatives.

Sri Lanka faces several challenges in its aquaculture and inland fisheries sectors, including:

- Limited education and delayed initiation of fisheries research;
- Outdated fry and fingerling production techniques;
- Insufficient aquaculture expertise and management personnel.

Despite these obstacles, Sri Lanka has prioritized development of inland fisheries and aquaculture since 1994. The Ministry of Fisheries and Aquatic Resources Development's action plan emphasizes programs to expand and modernize these sectors.

China is the world leader in aquaculture production. Over the past two decades, China has developed advanced fisheries management systems, innovative production techniques, and efficient aquaculture technologies. This positions China as a valuable partner for countries like Sri Lanka, seeking to modernize their fisheries industries.

The project's primary goal was to strengthen Sri Lanka's fisheries and aquaculture capacity through technical assistance and training. Key activities included:

- Deploying experienced Chinese experts with extensive knowledge in aquaculture and fisheries to provide on-site technical support and training for Sri Lankan fisheries professionals;
- Combining theoretical knowledge with practical application by integrating laboratory work, hatchery operations and field-based guidance at aquaculture sites;
- Enhancing the capacity of Sri Lankan fisheries professionals to apply advanced Chinese aquaculture techniques, practical technologies and management systems.

RESULTS ACHIEVED

Conducted research to identify needs:

The expert team conducted a series of technical needs assessments in Sri Lanka through exchanges, on-site visits, and discussions with fishermen. Coordinated by officials from the Ministry of Fisheries and Aquatic Resources of Sri Lanka, as well as supported by local fisheries departments, the team organized meetings with local fisheries researchers, managers and extension officers. These sought to explore the development history of aquaculture, the composition and functions of research and technology transfer institutions, the current status of aquaculture, future prospects and key bottlenecks. The expert team visited four aquaculture extension stations, two carp breeding and farming facilities, one tilapia farm, along with two ornamental fish breeding and farming sites, to conduct technical research and provide guidance.

Capacity training to enhance effectiveness:

Based on Sri Lanka's fisheries development needs, the center's experts organized technical training and study tours for six Sri Lankan experts visiting China. The primary focus was to enhance Sri Lanka's fish seed production capacity through technical exchanges. In Sri Lanka, the expert team hosted fisheries technical training sessions in the Kalawewa and Udawalawa regions.

About 100 participants, including technical officers, extension staff and fishermen from fish seed breeding centers, aquaculture extension stations and fisheries, attended the sessions. Discussions focused on the current state of aquaculture development in Sri Lanka and priority areas for China-Sri Lanka fisheries cooperation.

More than 500 technical manuals were distributed during the training, as well as water quality testers and dissolved oxygen meters, which were donated to breeding centers and fisheries. Experts also engaged with researchers, managers and technicians from the National Aquaculture Development Authority (NAQDA) to share experiences on enhancing research capabilities, conduct technical demonstrations and strengthen international cooperation.

Follow-up visits:

During the project's implementation in Sri Lanka, experts visited over 10 trainees who had previously attended training in China. They distributed the center's publication, Fish Today, and they introduced

Six experts from Sri Lanka receiving training in seedling production at the Freshwater Center

Experts conducted artificial breeding experiments.

key developments in China's aquaculture industry and the center's achievements in research, technology transfers and training.

These follow-up visits not only allowed the experts to address new challenges faced by the trainees, but also provided recommendations on how to apply what they had learned to further promote local fisheries development. Additionally, the visits helped identify new training needs and set new training goals, laying a solid foundation for the center's future international training efforts.

Promoted Cooperation:

During the project, experts visited major fisheries institutions and farms in the Rambodagalla and Dambulla regions of Sri Lanka. Through discussions with officials, researchers, technicians, farmers, and managers of fisheries enterprises, the team gathered first-hand information on the technical needs for Sri Lanka's aquaculture development. Following field visits, the team conducted a comprehensive analysis of the strengths, weaknesses, opportunities and challenges of the local aquaculture industry.

Based on this, experts communicated with officials and technical staff from the Ministry of Fisheries and Aquatic Resources, the National Aquaculture Development Authority (NAQDA) and other affiliated units. This resulted in them drafting a cooperation proposal focused on enhancing tilapia breed selection, feed development, freshwater pearl farming, building research capacities and upgrading practical aquaculture production systems. This received high attention from the Ministry of Fisheries and Aquatic Resources.

The expert team held a fisheries technology training session in the Udawalawa region.

TRAINING PLAN FOR POPULARIZING AUTOMOBILE MAINTENANCE TECHNOLOGY

Partner	Jiangxi Association for International Economic Cooperation, Ministry of Interior Affairs of Cuba, National African Federated Chamber of Commerce and Industry of South Africa, Western Cape and Emirates Driving Institute of UAE
Countries Involved	Chile, China, Cuba, South Africa, United Arab Emirates
Overview	Beneficiary countries gained a clearer understanding of maintenance tools, technologies and after-sales service operations for commercial vehicles. The trainees became proficient in operating tools and equipment for light trucks and pickup trucks, enabling them to address complex fault cases.
Results Achieved	For future project implementations, international organizations should provide reference materials, such as templates and clear submission guidelines, well in advance of each reporting stage. These materials would include the required submission deadlines and serve as a helpful reference for the project team.
Project Period	October 2010 – October 2013

OVERVIEW

With economic development, the gap between the automobile spare parts industries of developing countries and advanced economies has steadily narrowed. Developing countries have achieved significant progress in localization by absorbing and adapting imported technologies, fostering innovation, and collaborating with international companies. As a result, competitive manufacturing systems for automobiles and spare parts have emerged, not only meeting domestic market demands, but also entering global markets.

In the face of intense international competition, technological exchanges and cooperation play a critical role in helping target countries address domestic technological gaps and enhance productivity. This accelerates technological transformation in existing industries, bridging the divide between developing and developed nations to foster a more balanced and collaborative competitive environment.

As automobile sales rise and customer expectations grow, the level of expertise in automobile maintenance has become increasingly important customer satisfaction. Developing countries must, therefore, prioritize dissemination of automobile maintenance technologies.

A training initiative for promoting these technologies would deliver multiple benefits: fostering economic

and technological cooperation between nations, developing skilled managerial and technical personnel, increasing employment opportunities and improving customer satisfaction. Ultimately, such a program could significantly advance the global automotive industry, while enhancing living standards in participating countries.

RESULTS ACHIEVED

Nearly 100 organizations across the four countries benefited from automotive after-sales training.

This was achieved through teams of over three experts dispatched to South Africa, Cuba, the United Arab Emirates and Chile, from April 2010 to April 2013. Upon completion of the training, beneficiary countries gained a clearer understanding of maintenance tools, technologies and after-sales service operations for commercial vehicles. Trainees became proficient in operating tools and equipment for light trucks and pickup trucks, enabling them to address complex fault cases.

Additionally, their understanding of after-sales claims procedures and parts procurement was enhanced, leading to a more professional approach. Upon returning to their local technical units, trainees shared the knowledge and practical skills they had acquired, laying solid foundations for the development of localized automotive maintenance technology and service teams in the region.

