



Science and Technology Daily

VOL.6-NO.254

AUGUST 22-23, 2026

Ecological and Environmental Code Comes into Force

By Staff Reporters

China's Ecological and Environmental Code came into force on August 15, following its adoption at the fourth session of the 14th National People's Congress in March. It is the world's first unified legal code named specifically for the ecology and environment, and China's second statutory code after the Civil Code.

The Code consists of 1,242 articles in five chapters, covering pollution control, ecological protection, and green and low-carbon development. These three areas directly address the three planetary crises of climate change, biodiversity loss and pollution identified by a 2021 United Nations Environment Programme report, *Making Peace With Nature: A Scientific Blueprint to Tackle the Climate, Biodiversity and Pollution Emergencies*.

Before the Ecological and Environmental Code was formulated, there were more than 30 ecology and environment-related laws. Ten of them, including the Environmental Protection Law, have been comprehensively revised and incorporated into the Code. These laws cease to be in force with the Code taking effect.

Key principles and provisions from the existing laws concerning river basins, regions, natural resources, biodiversity and other ecological elements and ecosystems, as well as those concerning the circular economy and energy conservation have been incorporated into or reflected in the Code. These laws will continue to remain in force.

To address legal needs related to climate change, carbon peaking and carbon neutrality, and green and low-carbon development, the Code sets out certain principles and forward-looking provisions in the areas where no dedicated laws have yet been enacted.

Homegrown Chinese practices, including the river and lake chief system, ecological and environmental zoning-based management and control, and ecological conservation red-lines, have been incorporated into the Ecological and Environmental Code. These institutional innovations, born of China's own experience, form the strongest practical foundation for the Code. *See page 2*

WEEKLY REVIEW

New Chip Converts Light Signals into Tokens

A team led by Miao Feng and Liang Shijun from Nanjing University, in collaboration with the National University of Singapore, has developed an ultra-low-power intelligent vision sensor chip that directly converts light into tokens. The tokens generated by this chip can be fed directly into an encoder for image recognition.

AI Large Model Facilitates Soybean Breeding

Chinese researchers have unveiled an upgraded version of "Fengshu" 2.0, a vertical large model tailored for soybean science, to facilitate data-assisted breeding of soybeans, according to Anhui Agricultural University.

Light-powered Nanorobots Can Collect Bacteria

Researchers from the University of Würzburg have built microscopic, light-driven robots that can rapidly navigate through liquid, collect bacteria, and deposit them in chosen locations. These tiny "cleaners" could open new possibilities for manipulating cells and microbes with remarkable precision.

Type of Breast Cancer Found Manipulating Immune System

New research from the University of Oklahoma has revealed how an aggressive type of breast cancer can manipulate the immune system to draw nerves into tumors, creating conditions that may help the cancer grow.



China launches its reusable rocket Zhuque-3 Y2 on August 19, and achieves its first successful land-based controlled recovery of a rocket's first stage using deployable landing legs. (PHOTO: XINHUA)

STI Frontier

Green Power Hub in Canyon

By LU Zijian & SUN Yu

A great dam stands on the Lancang River in a canyon located between the counties of Nanjian and Fengqing in Yunnan province, southwest China. This is the Xiaowan Hydropower Plant, a key power source for China's west-to-east power transmission program and a flagship project in the cascade hydropower development of the Lancang River Basin.

The Xiaowan Hydropower Plant has been advancing on a path of innovation, from the excavation of a 700-meter-high slope to the independent development of the core control system of the 700 MW hydropower unit.

Tackling complex geology

When the first group of builders walked into the unfrequented canyon, they were met by nearly vertical cliffs, a

rapid river and complex geology. Excavating a 700-meter-high slope was unprecedented in global hydropower history.

Soon after construction began, Slope No.2 developed dangerous creep deformation. It created the risk of a landslide that could block the river and form a landslide-dammed lake, threatening the safety of the arch dam and the underground powerhouse.

The situation was traced to three main factors: the excavation disrupted the slope's original stability, the blasts during construction caused vibrations, affecting the slope, and the rainfall softened the soil. In addition, delays in implementing support and drainage measures aggravated the situation.

Although some experts thought the site would be extremely difficult and risky to stabilize, the building team ultimately settled on a comprehensive treatment

plan. It meant using prestressed anchor cables, with anti-slide piles as a supplementary measure.

More than 1,380 bundles of anchor cables, 15 anti-slide piles and retaining walls, 10 steel-frame anti-slide piles, and a three-dimensional drainage tunnel system comprising nine levels with a total length of 3,750 meters were all completed within just over a year.

"The anchor cables stabilize the accumulated mass by pulling it from above, while the anti-slide piles act like a row of supporting columns to hold the bottom in place, and the drainage system promptly alleviates the impact of rainfall," Sun Yamin, a hydraulic engineering technician, said. Through these intensive, comprehensive stabilization measures, the deformation was brought under control in about six months and reached long-term stability after one year. *See page 2*

Robotics Wows the World at WRC 2026

By LI Linxu

Do you want to watch robots boxing, dancing, or even cooking? Are you interested in finding business partners in robotics? Or perhaps you just want to have some fun? Come to the World Robot Conference 2026 (WRC 2026).

Themed "Human-Robot Symbiosis, Production-Demand Convergence," the 2026 edition of WRC kicked off in Beijing on August 19.

Speaking at the opening ceremony, Xin Guobin, vice minister of industry and information technology, said the operating revenue of industrial enterprises above designated size in China's robotics sector exceeded 300 billion RMB in 2025, with an average annual

growth rate of over 20 percent over the past five years.

This year's event gathered more than 300 exhibitors, presenting over 3,000 products — including more than 300 debuts.

At the booth of Beijing Innovation Center of Humanoid Robotics, the Tian-gong Omni, a new intelligent species of humanoid robot, demonstrated versatile skills such as walking on plum-blossom piles, navigating stairs, and crawling on all fours, vividly illustrating its motion control, environmental adaptability, and task execution capabilities.

