

Editor's note: This year marks the 20th anniversary of President Xi Jinping's proposal of the concept that "lucid waters and lush mountains are invaluable assets". China Daily will present a series of stories on how resources such as mountains, rivers, lakes, forests and farms are being transformed into priceless gifts.

By **HOU LIQIANG** and **YANG JUN** in Renhuai, Guizhou, and **LIU KUN** in Wuhan

Among dozens of large tributaries of the Yangtze River, the Chishui distinguishes itself as particularly unique. It is the only tributary that has not been dammed along its main course, and serves as a haven for over 160 fish species, playing a crucial role in the biodiversity of the Yangtze basin.

Yet, its ecological significance is paralleled by its economic importance, as its banks are lined with the country's most *baijiu* distilleries, earning it the nickname "liquor river". This makes the Chishui a pivotal testing ground for the harmonious integration of development and conservation, embodying the core spirit of the concept of "lucid waters and lush mountains are invaluable assets", proposed by President Xi Jinping two decades ago.

To date, regions along the river have responded admirably to the test. The ecological environment of the Chishui has seen significant improvement, while the local *baijiu*, or white liquor, industry continues to thrive.

Flowing for over 400 kilometers, the Chishui rises in Southwest China's Yunnan province and joins the Yangtze in Sichuan province, but its longest stretch is in Guizhou.

The section of the Chishui in Guizhou's Renhuai county is one of the areas with the highest concentration of *baijiu* distilleries.

The production of sauce-aroma *baijiu*, which necessitates high fermentation temperatures, peaks in summer. Consequently, significantly more wastewater is generated during the hotter months.

In response to the seasonal challenge, the Renhuai government has bolstered its efforts to enhance *baijiu* wastewater treatment capacity, achieving a notable daily capacity increase of 13,000 metric tons in 2023. An intelligent system has also been introduced to improve wastewater processing management.

According to Lu Jun, an employee at Renhuai Water Affairs Co, the system can show in real time the exact amount of wastewater discharged by *baijiu* distilleries, the influent and effluent volumes of each of the 12 wastewater treatment plants, as well as data on key water pollution indicators.

The system automatically alerts maintenance personnel to any emerging issues, he said. The design of the network means that the workers can halt the flow of wastewater, and close relevant drainage outlets that discharge into the Chishui to ensure that no untreated water leaks into the river.

"Typically, all wastewater is treated on the same day it is generated to a quality reaching national standards for discharge into the environment," he said.

After small hydropower stations were demolished, the Tongzi River, a tributary to the Chishui River, flows naturally in Chishui, Guizhou province. XINHUA



Distiller has spirited approach to circular economy

By **HOU LIQIANG** and **LIU BOQIAN** in Renhuai, Guizhou

The most well-known *baijiu* distiller in Southwest China's Guizhou province, Kweichow Moutai Group, has achieved a resource utilization rate of 100 percent from its waste in *baijiu* production, according to the company's circular economy wing.

Achieving a synergy of development in ecological, social and economic benefits, it is able to reuse all waste and minimize its discharge of

water pollutants, emissions and solid waste.

The result has been made possible through the operation of an industrial park run by Kweichow Moutai Distillery (Group) Circular Economy Industry Investment and Development Co.

Jiang Youfeng, its deputy general manager, said that the park has developed four pillar products: *baijiu* base spirit, organic fertilizer, fermented feed and biomass biogas, on the back of an annual capacity to process

300,000 metric tons of waste, all by-products of *baijiu* production.

Aside from distillers' grains, the park also disposes of straw that is used in the *baijiu* fermentation process.

Jiang said the company ensures distillers' grains are processed for utilization to the fullest extent.

The grains are first fermented to produce feed, maximizing their high starch and protein content. This process can produce 20,000 tons of feed annually, Jiang said.

According to the company, since 2019, the extensive application of organic fertilizers produced in the industrial park has improved the soil quality of 66,700 hectares of sorghum and wheat fields that serve as Kweichow Moutai's supply bases.

Jiang said that the distillers' grains are then used to produce organic fertilizer or to generate biogas. Biogas production creates a closed-loop circular system within the industrial park, he added.

"The park has the capacity to pro-

duce 10 million cubic meters of biomass biogas per year, which is utilized in the distillation process," he said. "The high concentration of wastewater generated from distillation can be used as a raw material for further biogas production."

Jiang said the company will further enhance its research and development efforts to explore high-value applications for distillers' grains, with one of the priorities being their use in making cosmetics.

Moutai *baijiu*'s grains contain numerous anti-aging and whitening components. Using biotechnology, these can be extracted for use as ingredients in high-end cosmetics.

The company also plans to use its high-concentration wastewater to cultivate microorganisms that can produce a natural polymer called PHA, or Phytohemagglutinin, which can be extracted to manufacture biodegradable materials. Additionally, they intend to use distillers' grains to cultivate insect protein for producing pet food.

"In the future, brewing by-products may be transformed into a diverse array of substances and products that can meet our needs for a better life," he said.

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Chishui benefits from balanced approach

Ecological approach sees Yangtze tributary cleaned up and business booming

"The population structure of fish species has also been significantly optimized," he said, adding that the average weight of *Onychostoma sima*, or Sima shoveljaw carp, for instance, has increased 263 percent.

