China Leads in Global Quest for Sustainability

Dialogue

By LONG Yun & BI Weizi

Imagine a world where sustainable development isn't just a goal but a reality, powered by innovation and collaboration. That's the world China is helping to build. With its advances in renewable energy and other sci-tech fields, China has become a global green powerhouse, setting the pace for a sustainable future.

Dr. Nicholas Mulei Musyoka, a Kenyan associate professor in renewable energy and energy storage at the Nottingham Ningbo China Beacons of Excellence Research and Innovation Institute, which is a part of the University of Nottingham Ningbo China (UNNC), recently shared his thoughts on China's renewable energy achievements and why they matter to the rest of the planet, with *Science and Technology Daily (S&T Daily)*.

Dr. Nicholas Mulei Musyoka. (PHOTO: S&T Daily)

China's cooperative nature

Musyoka's passion for renewable energy began during his master's and doctoral studies in South Africa, where he was involved in the country's national hydrogen and fuel cell strategy. Reflecting on his early career, he said, "I was fortunate enough to get a job as a postdoctoral fellow at the Council for Scientific and Industrial Research in South Africa. I worked in the hydrogen program, which allowed me to gain expertise in major international and bilateral projects." This experience laid the foundation for his later work in China, where he was drawn by the country's rapid development and commitment to renewable energy.

In 2019, Musyoka visited China for the first time, invited by a professor at Beijing Forestry University. He recalled a warm reception from his Chinese counterparts, which along with a prior connection with the University of Nottingham motivated him to join the UNNC in Zhejiang province. Since then, he has spent over a year and a half at the UNNC, describing it as a "tremendous experience, both personally and professionally."

One of the most striking aspects of China's research and development system, according to Musyoka, is its collaborative nature. "It's not just within the university system itself, but also opportunities to network and work with other institutions," he explained. He has been able to establish partnerships with leading Chinese institutions, which has enabled him to work on solving common problems on a global scale.

Musyoka also applauded the work ethic of his Chinese colleagues and students. "Their attitude is really impressive. They achieve a lot within a short space of time, which is reflected in the accelerated development across various sectors in China," he said.

Path to cleaner future

When asked about China's most notable achievements, Musyoka highlighted its leadership in solar and wind energy. "China has the largest solar installations globally and is a leader in manufacturing capability. In wind energy, both onshore and offshore installations are impressive," he said. These advancements are driven by strong policy directives and significant manufacturing capabilities.

In the energy storage sector, China is leading the way in battery technology, particularly in the production and market penetration of new energy vehicles (NEVs). According to Musyoka, China's advancements in setting a benchmark are driving down global costs. He called on other countries to learn from China's technological and adoption advancements while collaborating closely, saying that the widespread adoption of EVs in China creates a ripple effect, motivating other countries to follow suit because "they can see the benefits."

A shared responsibility

Musyoka emphasized that China's progress in renewable energy should not be viewed as a threat but as a positive contribution to global efforts to combat climate change. By leading the way in decarbonizing sectors like transportation and heavy industry, China is setting an example for other countries to follow.

He also highlighted the importance of international partnerships, particularly between China and Africa, in advancing renewable energy. "Through partnerships, knowledge transfer and infrastructure development, African countries can harness their renewable energy potential," he said. For example, China's involvement in solar energy projects in Morocco and Egypt is helping to exploit the region's vast renewable energy resources.

Looking ahead, Musyoka identified energy storage as the most critical area for innovation. "The biggest bottleneck in the wide-scale adoption of renewable energy technologies is energy storage, and how to store this energy in an efficient, cost-effective manner," he said. Having worked on hydrogen technologies for over a decade, he believes they hold a lot of promise. "Hydrogen can be stored forever and converted into green synthetic fuels when needed," he added.

Musyoka also discussed the potential of carbon capture and utilization technologies. "By capturing CO_2 from industrial emissions and reacting it with hydrogen produced through renewable energy, we can create greener fuels and chemicals," he said. These innovations could decarbonize hard-to-abate industries like steel and cement production, further contributing to global efforts to combat climate change.