At Fourier's booth, a Robot Butler's Day, an immersive experience space, drew crowds of visitors. Multiple GR-3 robots acted as "intelligent butler

assistants" in a simulated home environment. Visitors could control the robots with natural language commands, enabling them to autonomously allocate tasks and independently perform a range of duties — from home security and item delivery to daily companionship and visitor reception, showcasing new possibilities for robots to integrate into future family life.

This year's WRC witnessed greater international participation with support from about 30 international organizations, including the United Nations Industrial Development Organization, the International Federation of Robotics, and the World Federation of Engineering Organizations.

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International Cooperation

C919 Goes Global with Open Collaboration

By YAO Yian

On August 12, Air China's C919 commenced daily round-trip service between Beijing and Ulaanbaatar in Mongolia, marking China's first domestically built trunk jetliner entering a regular international commercial route, integrated into the global ticketing system.

This signals the C919 has entered a new phase of cross-border passenger service — a step made possible by not waiting for Western certification but by leveraging bilateral cooperation.

Under the China-Mongolia mutual airworthiness recognition framework, the C919 can operate without going through the lengthy U.S. FAA or European EASA certification process. Tian Linchuan, an assistant researcher at the School of Aeronautics and Astronautics at Shanghai Jiao Tong University, said the Western certification is a "bonus, not the only threshold" for China's jet to go global. The roughly 1,200-kilometer route, with a flight time of two hours 15 minutes, falls well within the C919's optimal operating range. It will help China accumulate overseas operational data and build replicable international service standards.

This milestone is preceded by years of overseas cooperation by another homegrown Chinese civil aircraft, the C909. The jet has already opened 25 overseas routes in Indonesia, Laos and Vietnam, serving over one million passengers and building experience in overseas regulation and maintenance systems. Air China operated the C909 on the Hohhot-Ulaanbaatar route for nearly a year, ensuring Ulaanbaatar's airport had full support capabilities for Chinese-built aircraft before the C919's arrival.

International airshows and industry expos have further expanded enterprise-level cooperation. At the July 2026 Farnborough International Airshow in the UK, models of the C909, C919 and the under-development C929 wide-body jet were displayed, drawing inquiries from overseas aviation professionals.

At the fourth China International Supply Chain Expo in Beijing in June, the AVIC SAC Commercial Aircraft Company Ltd., a key C919 supplier, announced stable partnerships with over 500 suppliers across 20 countries and regions. Wang Cui, Airbus global senior vice president, pointed out that China is the company's largest single-country market, with 2,334 aircraft in service in Chinese mainland as of May 2026.

The C919 is expected to expand to Southeast Asia and Central Asia, using Belt and Road operations as a foundation for regional spare-parts depots and maintenance centers. EASA certification, projected to take three to six years, will open access to the European Union and over 90 countries. In an era of geopolitical uncertainty, the C919's international debut reinforces a clear message: What enables aircraft to fly farther is never going it alone, but open collaboration.

New Graphic

From January to July

China's Value-added
Industrial Output of
High-tech Manufacturing

13.8% Y-O-Y

Source: National Bureau of Statistics
Designed by SONG Ziyao / Science and Technology Daily

WECHAT ACCOUNT



E-PAPER



Ecological Protection Plan Launches All-round Restoration

Policy Express

By TANG Zhexiao

Six government authorities, including the Ministry of Ecology and Environment and the Ministry of Natural Resources, have jointly issued the 15th Five-Year Plan (2026-2030) for ecological protection to advance the integrated conservation of mountains, rivers, forests, farmlands, lakes, grasslands and deserts.

The document sets out that by 2030, China's ecological spatial framework will be optimized, ecological quality will see steady improvements, biodiversity loss will be effectively curbed, and more high-quality ecological products will be supplied. The supervision systems for ecological conservation and restoration will be further refined, and the national ecological security will be effectively safeguarded.

Specific goals have been put forward:

- ◆ Nature reserves on land should account for no less than 18 percent of the nation's terrestrial territory.



Lotus flowers bloom in Donghu Lake in Wuhan, central China's Hubei province. (PHOTO: XINHUA)

- ◆ The Ecological Quality Index should be raised to 86.5.
- ◆ Soil and water conservation rate should exceed 74 percent.
- ◆ Forest coverage rate should hit 25.8 percent.

Ecological conservation and restoration will target the "Three Zones and Four Belts," referring to the Qinghai-Tibet Plateau Ecological Barrier Area, the Yellow River Key Ecological Function Area, and the Yangtze River Key Ecological

Function Area, to build green barriers in the Three-North Shelterbelt Program.

For coordinated ecosystem conservation and restoration, the plan assigns three major tasks: enabling natural ecosystems to recuperate, carrying out ecosystem restoration projects, and boosting urban-rural ecological livability.

It sets out regulations for protection of grasslands, forests, rivers, lakes and wetlands, proposes to strengthen protection of original deserts, glaciers, snow-capped mountains, permafrost systems, and marine ecosystems, and strictly control sea reclamation.

China will upgrade urban green space systems, make park lands accessible to the public, rehabilitate urban wetlands and water environments, and manage small-scale water bodies in rural areas.

Full-scale biodiversity conservation will be incorporated into municipal statutes, plans and policy frameworks.

Other goals include strengthening ecological quality monitoring and assessment, and the construction of ecological civilization demonstration areas.



training, recruitment and development of innovative talent engaged in basic research, and encourage major science projects that spot and cultivate talent through hands-on practice at the research frontline.

To stimulate the creativity of researchers, MOF has expanded the scope of the lump-sum project-funding system, a no-line-item budgeting model that gives researchers greater flexibility in budget management, alongside competitive and stable funding streams.

MOF is also collaborating with other departments to reform the science evaluation system, establishing a classification-based assessment framework tailored to the distinct nature of basic research, according to Wang.

