Yingxiu, the town nearest the epicentre.

J. QIU

THE SLEEPING DRAGON

The great Sichuan earthquake of 12 May 2008 caught Earth scientists off guard. A year on, **Alexandra Witze** reports from the shattered towns on how researchers have learned from their failures.

Tucked below towering hillsides in Bailu, in China's Sichuan province, two school buildings face one another across a courtyard. Both are several storeys high, white with cheery light-blue trim. It's a peaceful April day, cool and humid; a rubbish bin shaped like a penguin sits at the side of the courtyard, as if waiting for someone to toss in a candy wrapper. But no one will be feeding the penguin today. That's because a nearly 2-metre-high ridge of buckled and uplifted concrete runs right through the courtyard, a manifestation of the geological faults that spawned the great Sichuan earthquake of 12 May 2008.

Along the third side of the courtyard is a ghost. It is a pile of brick rubble, all that remains of another building that collapsed in the quake. There, geologists are hunting for clues to what happened on that day, digging a 40-metre-deep trench to search for signs of past quakes that emanated from these faults.

These cracks in Earth's crust are deceptive pieces of geology. Both Chinese and Western scientists had mapped them before but failed to recognize their potential. "I was astonished at this quake," says Xu Xiwei, deputy director of the Institute of Geology at the China Earthquake Administration in Beijing. The buildings that collapsed and the landslides and mud flows that buried towns combined to kill at least 70,000 people and cause widespread ecological damage (see 'Pandas in peril', overleaf) in this rural corner of southwest China.

More so than other quakes, this one has uncovered gaps in earthquake hazard research, both in China and elsewhere. When scientists assess seismic risk, they tend to focus on the faults that move the most and produce large earthquakes often. That strategy pays off with the many quakes that play by the rules. In western Sichuan, however, it turned out to be disastrously wrong.

One year later, researchers are probing the deadly faults in the hope of finding ways to avoid repeating their mistakes. In retrospect, they say, the geology of the Longmen Shan, or Dragon's Gate Mountains, was trying to warn them.

Mountains of trouble

The range marks the line where the 5,000-metre-high Tibetan plateau rams into the low, stable Sichuan plain. The region has the steepest topographical relief in the world, says geologist Clark Burchfiel of the Massachusetts Institute of Technology (MIT) in Cambridge: over a distance of just 50 kilometres as the crow flies, surface elevation changes by more than 4 kilometres. The Longmen Shan are a world of sloped hillsides cut by dramatic river valleys, the ideal place for quakes to trigger enormous landslides.

That kind of topography does not persist without active geological forces at work, continually building the steep mountain belt. In the

late 1980s, when Burchfiel and his colleagues began mapping the area, they were convinced they would find evidence for large ground movement along the Longmen Shan: perhaps 10 millimetres per year of 'shortening', in which the plateau and plain converge and push up the mountain range.

But years of walking the faults unearthed no evidence for this amount of shortening in the recent geological past. By mapping rock formations, the team found evidence of just 1–2 millimetres of movement per year, instead of the 10 they were expecting. "At that rate, you don't expect to have a mountain range that high," Burchfiel says. Nonetheless, he couldn't deny what the rocks were saying, so eventually he published a major geological overview of the region, supposing that no one would believe the low rates of shortening. Then Burchfiel moved on to map other nearby areas.

Over time, however, studies have confirmed his conclusions. Researchers measured ground motion in the area using Global Positioning System receivers and found low rates of slip across the Longmen Shan, confirming the 1–2 millimetres per year suggested by Burchfiel[2].

To a geologist, that rate seems relatively benign, because faults store up potential earthquake energy in proportion to the speed of the regional crustal motion. Take two spots on either side of a mountain range, for example. If one is moving quickly in relation to the other, the stress on rocks in between will build up quickly — stress that has to be released by rock movement along a fault. In most cases, that movement is not steady but happens only infrequently, when the stress grows great enough to overcome the friction between rocks on either side of the fault. That sudden release is the earthquake.