Compiled training materials for four countries and developed training reports.

To support their continued learning in future, the project also produced the following key documents:

- Automotive Parts Catalog
- Maintenance Technology Manual
- Claims Process Manual
- Maintenance Equipment Operation Textbook

LESSONS LEARNED

During implementation, the project team encountered challenges in preparing and submitting application materials, along with the mid-term and final reports, as this was their first involvement in a South-South Cooperation project. The Jiangxi Provincial International Economic Cooperation Promotion Association offered repeated guidance on ensuring the completeness and timely submission of project materials. They proactively informed the project applicant about key submission deadlines, which enabled the applicant to successfully pass the application process and submit the required reports on time and in an organized manner.

The team suggests that for future projects, international organizations could provide reference materials, such as templates and clear submission guidelines, well in advance of each reporting stage. These materials would include the required submission deadlines and serve as a helpful reference for the project team. Additionally, it would be beneficial to designate specialized staff within the organization to respond to queries and provide guidance, ensuring that the applicant has the support needed to submit materials correctly and on time.

CHINA-KENYA SMALL-SCALE DEMONSTRATION PROJECTS ON SOLAR PHOTOVOLTAIC AND WATER HEATING SYSTEMS

Partner	Gansu Natural Energy Research Institute (GNERI), UNIDO International Solar Energy Centre for Technology Promotion and Transfer (UNIDO-ISEC)
Countries Involved	China, Kenya
Overview	This project aimed to identify the appropriate small-scale solar PV system and solar water heating system for Kenya. After the project's completion, 100 sets of solar cookers, 100 sets of in-home or large-scale solar water heating systems and 40-60 sets of in-home or in village solar PV systems were put into use.
Results Achieved	The project has successfully developed solar water heaters, solar cookers, and small-scale household photovoltaic (PV) power generation products tailored to the needs of African regions. The following items were distributed to pilot urban and rural areas in Kenya: 40–50 solar PV systems; 100 sets of household solar water heaters; 100 solar cookers.
Lessons Learned	To ensure effective collaboration, it is critical to meticulously plan, allow sufficient lead times, and to prepare multiple contingency plans for project execution and coordination.
Project Period	December 2009 – March 2012

Solar product donation ceremony by GNERI/UNIDO-ISEC in Thika, Kenya

OVERVIEW

Kenya faces significant challenges in energy access, with a heavy reliance on imported fossil fuels such as petroleum and oil, particularly for urban areas, while rural regions experience limited connectivity to the national grid, covering only 4 percent of the population. Firewood remains the primary energy source for heating, cooking and hot water in rural households, contributing to respiratory health issues and environmental degradation.

However, Kenya is rich in solar energy resources, making the development of solar technologies an ideal solution. Despite this, solar products are scarce in the market. To address the energy crisis, the Kenyan Ministry of Finance has announced a $2 billion special fund to accelerate clean power. International organizations, including the World Bank, African Development Bank, and agencies from France and Germany, have also expressed support for renewable energy projects in Kenya.

In recent years, Kenya has focused more on energy-saving and renewable energy efforts. By the end of 2009, the government approved several projects, including six geothermal, seven wind and nine solar initiatives. Solar energy, being a zero-emission and sustainable energy source, is becoming increasingly viable, and expected to contribute 40 percent to the global energy supply by 2050.

The project aimed to:

- Develop solar energy products tailored to Kenya and the broader African market;
- Enhance research and development capabilities in solar energy technology, as well as;
- Design and deploy small-scale solar PV systems and solar water heating systems suited to Kenya's climate.

Despite its potential, the project faced several challenges:

- Demonstration Site Selection: Identifying suitable locations in Kenya for showcasing the technology is complex.
- Climate-Specific Research: limited expertise in adapting solar PV systems to high-temperature, high-humidity conditions.
- Low-Latitude Technology Adaptation: lack of experience in optimizing solar PV systems for low-latitude environments.

Left: Solar product donation ceremony by GNERI/UNIDO-ISEC in Thika, Kenya;
Right: Solar water heater demonstrated in Kenya

RESULTS ACHIEVED

Survey report on Kenyan solar conditions and demonstration site confirmation with Kenya government support

The project team dispatched three members to Kenya to conduct need assessments, site visits and engage with key stakeholders. They conducted meetings with the Kenyan Ministry of Energy and Mineral Development, the Rural Electrification Authority, Kenya Electronics Technology Limited, Kenya Broadcasting Corporation, China Radio International (CRI) Kenya Bureau, the United Nations Industrial Development Organization (UNIDO) Kenya Office, and the Chinese Embassy. Additionally, the team assessed and interacted among villages and towns near the capital, Nairobi.

During the project's implementation, the team invited five delegates from Kenya, including leaders and researchers from the Ministry of Energy and Mineral Development, Kenya Electronics Technology Limited, Kenyatta University and the Peter Foundation. The delegates participated in study sessions and discussions in China, focusing on scientific collaboration, promoting demonstrations, and industrialization strategies.

Research and promotion of solar products for Kenya, along with Kenyan researchers undertaking technological training in China

The project team conducted five specialized research studies. These sought to:

- Optimize the tilt angle and natural circulation design for solar water heaters in low-latitude regions;
- Develop a water supply booster and temperature control system for solar water heaters suitable for Kenya and other African regions;
- Investigate the effects of high temperature and humidity on photovoltaic (PV) module performance and power generation efficiency;
- Study the impact of PV module hot spots on power output and product lifespans, as well as;
- Research and develop solar energy products tailored for low-latitude areas in Kenya and tropical/subtropical regions of Africa.

The research team published three papers in domestic academic conferences and journals, focusing on the scientific advancements achieved during the project.

Solar products were developed and donated to Kenya, while local research and production abilities were strengthened

The project team developed photovoltaic (PV) modules and systems suitable for high-temperature and high-humidity climate conditions, and assisted Kenya in addressing technical and material challenges in the development of solar energy products. It also resolved initial problems encountered in promoting and commercializing the technology.

As a result, the project successfully developed solar water heaters, solar cookers and small-scale household photovoltaic (PV) power generation products, tailored to the needs of African regions.

Upon completing the project, 100 sets of in-home solar cookers, 100 sets of in-home solar water heating system and 50 sets of village-scale solar PV systems were developed. A solar product donation ceremony by GNERI and UNIDO-ISEC was held in Thika, Kenya, on April 18th, 2012.

LESSONS LEARNED

Through this project, China and Kenya have forged a practical partnership in renewable energy technology research and development, with a particular emphasis on small-scale solar photovoltaic (PV) systems and solar water heating technologies. Within the project framework, the two countries have achieved notable initial successes in the joint research, development, and promotion of solar water heating systems, solar cookers, and key components of small-scale PV systems.

Such collaborative international initiatives underscore the critical role of partnerships among research institutions, enterprises, and governmental bodies in advancing scientific and technological innovations across the Global South. They also highlight China's growing scientific and technological capacities which can be further leveraged in contributing to its own and other developing countries' industrialization and commercialization of its renewable energy technologies and facilitate expanded access to international markets.

