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China's Turtles, Emblems of a Crisis

Du Bin for The New York Times

Visitors to the Changsha Zoo in China's southern Hunan Province observe the endangered Yangtze soft-shell turtle.

By JIM YARDLEY
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CHANGSHA, China — Unnoticed and unappreciated for five decades, a large female turtle with a stained, leathery shell is now a precious commodity in this city's decaying zoo. She is fed a special diet of raw meat. Her small pool has been encased with bulletproof glass. A surveillance camera monitors her movements. A guard is posted at night.

The agenda is simple: The turtle must not die.

Earlier this year, scientists concluded that she was the planet's last known female Yangtze giant soft-shell turtle. She is about 80 years old and weighs almost 90 pounds.

As it happens, the planet also has only one undisputed,

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Threatened Biodiversity in China

known male. He lives at a zoo in the city of Suzhou. He is 100 years old and weighs about 200 pounds. They are the last hope of saving a species believed to be the largest freshwater turtles in the world.

"It's a very dire situation," said Peter Pritchard, a prominent turtle expert in the United States who has helped in trying to save the species. "This one is so big and it has such an aura of mystery."

For many Chinese, turtles symbolize health and longevity, but the saga of the last two Yangtze giant soft-shells is more symbolic of the threatened state of wildlife and biodiversity in China. Pollution, hunting and rampant development are destroying natural habitats, and also endangering plant and animal populations.

China contains some of the world's richest troves of biodiversity, yet the latest major survey of plants and animals reveals a bleak picture that has grown bleaker during the past decade. Nearly 40 percent of all mammal species in China are now endangered, scientists say. For plants, the situation is worse; 70 percent of all nonflowering plant species and 86 percent of flowering species are considered threatened.

An overriding problem is the fierce competition for land and water. China's goal of quadrupling its economy by 2020 means that industry, growing cities and farmers are jostling for a limited supply of usable land.

Cities or factories often claim farmland for expansion; farmers, in turn, reclaim marginal land that could be habitat. Already, China has lost half of its wetlands, according to one survey.

For the Chinese scientists and conservationists trying to reverse these trends, the challenge begins with trying to convince the government that protecting wildlife is an important priority. For centuries, Chinese leaders emphasized dominance over nature rather than coexistence with it. Animals and plants are still often regarded as commodities valued for use as medicine or food, rather than as essential pieces of a natural order.

"The whole idea of ecology and ecosystems is a new thing in the culture," said Lu Zhi, a professor of conservation biology at Peking University.

Scientists say China's status as a leading center of biodiversity makes the threatened state of wildlife a global concern. Many of China's species are concentrated in the mountainous southwestern region — sometimes popularized in the West as Shangri-La — as well as in Tibet, Hainan Island and along the North Korean border. Endangered indigenous animals include the giant panda, several varieties of pheasants and monkeys, and a range of small mammals including shrews and rodents.

"China is one of a small handful of countries, maybe a dozen, that has remarkably high numbers of species, and a remarkably high number of species that are not found anywhere else," said Jeffrey A. McNeely, chief scientist for the World Conservation

Union.

Nearly every major international conservation group has established a China office to promote different wildlife protection initiatives. The group WildAid has sponsored a public education campaign featuring billboards with the Chinese basketball star Yao Ming. "Endangered species are our friends," Mr. Yao said at a news conference last year in Beijing.

China has a large system of nature reserves, mostly in the country's more remote western regions, though financing levels are far below those even in other developing countries. No Chinese protection program is considered more successful than the robust effort to save the panda. Roughly 2,000 pandas now live in panda reserves. Other captive breeding programs have helped pull the Chinese alligator and the Tibetan antelope away from the brink of extinction.

But these successes, which involve animals of symbolic national importance, are modest compared with the number of species that are neglected and edging closer to extinction. Last year, the Yangtze River dolphin, a freshwater mammal known as the baiji, was declared extinct.

"So many species are neglected," said Dr. Lu, who also heads the China affiliate of Conservation International. "Look at the baiji. The extinction was announced and what has been done? Nothing. People felt pity."

Then, alluding to the Yangtze giant soft-shell, also known as the Rafetus swinhoei, she added:

"This turtle will be next."