As the world faces the urgent challenge of climate change, Musyoka's message is clear: "We should all join hands to push forward and create a wonderful world for everybody." Through shared knowledge, collective action, and a commitment to innovation, we can build a sustainable future for generations to come, he added.

UNNC also contributed to this article.

My China Story

My Amazing Journey to the East

By Robert Mark Ellam

I must start by saying that it still astonishes me to have spent so much time in China in recent years, and to think how deeply my life has become intertwined with this country...I grew up in a working-class family in a small town in industrial northern England, where most people's experience of international travel was either as conscripted soldiers or, for the more affluent and adventurous, vacations in France or Spain.

In the 1960s, it was probably more realistic to daydream about going to the Moon than to expect to visit China, let alone live there. If I formed a vision of China, it would have been from back issues of *National Geographic* magazine passed on to me by a friend of my father.

Possibly my first inkling that it might be possible one day to visit China was when some of my Open University colleagues participated in an expedition to the Qinghai-Xizang Plateau. Participation in the expedition was a major research opportunity for those involved, and samples collected were the basis of the PhD project for my friend and fellow student. I remember watching her plotting Rb-Sr isochrons for Lhasa granites on the thermal printer of an HP4585T — the height of 192 kB desktop computer sophistication at that time.

More than 25 years would pass before my own first visit to China in 2011, when Liu Congqiang, director of the State Key Laboratory of Environmental Geochemistry of the Chinese Academy of Sciences (CAS), invited us to visit his own institute in Guiyang and a variety of other CAS laboratories around the country. I remember insisting that we add a night in Shanghai, where we had no academic business, to our itinerary, because I genuinely believed this might be my single lifetime chance to visit China and didn't want to miss Shanghai. As it happened, that was the first of what became regular visits to China.

In my previous position, I led the Scottish Universities Environmental Research Centre (SUERC), a collaborative research centre operated by the Universities of Edinburgh and Glasgow and funded largely by the UK Natural Environment Research Council. I had known Professor Liu for several years, and when he established the Institute of Surface Earth System Science (ISESS), SUERC became ISESS's first international partner because we identified mutual benefit in a research and training alliance. I visited Tianjin University (TJU) regularly during my tenure as SUERC director and in my capacity as honorary professor of TJU and member of the ISESS International Academic Advisory Committee. When I decided it was time to leave SUERC, the new School of Earth System Science was an obvious place in which to launch the next stage of my career.

Certainly, I have seen many changes; the Institute and School have grown beyond my expectations, but there are still many friends left from the early days. The Weijin Road Campus seems to be continually changing. As I travel between Tianjin and the new Daxing airport, I'm more often than not in an electric car. The car is, of course, only "green" if the electricity it uses is sustainably sourced, but I see wind turbines appearing almost as quickly as in the UK, and my perspective is based on my Scottish home, which is only a couple of kilometres from Europe's largest onshore wind farm.

Professor Robert Mark Ellam is a well-known isotopic geochemist, academician (Fellow of the Royal Society of Edinburgh) and a chair professor at TJU.