In the Sichuan quake, which measured 7.9 on the moment magnitude scale, there was nearly 5 metres of slip along the Beichuan fault, the biggest of the faults that ruptured last year (see map). Given how slowly stress accumulates in the region, rough calculations suggest that quakes of that scale should occur very infrequently, about every 2,000 to 10,000 years[3].

> "I don't think there was a reason to say there would have been a major quake here." — Leigh Royden

Large shocks in the past will have left their marks in local geology. But the record is hard to read in the Longmen Shan: heavy rains and high erosion rates have obscured much of the evidence, says Alexander Densmore, a geologist at Durham University, UK, who has mapped faults in the area. "There aren't that many places that you can really see the past history," he says. Most of the recent known quakes along the Beichuan fault have been much smaller than the 2008 quake, including one magnitude-6.2 quake in 1958 and another in 1970, says Chen Zhiliang, a geologist at the Chengdu Institute of Geology and Mineral Resources. There is no archaeological evidence that the town of Beichuan itself has ever been destroyed by a quake since it was founded some 1,500 years ago.

So few thought that the Longmen Shan posed a major seismic hazard. "I don't think there was a reason to say there would have been a major quake here," says Leigh Royden, a geophysicist at MIT who has modelled the region's tectonics.

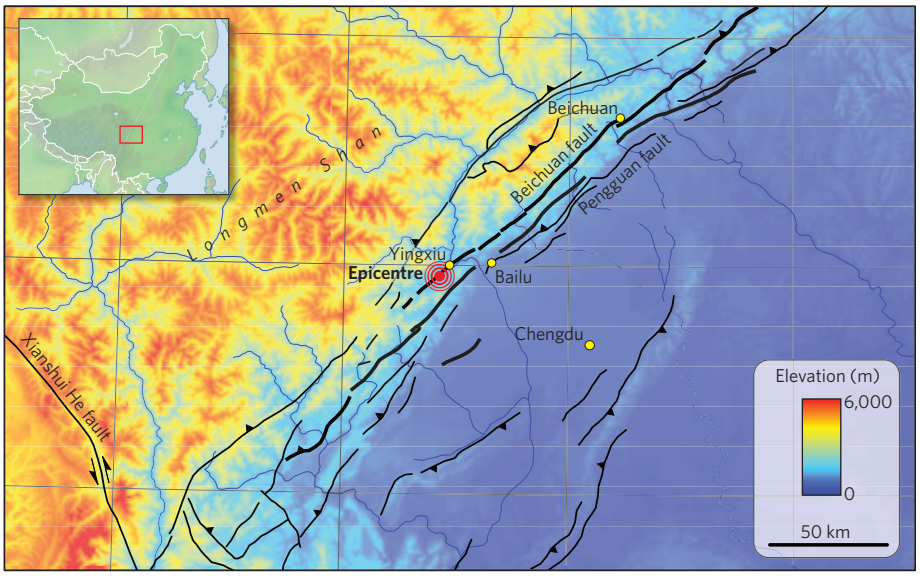
A. WITZE

A fault ripped right through a school in Bailu.

In hindsight, it's easy to see the danger of dismissing the quake potential of the Longmen Shan. Just because something happens rarely does not mean it will never happen. It should have been obvious that the faults along that range were sleeping dragons that would awake some time. But researchers have only so much time and money to spend on seismic-risk assessments, and they therefore focus on areas that are known to have major quakes every few hundred years — not ones that might stay quiet for 5,000 years.

For example, rather than worry too much about the Beichuan fault, Chinese geologists had focused on a pair of far more active fault zones to the west: the Anning He and the Xianshui He faults, both of which slip at rates of up to 10 millimetres per year. The China Earthquake Administration has spent most of its monitoring efforts on these active faults, including deploying nearly 300 broadband seismometers — ones that capture a wide range of vibrational frequencies — in the world's densest array to map the underlying crust. When the Beichuan fault broke instead, seismologists scrambled to refocus on the Longmen Shan. Some are now looking into whether a new reservoir nearby triggered the quake (see 'The reservoir link', overleaf).

