

Facilitate B&R Development with Science, Technology and Education

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2018 marks the 5th anniversary of the initiation of the Belt and Road (B&R) Initiative by President XI Jinping. Looking back, we can say with pride that the Chinese Academy of Sciences (CAS) has made much contribution to the Belt and Road development in terms of scientific cooperation, innovation, scientific capacity building, education and training. As the largest national scientific organization in China with major functions in research and innovation, higher education and advice, CAS realized from the start it could take advantage of its comprehensive strength and contribute to the related needs and development of the initiative and that it had the responsibility to support this biggest international cooperation proposal ever raised by China.

CAS started to mobilize and support its scientists and staff to participate in the B&R development soon after the Initiative was first proposed in 2013. The reason we could take quick actions was largely because CAS had a few major programs in operation focused on strengthening cooperation and exchange with developing countries by the time the proposal was made. Tools of support were launched some time earlier accompanying with the election of Prof. BAI Chunli as president of TWAS (the World Academy of Sciences for the advancement of science in developing countries) in 2012. As an old saying goes, opportunity particularly goes to those who are well prepared.

Today the programs and tools available at CAS in support of its institutes and scientists' engagement and cooperation with the B&R countries (countries along the

Belt and Road) include: the CAS International Outreach Program to developing countries that supports the setting up of overseas research and education centers there, President International Fellowship Initiative (PIFI) that supports both international scholars and graduates (both for doctoral and master's degrees) to work and study in China, the CAS-TWAS Centers of Excellence program that gives enhanced support to programs and actions coordinated and organized by the centers, the CAS International Partnership program that supports joint research under joint funding scheme and the CAS B&R Scientific Cooperation Action Plan that support joint research projects in a wide range of areas.

Due to CAS active engagement and support in the past five years, we have formulated a preliminary but rather comprehensive network of cooperation and exchanges with the B&R countries, which contains overseas centers, cooperative projects, graduate education and training of experts and administrators. We have had our impact felt and voice heard in some of the Belt and Road countries. Our work and efforts range from addressing specific local challenges to global ones, from the education of PhDs and masters to the training of officials and administrative people, from cooperation between individual scientists to that between institutions. In the following, a few aspects are presented to illustrate our efforts, accomplishments and contributions.

1. The 9 overseas research and education centers established have become important platforms in strengthening cooperation and exchanges with the

B&R countries, and the few CAS-TWAS centers of excellence have done a good job in carrying out cooperation and exchanges in the services of the Belt and Road development.

In the past five years, CAS has set up 9 overseas research and education centers focused on major local social/economic needs and global scientific challenges. Done in partnership with the local institutes on the principles of mutual consultation, joint efforts and shared results, these centers are located respectively in the capital cities of Kenya, Kazakhstan, Uzbekistan, Nepal, Sri Lanka, Myanmar, Thailand, Chile and Brazil. As open platforms for research and education, they welcome scientists from all over of the world to use. Though much needs to be done to attract international scientists, their attraction to scientists from other Chinese institutions has been obvious.

It is also obvious that they have done a good job in addressing the local sustainable needs, upgrading the local scientific capacity building, and training of both graduates and scientific experts. Their works and efforts have won high appraisals from the hosting countries and institutions.

Officials from ministries of higher education, city planning and water supply of Sri Lanka prize the CAS, China-Sri Lanka Joint Research and Education Center as meeting their national needs. Though the center is yet to be completed, it has already provided costal weather forecasts services and made good progress in addressing CKDu, a chronic kidney disease of unknown etiology, commonly to be caused by unclean drinking water. The fact that the Government of Sri Lankan has provided a match-fund equivalent to 81 million RMB to assist the addressing of CKDu indicates the importance of the Chinese efforts.

Officials from the Ministry of Education, Kenya and the hosting institution Jomo Kenyatta University of Agriculture and Technology (JKUAT) such as Amina Mohammed, Cabinet Secretary and Mabel Imbuga, former Vice-Chancellor of JKUAT prize the first-ever Chinese-African joint research center – the Sino-Africa Joint Research Center as meeting the critical needs of the country in biodiversity conservation, green development and research capacity building and as injecting new driving force to propel JKUAT to a much higher level in research and innovation. “With this center, we can conduct experiments at the university. It provides us such convenience,” commented by a Kenya researcher when hosting a high level visit from China.

As an old Chinese saying goes, “providing the fish is no better than providing the fishing rod and techniques.”



