Government-Industry-University-Research Collaboration on the Belt and Road Initiative: China-Sri Lanka Partnership for a "Benefiting the People, Heart-Warming" Clean Water Project (Postprint)

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Abstract

Sri Lanka is located at the "crossroads" of east-west maritime traffic in the Indian Ocean and serves as an important partner country for China in building the "21st Century Maritime Silk Road." In recent years, with the joint support of the Chinese and Sri Lankan governments, institutions affiliated with the Chinese Academy of Sciences, domestic universities, and medical research institutes, together with relevant Sri Lankan organizations, have conducted cooperative research on the worldwide challenge of chronic kidney disease of unknown etiology (CKDu) and its pathogenesis occurring in the dry zone of central Sri Lanka. Simultaneously, China has actively responded to the shared concerns of both the ruling party and opposition in Sri Lanka, adopting a "government-industry-academia-research" cooperation model to create a "people-benefiting, heart-warming" "Clean Water Project" that addresses Sri Lanka' s long-standing safe drinking water supply issues, strives to enhance Sri Lanka' s drinking water safety and security capabilities, and thereby plays a positive role in promoting "people-to-people bonds" between China and countries along the "Belt and Road."

Full Text

Building the Belt and Road through Government-Industry-University-Research Institute Collaboration: A Case Study of the "Beneficial and Heartwarming" Clean Water Project in China-Sri Lanka Cooperation

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Abstract

Sri Lanka is located at the crossroads of the Indian Ocean, which plays an important role in China' s "the 21st century maritime Silk Road" initiative. In recent years, with the joint support from the governments of China and Sri Lanka, the Chinese Academy of Sciences (CAS) has pioneered in taking a series of innovative actions in Sri Lanka to carry out cooperative research on the subject of chronic kidney disease of unknown causes (CKDu) by working closely with its international partner institutions. CKDu is an internationally recognized public health problem and is becoming a growing concern in Sri Lanka. CAS also actively responds to the concern of Sri Lanka in the drinking water problem and gives a helping hand to solve the problem. So far, China has constructed some public interest projects by the model of "Government-Industry-University-Institute collaboration," and strives to enhance drinking water safety and security capabilities in Sri Lanka, which could promote the people-to-people bond between China and the countries along the Belt and Road.

Keywords: people-to-people bond, the Belt and Road initiatives, Sri Lanka, safe drinking water, public interest projects

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The bond between states lies in the affinity between peoples, and affinity between peoples lies in mutual understanding. As the Belt and Road Initiative gains increasing recognition from countries worldwide, "people-to-people bonds" — one of the five key cooperation priorities outlined in the initiative—has become the popular and social foundation for promoting regional cooperation. Sri Lanka is located at the crossroads of the Indian Ocean' s east-west maritime routes, serving as the intersection of the ancient Silk Road' s southern overland route and the Maritime Silk Road. It is also an important partner country in China' s construction of the 21st Century Maritime Silk Road. In recent years, however, China-Sri Lanka relations have experienced fluctuations and even stagnation. Therefore, developing "beneficial and heartwarming" projects that can serve as a "stabilizer" to ensure bilateral friendly relations can withstand changing circumstances is of great significance. The year 2017 marks the 60th anniversary of diplomatic relations between China and Sri Lanka and the 65th anniversary of the Rice-Rubber Pact. Optimizing and upgrading China's practical cooperation with Sri Lanka to consolidate the popular foundation of bilateral relations and promote people-to-people bonds between China and countries along the Belt and Road will facilitate the smooth advancement of Belt and Road construction.

1 Background of the China-Sri Lanka Clean Water Project

Most countries along the Belt and Road are developing nations with backward infrastructure and poor sanitation conditions. They face widespread challenges in ensuring drinking water safety, preventing water pollution, protecting water environments, and developing water resources, leading to prominent public health hazards. According to UN statistics, approximately 884 million people worldwide lack access to safe drinking water, and 2.6 billion people lack basic sanitation services [1]. Due to unsafe drinking water and sanitation conditions, approximately 842,000 people die from diarrhea annually, primarily in developing countries. Improving water safety, sanitation facilities, and healthcare could prevent 361,000 deaths among children under five each year [2]. The UN 2030 Agenda for Sustainable Development calls for providing water and sanitation for all and ensuring their sustainable management by 2030 [3].