According to provincial authorities in Guizhou, as the general quality of water improved from Grade II to Grade I from 2013 to 2023, the total output value of the sauce-aroma *baijiu* industry on the banks of the Chishui jumped from 48 billion yuan to 150 billion yuan (\$6.7 billion to \$21 billion).

Last year, the Renhuai government reported that the output value and value added of the *baijiu* industry in the county increased by

almost 10.7 percent and 8.1 percent year-on-year, respectively.

Surging success

Hubei province's Yidu county provides another potent example to demonstrate that environmental conservation doesn't need to be in conflict with economic development.

As a response to President Xi's directives to safeguard the Yangtze and curb overdevelopment, the Yidu government's decision to relocate fish farms inland in 2016 has produced two significant outcomes: fostering the sustainable growth of the local sturgeon industry and revitalizing the Qingjiang River, another tributary of the Yangtze.



A sewage plant treats urban wastewater in Bijie, Guizhou province, last year. ZHOU XUNCHAO / FOR CHINA DAILY



A researcher prepares to release adult Yangtze sturgeon for an experiment to study their breeding capability in the natural environment in Chishui, Guizhou province, in April. XINHUA

The sturgeon farming sector in the county took shape during the 1990s. By 2016, this industry had become a cornerstone of the local economy, involving nearly 560 households and accounting for 30 percent of the nation's sturgeon output.

Back then, the farming operations covered an extensive water surface area of roughly 8.65 square kilometers. The heightened utilization of fodder to enhance sturgeon growth resulted in remarkable eutrophication within the Qingjiang, causing water quality in some parts to plummet below Grade V.

Deng Zhongzheng, who had 30 cages of sturgeons in the Qingjiang, was keenly aware of the increasingly polluted situation in the river back then. Fish cages for sturgeon farming covered most of the surface of the watercourse, with only a narrow channel left. "Certain sections of the river appeared black, while some others took on a reddish hue, dotted by a lot of rubbish and dead fish," he recalled.

No longer having to endure the challenges of weather on his floating farm on the Qingjiang, Deng now works at an onshore base known as "sturgeon valley".

Built in 2018, the base covers an area of over 120,000 square meters and accommodates more than a million sturgeon, according to the Yidu government.

Ji Jianyi, general manager of Qingjiang Sturgeon Valley Special Aquaculture Co, said the base is a green and intelligent facility that guarantees "win-win outcomes for ecological improvement and profitability".

Drawing water from the Qingjiang, the base uses an advanced digital platform to precisely regulate water quality, flow rate, temperature and dissolved oxygen levels, effectively replicating the ecological conditions of the watercourse, he said.

The platform, which can be controlled via smartphone, carries out continuous monitoring over every corner of the base's fish farming area, he said.

"Integrating monitoring, detection and control functions, it can accurately manage and automatically carry out operations such as feeding and oxygenation," he said.

Ji highlighted the adoption of a microbiological circulation purification system, which utilizes high-pressure oxygen for the treatment of excrement and sewage. The treated water still needs to undergo multiple purification processes before being

discharged back into the Qingjiang.

The application of digital technologies has enhanced the cost-effectiveness of sturgeon farming. This factory-style mode only needs 1 percent of the area needed by the previous floating farms, and water consumption has reduced by 95 percent, said Liu Zhongxing, an executive at the base.

"Both the production capacity and quality of sturgeon roe have seen significant improvements," he said.

In the caviar processing workshop of the sturgeon valley, workers, clad in protective gear, swiftly process the freshly harvested roe. Outside the workshop, refrigerated trucks stand ready to dispatch the latest batch to Shanghai and Shenzhen in Guangdong province.

Such scenes of organized urgency have become routine for workers in the workshop, who send over 10,000 tins of caviar daily to Europe, the United States and the Middle East, as well as domestic metropolises such as Beijing and Shanghai.

This relentless demand has kept sales executive Ma Min extremely busy. "Currently, 150,000 boxes of caviar are awaiting delivery for domestic orders, while we have received multiple urgent requests to fulfill 3 metric tons of international orders," she said, adding that despite a heavily packed production calendar, new orders keep coming in.

Yidu has 24 sturgeon farming enterprises, which produce 10,000 tons of sturgeon and 180 tons of caviar annually.

The county's sturgeon caviar is exported to over 20 countries and regions, fulfilling a third of the global market demand. The annual output value of its sturgeon farming industry has reached nearly 1 billion yuan, according to the Yidu government.

To address the surging demand, the sturgeon valley is expanding its sturgeon farming area and enhancing its caviar processing capacity. Scheduled for completion by the end of September, this expansion will boost its annual caviar output capacity sixfold to 600 tons.

With the quality of water in the Qingjiang consistently at or above Grade II, and the continuous boom of the sturgeon farming industry, the local government has a more ambitious plan. Yidu aims to harness the industry's potential by developing a modern industrial park that combines fish breeding, aquaculture processing and comprehensive multichannel distribution.

"We aim to attract 1 million visitors annually and foster the development of a 10-billion-yuan industry through strategic collaboration across the entire supply chain," it said in a statement.

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