China-Sri Lanka Joint Research and Education Center, though still under construction, has already provided costal weather forecasts services and made good progress in addressing CKDu, a chronic kidney disease of unknown etiology, via improving the quality of drinking water for local communities.

For the centers in both Kenya and Sri Lanka, this is exactly what we wish to realize. We are not only providing the buildings, equipment and good scientists, but the knowledge and skills to the local people, with which they will master the ability to address the local needs.

“The CAS Central Asian Drug R&D Center meets our strategic needs. We can well expect it to be good services to the local people,” said the former president of the Academy of Sciences of Uzbekistan. The center contains a set of facilities from medical services to drug development. It is in the process of registering a few medicines in China and Uzbekistan and in bringing multiple teams to make the center a truly functional one.

The CAS-South America Center for Astronomy brought to Chile an astronomical data center and an international postdoc program. These actions not only benefit scientists from Chile, but scientists from other countries.

Five years ago, 5 CAS-TWAS centers of excellence were jointly set up in the field of climate change, safe clean drinking water, disaster mitigation and control, green technology and biotechnology. Each has its own impact and achievements in sharing expertise and promoting south-south and south-north cooperation.

CAS-TWAS Center for Green Technology (CEGT) dedicated itself to the promotion of green development

in the Belt and Road regions through tech-transfer and technology upgrade assistance. They actively engage themselves with local partners in Mongolia, Russia and Myanmar to green their mode of production. New technologies helped reduce environmentally-hazardous residues and by-products in coppering mining process and increase the output and further investment, which revitalized the industry and local economy and overall development. In the Myanmar case, the cooperation and introduction of new technology have led to direct and indirect creation of about 10,000 new job opportunities and have brought in over 120 millions dollars in taxation to the Myanmar government.

CAS-TWAS Center of Excellence for Water and Environment committed itself to train professionals in the water and environmental engineering for developing countries and promote joint research and transfer of adaptable water treatment technologies. With the support of the center, the Ministry of Environment of Cambodia established its first laboratory for water environment research and built its first online water monitoring station at Mekong River.

Most of these overseas centers carry out education and training programs. The Center in Nairobi has provided graduate training to more than 150 students. The Center in Sri Lanka has provided training to more than 50 students. The short training courses organized by these centers are designed to meet specific local needs and are very well received by the locals.

Indeed, each CAS overseas center has good stories to tell. In general, they have become important assets to the local people, posing to make more contributions to the local needs.

2. President International Fellowship Initiative (PIFI) offers a package of fellowships and scholarships to promote people-to-people bond, scientific exchanges, and research cooperation. The initiative includes CAS-TWAS PhD Fellowship Program and the CAS B&R Master Fellowship Program that focus on the training of first-class talents in science and engineering.

The CAS-TWAS Fellowship PhD Program started in 2013 and supports 200 students to pursue PhD degrees in science and engineering at CAS every year. In order to create a base for selection and also according to increased demand, CAS launched the CAS B&R Master Fellowship Program in science and engineering. It recruits 150 students every year. So far, these two programs have recruited about

1,500 students, of which 100 PhDs have graduated.

In addition, CAS organizes 15 to 20 short training courses every year in areas such as eco-environment, flora and fauna resources, infectious diseases, extension and application of appropriate technology, green and sustainable development, disaster mitigation and control. So far, about 3,000 scientific experts and administrative people have participated in these trainings in the past 5 years.

The scholarship programs and these trainings have helped facilitate scientific cooperation, contributed to people-to-people understanding, and trained a large number of young researchers, engineers and capable administrators. Among our graduates and trained, some have already served in important research and administrative positions going back, or been employed by our overseas research and education centers. To make sure that some of the students can get back home, our overseas centers have programs to support them to continue their research back home. According to our records, there are good stories for both categories of people. Some of them have played key roles in establishing cooperative relationship with CAS.

Dr. Komiljon Tojibaev, a postdoc researcher of the CAS Kunming Institute of Botany, is now Director of the Institute of Botany in the Academy of Sciences of Uzbekistan. He was elected an academician of the Academy of Sciences of Uzbekistan.

Dr. Binod Dawadi, a PhD graduate of the Tibetan Research Institute of CAS, is now Deputy Director of Kathmandu Center of Research and Education, one of the CAS 9 overseas research centers built in partnership with Tribhuvan University. He was also awarded National Education Award of Nepal for his contribution in higher education in Nepal.