Recognizing the operational challenges often encountered by developing countries—including limited institutional implementation capacity, low operational efficiency, delays in project implementation—effective project planning, realistic timelines, and the development of robust contingency measures to ensure coordinated and timely execution of activities.

International Cooperation of City ICT Application Promotion for Developing Countries

SSDC Partner	Centre international de formation des autorités locales (CIFAL) - Shanghai (International Training Centre for Local Authorities)
Countries Involved	Albania, Bolivia, Bulgaria, China, Former Yugoslav Republic of Macedonia, Ghana, Indonesia, Kazakhstan, Kenya, Lao People's Democratic Republic, Liberia, Malawi, Myanmar, Nepal, Pakistan, Papua New Guinea, Philippines, Republic of Moldova, Seychelles, Sierra Leone, Uganda, United Republic of Tanzania and Viet Nam
Overview	In recent years, CIFAL-Shanghai has found that information and communications technology (ICT) has been proven useful in promoting city management, industry, the provision of public services and citizen welfare. This project was designed to promote and facilitate the use of ICT at the city level. This was achieved through: 1. raising awareness of how ICT can be leveraged for city development; and 2. sharing Southern countries' experiences with ICT.
Results Achieved	1. Facilitated cooperation between public-and private-sector organizations across the global South to collect relevant data on the use of ICT at the city level. 2. Organized two seminars on ICT use in developing countries, as a platform for countries to share their successful experiences and learn from each other. 3. Organized two high-level global forums.
Lessons Learned	1. Build comprehensive project management systems. 2. Formulate reasonable arrangements for training, forums and visits. 3. Strengthen communication with project participants. Lessons drawn from implementation of ICT in Shanghai: 1. Seize development opportunities and implement a development strategy. 2. Improve institutional mechanisms and strengthen organizational leadership. 3. Focus on policy guidance and key projects. 4. Promote pilot testing and achieve "leapfrog" development. 5. Encourage government to take the lead in demonstration projects, with wide consultation with relevant stakeholders.

2018 Global CEO Development Conference

Overview

This project, titled "International Cooperation of City ICT Application Promotion for Developing Countries", was designed to promote and facilitate the use of information and communications technologies (ICTs) for development at the city level in countries of the global South.

ICT has many benefits for development. Research has shown that these technologies have enabled governments to improve the efficiency and effectiveness of public administration services, promoted economic growth and social development, and ensured better and more convenient provision of public services to citizens. At the same time, the use of ICT for complex data processing, real-time monitoring, and decision-making can help to address emerging challenges such as energy shortages, climate change and congestion.

Although there has been research into the use of ICT for city development, there have been few programmes that systematically analyse the current situation in the developing countries and even fewer that discuss how to implement ICT in countries with limited capacity.

This project concentrated on countries of the South sharing with one another their experiences with advanced development of ICT systems and, more important, how ICT could be best applied in developing countries where ICT infrastructure was not yet well developed. It made use of the CIFAL-Shanghai stable communication network and extensive experience with local authorities, national governments, international organizations, the private sector and academia.

The project achieved these aims through:

- developing and operationalizing a platform for the exchange of data, research and experiences between participating countries and institutions, which enabled sharing of findings and joint problem-solving; and
- organizing workshops, seminars and forums for participating countries to discuss challenges in their specific contexts, share experiences and explore how challenges can be addressed.

Results Achieved

Over the life of the project, CIFAL-Shanghai cooperated with public and private-sector entities to gather, analyse and compare statistics on ICT in developing countries. Data were collected on indicators such as Internet subscription rates, percentage of individuals using the Internet and cell phone subscriber rates.

In addition to the gathering and sharing of data, the project organized a number of seminars, training programme and forums:

- "Training courses on information technology application for developing countries", held in Shanghai in 2012, featured lectures on information security systems, wireless network technologies and strategic planning. The training course also included site visits.
- "Seminar on information development for developing countries", held in Shanghai in 2012, featured lectures on software design for urban management, use of ICT in Shanghai, and the experience with establishing and operating Shanghai web portals. The training course also included site visits.
- "Global City Informatization Forum", hosted by the Department of Economic and Social Affairs (DESA), the United Nations Industrial Development Organization (UNIDO), the International Telecommunication Union (ITU), the United Nations Institute for Training and Research (UNITAR) and the Shanghai Municipal Commission of Economy and Informatization. The Forum attracted approximately 400 participants from 20 countries.
- "Global CEO Development Forum", hosted by UNIDO. The Forum had approximately 1,500 participants from more than 30 countries.

Lessons Learned from This Project

- **Build a comprehensive project management system.** Create relevant management norms such as training, inspection and forum management. Set up a project leadership management team and organize emergency response teams. Ensure that project management has rules to follow and strict standards, and provide a guarantee for the smooth implementation of the project.
- **Formulate reasonable arrangements for training, forums and visits.** Create an implementation plan, drawing from past experience, based on the assessed needs of the project, with content tailored to the specific requirements of the specific activities.
- **Strengthen communication with project participants.** Ensure proper follow-up for the project to understand the effect of project implementation; develop, maintain and enhance relationships; and promote cooperation and exchanges between the Centre and participating countries.

Lessons Learned from Implementation of ICT in Shanghai

- **Seize development opportunities and implement a development strategy.** Implement the leading informatization development strategy and make every effort with regard to all aspects of informatization construction. The Government attaches great importance to overall planning and comprehensive promotion, which effectively guarantees the healthy, orderly and rapid development of Shanghai's informatization.
- **Improve institutional mechanisms and strengthen organizational leadership.** Shanghai has a unified information industry and organization leading the promotion of informatization in the city. It has successively established several functional service organizations and various industry or professional associations in the field of information technology. In order to form a joint force and safeguard important areas of informatization and major project construction, Shanghai has also established a number of relevant parties, including network and information security, radio management, and social credit system construction. These working mechanisms are fully promoting informatization.
- **Focus on policy guidance and key projects.** Based on development strategy guidance and institutional mechanism innovation, Shanghai's informatization construction has strengthened the work of policy guidance and key projects. In order to ensure the implementation of informatization construction, Shanghai incorporated the key informatization construction projects with a large project investment, high technological content, and economic and social benefits into the city's annual major projects and practical projects for the private sector.
- **Promote pilot testing and achieve "leapfrog" development.** In the process of informatization construction, Shanghai conscientiously implemented the national requirements for the initial development, carried out a series of pilot works, promoted several leading development projects, and realized a number of reform and innovation achievements.
- **Encourage government to take the lead in demonstration projects, with wide consultation with relevant stakeholders.** Shanghai is striving to promote e-government construction and the transformation of government functions and service efficiency.

cifal Shanghai

Powering Villages' Sustainability: Small Hydropower Development in South and South East Asia

SSDC Partner	International Network on Small Hydro Power (INSHP)
Countries Involved	China, Lao People's Democratic Republic, Nepal and other countries in South and South East Asia
Overview	Small hydropower (SHP) is a renewable source of energy with vast untapped global potential. Given its small scale, it can play an especially important role in developing countries. Many countries in South and South East Asia possess substantial SHP potential but this potential remains untapped. Through this project, SHP technology was shared by China with countries in South and South East Asia. The project involved training in SHP for relevant stakeholders, facilitating study tours to promote SHP, and compiling relevant research and materials.
Results Achieved	• A number of training and capacity-building workshops were successfully carried out to deepen cooperation between the energy sectors in participating countries. • Multiple study tours and missions were arranged to facilitate the sharing of experiences and technologies. • Reports on the state of SHP in various countries were produced and shared.
Lessons Learned	• Capacity-building for professionals is vital. This can include training in project implementation, use of equipment and policy consultation as well as on-the-job training. • Promote and facilitate the sharing of information, planning and standards. • Promote project sustainability through mechanisms such as innovative modes of investment and financing. • Facilitate and strengthen communication between key stakeholders. • Work with SSDC to discuss and incorporate changes to project design as and when needed.

