



Forbidden fruit. Mapping along the Altyn Tagh fault in Xinjiang (*left*) got Ramón Arrowsmith's team in hot water with local authorities.

iversity of Colorado, Boulder. Among nations that offer exceptional fieldwork opportunities, he says, China and the hardships it presents to foreign researchers make it “one of the most restrictive countries in the world.”

Genuine security risk?

China has long kept a wary eye on geographic data. In the 1990s, foreigners were not allowed to possess certain geologic maps, says David Rowley, a geologist at the University of Chicago in Illinois who studies the evolution of Tibetan topography. But such restrictions were easily circumvented. Chinese collaborators kept restricted maps and let their foreign counterparts look at them. Working in China “was a pain,” Rowley recalls, but “in the end, we did have access.” The regulations “were not big obstacles,” agrees Molnar, who speculates that that could be because few scientists knew about them.

As advances in technology have simplified mapping and made detailed geographic information readily accessible, the government has tightened the screws. Since at least 2007, it has been effectively illegal for foreigners to operate a GPS device in China. International brands of cameras with GPS capabilities have been rigged to avoid displaying coordinates if the user is in China, says Stefan Geens, an analyst in Stockholm who studies networked digital maps and geospatial imagery.

Google Earth is another prime target. A Wikileaks cable released in 2010 showed that in 2006, the Chinese government unsuccessfully lobbied the U.S. embassy in Beijing to pressure Google to reduce image resolution of certain Chinese locations. The Chinese version of Google Maps, along with other mapping programs available in China, suppresses latitude and longitude. “They’ve gone out of their way to shield coordinates,”

FIELD RESEARCH

Foreigners Run Afoul of China's Tightening Secrecy Rules

SHANGHAI, CHINA—In August 2007, J. Ramón Arrowsmith set out for China's far west on what should have been a routine geophysics expedition. Working with Chinese and U.S. colleagues, Arrowsmith, a geologist at Arizona State University, Tempe, spent 20 days in Xinjiang Uyghur Autonomous Region's Altun Mountain Nature Reserve, near Tibet, mapping landforms to trace how earthquakes move along the Altyn Tagh fault. Little did they know that a few months earlier, China's Ministry of Land and Resources had issued a decree forbidding foreigners from using some methods of gathering topographic data.

Leaving the reserve, the team was intercepted by local authorities and brought to a hotel for questioning. Their handheld GPS devices and 1:100,000-scale topographic maps drew particular scrutiny, Arrowsmith says. He had never been similarly hassled over fieldwork in Ethiopia, India, Kyrgyzstan, and other sites. They were grilled for a week, during which they made frantic efforts to sort things out with colleagues in Beijing. The researchers were never charged with a crime, but their data and equipment were seized. That November, after what Arrowsmith calls “a fair amount of apology” from

the scientists, they got their belongings back.

As Arrowsmith's group learned the hard way, the Chinese government is curtailing the ability of foreign researchers to conduct fieldwork in China. Between 2006 and 2011, authorities pursued nearly 40 illegal mapping and surveying cases, according to state press reports. Several have involved scientists, one of whom is serving a long prison sentence. The terrain is likely to get even more treacherous: Last year, China's State Bureau of Surveying and Mapping (SBSM) revealed plans to revise its Surveying and Mapping Law, which governs all geospatial and map-making activities. Revisions under discussion may not take effect until 2017. But they are expected to further constrain activities of foreign scientists who need to map coordinates and use GPS devices in China—and could scare off Chinese collaborators.

China heads a list of countries that are cracking down on the collection and possession of geographic data. India restricts GPS use in sensitive regions such as Kashmir, and a draft bill in Pakistan would require anyone engaged in mapping to register with the government. But in terms of scientific impact, China's policies are particularly worrisome, says Peter Molnar, a geophysicist at the Uni-

Geens says. And in March 2007, the land ministry decree forbade foreigners from carrying out surveys or making “electronic navigation maps.” Rowley says: “It is getting more and more difficult for foreigners to do research in geology in China.”

An official at SBSM declined to comment. But a recent *China Daily* article states that bureau officials aim to “intensify efforts to crack down on illegal foreign surveying activities” for the purpose of “defending national security and interests.” Xu Deming, vice minister of land and resources, told the state-run newspaper *Legal Daily* last September that key concerns include Internet mapping programs, location-based mobile applications, and remote sensing capabilities. “The risks to geographic information security have steadily grown as the collection, transmission, and use of geographic information has become easier,” Xu stated.

Critics argue that the tightening policies are anachronistic and ineffective. The GPS restrictions, for example, exist even as more and more cars and mobile phones are GPS-enabled. “The barn door has been left open and the horses have left,” Geens says.