AI models to build a "smart brain" for customs supervision. The system will automatically detect risks, issue alerts, and enable rapid response, cracking down on smuggling and other illegal activities.

GACC will also adopt embedded and non-intrusive supervision models, connecting customs operations with enterprise production, warehousing and logistics systems, thereby achieving more precise oversight, higher efficiency and a better business environment. Companies will no longer need to repeatedly submit paper documents or halt operations for inspections.

More high-tech inspection equipment, including smart scanners, handheld terminals and inspection robots, will be deployed for rapid, non-invasive screening of containers.

Case Study

Xizang: Pioneering New Path for Green Development Through Tech

By TANG Zhexiao & YANG Yuhang

Nagqu city, situated at an altitude of 4,500 meters in Xizang autonomous region, was long plagued by tough natural conditions and a weak industrial base. Breaking away from traditional development models, Nagqu is leveraging technology to build deep processing as well as restore the ecological environment, forging a new path that prioritizes ecological conservation and green development in ultra-high-altitude regions.

Nagqu, home to the Qiangtang Grassland, a vast alpine plateau, is among China's five major pastoral areas. It abounds in plateau-specific fauna and vegetation, including yaks, Tibetan sheep and caterpillar fungus. Nevertheless, its local industries remained stuck in the phase of selling raw materials, while the value-added deep processing was done outside the region.

But now, thanks to bio-extraction technologies at high altitudes, low-value by-products such as yak bones and hides are processed into high-value raw materials for functional food via extraction of collagen and active peptides.

Distinctive livestock breeds, such as the Jiali Niangya yak and the Duoma sheep, are gradually entering the national market, backed by organic certifications and geographical indications.

Currently, Nagqu is home to 22 leading agricultural and pastoral enterprises and 1,616 specialized cooperatives. These cooperatives distribute an average of about 700 million RMB in annual dividends, adding an average of 100,000 RMB to the annual incomes of family ranches and large-scale breeding households.

The per capita disposable income of farmers and herders grew from 15,792 RMB in 2021 to 21,586 RMB in 2025, an average annual growth rate of 8.2 percent.

While intensive processing has resolved industrial bottlenecks, ecological

restoration has also delivered remarkable results.

Located in the northwestern Xizang ecological conservation area, 96.64 percent of Nagqu's land area has been designated as a priority ecological protection zone. According to the Municipal Ecology and Environment Bureau, the region is advancing a model combining governance, scientific research, and public education, transforming abandoned mines into demonstration sites for plateau mine restoration.

Equipped with ecological monitoring stations and science exhibition spaces, restored mining areas are serving as open-air laboratories that can be observed, studied, and replicated.

The comprehensive vegetation coverage of Nagqu's grasslands has increased to 51.72 percent, with a cumulative restored area of 7.11 million mu. Nagqu city, as well as Jiali county and Nyainrong county, have been named national demonstration zones for ecological civilization development.

Nagqu's installed clean energy capacity has reached 1.37 million kilowatts, ushering in a new era of exporting Nagqu's green power. Its highway mileage exceeds 35,900 kilometers, and main power grids cover all counties and districts. Nearly 10,000 communication base stations connect the region to the outside world.

Behind these figures lies the deployment of key technologies, such as photovoltaics, energy storage, and grid integration. The extensive coverage of communication base stations has laid the foundation for the emergence of new business models including remote education, smart animal husbandry, and e-commerce live streaming across Nagqu.

From abandoned mines to scientific research bases, Nagqu is demonstrating that high-altitude regions can embark on an innovative path prioritizing ecological conservation and green development.



Tibetan antelopes migrate within the core area of the Qiangtang National Nature Reserve, Nyima county, Nagqu city, Xizang autonomous region. (PHOTO: XINHUA)

China's Basic Research Spending Sees Steady Rise

By CHEN Chunyou

China continues to prioritize basic research, with its 2026 central-level budget for core basic research rising by 16.3 percent year on year, said Wang Ye, deputy director-general of the department of science, education and culture of the Ministry of Finance (MOF), at a recent press conference.

In the first half of 2026, national general public budget revenue reached 12.1 trillion RMB, up 4.7 percent year on year, while expenditure stood at 14.33 trillion RMB, a 1.5 percent increase, according to MOF.

Wang said the central government has prioritized science and technology in its fiscal allocations, optimizing spending structures to boost investment in basic research.

Besides direct central funding, MOF has introduced fiscal transfer payments and tax incentives to encourage local governments, enterprises and private capital to beef up their R&D expenditure, fostering a diversified funding ecosystem.

This approach has delivered tangible results. China's total national expenditure on basic research grew from 55.5 billion RMB in 2013 to 277.8 billion RMB

in 2025, ranking second globally. The proportion of total national R&D expenditure climbed from 4.68 percent to 7.08 percent.

To build a solid foundation for basic research, MOF has coordinated resources across channels to support the construction and sharing of major national science and technology infrastructure and research platforms.

Talent development is equally important. To build a high-caliber research workforce, MOF supports initiatives that select and nurture top-tier students in basic disciplines, provide comprehensive support for the

Customs to Accelerate Smart Upgrades

By CHEN Chunyou & WU Yefan

By 2030, more than 90 percent of China's ports will be equipped with smart inspection devices, as the country accelerates "Smart Customs" upgrades during the 15th Five-Year Plan period (2026-2030), according to Sun Meijun, minister of the General Administration of Customs of China (GACC).

Speaking at a recent press conference, Sun said in the first half of 2026, China's foreign trade imports and exports grew by 16.9 percent year on year, with exports rising 13.4 percent and imports up 22.1 percent. Foreign trade

showed a development trend characterized by growth in both volume and quality, a shift toward green and innovation-driven growth, improved import and export structures, and an expanding network of trading partners.