The question now is what the Sichuan quake tells geologists about future seismic risk. Some say that more attention should be paid to regions with steep topographical relief, even if



they have minimal ground movement. Royden points to an analogous region in Canada's Northwest Territories, but few people live there, so it is unlikely to become a priority for research. Within China and in other densely populated regions, there are few obvious analogues, although researchers will surely be taking a fresh look at mountainous zones.

Beyond being deceptively lethargic, the Beichuan fault caught Earth scientists off guard last year in another way. From the surface, the fault appears to be divided into relatively short segments that were assumed to move separately in relatively small earthquakes. "We traditionally tend to look at individual fault segments and say those are the maximum size of the earthquake," says John Shaw, a geologist at Harvard University. But if the segments can connect, "the magnitude of those earthquakes is much greater than anticipated".

That is what happened last year. The Beichuan fault ruptured across several segments totalling 240 kilometres, while a secondary fault to its southeast, the Pengguan fault, broke for 72 kilometres. The segments apparently connect at depth, allowing the quake to grow larger than would have been expected. Chinese geologists are now beginning to map in detail the faults that connect with the Beichuan fault.

The danger that remains is another concern. Because the Beichuan fault broke almost entirely to the northeast of its epicentre, some scientists wonder whether the segment that runs towards the southwest is ready to go. Nearby faults may also pose a risk. One study suggests the Beichuan quake increased stress, among other places, on the Xianshui He fault, and on other faults near the city of Ya'an and southeast of Chengdu, the capital of Sichuan[4]. Another study proposes that the chance of a magnitude-7 or greater quake in the area during the next decade is now 8–12%, higher than it was before the 2008 quake[5].

Pandas in peril

"The mountain literally exploded. Boulders were flying in the air, along with earth and leaves," says Deng Linhua, recalling the Sichuan earthquake on 12 May 2008. "It was horrifying." Deng is a vet at the Wolong National Nature Reserve, China's most famous sanctuary for giant pandas and other rare animal species, which sprawls across 200,000 hectares of rugged terrain just a few kilometres from the quake's epicentre.

The earthquake set off landslides, debris flow and avalanches, causing serious ecological damage to 15% of the panda habitat in Wolong. In particular, the reserve's bamboo forests were badly hit, threatening the future of its 143 wild pandas, about one-tenth of the total wild population in China.

The quake also destroyed the China Conservation and Research Centre for the Giant Panda, which boasts the world's largest breeding and research programme, established in 1980 in Wolong by the Chinese government and the international conservation group now known as WWF. "The pandas were terrified," says Deng Tao, a panda keeper at the centre. "Some ran away, and others climbed up to the top of trees and wouldn't come down."

The centre's staff evacuated most of their 63 captive pandas about 300 kilometres by road to another panda base in the area of Ya'an, south of Wolong, and to zoos that were able to house pandas (see photo). One panda is still missing, and one mother of five was killed in her enclosure by a landslide.

Six young pandas remain at the centre in Wolong. One year on, they are happily savouring fresh bamboo in their new, temporary enclosures. "They have mostly recovered from the trauma, but are very sensitive to loud noises," says Deng Tao.

Wolong's reconstruction is also under way: the conservation and research centre will be relocated to an open valley near Gengda, more than 10 kilometres northeast of the current site. "The new site will be less vulnerable to geological hazards," says Wang Lun, the reserve's vice-director.

A total fund of 200 million yuan (US$29 million) has been earmarked for this project and other reconstruction efforts at Wolong, which are expected to take three years to complete. **Jane Qiu**

WOLONG NATIONAL NATURE RESERVE

How it hit

The biggest city in this threatened zone is Chengdu, now teeming with 10 million people. Constant traffic jams and high demand make it near impossible to hail a taxi during working hours. Young professionals who have relocated from Beijing or Shanghai to enjoy a more laid-back lifestyle thread their way through the crush on electric bikes. Ethnic Tibetans, part of the diverse mix in southwest China, find themselves shouldered out of the boom, and many end up as beggars on the pavement.