Overview

Small hydropower (SHP) is a renewable source of energy with a vast untapped global potential. Given its small scale, in many developing countries, it plays an important role in electrifying remote, rural communities. South and South East Asia, in particular, possess substantial SHP potential that remains untapped. In Nepal, for example, high rainfall and rugged topography account for an estimated 1,430 MW of untapped SHP potential. Similarly, the Lao People's Democratic Republic has an abundant SHP potential capacity of 800 MW for SHP plants up to 15 MW. Expanding SHP has the potential to assist in providing rural and remote communities with access to electricity.

Extensive opportunities for SHP development in the region are hampered by myriad challenges. In Nepal, issues related to lack of political stability present numerous obstacles in the form of complicated, uncertain, and prolonged processes and procedures. Meanwhile, small and pico hydropower projects in the Lao People's Democratic Republic offer limited commercial opportunities, making it difficult to attract public and private investors. For this reason, few actors aside from government and multilateral agencies are involved in off-grid electrification efforts.

Seminar on China-Indonesia Small Hydropower International Cooperation and National Capacity Building in Indonesia

In the region more generally, the World Small Hydro Power Development Report 2013 notes that an estimated 80 per cent of SHP in South and South East Asia remains untapped. Challenges include lack of trained local personnel familiar with the operation and management of SHP plants, lengthy and complex policy procedures, and limited awareness among government officials.

China has the largest installed SHP capacity in the world. Driven by rural electrification programmes aimed at developing villages in remote, mountainous areas, SHP now provides energy to 300 million people. It is a proven and mature technology in China, with both public and private investors supporting its development. The International Network on Small Hydro Power (INSHP) is a public, non-profit organization under the auspices of the United Nations Industrial Development Organization (UNIDO), the Ministry of Water Resources of China and the Ministry of Commerce of China. The International Center on Small Hydro Power (ICSHP) is its headquarters. The INSHP mandate is to promote SHP development worldwide. Through numerous South-South cooperation activities, China's practice and experience in SHP have been shared in over 50 developing countries.

This project was designed to share SHP technology and know-how with countries in South and South East Asia. The project achieved this through:

- providing training in SHP technology for representatives from the region;
- facilitating study tours for representatives from the region to China, and for delegations from INSHP to partner countries; and
- compiling SHP reports and training manuals.

Results

Training and Capacity-building

Across the life of the project, a number of training and capacity-building workshops were successfully carried out:

- A training workshop on SHP technology for the region brought together 32 officials and technical staff from 12 countries in the region. The training deepened cooperation between the energy sectors of participating countries including sharing of SHP country reports. The training also included site visits and on-site investigations to observe China's SHP plant construction and management.
- A seminar on SHP development for the region brought together representatives from countries, academia, and equipment and design firms. It provided an opportunity for participants to discuss and exchange experiences, share their countries' SHP development contexts and requirements, and assess country limitations.
- The 7th Hydropower for Today Forum was organized under the theme of small hydropower and green development. The Forum called upon all agencies relating to hydropower to support the promotion of replicable and sustainable models of SHP. It further served as a platform where stakeholders from the public and private sectors as well as members of research entities and NGOs were able to share best practices and lessons learned from on-the-ground SHP experiences.

Study Tours and Missions

INSHP organized multiple study tours and missions to share experiences and technologies. They included:

- a delegation from the Lao People's Democratic Republic to ICSHP in China during which INSHP provided an overview of SHP potential, requirements, training needs and specific benefits in terms of renewable energy;
- a delegation from Nepal to ICSHP in China, which served to strengthen relationships between ICSHP and Nepalese counterparts, demonstrate successful Chinese technology and expertise with the potential to be used in Nepal, and promote understanding of Chinese experience in SHP development;
- technical visit by engineers from Nepal to ICSHP in China, which included study tours to SHP stations and manufacturing bases;
- ICSHP mission to the Lao People's Democratic Republic; and
- ICSHP consultation mission related to SHP development to the Lao People's Democratic Republic and Nepal in order to meet with key stakeholders and share experiences.

Reports and Training Manuals

The following reports were developed as part of the project:

- SHP Report on China – providing a comprehensive compilation of all relevant data available on SHP in China;
- Training Material on SHP – ICSHP undertook research and compiled information on the latest trends regarding SHP to support knowledge-sharing and access to the latest information in China;
- Country Report on South and South East Asia – Representatives from countries in the region were offered the opportunity to share their recent developments and SHP regulatory frameworks. Reports were produced and made available in Afghanistan, Cambodia, India, Indonesia, the Lao People's Democratic Republic, Malaysia, Nepal, Pakistan, the Philippines, Sri Lanka and Thailand;
- Report on World SHP Development – aimed at identifying the development status and potential resources for SHP around the world.

Lessons Learned

- **Undertake capacity-building for professionals.** Strengthen the knowledge-sharing and training among professional and technical personnel for SHP, including technical expertise, equipment application, project development, policy consultation, investment and financing, on-the-job training and on-site teaching.
- **Promote and facilitate the provision of information, planning and standards**. Establish and improve databases regarding water conservancy, hydrology and meteorology to promote and facilitate SHP project development. Stipulate scientific and reasonable river basin planning for SHP and establish development mechanisms at both the national and regional levels. Compile an international standard of SHP project development applicable for countries of the global South.
- **Ensure sustainable project development.** Explore innovative modes of investment and financing for SHP project development in Southern countries. Develop SHP demonstration projects, replicate successful experiences of project development and construction, and promote scaled-up development of SHP projects.
- **Facilitate and strengthen communication with stakeholders.** Strengthen multi-level communication and cooperation among international organizations, government, NGOs, scientific institutions and other related stakeholders. It is essential to have face-to-face interviews with stakeholders to understand issues such as local policies and technologies. Such interviews can be undertaken during the on-site survey or carried out at training workshops.
- **Changes to project design supported by SSDC.** Follow-up activities and advocacy work should be taken into consideration during project design. Activities could be diversified but with a common target.