Surviving History's Tides

Fifty-one years ago, a traveling circus performed at the new zoo in Changsha, the capital of Hunan Province in southern China. For a cash payment, the circus left behind a large female turtle. Zookeepers slipped the turtle into a large pond, where for a half-century it hibernated in winters and poked its pig-like snout above the water's surface every spring. The walls of the zoo became the equivalent of a time capsule.

Outside, the convulsions of modern Chinese history were scarring an already damaged landscape. Under Mao, national campaigns were waged to kill birds and other animals perceived as pests. Widespread famines in the late 1950s and early 1960s drove desperate people to hunt or gather anything deemed edible, even tree bark.

Since the 1980s, the pressure has come from the rapid push for economic development. In recent years, turtle experts identified the Yangtze giant soft-shell as dangerously close to extinction. Inside the Changsha Zoo, zookeepers had no idea that experts were scouring China for the species. In fact, they knew very little about their female turtle. "We just treated it like a normal animal," said Yan Xiahui, deputy director of the zoo.

The species was first identified as distinct in the 1870s. A British diplomat in Shanghai sent a specimen to the British Museum, where it was beheaded and pickled in a jar. Some experts debated whether it was part of another species, and for years it received little attention.

"It proceeded to be ignored by the world as if it didn't exist for roughly 100 years," said Dr. Pritchard, the American expert, who has seen the specimen in the British Museum.

With its wide, flat shape and leathery dorsal shell, the giant Yangtze males can weigh

more than 220 pounds; females are usually smaller. By the 1990s, a prominent Chinese herpetologist, Zhao Kentang, had realized the significance of the turtle and tried in vain to persuade different zoos to bring the turtles together for breeding.

By 2004, after conducting field surveys in China and Vietnam, herpetologists concluded that six of the turtles were still alive. Three were in Chinese zoos in Beijing, Shanghai and Suzhou; two others lived in a Buddhist temple in Suzhou; and a sixth lived in a famous Vietnamese lake in the center of Hanoi.

Negotiations began toward a breeding agreement. By 2005, the turtle in the Beijing zoo had died. Questions also emerged about whether the Hanoi turtle was actually the same species. A leading Vietnamese expert argued it was not. Monks at the Buddhist temple considered their turtles religious icons and did not want to move them. Last year, a deal was finally reached between the Suzhou and Shanghai zoos.

"Then in October, the one in Shanghai died," said Xie Yan, the China program director for the Wildlife Conservation Society, which has been instrumental in guiding the discussions. "It was horrible news."

In January, herpetologists gathered in Suzhou for a conference about the turtle. Every zoo in China had been issued an urgent circular asking for any information about their large turtles. Officials at the Changsha Zoo responded. The Wildlife Conservation Society sent two experts to Changsha.

"We were very happy because it was a female and had just laid eggs last year," said Lu Shunqing, one of the experts, noting that the eggs were unfertilized.

The discovery of the Changsha turtle was critical. In August, one of the turtles in the Buddhist temple died. Experts visited the temple and found no proof that the second turtle existed. That left two undisputed Yangtze giant soft-shells: the female in Changsha; the male in Suzhou. Neither had commingled with the opposite sex in decades, if ever. And, more problematic, neither zoo was willing to let its turtle go.

Restoring Diversity

Biodiversity, a linguistic marriage of biology and diversity, describes the variations of life within a particular setting, or ecosystem. That ecosystem could be a single pond or the entire earth. Implicit is the idea that the ecosystem is sustained by the coexistence and interaction between plants, animals and other life forms.

Few, if any, of the world's modern economic powers, including the United States, have industrialized without taking a dire toll on plants and animals. In China, the Communist Party's top-down, authoritarian system has presided over a destruction of nature. Now, with environmental problems threatening the economy, the party is trying to engineer a top-down reconstruction.

Environmental construction, a government term, is now a high priority. Yet the results are not always synonymous with biodiversity. Since 1998, China has banned the domestic timber trade and started a nationwide reforestation program. China is now one of the few countries in the world where forest cover is expanding. Yet many scientists say these new forests are more like plantations than habitat.