> **"People often forget to account for disaster prevention in reconstruction." —** Cui Peng

Chengdu is also home to the province's leading earthquake scientists, for whom the 12 May quake — referred to as '5/12' for short, like '9/11' in the United States — occurred practically in their backyards.

In his tidy office in Chengdu, with a Chinese-language copy of *On the Origin of Species* at hand and a picture of Albert Einstein looking on, Chen recalls what it was like at 2:28 p.m. on 12 May. The office began shaking with the strongest tremors he had felt in more than 40 years in the city. Staff members evacuated the building; people poured into the streets as bricks rained down. Chen tried to call his son, but phone lines were dead, so he rushed to the nearby primary school to find his granddaughter. Then he came back to his office building, which was constructed to some of the highest quake-protection standards in the city, and within two days had posted online a history of quakes in the Longmen Shan area.

Across town, when the quake hit, geodesist Du Fang hid under the sturdy wooden table in her office at the Sichuan seismological bureau. Du, the deputy director for earthquake prediction, says she had no idea the quake was coming. Although there are anecdotal reports of toads pouring into Sichuan streets as indicators in the days before the quake, scientific data justify her. Seismometers along the Beichuan fault recorded no increase in tremors that might have presaged the quake, although one station 640 kilometres south of Beichuan recorded changes that some claim were a warning.

In many ways, the Chinese government is still struggling with the aftermath of the disaster. Praised initially for its quick response in sending emergency crews into the affected areas, the government soon faced angry parents asking why so many schools had collapsed. Bitterness lingers. In Yingxiu, the town closest to the epicentre, where as much as 80% of the population died in the quake, rows of temporary housing crowd up against the ruins of Xuankou Middle School where 55 people, including 43 students, were crushed to death.

The government is rebuilding at breakneck pace. Above each cluster of temporary shelters

rises an optimistic billboard showing gleaming plans of new houses to be built. Some are already done: fresh paint and new concrete rise from the recently cleaned-up hillsides, with red characters for good wishes inscribed over the brand-new doorways.

New houses along the Longmen Shan are supposed to be able to withstand a magnitude-8 quake; previously, building regulations in Chengdu required construction to withstand only a magnitude-7 quake, which has one-tenth the intensity of shaking. In many places, however, reconstruction is taking place so quickly that no one is confident that building codes are being followed. Villagers bring hand-carts to the landslides that once blocked the road and haul away rocks to break them and use them to start building homes afresh. Piles of brick — one of the worst construction materials for a quake-prone zone — dot the sides of main roads, waiting to be mortared together into new homes. Lorries piled with construction materials cause hours-long traffic queues along the narrow roads that thread through the mountain valleys.

Even as construction cranes rise from town centres, the landslide-scarred mountains above tower ominously. More than one-fifth of the people who died in the quake were killed by landslides or mud flows, says Cui Peng, a geomorphologist at the Institute of Mountain Hazards and Environment in Chengdu. Precise numbers are hard to tally — the affected area sprawls over 130,000 square kilometres in 51 counties — but estimates suggest that at least 50,000 landslides occurred, perhaps as many as 100,000 or more[6]. One, in Wangjiayan, killed 1,600 people. Another, at Beichuan High School, buried 400 students. Elsewhere, landslides did not kill directly but dammed rivers, creating more than two dozen major 'quake lakes' that threatened residents downstream.

Delving into earthquake history at Bailu.

A. WITZE

The danger of landslides, Cui warns, will be even more acute this rainy season, which begins late this month. The quake destabilized a number of slopes in the area, making them particularly prone to failure after rain. Last September, for instance, heavy rains sent a mud torrent sweeping into the empty centre of Beichuan, already devastated by the earthquake months earlier. The problem is exacerbated by large-scale damage to the landscape from mining practices that have carved out hillsides, and from deforestation that has stripped the slopes of their protective trees.