Shiwang'andu Small Hydro Power Project

Promoting Africa's Broadcast Television Dubbing Skills

SSDC Partner	China-Africa Business Council (CABC)
Countries Involved	China, the United Republic of Tanzania and other African countries
Overview	Africa is experiencing a period of rapid development during which the development of the cultural industry is especially urgent. An important part of this is the development of a local television industry. Dubbing of foreign-language programmes is important not only to make television shows accessible to local communities but also for the growth and promotion of the television industry as a whole. Demand for translation and dubbing has increased year after year in the United Republic of Tanzania; however, there is a lack of trained professionals. Through this project, skills and technology were shared between China and the United Republic of Tanzania and then with other African countries.
Results Achieved	Well -established dubbing training standards were created and training was shared. The success of the China-United Republic of Tanzania project was noted by other African countries, which then expressed their desire to have that experience transferred. A cohort of professionally trained voice actors now exists in the United Republic of Tanzania. The project also trained a group of sound engineers. A batch of foreign-language programmes have been dubbed into Swahili and broadcast.
Lessons Learned	Project success can depend on many factors that may be outside of the project team's control, for example whether students are granted visas to attend training in China. Training materials should be considered living documents and adapted to the needs and skill levels of the students.

Overview

Africa is experiencing a period of rapid development during which the development of the cultural industry is especially urgent. An important part of this is the development of a local broadcast television industry.

Dubbing of programmes is important to make foreign television accessible to local communities; it is also necessary for the promotion of the television industry as a whole. Currently, dubbing in most African countries faces two challenges: the lack of professional voice actors and actresses and the lack of professional dubbing technology.

As a country with rapid development of the cultural industry, the United Republic of Tanzania has experienced demand for translation and dubbing that has increased year by year; however, there exists a lack of trained professionals. The United Republic of Tanzania faces three main problems if it is to improve dubbing professionalism: (a) lack of professional equipment; (b) lack of professional dubbing technology talent; and (c) lack of professional voice actors.

Professional dubbing and recording constitute a high-technology industry. China has developed a system of technology and experience in this field through research, innovation and continuous exploration. Through this project, the China-Africa Business Council (CABC) was able to share this technology and experience with the United Republic of Tanzania.

Established in 2006, CABC has actively encouraged the Chinese companies to conduct training programmes, enhance technical and cultural exchanges, create more jobs for women and promote charity works in various African countries. It is comprised of over 700 member companies that are active in 51 countries, investing in 38 countries, and conducting cultural and technical exchanges with 30 countries.

StarTimes Co., Ltd. is a member of CABC and has an active presence in media and technology in Africa. Founded in 1988, StarTimes group is now one of the most influential technology providers, network operators and content providers in the country. It began its African business in 2002 and has been working closely with governments in Africa to jointly promote digitalization and informatization. To date, StarTimes Co., Ltd. has established subsidiaries in 30 African countries.

CABC, together with StarTimes, has come up with a pragmatic plan to help to improve the capacity of voice acting and its relevant technologies in Africa. This programme first conducts research on the broadcasting and dubbing industries in the United Republic of Tanzania to identify the dubbing technologies that suit the local context. Then it selects 10 to 15 trainees among the voice actors and actresses in the United Republic of Tanzania and offers them a six-month training course, which makes full use of China's technologies; technical experts and voice actors are invited to provide students with professional knowledge and skills. Upon finishing the training, workshops are hosted to summarize the training experience and promote the successful experiences to other African countries.

This project was a collaboration between CABC, StarTimes Co., Ltd., national television authorities and other relevant agencies in the United Republic of Tanzania. It was designed to improve the level of dubbing and recording technology in the United Republic of Tanzania and develop the skills of professional voice actors and sound recording artists. It achieved this through:

- undertaking a feasibility study in the United Republic of Tanzania; and
- providing training and workshops in China for students from the United Republic of Tanzania.

Results

The project has had many positive results including the promotion of training, recognition in other African countries, the creation of training standards, training of professional voices and recording engineers, creation of dubbing works and templates, and the promotion of

cultural and technological exchanges between China and African countries.

- **Well-established dubbing training standards were established, and training experience was shared.** Through one-year dubbing training programmes, the training courses accumulated rich local experience in communication, enrolment and technical training at the African government level and provided valuable lessons for other regions in Africa to enhance dubbing skills and organize training. During the teaching process, a set of well-established training standards for local language dubbing techniques were developed and can be replicated for dubbing training in other parts of Africa.
- **Such successful experience was recognized by more African countries.** The successful voice technology training in the United Republic of Tanzania gained recognition from the Governments of other African countries. Cultural officials in Nigeria, Zambia and other countries expressed their desire to learn from the experience of the United Republic of Tanzania and receive training in voice technology and other broadcasting and television sectors from China.
- **The project trained a cohort of professional voice actors in the United Republic of Tanzania who mastered international standard voice dubbing skills.** The project also trained a group of sound engineers who mastered basic sound engineer skills and two professional Swahili sound engineers. Through the programme, participants received technical guidance and access to practical opportunities in dubbing and recording. After returning from China, they disseminated the technologies and theories learned to enhance the overall voice and recording industry.
- **Through the programme, a batch of Swahili-language dubbing works have been created.** These works were mainly those created by students as part of a practical learning process. By the end of December 2017, the students had dubbed 19 complete TV series, nine films, two cartoons and one documentary. After refinement, these practice works met broadcast requirements and some were subsequently broadcast in Africa.

Finally, the programme acted as a platform for cultural exchanges between China and Africa.

Lessons Learned

- **The choice of students is based on availability of visas.** Students need to study in China for nearly a year, and obtaining a long-term visa is dependent on factors such as age, level of education and prior work experience. Short-term visas for three months are available if students do not meet the above requirements. Finally, trainees had to come in groups to China.
- **Students had limited experience in professionalized dubbing, which meant that the curriculum needed to be updated and refined.** The training starts with the basic courses and also corrects trainees incorrect existing dubbing techniques. Many of the Tanzanian trainees had not engaged in dubbing before; however, they had excellent voices and some experience in sound work, such as prior work as performers or presenters. Nevertheless, the voice methods of performers and moderators are different, and there were difficulties with the training. Teachers needed to correct their pronunciation, starting from zero. For future training, the curriculum needs to be developed and modified based on the prior experience of the trainees.

Tanzani Second Dubbing Contest

Performance at the "Seventh African Digital Television Development Forum"

Exchange and Cooperation of Technology and Management on High-value-added Vegetables

SSDC Partner	Mountain-River-Lake Regional Sustainable Development of Jiangxi Province (MRLSD)
Countries Involved	China and Kenya
Overview	Agriculture has an important role to play in job creation and poverty alleviation in Kenya. The cultivation of high-value-added products such as tomatoes, cucumbers and other vegetables can be an effective means of addressing poverty. Owing to the delicate nature of the crop, high-value-added vegetables are often grown using irrigation. Such technology may not be available to local communities. In addition, these crops are highly susceptible to disease and disease control methods may not be known. China has developed advanced horticulture technologies. Through this project, such technologies were transferred to Kenya.
Results Achieved	Kenyan stakeholders were trained in horticulture techniques and learned first-hand from Chinese counterparts. Experience was transferred from China to government officials, civil society organizations and academia in Kenya through seminars. A situation analysis was carried out to assess the local context and identify potential challenges and opportunities. Plans for a demonstration model farm were established, drawing from experience in China.