Authorities routinely cite the regulations as grounds for hauling in scientists and tour operators. Enforcement appears to be most aggressive in western China, where ethnic tensions, natural resource extraction, and military bases abound. For example, in September 2008, Xinjiang authorities confiscated GPS devices from two British students studying earthquake dynamics and fined them each \$1450. Other cases include two Japanese scholars fined and deported in 2006 for mapping the locations of an airport and water facilities, and a U.S. tour operator fined for logging points in two GPS receivers in 2011.

But the most chilling cautionary tale is that of imprisoned Chinese-American geologist Xue Feng.

Arbitrary and confusing

Xue entered a graduate program in geology at the University of Chicago in the 1990s. Among all the students that Rowley, Xue’s doctoral adviser, has worked with, Xue ranked “near the top,” he says. But with a wife and two children to support, Xue was looking for stability after earning his Ph.D. in 1998. He took a job with the oil industry research firm IHS upon graduation.

Xue, 47, was assigned to IHS’s Houston office and tasked with obtaining data from his native China, where a burgeoning oil industry was in the midst of a restructuring that had exposed valuable data. In 2005, he brokered the purchase of coordinates of

more than 30,000 Chinese oil wells. IHS sells such information from around the world to firms bidding for oil rights and looking to perform due diligence on a site, Rowley says. Xue subsequently left IHS for another firm. On a trip to China in November 2007, he was detained by security officials; the seemingly innocuous data on oil wells had been classified retroactively as a state secret.

Xue, who holds a U.S. passport, spent nearly 3 years in detention before he was sentenced. During that time, according to accounts he gave U.S. consular officers, authorities burned his arms with lighted cigarettes, struck him with an ashtray, and coerced him into signing false documents. At a trial in July 2010, he was sentenced to 8 years in prison for trafficking in state secrets. Appeals from President Barack Obama, former U.S. ambassador to China Jon Huntsman, and current ambassador Gary Locke may have helped Xue win a minor sentence reduction last summer, says



Happier days. Xue Feng (far right) was one of David Rowley’s top students before his activities in China landed him in prison.

John Kamm, executive director of the San Francisco, California-based human rights organization Dui Hua Foundation. But Xue’s wife and children have been left with limited means of support, says Rowley, who created a Web page devoted to the case. He asserts that the well locations are harmless and that much of the information Xue obtained could be reconstructed from published maps.

The restrictions also affect Chinese researchers who have remained in their homeland. Wang Jun, a paleobotanist at the Chinese Academy of Sciences’ Nanjing Institute of Geology and Palaeontology, says he is regularly called in for questioning by local police when in the field with foreign partners, even when “our joint field research has nothing to do with surveying and mapping.” The regulations have created administrative headaches for local collaborators, who can spend months seeking

permission for fieldwork.

U.S. scientists must make sure that both they and their Chinese counterparts fully understand the relevant regulations, says David Fountain, director of the tectonics program at the U.S. National Science Foundation (NSF). Any fallout for breaching a regulation “could be more significant for the collaborators than it is for the U.S. scientists,” he warns. Chinese scientists are often slapped with hefty fines—Arrowsmith’s partners during his 2007 trip were fined several thousand dollars—and some will ask up front if their Western colleagues can cover any penalties, says Bill Chang, former NSF Beijing representative.

Following Arrowsmith’s 2007 trip, which NSF funded, the agency distributed an unofficial translation of the land ministry decree that the team had run afoul of. But that document leaves many questions unanswered. Scientists remain uncertain about whether they are allowed to jot down coordinates in a field notebook or use a GPS-enabled iPhone. Enforcement is piecemeal as well. The decree sets a maximum fine of \$4800 for violations, but some researchers have been hit up for \$12,900, according to NSF, and the current Surveying and Mapping Law, last updated in 2002, sets a maximum penalty of \$80,400. “The rules are confusing,” Chang says. Most of the violations publicized so far have involved geospatial research in Xinjiang. Working in Tibet, mean-

while, has become “almost impossible,” Rowley says.

Punishment for possessing state secrets—Xue’s conviction—is another murky legal area. Each ministry maintains its own list of secrets, Kamm says. “Scientists and researchers should find out what’s on the list of ministries with whom they have or will have dealings,” he says. He notes that penalties for violating secrecy laws have gotten harsher in the past few years.

Arrowsmith continues to venture into the field in China, in part because its hundreds of active faults “offer excellent datasets for future research.” But for many other scientists who rely on geospatial data, China is sliding down the list of attractive destinations. If scientists “have a choice between China and some other place,” Chang says, “they factor in all these issues.”

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