LAMOST: Observing Distant Stars

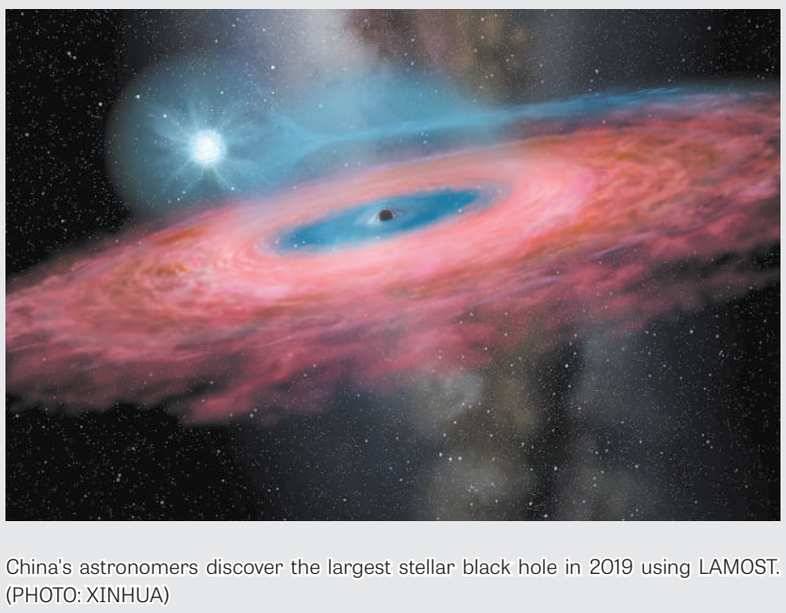
Science Outreach

By BI Weizi

In order to fully exploit the Large Sky Area Multi-Object Fiber Spectroscopic Telescope (LAMOST)'s potential and achieve the highest scientific return, astronomers have identified three key research areas based on the telescope's capabilities and characteristics.

Galaxy physics has long been a feature in the international astronomical community.

As an important part of the LAMOST scientific survey, hundreds of thousands of spectra of extragalactic objects are expected to be obtained to study galaxy evolution, AGNs/QSOs, large-scale structure, and dark matter/energy.



China's astronomers discover the largest stellar black hole in 2019 using LAMOST. (PHOTO: XINHUA)

Another important task of the telescope is to study the structural properties of stars and the Milky Way. LAMOST has made it possible to observe more distant stars, so that the structure of the Milky Way can be more accurately understood. Stars are an important component of many galaxies. The spectrum of a star allows astronomers to analyze its physical condition such as density and temperature, to study its chemical composition, and to measure its speed of motion and orbit. By studying the distribution of different types of stars, the formation of the Milky Way can be further investigated.

Multi-band sky identification is also another important research objective of LAMOST. It is common practice in the astronomical community to analyze objects detected in other bands of the spectrum, such as radio, infrared, X-rays and gamma-rays. The combination of a large aperture, wide field of view and 4,000 fibres makes LAMOST one of the most powerful optical spectroscopic survey instruments in the world.

LAMOST is a special active reflecting Schmidt telescope independently developed by China. By using an innovative active optics technique that continuously changes the mirror surface, a series of different Schmidt reflecting systems can work at different times.

Traditional Eastern Wisdom

Bai Tie-Dye: Art of White and Blue

By Staff Reporters

The tie-dye technique of the Bai ethnic group in Yunnan province in southwest China is a traditional textile dyeing technique, listed as a national intangible cultural heritage.

It typically uses cotton or cotton-linen blended white cloth and indigo solution made from natural plants such as polygonum tinctorium, dyer's woad root and mugwort as the primary dye.

The core process has two steps: tying and dyeing. In the tying phase, after the pattern is drawn on the fabric, the areas that should remain white are tightly bound with thread so that the dye would not be able to go into it. Then the cloth with knots all over it is immersed into a dye vat. After the dye has taken effect, the cloth is removed, dried, and then subjected to repeated dyeing. Each immersion deepens the color, resulting in a deep and vibrant hue. The variations in tightness and density during the tying process create an array of shades, giving the final product a rich texture. Each tie-dyed piece is unique.

Nowadays, the Bai people have innovated the traditional tie-dye technique, combining it with modern dyeing technology. This has made the traditional monochrome tie-dye more colorful, creating a new style.

German teachers and students try their hand at tie-dye in China. (PHOTO: VCG)

China, ASEAN Accelerate Digital Cooperation

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Commenting on the collaboration, Thai Deputy Prime Minister, Prasert Jantararuangtong emphasized the significance of China's achievements in digital economy development. "China's success in areas such as 5G, AI, and infrastructure has the potential to empower ASEAN countries in their own digital transformation efforts," he said. Furthermore, Xu Liping, a researcher at the Institute of Asia-Pacific and Global Strategy, Chinese Academy of Social Sciences, highlighted that the increasing political trust and shared development goals between China and ASEAN are solid foundations for strengthening digital cooperation. He said, "The complementary advantages of China's digital technologies and ASEAN's dynamic market create a virtuous cycle of growth and opportunity for both regions."

With robust cooperation frameworks and technological advancements in place, the future of China-ASEAN digital collaboration looks promising. The strengthening of digital infrastructure, combined with talent cultivation and policy alignment, will drive economic growth and foster long-term prosperity for both regions, making the digital economy a key pillar of China-ASEAN relations.