Sri Lanka has long faced challenges in ensuring safe and sanitary drinking water. Since the 1990s, Chronic Kidney Disease of Unknown Etiology (CKDu) has ravaged the country, affecting up to 40,000 people with a standardized prevalence rate of approximately 15%, and causing over 20,000 deaths to date [4]. According to official data, approximately 20,000 kidney failure patients are hospitalized or readmitted annually, with about 2,000 deaths [5]. CKDu is most severe in Sri Lanka' s North Central Province, primarily affecting low socioeconomic status populations, particularly vulnerable groups engaged in agricultural production [6]. Healthy individuals gradually lose their ability to work after contracting the disease, and treatment costs become a heavy burden for both affected families and local health institutions, imposing a tremendous strain on the local economy and people' s livelihoods. No consensus has been reached on the pathogenesis of CKDu. According to preliminary research by the World Health Organization (WHO), groundwater quality is an important influencing factor. For instance, the combined effects of groundwater hardness and pesticide contamination may contribute to CKDu onset. Therefore, providing safe drinking water to residents is currently one of the most effective approaches for disease prevention and control.

Currently, CKDu is spreading gradually from Sri Lanka' s central dry zone to surrounding areas, becoming a livelihood issue that affects social stability and a political priority for successive governments eager to find solutions. It is also an international health challenge of great concern to WHO and other international organizations. However, due to the country' s underdeveloped socioeconomic conditions, it faces various challenges including frequent natural disasters, a shortage of scientific and technological talent, and insufficient innovation capacity. Although the government attaches great importance to solving drinking water safety issues, it struggles to address them independently and is actively seeking international cooperation and assistance. WHO, the United States, and Japan have long been involved in research and aid related to CKDu pathogenesis. In May 2013, the Sri Lankan government requested technical assistance from China to help solve the safe water supply problem in CKDu-affected areas. To

respond to this major concern from Sri Lanka, relevant institutions of the Chinese Academy of Sciences (CAS), with strong support from both governments, began cooperation with their Sri Lankan counterparts.

2 Joint Government Support for Bilateral Cooperation

Since 2013, led by the Research Center for Eco-Environmental Sciences of CAS, Chinese institutions including the Institute of Hydrobiology, Institute of Remote Sensing and Digital Earth, Chongqing Institute of Green and Intelligent Technology, Hefei Institutes of Physical Science, Beijing Center for Disease Prevention and Control, Peking University First Hospital, and domestic water enterprises have conducted frequent exchanges with Sri Lanka' s Ministry of Water Supply and Drainage, National Water Supply and Drainage Board, Ministry of Health, University of Peradeniya, and other institutions to accurately identify Sri Lanka' s scientific and technological needs in addressing CKDu.

2.1 Active Government Support and Agreement Signing In April 2014, then Sri Lankan President Mahinda Rajapaksa met with CAS President Bai Chunli during his visit to Sri Lanka, and the two sides engaged in extensive and in-depth discussions on strengthening scientific and technological cooperation. President Rajapaksa expressed Sri Lanka' s willingness to enhance scientific and technological exchanges and cooperation with China, hoping that China would help improve Sri Lanka' s scientific and technological innovation capacity, establish joint research and education bases, and conduct collaborative research and talent training. In September 2014, witnessed by Chinese President Xi Jinping and then Sri Lankan President Rajapaksa, CAS and Sri Lanka' s Ministry of Higher Education signed the Agreement on Establishing the China-Sri Lanka Joint Center for Education and Research on the Maritime Silk Road. The center focuses on cooperation in marine science, ecological environment, and talent training, building a South Asian platform for scientific research and talent cultivation centered in Sri Lanka, with water and environment as priority cooperation areas. Subsequently, in March 2015, witnessed by Chinese President Xi Jinping and Sri Lankan President Maithripala Sirisena, CAS President Bai Chunli and Sri Lankan Minister of Water Supply and Drainage Rauff Hakeem signed the Memorandum of Understanding between the Chinese Academy of Sciences and the Ministry of City Planning and Water Supply of Sri Lanka. In April 2016, the two governments issued a joint statement, agreeing to cooperate on CKDu etiology research, safe water supply, and the construction of the China-Sri Lanka Water Center. In October 2016, CAS signed another memorandum of understanding with the Sri Lankan Ministry of Health to conduct close cooperation on CKDu etiology analysis and control in Sri Lanka.