Overview

Agriculture has an important role to play in job creation and poverty alleviation in Kenya. Successful cases of poverty alleviation in rural areas show that the production of high-value-added products such as tomatoes, cucumbers and other vegetables would be an effective way to address those issues.

Suba District is one of the twelve districts in Nyanza Province. It is located in the southwestern part of Kenya along Lake Victoria. The District has increasing poverty and inequality due to population growth and environmental degradation. It does, however, have moderate temperatures, abundant sunshine and adequate water resources, making it suitable for planting various vegetables. In this context, the Government of Kenya has promoted the farming of high-value-added vegetables such as tomatoes and cucumbers as a strategy to increase incomes, reduce environmental pollution and promote sustainable community development. Owing to the delicate nature of the crop, high-value-added vegetables are grown mainly using irrigation, which can be prohibitively costly for local communities. Short-term rotations with other horticultural or food crops are sometimes practiced but are limited by input resources and lack of technical knowledge. Such crops are also highly susceptible to diseases.

Recommended control measures include use of chemicals, crop rotation and other cultural practices. However, use of these methods by small-scale growers in Suba District is greatly hampered owing to the high cost of using chemicals and lack of the crop husbandry techniques. The introduction and use of disease-resistant cultivars coupled with rational disease management could be instrumental in alleviating disease constraints in the local production of tomatoes and cucumbers. In addition, the application of the latest greenhouse technology would be of benefit to local communities.

China has advanced horticulture technologies that it is willing to share with others. The project was designed to transfer some successful techniques and technologies from China to Kenya. MRLSD partnered with OSIENALA (Friends of Lake Victoria) and other related institutions to enhance Kenya's capacity to cultivate high-value-added vegetables.

The project achieved this through:

- providing training and the opportunity for China and Kenya to share experiences;
- organizing a delegation from MRLSD to visit Kenya to work with local stakeholders to identify challenges and potential solutions; and
- developing a small-scale demonstration project in Kenya.

Results

In November 2014, MRLSD arranged for three participants from OSIENALA to take part in a four-day training course in Nanchang, Jiangxi Province. The training course finished with an experience-sharing seminar. The training course also included several field visits to a number of local rural cooperatives that were successfully growing high-value-added vegetables. The local agricultural technicians shared their experience in how to improve the quality and yield of vegetables and how to sell products with the help of local government.

In October 2015, a three-person delegation from MRLSD visited Kenya. During the mission, MRLSD met with OSIENALA and other stakeholders to undertake a situation analysis and identify challenges and opportunities. The partners also identified a site for a demonstration model farm to cultivate vegetables and held a workshop to discuss planning and management, drawing from experience in China.

In August 2016, OSIENALA organized a seminar for officials from government, civil society and academia in Kenya to further share the experience from China.

Field visit to vegetable greenhouse

Technical Cooperation for Environmentally Friendly Pesticide Formulation in South Africa and Sudan

SSDC Partner	Nantong Pesticide Formulation Development Centre (NPFC)
Countries Involved	China, South Africa and Sudan
Overview	South Africa and Sudan are both agrarian countries where the use of pesticides is a necessary tool to protect crops from damage and human and animal lives from vector-borne and other diseases. Local manufacturing of pesticides is limited. Pesticides that are imported from abroad are often older formulations that can be highly toxic. These pesticides can also have serious environmental impacts and pose hazards to food safety and the health of applicators, workers and farmers. There is an urgent need to introduce new, modern and safer agrochemicals into Southern countries. However, countries can lack access owing to high costs and patent protections. Through this project, Chinese stakeholders worked with in-country counterparts to develop and transfer environmentally friendly pesticide formulations to South Africa and Sudan.
Results Achieved	Representatives from South Africa and Sudan visited China to learn about pesticide formulations and receive training. Representatives from China undertook study tours to Australia and the United States of America to gather information, which could then be shared with South Africa and Sudan. New environmentally friendly pesticide formulations were developed for use in the two countries.

Overview

Sudan is an agrarian country where the use of pesticides has become a necessary tool to protect both crops from pest damage and human and animal lives from vector-borne and other diseases. However, there are at present no local pesticide manufacturing plants. All pesticides are imported from abroad; however, these are often highly toxic agrochemicals based on older, unsafe pesticide formulations of varying toxicity. These older pesticides can have serious environmental impacts and are also hazardous to food safety and the health of applicators, workers and farmers. The situation in South Africa is very similar.

Research and development (R&D) in agrochemicals in Northern countries, especially in Western Europe, Japan and the United States of America, has played a key role in bringing highly active, broad spectrum, less toxic pesticide formulations to the market. These have vastly reduced the problems associated with the production and use of pesticides. However, these benefits have largely accrued in developed countries. There is an urgent need to introduce and promote environmentally friendly and safe formulations in developing countries; however, many of them have limited access to them due to high costs and patent protections.

The Nantong Pesticide Formulation Development Centre (NPFC) undertook two separate but similar projects to address these issues. In Sudan, NPFC worked in partnership with the Senal Agricultural Industry and Chemical Company Ltd. Sudan (SAICC) and in South Africa with the Villa Crop Protection Academy (VCPA), under the Ministry of Agriculture of South Africa. In both cases, the projects were designed to establish a pesticide formulation plant based on environmentally friendly bio-pesticides and their water-based formulation technologies. This technology would be shared by the Nantong Pesticide Formulation Development Centre from China. The plant would produce products with the potential to replace older polluting pesticide formulations on the market and promote the development of a green crop protection industry in South Africa and Sudan. The project has benefits for environmental protection, food safety and human health while increasing the agricultural productivity.

Results

The project achieved the following results in Sudan:

- Two representatives from NPFC visited Sudan to collect information on pesticide formulations currently used in the country. During the mission, a study on the feasibility of establishing an environmentally friendly water-based pesticide formulation plant was completed.
- Two staff from Sudan were trained by NPFC in pesticide capsule suspension (CS) formulation.
- Three pesticide formulations were developed by NPFC for potential use in Sudan. The pesticides were found to have a good efficiency level and low toxicity and be able to be produced at low cost. The pesticides were subsequently transferred to Sudan.

The project achieved the following results in South Africa:

- Two representatives from NPFC visited South Africa to collect information on pesticide formulations currently used in the country. During the mission, a study on the feasibility of establishing an environmentally friendly water-based pesticide formulation plant was completed.
- Representatives from NPFC undertook study tours to Australia and the United States to gather relevant information on the formulation of environmentally friendly pesticides. Information gained during those visits was shared with other countries of the South.
- Two staff from South Africa were trained at NPFC in water-dispersible granule formulation.
- A recipe for environmentally friendly pesticide was developed by NPFC for potential use in South Africa. The pesticide was found to be effective and with low toxicity. It was subsequently transferred to South Africa.