Wang Jun, GACC vice minister and spokesperson, said during the 14th Five-Year Plan period (2021-2025), GACC leveraged digital and intelligent technologies to fundamentally reshape customs procedures. The Smart Customs framework has now reached a stage of integrated operation and initial maturity.

One notable example is the portable customs clearance system for in-

bound and outbound parcels, a public platform integrating online declaration, tax payment, tax refund, return processing, and shipment tracking.

Individuals can now complete all customs formalities for cross-border parcels without leaving their homes.

During the 15th Five-Year Plan period, GACC aims to build a systemic risk prevention system, deploy smart customs supervision, facilitate cross-border trade, and enhance collaborative governance mechanisms.

In the coming years, it will continue to develop Smart Customs further. It will leverage massive datasets and large

Green Power Hub in Canyon

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Developing a domestic control system
For a long time, the key hardware and software of the core control system and supporting system in large hydropower plants used imported equipment, which meant expensive purchases and maintenance, according to Wang Yuanhong, deputy director of the Xiaowan Hydropower Plant.

The computer-based supervisory and control system is like the nerve center of a hydropower plant. It is also one of the Xiaowan Hydropower Plant's key areas of focus. Two development paths lay ahead: the mature distributed control system used in thermal power plants and the centralized control architecture for hydropower plants that is safer and more reliable, but more challenging.

After repeated discussions, techni-

cal reviews and analyses, the project leader made the final decision: building a fast, efficient, compatible and open centralized control system that uses international communications standards for power system automation, supported by hardware terminals integrating automatic generation control and automatic voltage control functions.

The first communications test was unsuccessful, but the team did not give up. After countless rounds of testing, troubleshooting and optimization, indexes such as the timeliness, accuracy and speed of control and response of the system's data transmission all met the requirements of national and industrial regulations. Some of the indexes are even higher than current standards.

In September 2025, the Xiaowan Hydropower Plant became China's first

hydropower plant with generating units boasting an individual capacity of 700 MW and a 100-percent domestically managed control system.

A hydro-solar complementary model
There are several photovoltaic (PV) stations around Xiaowan. PV power generation, dependent on weather conditions, varies strongly and can be intermittent. Large-scale integration of solar power into the power grid can cause safety issues. Zhang Xiaodong, deputy director of the Xiaowan Hydropower Plant's new energy construction and management department, said they envisioned a hydro-solar complementary model that leverages the rapid startup and shutdown capabilities of hydropower to smooth out fluctuations in solar power output and ensure grid stability.

With a reservoir capacity of 15 billion cubic meters, the Xiaowan Hydropower Plant is essentially a giant "power bank" with excellent regulating capabilities.

When there is surplus electricity, PV power can be used to pump water into the reservoir for storage and release it when needed. This can significantly improve the utilization of PV power, Zhang said.

The key to realizing this vision is to optimize how PV power is connected to the hydropower plant. The project team conducted a detailed assessment of the conditions at each PV station and proposed an innovative hydro-solar interconnection model. A dedicated collection station was proposed to aggregate power from the dispersed PV resources for transmission, complemented by grid-forming synchronous condensers.

Following this model, the Xiaowan Hydropower Plant gathers 1.23 GW of clean energy from 16 PV stations in the region with a total installed capacity of 5.43 GW. The annual power generated can meet the need of about seven million households, and cut about 16 million tonnes of CO2 emissions per year.

Ecological and Environmental Code Comes into Force

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A core feature of this integrated approach is a separate book on green and low-carbon development. It establishes and improves incentives for green consumption, developing systems for recycling and reuse of waste, and promoting coordinated green transformation of upstream and downstream enterprises, thereby translating the principles of putting ecology first and pursuing green development into legal rules.

The Code also includes a dedicated chapter on responding to climate change, establishing a legal mechanism to mitigate climate change through the carbon peaking and carbon neutrality goals.

In addition, the Code has a dedicated section on international cooperation under the book on green and low-carbon development, providing for active participation and leadership in global climate governance, as well as bilateral and multilateral international exchanges and cooperation to address climate change.

Overstretched Security Concerns Can't Stop Win-win Cooperation



By GONG Qian & ZHANG Mengran

A yet-to-break-ground car factory recently stirred unease within certain Spanish government departments. Attempts to block the project, however, cannot hold back the momentum toward deeper and more substantive China-Spain cooperation.

In June, the regional government of Galicia in Spain announced that Chinese carmaker SAIC Motor will build its first European electric vehicle (EV) plant in port city Ferrol, with an initial investment of 200 million euros, and estimatedly create over 2,300 new jobs. For this old industrial city described by local authorities as "in particular need of such opportunities," the investment comes as much-needed, timely support.

Yet at a time when the project is awaiting final approval, Spain's Defense Ministry and the National Intelligence Center unexpectedly raised security concerns, claiming that the plant's proximity to a military shipyard and naval base might facilitate so-called Chinese "espionage operations."

However, the allegation doesn't withstand basic logical scrutiny. Enrique Santiago, the parliamentary spokesperson for the political coalition United Left, argued that if China wanted to monitor Spain's naval movements, it would use its vast satellite network or launch cyber operations, rather than build a plant employing thousands of local workers. Santiago said on X: "With



The first car carrier from the Chinese automotive giant SAIC Motor is welcomed in Ferrol, Spain on July 9, 2026. (PHOTO: VCG)

satellites existing, it is not credible that a factory is a 'threat.'"

Exactly! Suspecting a factory of spying when it is in full public view and subject to local government oversight is not a security assessment — it is overactive imagination.

What makes the issue even more thought-provoking is its timing. Alfonso Rueda, president of the regional government of Galicia, put it plainly: Two tiers of government had worked on the project for months without a single security concern being raised. "It is surprising that a central government department is now making such statements."

Spanish left-wing coalition Sumar pointed a finger at NATO, alleging behind-the-scenes pressure from external actors. Spanish political parties and officials know that the so-called security

issue is nothing more than a pretext for maligning competitors one cannot out-compete.