The current cooperation with both Cambodia and Sri Lanka in water and environment would not be in place without the bridging of the two trainees, Ms. Chhun Monita from the Ministry of Environment of Cambodia and Dr. S. K. Weragoda from the National Water Supply and Drainage Board of Sri Lanka. Their organizations are carrying out mutual beneficial cooperation with CAS institutes.

Looking into the future, we can well anticipate their more important role in bridging cooperation, and many contributions from them in helping the development of their countries. Scientific talents are important force for innovation and therefore for the success of the Belt and Road initiative. CAS will continue this good path and to prepare more talent for the B&R countries.

3. CAS organized and supported over 100 scientific cooperative projects in the past 5 years in jointly addressing the needs of B&R countries and particularly aimed at its green, healthy, safe and sustainable development.

These cooperative projects cover a wide scope of areas closely related to the needs of Belt and Road countries, such as infectious diseases and biosafety, eco-environment and sustainable development, biodiversity conservation and resources utilization, science data and engineering support, natural disaster mitigation and control.

The joint geological survey carried out by CAS and Pakistan scientists on the motion of Makran Trench has improved the preparedness of the cities and people in Pakistan for future potential disasters. International geological community confirmed several devastating earthquakes and tsunamis in history originated from that part of the Indian Ocean.

Again the joint efforts between CAS and Pakistan scientists have provided strong scientific bases for the construction of the Nehru Tim Jielu Mu Hydropower Station, the largest hydropower project in Pakistan.

Digital Belt and Road program provided the remote sensing data and technologies for natural disaster mitigation and world heritage protection. The project led to the discoveries of 10 Roman civilization remains in Tunisia and a few sites in Central Asia. The achievements were highly appreciated by the Ambassador of Tunisia to China in a letter of thanks to CAS. In addition to adding up the world heritage list, these sites will bring the Tunisia more international tourists.

The team led by Prof. WANG Tao from CAS Northwest Institute of Eco-Environment and Resources

assisted the Mongolian Academy of Sciences in effectively preventing the invasion of sand dunes to highways and railways. The Mongolian Academy of Sciences wrote to President BAI Chunli, thanking CAS and Prof. WANG Tao's team for the help. To honor Prof. Wang's contributions, the Mongolian Government presented him the Labor Prize of Mongolia.

The joint biotechnology laboratory between CAS Technical Institute of Physics and Chemistry and Ethiopian Meat and Dairy Industry Development Institute aims at the development and commercialization of environmental friendly bio-technology for bone gelatin manufacturing. The joint efforts will enable local agricultural industry to manufacture and export bone gelatin from animal bones, which were disposed as waste and caused severe pollution in the past. The commercialization of the new technologies will also help to create over 500 jobs for the local community.

Some of the projects won global recognition and attracted participation of international organizations and scientists. A good example is the Third Pole Environment (TPE) program. The Third Pole region is centered on the Tibetan Plateau and has gained growing attention due to its significant role in global atmospheric circulation and its sensitivity for providing a first indication in climate changes. The TPE program successfully pooled international efforts for the interdisciplinary study of water-ice-air-ecology-human correlations. Data generated by the cooperative program are shared among member organizations and scientists of the program. The scientific discoveries and publications benefitted the surrounding countries of the region in environmental policy-making.



The Sino-Africa Joint Research Center meets the critical needs of Kenya in biodiversity conservation, green development and research capacity building.



South America Center for Astronomy (Chile and Argentina)
(Launched in February 2013, the center was granted the
International Research Organization status in Chile by the
Chilean government)



China-Brazil Joint Lab for Space Weather
(Started in 2014 in Brazil)
Focusing on global pattern of space weather events

Sino-Africa Joint Research Center
(Started in June 2013 in Kenya)
Focusing on green and sustainable
development in Africa





Five CAS-TWAS Centers of Excellence:

Providing training to more than 750 students and researchers from more than 50 developing countries

CAS-TWAS Center of Excellence for Climate & Environment Sciences



Focusing on scientific issues concerning climate and environment facing developing countries

CAS-TWAS Center of Excellence for Water & Environment



Contributing to the improvement of local health safety by revealing the connection between drinking water and diseases

CAS-TWAS Center of Excellence for Biotechnology



Releasing the First Report on Biotechnology in Developing Countries

CAS-TWAS Center of Excellence for Green Technology



Addressing local environmental problems and directly creating job opportunities for 5,000 local people in Burma

CAS-TWAS Center of Excellence on Space Tech for Disaster Mitigation



Focusing on upgrading scientific capacity for space disaster mitigation, forming a sharing system of data base for space disaster mitigation in Asia