If people rebuild houses in places that are prone to landslides, Cui notes, constructing them to withstand quakes won't help. "People often forget to account for disaster prevention in reconstruction," he says. His team at the institute, which is part of the Chinese Academy of Sciences, has made detailed recommendations to the government to highlight areas that should avoid rebuilding. Meanwhile, new houses are springing up informally in the villages that dot the Longmen Shan — one by one, and probably not in government-approved areas.

A flood of data

Amid the disheartening news, however, scientists say the data from the earthquake itself will illuminate the region's geology at a more fundamental level. Those data exist because in recent years the Chinese government has spent a lot of money on new equipment to try to make its Earth sciences competitive in the world arena.

The reservoir link

Just 15 kilometres from the epicentre of the 2008 Sichuan earthquake, the concrete wall of the Zipingpu dam has tamed the once-turbulent Min River to form a placid lake. Controversy belies the calmness of its waters, however.

Christian Klose, a geologist at Columbia University in New York City, argues that filling the reservoir, which began about 2 years before the quake and eventually impounded 300 million tonnes of water behind the dam, would have changed the stresses on the regional fault system and may have pushed the Beichuan fault to rupture in the killer quake.

Klose has submitted his work for publication in a peer-reviewed journal and presented it in December at an American Geophysical Union meeting in San Francisco. Researchers who heard the talk, or have spoken to him about the work, remain largely unconvinced, however. "That quake — there's no way it was induced by a small reservoir," says David Simpson, president of the Incorporated Research Institutions for Seismology in Washington DC.

Simpson acknowledges that reservoirs have been linked to much smaller earthquakes in the past; perhaps the best-known example is the Koyna dam in India, the construction of which helped to trigger a magnitude-6.5 earthquake in 1967 that killed more than 180 people.

For this reason it is common to install seismic sensors around newly built reservoirs, and the Chinese government did just that around the Zipingpu reservoir. The sensors monitored seismic activity as the water rose, then lowered, then was filled to the top.

Those data, say various Chinese sources, do not indicate a significant increase in seismicity before the great earthquake, a signal that might have been expected if adding water had changed stress on the fault system.

A. WITZE

Others argue that, although reservoirs might lead to smaller earthquakes near the surface, they could not trigger a magnitude-7.9 quake whose focus was 19 kilometres underground.

More intriguing is the question of whether the construction of the reservoir might have merely prompted a major earthquake that was due to happen anyway. Walter Mooney, a geologist at the US Geological Survey in Menlo Park, California, says that possibility is little relief to those who lost loved ones in the disaster. "Even if the reservoir was slightly related to it or advanced the time for when an earthquake was ready to go," he says, "that's still not socially acceptable."

China is not formally investigating the proposed link, although many Chinese geologists say privately that more work is warranted. **A. W.**

A crown jewel of the government's programme is the array of nearly 300 broadband seismometer stations, which was deployed in western Sichuan by Liu Qiyuan of the China Earthquake Administration and his team. The envy of Western scientists, the array boasts the densest arrangement of seismometers of any large network around the world: it has yielded more than 7 terabytes of data so far. Rob van der Hilst, a geophysicist at MIT who set out an earlier 25-station array in the same region, calls the Chinese network "an enormous tour de force". First deployed in October 2006 and spaced 5–30 kilometres apart, the solar-powered stations cover 370,000 square kilometres of mountainous terrain; someone visits each station every four months to collect the data. Originally funded with 60 million yuan (US$9 million) from the ministry of science and technology and more than 8 million yuan from the provincial government, Liu now scrapes together 1.8 million yuan per year to keep the network operating.

Last May, the great quake knocked out three of the array's stations; one was squashed under a massive boulder. But the data recorded at the time by nearby stations are yielding an unprecedented glimpse into the crust of western Sichuan; a major quake has never been captured in such detail by a network like this. "It's a very rare opportunity in the world," says Liu. "This quake should play an important role in seismological history."

Preliminary data suggest that there is a major change in the geology roughly 20 kilometres below the surface, where relatively brittle material gives way to deeper, softer rock through which seismic waves travel more slowly. This could help explain, Liu says, why the quake and all its aftershocks occurred in the upper 20 kilometres of crust.