However, rational voices soon prevailed. Sources from the Spanish Prime Minister's Office clarified that the Defense Ministry's objection was merely a report and was "non-binding." Óscar López, Spanish minister for digital transformation and public function, made it clear that the government is convinced the Chinese investment will be compatible with industrial growth, job creation and national security.

Trade unions also backed the project for a straightforward reason: It will create quality jobs and opportunities for digital and energy transition.

According to insiders, the project is set to be approved as public opinion, employment and economic development

represent tangible livelihood interests that cannot be overlooked.

Spain in fact has a bigger picture to consider. It harbors ambitions to take the lead in EV production in Europe, a goal that hinges on partners such as SAIC Motor with proven technological and supply-chain strengths. Yolanda Díaz, Spain's second deputy prime minister and a native of Ferrol, discussed advancing the project with Chinese counterparts during her China visit in May. From national authorities to local governments, politicians to trade unions, Spanish stakeholders share one overriding attitude: eager for delivery.

The Ferrol controversy drives home two key points. First, "security" is a serious concept. When weaponized for extraneous purposes, it becomes a cover for protectionist self-interest and undermines international trade rules. Second, hard facts will eventually dispel artificially stoked fears.

A July 2025 study by top European think tank Bruegel notes that Chinese investment can reindustrialize European regions hit hard by the decline of the combustion-engine sector: CATL's plant in Hungary is projected to create 9,000 jobs, while Chery plans to reactivate the former Nissan plant in Barcelona, Spain.

As an old Chinese saying goes: A straight foot is not afraid of a crooked shoe. Chinese companies go global on the strength of their own technology and production capacity, bringing jobs and industrial upgrading to host economies. Roadblocks built on overstretched security arguments cannot stop win-win cooperation. The imperative for development will ultimately drown out politically motivated noise.

definition, data compliance and intellectual property ownership. In addition, there are inconsistent regulatory rules and incomplete compliance systems at the supervisory level.

Therefore, to promote the steady and sustainable development of "AI + OPC," all sectors of society need to build consensus and work together.

According to Wang, OPCs should adhere to the principle of technology for good and strive for alignment at the value, institutional and philosophical levels. He emphasized the need to focus on key core technology bottlenecks, build an open and collaborative industrial ecosystem, deeply engage with the real economy, and empower the transformation and upgrading of traditional industries. At the same time, talent development systems should be strengthened to cultivate a fertile ground for innovation.

Liang proposed a shift from investing in hardware to investing in people, from venue leasing to opening up real-world scenarios, from cash subsidies to computing and model vouchers, and from isolated entrepreneurship to community synergy. "Make money first, then pursue perfection. AI is your employee, and you are the CEO. One-person entrepreneurship does not mean fighting alone; joining a community is a necessity for OPC survival."

stronger industrial ecosystem."

Er. Bikash Gurung, president of the Robotics Association of Nepal, said China's robotics industry is the market leader in the world. The innovation in robot world models, the dexterity of the robots, and the growing physical ability of humanoid robots is surprising the world. As the world heads for a trillion-dollar intelligent robot industry, China will have a major share of the market and the investment from China-based robotics companies will grow exponentially. Nepal and China already have co-operation for robotics development. "Our association is supporting the uptake of China-based robots, whether industrial, humanoid or sorting robots."

Voice of the World

A Solid Legal Model for Clean and Beautiful World

—— International Experts Weigh In on China's Ecological and Environmental Code

Edited by QI Liming

China's Ecological and Environmental Code, the world's first code specifically named after the ecological environment, has drawn the attention of experts from around the globe. They regard it not only as a significant legal achievement in advancing China's ecological civilization, but also as a solid legal model for promoting the joint construction of a clean and beautiful world.

The Code integrates pollution control, ecological protection, green and low-carbon development, and accountability into a single institutional framework. Sam Geall, associate fellow at the Chatham House Environment and Society Centre in the UK, said China's comprehensive and systematic approach to establishing an ecological environment legal system holds great value. The Code has devoted a separate chapter to "green and low-carbon development" and a separate section to "addressing climate change," providing a reference for other countries in promoting green and low-carbon transformation.

Gaston Kouao, an environmental protection expert in Côte d'Ivoire, said, "Environmental issues have never been problems faced by a single country alone; rather, they are challenges that all of humanity must confront together." China has long maintained consistency in policies and actions regarding biodiversity conservation, pollution control, and ecological environment protection.

The Code is not only an important institutional outcome of China's ecological civilization construction practice, but also provides a new practical sample for other countries to promote green development through the rule of law, he said.

According to Dimitri de Boer, chief representative of the global environmental organization ClientEarth's office in China, the Code is not only a crucial milestone in the development of China's environmental legal system, but also provides innovative institutional solutions that can serve as a reference for global environmental governance.

The Code is not only driven by strong practical needs but also has a solid theoretical foundation. In the eyes of Clifford Cobb, vice president of the U.S. Institute for Postmodern Development of China, it embodies China's experience in environmental governance, and represents a fruitful achievement in China's efforts to promote ecological civilization.

Dubravka Ćedović Handanović, Serbian minister of energy and mining, said, "The issue of ecological environment involves multiple aspects such as economy, society, resource utilization and people's livelihood. It requires governance through systematic institutional arrangements." The Code incorporates ecological environment protection into the framework of legalization and institutionalization, which is of great significance for improving the ecological environment governance system and provides a reference for other countries, she added.

Hi-Tech

Smart Mosquito Traps Make Summer Parks More Pleasant

By Staff Reporters

As evening falls, visitors stroll along the shores of Northwest Lake Park in Wuhan, central China's Hubei province, enjoying the cool air. Many have noticed a striking difference this summer: Unlike in previous years, when mosquitoes frequently feasted on parkgoers, there seem to be far fewer of the insects buzzing around.

The change can be attributed to a batch of high-tech mosquito traps that have gone into operation in the park.