Technical Cooperation for Environmentally Friendly Pesticide Formulation in Sudan

Technical Cooperation for Environmentally Friendly Pesticide Formulation in South Africa

Promoting Prefabricated Housing in Liberia

SSDC Partner	China-Africa Business Council (CABC)
Countries Involved	China and Liberia
Overview	Due to a variety of factors, the demand for housing in Africa grows by 15 to 20 per cent each year. Challenges to increasing supply include high construction costs, lack of technologies suitable for local contexts, limited local materials and lack of skilled workers. Prefabricated housing is one product that can be used to address this issue. In this project, cooperation between two private-sector enterprises enabled the transfer of prefabricated housing technology from China to Liberia.
Results Achieved	Sharing of information between Chinese and Liberian partners through study visits, workshops, and training programmes. Transfer of prefabricated housing technology, ensuring that the technology was adapted to the local needs and context. Opportunities provided for ongoing local employment.
Lessons Learned	Projects should begin with a feasibility study to understand the local context. Ongoing communication between the project team and stakeholders is vital. Meetings to exchange experience are important to discuss project progress, exchange views and make real-time improvements to the project as required.

Overview

Due to rapid urbanization, rapid population growth and other factors, demand for housing in Africa grows by 15 to 20 per cent each year. Housing development in Africa faces multiple challenges including high construction costs, lack of technologies suitable for local contexts, limited materials needed for construction, and lack of skilled labourers and technicians.

Prefabricated homes, or prefabs, are specialized types of prefabricated buildings that are manufactured off-site in standard sections. These sections can then be easily shipped and assembled on-site. The design of many prefab houses makes building assembly easy to teach and learn and does not require heavy equipment. Compared with traditional construction methods, assembly time can be reduced by 50 per cent and costs by 40 per cent. For African countries such as Liberia, with prolonged wet seasons, this technology can reduce construction periods and cut costs, easing pressure on housing demand.

Established in 2006, the China-Africa Business Council (CABC) was one of the first non-governmental organizations to facilitate economic and cultural exchange between China and countries in Africa. It encourages Chinese companies to conduct training programmes, enhance technical and cultural exchanges, create jobs for local communities with a focus on women, and promote charity work. The Beijing Hengtong Innovation Luxwood Technology Co., Ltd. is a member of CABC and a leading company in prefab housing.

CABC, Beijing Hengton Innovation Luxwood Technology Co., Ltd. and the Ministry of State for Presidential Affairs of Liberia collaborated on this project to promote and transfer prefab housing technology from China to Liberia, build local capacity and improve local housing standards. The project achieved this through:

- conducting research on prefab housing in Liberia;
- demonstrating the construction of prefab housing; and
- organizing workshops and training for local officials and technicians in the technology.

Promoting Prefabricated Housing in Liberia

Results

The project achieved the following results:

- a two-month feasibility study in Liberia conducted by the private-sector partner In 2017;
- successful organization of a China-Liberia rapid-assembly low-cost-housing technical seminar in Beijing, during which partners shared information on the construction technology. Participants noted that the technology being used in Liberia could also be shared with other African countries; and
- four-day training session in the prefab housing technology at a factory in Beijing.

Experience

- **The project helped to solve the housing problem with newly developed housing technology.** Based on the feasibility study, the technology was adjusted to the local context. It overcomes obstacles related to construction in Liberia and promotes the speed and comfortableness of locally built houses and buildings, saves on building construction costs, and meets the need for rapidly built, low-cost houses with standardized, serialized and complete low-cost-assembly housing technology. By doing this, it works to ensure local people's livelihood stability and development.
- **The project served as an entry point for Chinese enterprises to go into the Liberian building market.** The technology was well recognized by the Government of Liberia. As a result, memorandums/agreements of

cooperation in new city development projects, relocation projects, high-grade villas, housing, etc., continued to be signed.

- **The project drove development of prefabricated buildings in Liberia.** The popularization of this project will contribute to driving the development of the Liberia prefabricated building market, providing opportunities to learn prefabricated -building technology and more employment opportunities for local government departments, construction workers and students.

Lessons Learned

Overall, the rapid-assembly low-cost housing project in Liberia proceeded smoothly. The plan for each implementation step was reasonable, and some successful experiences can be used for reference for subsequent projects.

- **Work survey plays a key role in project implementation.** Previous research created an in-depth understanding of the economic situation, housing needs, local housing characteristics, construction material supply and condition of local construction technicians in Liberia, which indicated a direction for the project to research and develop a rapid-assembly low-cost house fit for Liberia.
- **Interaction during the project implementation supports project achievement.** The project team actively invited personnel in all fields in Liberia to participate in systematic technical training for local construction technicians to expose them to the housing technology, which enables rapid promotion of publicity at the local level.
- **Carry out experience-exchange meetings in time to make project achievements more practical.** During the implementation of the Liberia project, the project team held two experience-exchange meetings and invited people from all fields in Liberia and the Chinese construction technicians to participate to exchange views on the project so that the project could be improved in real time and make the results of the project more practical.

Housing in Liberia

Affordable Housing Technology for Developing Countries

SSDC Partner	International Centre for Materials Technology Promotion (ICM)
Countries Involved	Bahrain, China, Morocco and Sudan
Overview	In many countries, it can be difficult for low-income individuals and families to move from rental accommodation to home ownership. The light steel structure system, a technology developed in China, is one effective way to construct affordable social housing and help to meet needs in developing countries. The system provides low-cost, safe, environmentally friendly and permanent houses quickly. Through this project, light-steel-structure-system technology was transferred from China to Bahrain, Morocco and Sudan.
Results Achieved	Expert teams from China completed field visits in Bahrain, Morocco and Sudan to investigate local building conditions. A technology transfer workshop was held in Bahrain to present and share the technology with representatives from the Middle East and Africa. Two prototype houses were constructed in Bahrain. A local training centre, the International Smart Building Centre, is being established in Bahrain to facilitate further transfer of skills and technology and provide local training and employment. A new standard for a light steel housing system was formulated in Bahrain.
Lessons Learned	Training workshops were found to be a fast and efficient way to enhance technology innovation ability of engineers. Given this, future training for other actors such as researchers, managers and policymakers should be considered.

Overview

In many countries, it can be difficult for low-income individuals and families to move from rental accommodation to home ownership. This is equally true for low-income families in Bahrain, Morocco and Sudan. There is a need in these countries for adequate affordable houses to tackle a growing housing problem. For example:

- In Bahrain as many as 45,000 families are registered with the Government, having either applied for low-cost housing loans or for State-provided accommodation. The Government of Bahrain is working to provide housing for these low-income citizens and has been looking for proposals to shorten the long waiting lists for those seeking State assistance in obtaining a home.
- Morocco is carrying out a country-wide "Slum-Free City" programme. However, there are limited choices for building materials since the building components are mainly clay bricks and concrete blocks of poor quality.

The situation in Sudan is similar to that in Bahrain and Morocco. In all three countries, there is an urgent need

to build high-quality houses rapidly and at low cost.

The light-steel-structure-system technology developed in China and promoted by the International Centre for Materials Technology Promotion (ICM) is one effective way to construct affordable housing and thereby help to meet needs in developing countries. The system provides low-cost, safe, environmentally friendly and permanent houses quickly. It takes only seven days to construct the main structure for a detached dwelling of 200 m^2 with a structural safety guarantee period of 95 years. Dwellings are specially designed to enable rapid building of new towns or for post-disaster rehabilitation. In addition, approximately 90 per cent of the materials used can be recycled.