2.2 Building Research Teams and Cooperation Platforms China and Sri Lanka plan to jointly establish the "China-Sri Lanka Water Technology Research and Demonstration Joint Center" as a sub-center of the "China-Sri Lanka Joint Center for Education and Research on the Maritime Silk Road" (referred

to as the "China-Sri Lanka Science and Education Cooperation Center"). The China-Sri Lanka Water Technology Research and Demonstration Joint Center was officially approved by both governments in December 2016, with completion expected in 2019. Relying on this joint center, both sides will promote the formation of joint research teams to conduct research in key areas including CKDu etiology, water treatment technology, and water resources planning. The focus will be on: (1) developing decentralized and centralized safe water supply technologies and complete equipment suitable for Sri Lankan villages, rainwater collection and purification technologies, and wastewater treatment and reuse technologies; (2) organizing national water resources and water quality surveys in Sri Lanka, investigating land and water resource utilization status, and formulating feasible solutions to enhance Sri Lanka' s water quality testing and analysis capabilities as well as water technology research and application capacity; (3) providing technical support for elucidating CKDu causes and ensuring safe water supply in affected areas, and offering the Sri Lankan government comprehensive solutions for drinking water safety in disease-stricken regions; (4) establishing a rural water supply management platform for CKDu-affected areas to accumulate relevant data and provide scientific basis for helping Sri Lanka formulate national water supply and drainage planning and water resources management plans; and (5) encouraging domestic enterprises to go global by conducting field investigations in Sri Lanka to develop affordable drinking water purification equipment suitable for local conditions, preparing for Chinese equipment to enter the broader South Asian market.

2.3 Infrastructure Aid and Water Supply Capacity Enhancement
Currently, Sri Lanka' s water treatment facilities are inadequate, and there is a shortage of expert technical personnel. At the request of the Sri Lankan government, China' s Ministry of Commerce officially approved in October 2015, through government foreign aid channels, the construction of a specialized kidney disease hospital and the "China-Sri Lanka Water Technology Research and Demonstration Joint Center" in Polonnaruwa, the region most severely affected by CKDu. The center will be built on the campus of the prestigious University of Peradeniya in Kandy, the Buddhist "holy city," covering an area of 2 hectares. The facilities will include a comprehensive research building, advanced water quality analysis laboratories, a pilot-scale center, expert apartments, and supporting infrastructure. In recent years, with support from Chinese government concessional loans and commercial loans, Chinese enterprises have been constructing several water supply projects in Sri Lanka, providing safe drinking water to large numbers of Sri Lankan people. For example, in 2014, China Machinery Industry Corporation' s subsidiary China Machinery Engineering Corporation (CMEC) commenced construction of the Athana Water Plant, Sri Lanka' s largest single water supply project. With a total investment of approximately US$230 million and a three-year construction period, the project will cover 397 square kilometers upon completion, providing clean water to 600,000 people in 42 local villages—a major beneficial project for

the people [7].

2.4 Talent Training and Technical Exchange To cultivate high-level management and scientific talent needed for Sri Lanka' s technological development and enhance their professional and practical skills, CAS currently sponsors dozens of young Sri Lankan students to pursue master' s and doctoral degrees in China through Chinese Government Scholarships, CAS-TWAS President' s Fellowship, and University of Chinese Academy of Sciences (UCAS) scholarships. In March 2016, CAS and Sri Lanka' s Ministry of Water Supply and Drainage jointly organized a CKDu symposium in Colombo. Over 150 experts from both countries attended, including specialists in public health, environmental science, drinking water, hydrogeology, and chronic kidney disease from CAS' s Research Center for Eco-Environmental Sciences, Peking University and its First Hospital, Beijing Center for Disease Prevention and Control, Sri Lanka' s Presidential Task Force for CKDu, Ministry of Health, University of Peradeniya, and University of Sri Jayewardenepura. This was the first symposium of its kind held in Sri Lanka, where experts discussed etiological investigation methods and treatment technologies, and comprehensively examined the potential contributions of water quality, geochemistry, agricultural practices, diet, medical care, and social factors to CKDu, along with possible solutions. Sri Lankan President Maithripala Sirisena, Chinese Ambassador to Sri Lanka Yi Xianliang, Sri Lankan Minister of Water Supply and Drainage Rauff Hakeem, and Chairman of the National Water Supply and Drainage Board K.L.L. Ansa attended the closing ceremony and heard the "CKDu Mitigation Action Plan Recommendations" proposed by experts from both sides. At the conclusion of the symposium, President Sirisena specially presented a commemorative medal to Professor Qiu Huasheng of CAS in recognition of his important contributions to promoting the construction of the China-Sri Lanka Science and Education Cooperation Center and cooperation in safe water supply and public health.