"These smart, breathing-simulation biological mosquito traps use biomimetic technology to capture and eliminate mosquitoes, without using chemical agents throughout the process," said Wang Zeming, a senior engineer at the park.

The machines attract mosquitoes by releasing carbon dioxide at a specific concentration to continuously simulate human breathing. Standing quietly among the grass, the black cylindrical devices have a simple, understated design that blends into the surrounding

landscape. An electronic display on each machine provides real-time updates on mosquito-catching data, making the equipment's operating status easy to monitor.

When in operation, the traps also activate special-spectrum lights that provide a secondary attraction for mosquitoes in the surrounding area, improving the capturing efficiency. Once mosquitoes are lured close to the machine, a negative-pressure airflow draws them inside like a vacuum cleaner, where they are confined in a sealed collection box and killed by dehydration.

"Compared with traditional methods such as pesticide spraying and sticky mosquito traps, smart mosquito traps are environmentally friendly and pollution-free. They can operate around the clock, with real-time access to mosquito-control data," Wang said. "They target only blood-feeding mosquitoes, without harming beneficial insects such as bees and dragonflies, making mosquito control more efficient, environmentally friendly and visually unobtrusive."



A mosquito trap stands on the lawn at Northwest Lake Park in Wuhan, Hubei province. (PHOTO: VCG)

Experts Map Out Survival Rules for OPCs

Opinion

By LIANG Yilian & JIANG Yun

With the advent of the AI era, the entrepreneurial spark of One-person Companies (OPCs) is gaining significant momentum. As numerous cities roll out targeted policies and establish funds to support OPC development, industry experts at the inaugural "AI+OPC" Innovation and Development Conference in Hangzhou recently shared insights into how OPCs can thrive.

Why was OPC impossible in the past but possible today? In the view of many experts, what appears to be an accidental novelty is in fact an inevitable product of the times.

Wang Jiangping, former vice minister of industry and information technology, said the surge of OPCs is an inevitable outcome of the increasing accessibility of AI technology. The threshold for entrepreneurship has dropped significantly, unleashing individual creativity on an unprecedented scale.

"One person, one set of AI tools, and one complete industrial chain —

this new paradigm enables more creative and skilled individuals to pursue innovation and entrepreneurship at extremely low cost," Wang said.

Pan Yunhe, former executive vice president of the Chinese Academy of Engineering and a professor at Zhejiang University, called the emergence of OPCs "a ripple effect of AI-driven industrial transformation."

Intelligent platforms provide not only computing power and data, but also models and a wide range of basic knowledge and technologies, greatly reducing the barriers to OPC formation, according to Pan. Liang Gui, former executive vice governor of Jiangxi province, pointed out that three forces are driving the rapid growth of OPCs. The first is the maturity of the tool chain: From 2024, AI has evolved from a mere assistant into a digital employee matrix, enabling a founder to hire a team of digital employees.

The second is extremely low start-up costs: Data shows that more than 90 percent of OPCs are launched with less than 500 USD, and the minimum monthly cost for an OPC in China can be less than 3,000 RMB.

The third is China's unique policy ecosystem: More than 30 cities across

the country have already introduced special OPC policies. In 2025, Shangcheng district in Hangzhou took the lead in Zhejiang province by issuing a "Six Ones" special policy package. The "Six Ones" are one plan, one policy, one guideline, one fund, one case study and one competition/conference to pitch and scale ideas.

According to the *National OPC Development Observation Report (2026)*, the industry currently faces many pain points: Local support policies are often highly homogenized, the overall supporting ecosystem remains inadequate, and there is a common tendency to emphasize hardware investment over software empowerment, and resource allocation over demand matching. In addition, more than 60 percent of entrepreneurs have cognitive bias regarding the OPC model, and the overall survival rate is below 10 percent.

In Liang's view, these failures can be attributed to five main "ways to die": the perfectionism trap, tool addiction, pseudo-demand self-indulgence, pricing phobia, and cash flow rupture.

Wang said OPC development faces issues such as amplified AI legal risks, confusion of legal personality, liability

holds enormous potential for trade between China and Europe.

In the eyes of Jacques Eone, president of the Cameroon Robotics Association, China's robotics industry is growing rapidly. He said that the development of humanoid and AI-powered robots, particularly by several companies encountered at the WRC 2026, is opening a new era of general-purpose robotics. "I see this as a major opportunity for Cameroon and Africa, where automation needs remain significant. We are exploring practical applications of robotics in agriculture, mining, security and other key sectors, with the ambition of improving productivity and supporting the emergence of a

Robotics Wows the World at WRC 2026

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Jeff Burnstein, president of the Association for Advancing Automation, the U.S., has come to the WRC nearly every year. Impressed by the crowds at the WRC and China's robotics development, he told *Science and Technology Daily* that although there are differences between Chinese and U.S. markets, China and the U.S. could strengthen cooperation in the robotics field, such as in standards.

euRobotics' Vice President Juha Rönning has more than one Chinese robot in his lab. He said the speed of China's robotics development exceeded his ex-

pectations. He believes that robots could be part of solutions to address global challenges such as an aging population and pollution.

Jack Perry Jr., chairman of the 48 Group and executive chairman of LEC Robotics, came to the WRC for the first time. He toured the exhibition booths and engaged with industry partners to explore potential opportunities for collaboration. He pointed out that Europe's demand for robotics is strong, with countless real-world applications yet to be fully recognized and explored. If properly developed, the robotics market

4 Longmen Grottoes in Digital Light



Editor's Note:

"Among the four suburbs of Luoyang, the finest scenery lies at Longmen." Tang Dynasty poet Bai Juyi wrote these lines more than 1,200 years ago. Standing on the bank of the Yi River in Henan, central China, he saw the same cliffs we see today.