This project was specifically designed to make use of local material resources and employ local labour, thereby providing employment opportunities. The system is designed so that unskilled workers are able to learn the manufacturing technique and construction procedure quickly and easily with minimal training. The project cooperated with local enterprises to set up production lines and introduce suitable manufacturing techniques, equipment and advanced management experience.

The project was operationalized in multiple ways:

- undertaking feasibility studies in the three countries to ensure adaptation to local contexts;
- transfer of light-steel-structure-system technology from China to local counterparts;
- building of two demonstration prototype houses in Bahrain under the supervision of the Ministry of Housing of Bahrain;
- working with local authorities in Bahrain to develop and implement relevant building standards; and
- providing training for engineers from Bahrain in China.

Results

The International Centre for Materials Technology Promotion (ICM) organized field visits to Bahrain, Morocco and Sudan for an expert team to investigate the local building conditions and available building materials. Feasibility studies were also carried out to identify housing solutions to address the growing housing problem in each country. Following this mapping and assessment of the advantages and disadvantages of different options, ICM provided housing systems and building components tailored to the demands of each country context.

A technology transfer workshop was held in Bahrain to present and share the affordable housing technology with representatives from countries in the Middle East and Africa.

Two prototype houses using the smart light-steel-structure system were completed in Bahrain as a demonstration of the technique. To date, thousands of people have visited the houses. During the construction period, a 40-day on-site training programme for engineers from Bahrain and Morocco was held. Participants benefited from gaining general knowledge as well as specific training in affordable housing technology and the latest building systems.

A local training centre, known as the International Smart Building Centre, is being established in Bahrain to facilitate the future transfer of this technology and provide training and local employment. This centre will act as a hub for demonstrations and training as well as facilitate the transfer of Chinese know-how to other countries of the global South.

With cooperation from the University of Bahrain, a new standard for a light-steel-housing system was formulated in Bahrain based on existing international practices.

Lessons Learned

During this project, the training workshop has been found to be a fast and efficient way to enhance the technology innovation ability of engineers. Thus, similar training should also be carried out for more people, such as researchers, managers and officials as well as policymakers, to enhance the effect of technology transfer.

Building Efficiency and Research and Development of Energy-efficient Walling Systems Tailored for Viet Nam and Cambodia

SSDC Partner	International Centre for Materials Technology Promotion (ICM)
Countries Involved	Cambodia, China and Viet Nam
Overview	Energy consumption in buildings accounts for more than 30 per cent of total energy consumption, making the building industry one of the industries with the highest energy consumption. Heat insulation in buildings is one vital mechanism to save energy and improve building function and living conditions. Viet Nam and Cambodia are two countries that face challenges despite both having tropical and semi-tropical climate zones in that they lack heat-insulation walling systems. In this project, heat insulation technology developed by ICM in China was transferred to Cambodia and Viet Nam upon request from the Governments of these countries.
Results Achieved	Chinese experts trained stakeholders in Cambodia and Viet Nam in the preparation of insulation so that products could be produced locally. ICM, in collaboration with local partners, undertook research and development activities to ensure that materials developed were appropriate for the local context. A demonstration production line was developed in Viet Nam. Building standards for new insulation technology were developed in Viet Nam.
Lessons Learned	Projects should consider longer time frames to enhance project impact and enable follow-up work such as commercialization of technologies as well as development and management of production lines.

Overview

Energy consumption in buildings accounts for more than 30 per cent of total energy consumption, making the building industry one of the industries with the highest energy consumption. Heat insulation in buildings is one vital mechanism to save energy and improve building function and living conditions. External insulation and inner insulation for exterior walls are two common insulation methods used in Asia, with inner insulation for exterior walls well developed in China.

Viet Nam and Cambodia are two countries that face challenges despite both having tropical and semi-tropical climate zones in that they lack heat-insulation walling systems.

In recent decades, the building industry in Viet Nam has developed rapidly; however, there has been a shortage of insulation on the market. At the same

A small-grant project entitled "Comprehensive Utilization of Wastes and Sustainable Development in Building Materials Sector for Asian Countries along the Belt and Road"

time, the Government of Viet Nam has published a series of new policies to encourage the development of building materials. Thus, heat-insulation walling-material technology is crucial to the growth of the building sector of Viet Nam.

The situation in Cambodia is even worse. There is no concept of the importance of heat insulation and energy efficiency on the part of the Government or the general population. As a result, many people live in badly conditioned houses with very high temperatures and poor ventilation. At the same time, higher-income Cambodians use air conditioners 24 hours a day without any awareness of energy consumption or climate change issues.

The International Centre for Materials Technology Promotion (ICM) is one of the leading organizations undertaking research in energy-saving building materials in China. It has made great achievements in research and the application of the inner insulation of exterior wall systems as well as new three-dimensional fibre foamed concrete technology. ICM received requests from the Governments of Viet Nam and Cambodia to transfer technology from China to their countries. The energy-efficient walling system transferred to each country will be tailored to different building structures and features in the tropical and semi-tropical zones of Viet Nam and Cambodia.

The project incorporated the following activities:

- technology transfer workshops at ICM headquarters in China to train Vietnamese and Cambodian engineers in energy-saving walling materials;
- a feasibility study by Chinese experts in Viet Nam and Cambodia to investigate local research and development conditions, materials available locally, prices of materials, and the feasibility of setting up building material lines;
- joint research and development activities in each country;
- establishment of production lines for manufacturing common energy-efficient walling materials and new products tailored to local conditions; and
- development of new building standards.

Results

Workshops and Training

ICM developed foamed concrete technology and new three-dimensional fibre foamed concrete technology based on building needs in Viet Nam. Two researchers from the Viet Nam Institute for Building Materials (VIBM) were then trained at ICM. The training focused on the preparation of heat-insulation foamed concrete and industrial manufacturing technologies. Following that training, VIBM was able to successfully reproduce the foamed concrete and began construction on a production line.

Experts from ICM visited VIBM to provide further advice and support including additional lectures and training. During the mission, the two teams discussed challenges that were arising and jointly developed solutions and suggestions. ICM then arranged another workshop in China to transfer knowledge on establishing production lines for foamed concrete.

Similarly, a delegation from ICM visited Cambodia to undertake a feasibility study, train Cambodian engineers on cement and foamed concrete technology, and provide technical guidance on industrial production.

Research and Development

ICM, in partnership with local partners, undertook research and development activities to ensure that insulation materials were developed that were appropriate for local contexts.

Establishment of Production Lines

ICM worked with VIBM to design an economically viable, environmentally friendly demonstration production line. The production line was developed based on existing Chinese expertise and experiences. A demonstration building was then constructed using the foamed concrete from the production line to demonstrate its feasibility.

Building Standards

ICM worked with VIBM and local governments to formulate building standards for the new foamed concrete technology. Standards were developed based on previous experience in China.

Lessons Learned

A continuous SSDC project or longer project period is important to enhance the effect of the project. After this project, the foreign partners hope that ICM can make additional efforts to help them to promote thecommercialization of technology as well as operate and manage the production line for foamed concrete.

ICM has been working with them to promote the cooperation but more progress could be achieved under a continuous SSDC project.

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