Often, the new forests include only one or two different tree species and are far inferior to natural forests as incubators for other species. Unintended results can occur. In Beijing, officials planted millions of "female" poplar trees without realizing that the females produced higher amounts of pollen. Workers have had to dig up thousands of

the trees, as floating springtime pollen often seems as thick as snow.

Restoring animal populations is also complicated. Turtles, which are both revered and consumed in China, were decimated in the wild by pollution and hunting. Traders quickly pushed into Southeast Asia, India and even the United States to meet demand.

"In conservation terms, it became a crisis," said Dr. Pritchard, the American expert. "It was first noticed six or seven years ago. The China market had become packed with turtles not from China."

In fact, Chinese markets teemed with animals, or animal parts, from around the world. Today, conservationists express particular concern about the illegal trade in tiger parts. China has signed an international treaty banning domestic trade of tiger parts, but tiger conservation groups say the illegal demand in China is a major reason for the decline of tigers around the world.

Meanwhile, conservationists worry that officials may one day reopen the tiger trade to appease Chinese businessmen who had run tiger breeding farms to produce parts for Chinese traditional medicine.

Turtles, meanwhile, have made a comeback with the emergence of breeding farms. Captive breeding also is now a popular government response for certain endangered species. But many conservationists worry that too little emphasis is placed on restoring habitat so that animals can be returned to the wild. More than 10,000 Chinese alligators have been bred, but reintroducing them to the wild has largely failed.

Conservationists say environmental policies need to better take biodiversity into account. Reforestation, for example, was largely an effort to stop soil erosion, which contributed to floods, and to stall desertification, the conversion of the land into a desert. The idea of creating a true forest was not a priority.

Meanwhile, economic development still dominates. China's richest source of biodiversity is a "hot spot" in southwestern China along the Nu River designated by Unesco as a World Heritage Site. Even so, provincial officials are trying to build a system of dams through the region. Local officials also have tried to redraw the boundaries for the World Heritage Site in order to create room for mining.

Conservationists are trying to speak the language of economics to build political support for protecting habitat. Rice demand is growing rapidly, even as farmland is dwindling. For decades, Chinese scientists have used wild rice species to develop hybrids that increase production. Now, development and farming are encroaching on wild rice habitat areas in coastal southern China.

"If we let it go unchecked," Dr. Lu, the Peking University professor, wrote in a report about biodiversity, "Chinese wild rice will become extinct in fifteen years."

Success Far From Certain

Extinction remains a far more immediate possibility for the Yangtze giant soft-shell. Next year, scientists will make a search in southwestern China in hopes of finding another Yangtze giant soft-shell in the wild.

In September, the Changsha and Suzhou zoos finally reached a deal. Neither wanted to move its turtle. But each agreed that scientists could attempt artificial insemination next spring. Each also signed a contract entitling a certain number of offspring for each zoo — potential stud turtles for future captive breeding programs.

Gerald Kuchling, a herpetologist overseeing the procedure, said success was far from guaranteed. Several years ago, a tortoise in Hawaii died after a similar procedure. In May, Dr. Kuchling conducted an ultrasound examination of the ovaries of the female turtle in Changsha. For years, she has laid unfertilized eggs in springtime, though zookeepers say the number has steadily diminished, to about 20.

"The main problem is really to get a viable sperm sample from the old male without harming him in any way," said Dr.. Kuchling, who added that using small electric shocks is one common method for eliciting a sample. Manual massage is another.

In Changsha, zoo officials moved the turtle into a private pool for better security and monitoring. But experts are concerned that zookeepers are now warming the water inside the pool during winter, even though it spent decades in the colder pond outside. They also are concerned that the pool has no mud to allow the turtle to hibernate.

Under China's system, the Ministry of Agriculture has oversight of the turtle. So far, the ministry has agreed to provide 200,000 yuan, or about $27,000, though none of the money has arrived. Asked for an interview in October, the ministry declined. But ministry officials later contacted the zoos and persuaded them to sign a new deal.

It was decided that the Changsha turtle will be transported to Suzhou next year. A special breeding pool is supposed to be built. First, scientists will try artificial insemination. If that fails, the two elderly turtles will give it a go the old-fashioned way.

The fate of a species hangs in the balance.

Ma Yi contributed research.

Ma Yi contributed research.

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