The Longmen Grottoes consist of 2,345 caves and niches housing nearly 110,000 Buddhist statues, and more than 2,800 inscribed steles. They have stood here for over 1,500 years. The chisels that carved them fell silent long ago, but the stone remembers. In November 2000, the Longmen Grottoes were inscribed on the UNESCO World Heritage List. "The grottoes and niches of Longmen," the committee wrote, "represent the high point of Chinese stone carving."

That judgment stands, but standing is not the same as enduring. Water seeps, wind erodes, and the stone has also suffered at human hands. In the past, conservation used to mean intervening after damage. Today, it means anticipating it and preventing it. Technology has made that shift possible. It answers a fundamental question: How do you keep "alive" something that is older than any living memory and made of stone?

This special edition follows Camilla Quaranta, an Italian student at Henan University, and Li Xiawei, a young guide at Longmen, as they discover the technologies reshaping how the site is conserved and experienced today.

Keeping Cultural Heritage Forever Young

In AD 500, after the Northern Wei Dynasty's relocation of its capital to Luoyang, construction began on a massive state project in the Yique Mountains located south of Luoyang. This was the Binyang Middle Cave, the only royal grotto at Longmen whose construction process is explicitly chronicled in official historical records.

More than 15 centuries later, an Italian student stood before it. Camilla Quaranta grew up in Milan, where she often visited museums and old churches with her family. Those early encounters with Roman relics and Renaissance art sparked a lifelong love of history. Now studying at Henan University, she came to China with a particular curiosity: to see for herself how an Eastern civilization, so different from her own, has endured over time. Longmen Grottoes was one of her stops.

Her friend Li Xiawei, a young guide at the grottoes, accompanied her into the cave. "Welcome to wonderland," Li said.

They looked up at the dome. A giant double-petal lotus has been "blooming" there for over 1,500 years. Around it people can see a blur of celestial musicians, whose colors and outlines have long faded.

"What did it look like when it was first built?" Camilla wondered quietly. In the past, one could only imagine. Today, using a combination of advanced technologies, the research team at the Longmen Grottoes Academy has digitally recreated the original appearance of

the lotus caisson.

To achieve a scientifically thorough restoration, the team first collected high-precision 3D data of the lotus caisson in January 2021, delineated its contours on orthophoto maps, and produced outline base maps. Due to prolonged damage from water seepage, weathering, microorganisms, and other factors, the painted surface had largely flaked off. Researchers could see only red, black, and a few green traces with the naked eye.

With portable microscopes, they also observed yellow, blue, pink, and white. They used X-ray fluorescence analyzers and laser Raman spectrometers to sample and test pigment residue from different parts of the caisson, identifying the pigment composition and establishing the overall color scheme.

After more than a year, the deteriorated lotus caisson was reconstructed on a flat surface. Then in early 2024, building on the results, the Academy released an animated version. Camilla and Li finally saw a more lively scene: celestial musicians stepping on clouds, soaring through the air, playing musical instruments and dancing, their fluttering sleeves evoking a joyful atmosphere.

"We do not have to time travel," Li said. "Now, through digital technology, everyone can see what they originally looked like."

Moving south, they arrived at the Ten Thousand Buddhas Cave, a Tang Dynasty cave named for the 15,000

small seated Buddhas carved into its walls. On the south wall of the front chamber stands a damaged statue of Guanyin, known in Sanskrit as Avalokitesvara. The head and arms of the statue are missing.

Li showed Camilla an old photograph of the undamaged Guanyin. Based on that, the team created a digital version in which the face, robe and decorative ribbons have been restored, reflecting the original appearance.

"Will I ever see a statue like that again?" Camilla asked. "I think so. In the digital world," Li replied. Camilla wanted to understand how this was done. Li took her to the Academy, where they met Zhang Guofeng, deputy head of the Exhibition and Digital Section.

Zhang told them the Academy's digital work began 20 years ago with the "Longmen Grottoes 3D Digitalization Project." In 2021, the team launched a new phase, conducting high-precision data collection for representative caves to create comprehensive digital records. Unlike earlier methods like drawing, molding, and black-and-white photography, the latest 3D scanning can achieve millimeter-level accuracy without touching the artifacts.

For the Guanyin statue, the first step in virtual restoration was finding evidence, Zhang said. Drawing on historical photographs, academic research, 3D digital technology, color analysis, and traditional sculptural knowledge, the team virtually restored the statue

and its original colors.

"Virtual restoration isn't about making it 'look complete,'" Zhang said. "It's about getting as close as possible to what it originally looked like. That distinction matters."

When Camilla asked about the "authenticity" of digital restoration, Zhang said, "Digital restoration is more a form of witnessing, more about the process. Cultural relics are cultural relics. Virtual restoration simply allows people to see what these relics looked like before they were damaged. It is a form of conjecture and verification."

For Zhang and his colleagues, the goal of digital restoration goes beyond freezing a moment in time. It is about keeping the artifacts "alive," preserving their information before further decay and carrying their presence beyond the cave walls, into spaces where stone cannot travel.

Today, through AR technology visitors to Longmen Grottoes can view the figures as they originally appeared by pointing their smartphones at the damaged statues.

"This is just the beginning," Camilla said, looking at the restored image on the screen. "What moves me most is seeing the past come back and knowing that these grottoes can now travel to classrooms, museums, and screens anywhere in the world. They no longer belong only to this mountain. They belong to anyone who wants to see them."

Watching Over the Stones: A Preventive Approach

To most visitors, the Fengxian Temple, the largest cliffside niche shrine at the Longmen Grottoes, is a great option for taking photos. To the researchers at the Longmen Grottoes Academy, it is a precious heritage to guard carefully, where every crack and damp patch is a symptom demanding immediate attention.

The temple houses the Vairocana Buddha, the tallest and most artistically accomplished statue at the site.

Water infiltration has been a persistent threat for over a millennium. Just above the southern slope of the temple sits a karst cave. Because limestone is highly soluble, water seeped through the stone, shaping the cave's stalactites and stalagmites over thousands of years. It also threatened the precious stone statues below.