Liu is now collaborating with van der Hilst and Michel Campillo of Joseph Fourier University in Grenoble, France, to run the data through new seismic analytical techniques[7]. He is also working with scientists from Taiwan, who are interested in probing any possible analogies with Taiwan's 1999 Chi-chi earthquake.

Liu originally set up the network to monitor what had seemed the biggest threat in the region: the Anning He and Xianshui He faults. After the 2008 quake, however, Liu shifted some of his stations to the north and east, onto the Beichuan fault. The array will remain in place there for a year, after which most of the stations will be moved to other areas, having collected the data he wants.

A. WITZE

The cemetery at Yingxiu commemorates a day when most of the town's citizens died.

Meanwhile, other researchers are trying different ways to investigate the geological history of the Longmen Shan. In a project spearheaded by the land and resources ministry, a team is drilling four holes along the fault zone to collect continuous rock cores from as deep as 4 kilometres. A pilot hole in the village of Hongkou has passed 650 metres' depth and may have already penetrated the fault zone, says Li Haibing, the project's chief geologist, who is at the Institute of Geology and Geophysics of the Chinese Academy of Sciences in Beijing. Team leaders intend to put seismological instruments down the hole for long-term monitoring.

> "This quake should play an important role in seismological history." — Liu Qiyuan

At the shuttered Bailu school, just off its tortured courtyard, the palaeoseismology trench is getting ever deeper. The pit, hand-dug by workers carrying buckets of dirt on yokes, has already revealed evidence of past tremors. Arcing layers of cinder mark the remains of fires triggered by smaller quakes like those that occurred in 1958 and 1970. The results from this trench, along with studies of the buildings still standing in Bailu, may aid future planning. Xu says that the government may intensify mapping of all the active fault traces in the country, in the hope that more precise knowledge may save lives.

As they look back on the earthquake, Earth scientists in China and around the world say that they remain chastened by their lack of foresight. Although many say they could not have recognized a hazard that rears its head only once every few thousand years, the recent disaster has made researchers rethink their assumptions, especially in areas where geological forces are so evidently at work. In the future, they will be less likely to conclude that areas showing little evidence of movement are safe from large quakes.

That will come as little consolation to the people of Bailu. On a spring day, a group of children swarms over a concrete court in town, shouting and elbowing each other in a game of basketball near the abandoned school. Up above, a caged songbird overlooks the playground for good luck. Rows of vegetable gardens dot the hillsides, fresh green against newly tilled dirt. But the school itself remains closed for good, a memorial park to the victims of the 2008 quake. ■

Alexandra Witze is *Nature*'s chief of correspondents for America. Additional reporting by Jane Qiu, *Nature*'s retained correspondent in Beijing.

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See Editorial, page 140.

Russia shifts stance on climate-change policy

Russia's government has quietly made a dramatic change to its policy on climate change, accepting that anthropogenic global warming poses severe risks and requires immediate action to limit carbon emissions.

"Russia's diplomatic approach to [December's scheduled climate talks in] Copenhagen was until now just one big silence," says Kristin Jørgensen, a climate-policy expert with Bellona, an environmental watchdog based in Norway that has a network of activists in Russia. "This is a totally surprising move. There were no hearings, no stakeholder discussion, no public debate — just nothing."

Policy analysts believe that the new climate 'doctrine', adopted in late April, marks a historic turning point. Principally a position statement, the doctrine also outlines a checklist of key climate actions. It follows a February assessment report compiled by leading Russian climate scientists, which was presented to the Russian cabinet on 23 April.

For a longer version of this story, see http://tinyurl.com/q2tyjn.

United States urged to boost global health funds

An expert committee convened by the US Institute of Medicine has called for the country to increase investment in global health initiatives to $15 billion per year by 2012.

Earlier in May President Barack Obama asked Congress to dedicate an average of $10.5 billion per year over the next six years to a global health initiative, with $8.5 billion of that funding dedicated to the HIV/AIDS programme PEPFAR (see *Nature* 457, 254–256; 2009).