3 Recommendations for Optimizing and Upgrading Practical Cooperation with Sri Lanka

The Belt and Road Initiative focuses on five key areas: policy coordination, facilities connectivity, unimpeded trade, financial integration, and people-to-people bonds. Compared with the first four areas, people-to-people bonds constitute the social foundation of Belt and Road construction and represent the fundamental guarantee for the smooth, in-depth, and sustainable implementation of all related work. Livelihood cooperation forms the basis of people-to-people bonds, and public interest projects serve as the material carriers of livelihood cooperation. Only through solid implementation of public interest projects can we gain the understanding, acceptance, and support of local populations, thereby ensuring the smooth implementation of Belt and Road construction. As an important partner in China' s 21st Century Maritime Silk Road construction, developing "beneficial and heartwarming" projects in Sri Lanka to ensure bilateral friendly relations can withstand historical changes holds significant "stabilizer" value.

3.1 Piloting People-to-People Projects through Safe Drinking Water Cooperation Water and environment projects are internationally recognized priority areas for livelihood assistance. China has already undertaken extensive safe drinking water cooperation in Sri Lanka, generating social and livelihood benefits. It is recommended to strengthen top-level design for people-to-people projects in Belt and Road countries, promote practical implementation, and ensure the 落地 of a number of landmark projects. Leverage the pilot demonstration effect of safe drinking water projects to lead and drive other people-to-people projects in science and education cooperation, such as marine meteorological disaster forecasting, geological disaster early warning, and ecological environmental protection. Given the widespread drinking water safety issues in Belt and Road countries, we should summarize the models and experiences from Sri Lanka' s safe drinking water projects, select representative countries in Southeast Asia, South Asia, the Middle East, Central Asia, and East Africa for technology and equipment demonstration and promotion, help these countries solve livelihood problems, and support national Belt and Road construction.

Currently, the World Bank, Asian Development Bank, WHO, and the United States Agency for International Development (USAID) have undertaken extensive work on safe drinking water issues in South Asia and other regions. For example, in June 2015, the World Bank provided US$165 million in credit to expand piped water supply services and improve sanitation facilities in Sri Lanka. Since 2012, USAID has implemented multiple clean drinking water programs in the country, providing sustainable water supply services to drought- and flood-prone areas in southern, eastern, and northern Sri Lanka, while collaborating with local NGOs such as the Lanka Rainwater Harvesting Forum (LRWHF) to leverage local organizational advantages and experience, achieving good results. These international organizations and countries have been implementing clean drinking water projects in Sri Lanka for many years with substantial investment and visible outcomes, earning excellent reputations among local populations. This creates external pressure for China' s future work in the country. It is recommended that in advancing science and education cooperation, we should respect the roles of existing international or regional organizations in partner countries, actively learn from their experience in local science and education cooperation, and when necessary, engage in mutually beneficial cooperation with them to leverage existing platform advantages for jointly discussing and selecting urgently needed or distinctive cooperative research programs. Furthermore, we should give full play to the unique advantages of non-governmental forces, broaden channels for people-to-people exchanges, build civil consensus, strengthen civil actions, and jointly operate public interest projects.

3.2 Creating a New Model of Government-Industry-University-Research Institute Collaboration for People-to-People Projects Driven by the Belt and Road Initiative, the scale and scope of China' s foreign infrastructure assistance continue to expand. Meanwhile, as China' s environmental protection industry grows stronger and water supply and drainage

technologies mature, the capacity and demand for Chinese environmental enterprises to "go global" are increasing. On the one hand, research institutions need enterprise support to implement technical assistance abroad; on the other hand, enterprises also need platforms and support to "go global." In particular, domestic environmental enterprises are primarily endogenous and lack talent, technology, and experience when going global. We should create a new model of "government-industry-university-research institute collaboration" to jointly build public interest projects. With support from the Chinese government and countries along the Belt and Road, research institutions should leverage their strengths to build cooperative research networks and industrial technology alliances with all parties, promoting water and environmental technology exchanges and cooperation between China and developing countries. By sharing China' s accumulated experience and technologies in water and environmental fields with developing countries, we can help them solve major livelihood issues in these domains while effectively promoting the export of technology and capital from China' s water industry. This approach will facilitate Chinese water enterprises' "going global" strategy, help them explore water markets in Belt and Road countries, and ultimately achieve a mutually reinforcing relationship between scientific and technological assistance and economic returns. This will create a new situation of "clean water diplomacy" and significantly enhance China' s national image.

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Note: Figure translations are in progress. See original paper for figures.