Fan Zilong, who heads the Protection and Restoration Section at the Academy, said as early as the Tang Dynasty (618-907), ancient craftsmen dug drainage channels above the Fengxian Temple to prevent seepage from eroding the great Buddha. More than a thousand years later, this system is still functioning. "The ancient craftsmen's site-sensitive wisdom is an inseparable part of the cultural heritage itself," Fan said.

Yet managing water infiltration still remains one of the most difficult challenges in grotto conservation. The ancient channels could do only so much. What was needed was a way to detect problems before they became disasters.

That was where modern technology stepped in. Field inspections that used to take Fan and his peers two weeks can now be done sitting in front of a computer, reviewing real-time data from key monitoring points. "It is like taking a patient's blood pressure and checking their blood sugar and lipids," Fan said.

The monitoring system tracks three main dimensions, each marked in a different color on the dashboard: the atmospheric environment, the cave micro-environment, and the cultural

relics themselves. Atmospheric monitoring tracks temperature, humidity, rainfall, and wind speed, while the cave micro-environment monitors internal temperature, humidity, and wall temperature. Together, they paint a complete picture of the grotto's "health."

The system proved its worth during the torrential rains that hit Luoyang in July 2021. "We were staring at the screens day and night, monitoring every change," recalled Liu Yi, a member of the team. Thanks to the early warning system, they noticed abnormal readings from crack displacement meters at the south cave of Leigutai, a group of three parallel caves and niches. "The data showed structural instability after the heavy rain. Without timely reinforcement, there was a real risk of collapse."

The team rushed to the site and installed emergency shoring, reinforcing the exterior with steel supports and adding bracing inside. And then came an unexpected reward. When they later dismantled the front wall, they discovered an 80-centimeter gap hiding more than 80 relic fragments. "The most exquisite piece was a Buddha head from the Tang Dynasty," Liu said. In responding to one emergency, they had uncovered a hidden treasure.

For Fan and Liu, however, the real significance of this work lies not in any single discovery, but in a fundamental shift in conservation philosophy — from reactive, emergency interventions to preventive care. The monitoring platform is not just a tool; it is a new way of thinking about stewardship.

"Just as people today pay attention to their health and get regular checkups, monitoring allows us to detect problems early and intervene before they get worse," Liu remarked.

In the end, the true guardians of Longmen are not the sensors or the screens. They are the vigilant minds behind them. Their goal is not simply to repair the past, but to safeguard it for the future.



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Guardians Across Time: How Technology Helps

The Cultural Relics Science and Technology Protection Center at the Longmen Grottoes Academy, may be likened to a hospital. Only, the "patients" here are of stone and the "doctors" do not use scalpels. Their tools of choice are laser cleaners, electron microscopes, and 3D printers. These guardians of history have young faces, yet their steady hands carry a quiet resolve belying their years.

Rui Zihang, born in 1995, guides a laser cleaner over a stele made during the Northern Qi Dynasty (AD 550 – 577). As the beam sweeps across the stone, the black grime encrusting it peels away layer by layer, revealing the grey-blue surface beneath. Gradually, the intricate folds of a carved robe emerge.

"It uses thermal effects," Rui says, keeping his hand steady on the device. "Different materials absorb specific frequencies at different rates. We just heat the contaminants until they separate,

leaving the underlying stone unharmed."

This non-contact method leaves no marks, making it safer than traditional techniques. But precision requires patience. Before touching the stele, Rui has spent hours testing the exact wavelength and energy on a hidden corner. Too little energy will leave the grime stubbornly intact. Too much risks scarring the ancient surface.

Asked why he chose this job, Rui pauses and looks at the stele. "Our job is to restore the artistic and cultural value of these historical relics as much as possible," he says. "Seeing these remnants of the past naturally inspires a sense of awe. You can't help but imagine how magnificent they once looked. It is a dialogue with history, and the process itself is healing."

In a nearby lab, Ma Jieyi, another young staff at the center, is using a small sandblasting device to clean the surface deposits on a Buddha head. In

another part of the room, a 3D printer is printing a replica of another Buddha head, layer by layer.

Ma picks up an earlier test piece. It is a 3D-printed model of a grotto eave. Over the centuries, the original eaves collapsed. The printed pieces can fit precisely into the gaps to block rainwater and the accompanying erosion. On the table lie fragments of a relief, the Emperor Worshiping the Buddha. Fresh out of the printer, it is off-white in color. Only after meticulous coloring will it truly resemble the historical original.

Turning digital models into physical prints is a matter of size and precision. Ma says small pieces take only a few hours, while larger ones need 16 or 17 hours. Each piece is different, and each demands its own approach.

If 3D printing reveals the external form of the Buddha, then scanning electron microscopy peers inside.

Zhang Man, also a member at the center, operates a scanning electron microscope. On the screen, a stone sample the size of a fingernail is magnified tens of thousands of times, revealing mineral crystal structures, weathering cracks,

and particle deposits. The high-powered microscope can detect structures invisible to the naked eye and ordinary optical microscopes.

"By observing the microscopic structures, we can analyze the chemical composition of the artifacts and detect tiny cracks that are otherwise undetectable," Zhang says.

She adds that one of the most common types of damage is due to weathering. Unweathered artifacts have a dense structure. After weathering, the structure becomes loose, cracks appear, and porosity increases. The scanning electron microscope helps identify the causes of deterioration, providing a basis for developing conservation plans. "For a more rigorous and evidence-based assessment," she adds, "we need to combine this with other testing methods."

The technologies are only half the story. Behind every laser beam and every data point is a young conservator who has devoted years to understanding stone, water, and time. In their hands, technology becomes something more than machinery. It becomes a form of reverence.



The Fengxian Temple at Longmen Grottoes in Luoyang city, Henan province in central China. (PHOTO: VCG)