But the committee, which included former National Institutes of Health head Harold Varmus, recommended that $13 billion be invested in fulfilling health-related Millennium Development Goals put forward by the United Nations, with another $2 billion for combating injuries and non-communicable conditions, such as heart disease. In addition, it advised that an inter-agency global health committee be created and located in the White House to coordinate such activities.

JOHN MADDOX

A memorial meeting to celebrate the life of Sir John Maddox, the editor of *Nature* for many years, will be held on Friday 5 June 2009 at 6 p.m., followed by a reception, at The Royal Institution, 21 Albemarle Street, London W1S 4BS. Those wishing to attend should notify Diane Kempinski at *Nature*, d.kempinski@nature.com. Places are limited.

THAT FOSSIL FRENZY IN FULL

"This specimen is like finding the lost ark for archaeologists. It is the scientific equivalent of the Holy Grail."

Jørn Hurum, University of Oslo, at the New York press unveiling of a 47-million-year-old fossil, christened Ida (pictured), last week.

"[It is] like the eighth wonder of the world."

Jens Franzen, Natural History Museum of Basel, Switzerland, who was involved in analysing the fossil.

"Any pop band is doing the same thing. We have to start thinking the same way in science."

Hurum justifies the attention.

"There was a TV company involved and time pressure. We've been pushed to finish the study; it's not how I like to do science."

Hurum's co-worker Philip Gingerich of the University of Michigan, Ann Arbor, reflects.

J. L. FRANZEN *ET AL. PLOS ONE* **4,** E5723 (2009)

For more on Ida see http://tinyurl.com/idafossil and Editorial, page 484.

Sources: *The Wall Street Journal*, *The New York Times*, BBC, Fox News, *The Guardian*

UK geographers vote against large expeditions

Members of London's Royal Geographical Society have thrown out a resolution to resume large exploratory expeditions. Campaigners say that the vote highlights growing division within the world's biggest scholarly geographical society.

The society stopped organizing large expeditions such as open-ended explorations of rainforests, after reviews of research practices in 2001 and 2004 suggested that smaller, more focused projects were the best ways to tackle global problems such as climate change and the security of food and water. "Twenty-first-century geography, not nineteenth-century geography, is what we're talking about," says Gordon Conway, the society's president.

The resolution was defeated by 2,590 votes to 1,607 on 18 May. Supporters of the 'Beagle Campaign' that put forward the resolution say they will continue to advocate their cause.

For a longer version of this story, see http://tinyurl.com/pbx929.

Delays to satellite launches put GPS at risk

Concern over the future performance of the US Global Positioning System (GPS) went up a notch last week as a government watchdog official warned that the US Department of Defense faced substantial challenges meeting its space-programme commitments.

A report from the Government Accountability Office (GAO) on 30 April had cautioned that new GPS satellites might not be launched in time to replace the ageing constellation that is currently in orbit. And on 20 May, Cristina Chaplain, GAO director of acquisition and sourcing, told the Senate committee on armed services that cost overruns of space programmes are part of the problem.

Dave Buckman, of the US Air Force Space Command, quickly replied on a Twitter feed that "GPS isn't falling out of the sky". Still, a temporary decline in performance might cause a problem for scientists who rely on GPS-positioned equipment that cannot be easily upgraded, such as low Earth-orbiting satellites, says Marek Ziebart, a space geodesy researcher at University College London.

For a longer version of this story, see http://tinyurl.com/gpsthreat.

Corrections

The News Feature 'The sleeping dragon' (*Nature* **459,** 153–157; 2009) misstated the number of landslides thought to result from the 2008 Sichuan earthquake. It should have said that scientists have identified at least 15,000 resulting landslides and rock avalanches, and perhaps as many as 50,000 or more.

The News story 'Even big societies feel the pinch' (*Nature* **459,** 17; 2009) cited incorrect information, provided by the American Chemical Society, that the society had already posted a $36.5-million bond in a lawsuit it recently lost. The society expects the bond will be posted by the first week of June.