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## China: High and dry

By Leslie Hook

### Water shortages put a brake on economic growth



Holed beneath the waterline: China's droughts and water shortages are pushing people to leave their homes and join an exodus to the cities

**W**ang Fuguo, a 63-year-old cotton farmer, does not know when his ancestors began tilling the land in the dusty village of Weijie. But he is fairly sure he will be the last of his family to do so. "They've all fled," he says, looking out from his gate at the abandoned houses that line the village's only street.

The reason is simple. "There's just no water here," he says. "If you don't have water you can't survive." His household gets running water for one hour every five days, barely enough to feed a tiny patch of aubergines and supply his family and their dozen sheep.

In the face of China's rapid economic expansion and growing presence on the global stage, it is often forgotten that the country is running out of water. In per capita terms, China's water resources are just a quarter of the world average. Eight of China's 28 provinces are as parched as countries in the Middle East such as Jordan and Syria, according to China Water Risk, a consultancy based in Hong Kong.

In the area where Mr Wang lives, Minqin county, a former oasis in Gansu sandwiched between the vast deserts of Inner Mongolia, the problem is particularly severe. Mr Wang's neighbours are not the only ones who have moved away. More than 10,000 people have left the area and have become *shengtai yimin*, "ecological migrants".

Chinese officials identify water scarcity as one of the nation's most pressing difficulties. The problems are social, political and economic. This year Beijing for the first time issued water quotas to every province, setting targets for annual consumption by 2015.

The water shortage is made even more urgent by China's rapid urbanisation, as expanding cities have greater water needs. More than 300m people are expected to move into cities between now and 2030.

This transformation comes as the Chinese are becoming far more critical and vocal about the way they are governed. Weibo, a Twitter-like social network, is routinely filled with users sharing information about pollution violations. Some users even dare officials to take a dip in the rivers they are supposed to be in charge of keeping clean. At times the government's inability to control its waterways has made it the object of public ridicule, such as when more than 16,000 dead pig carcasses floated down Shanghai's main waterway this year.

The economic problems are formidable, with the water shortage threatening to slam a brake on growth. According to a World Bank report in 2007, water problems cost China economic losses of 2.3 per cent of gross domestic product. Executives say that water shortages are already starting to reshape their industries.

"Serious water scarcity is one of the big problems that has slowed down social and economic development in the north," says Jiang

Liping, water specialist at the World Bank in Beijing.

China's lack of water is itself partly a result of economic growth. As people grow wealthier and move to cities, they eat more water-intensive foods, buy more water-intensive products and use more water at home. Changing climate also plays a role, as rainfall patterns and river flows shift. All this is exacerbated by a strained agricultural sector – which accounts for 60 per cent of China's water use. Farmers are digging ever deeper to access water supplies and irrigate more of their land.

The water scarcity is also worsened by the heavy pollution that accompanies China's economic growth. "Controlling pollution is the most difficult aspect of China's water policies," says Xia Jun, director of the centre for water resources research at the Chinese Academy of Social Sciences. "Even in places that have water, it is so polluted that you might not be able to use it." Already, 39 per cent of the water in China's major rivers is too toxic to be fit for any contact with humans.

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In a sign of the gravity of the problem, Beijing is planning to pour Rmb1.8tn (\$291bn) into water-related infrastructure projects such as irrigation and dams under the current five year plan – a sum that is greater than the annual gross domestic product of economies such as Egypt and Chile.

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Loss of livelihood for farmers such as Mr Wang in Minqin is just one example of the huge pressure that water scarcity is putting on China's whole commercial landscape. The country's growth and political stability are increasingly threatened by the widespread degradation of its air and soil.

China's energy sector is particularly threatened by water shortages. Promising new technologies will be constrained in some areas. Projects to develop shale gas, for example, require large amounts of water for hydraulic fracking. Even as Beijing builds new nuclear power plants at a record rate, the government has also announced a moratorium on inland nuclear plants because of concerns over water supply and safety.

"All uses of energy are connected with water," says Lin Boqiang, an energy economist at the University of Xiamen. "In the past, when there was not a shortage of water resources, people would only think about how much water they needed on the site where they wanted to build a project. Now it's the other way around. The volume of water available determines how much energy can be developed in a certain place."

The state's deep concern about water has resulted in some of the toughest laws on water use and water pollution anywhere in the world, although corruption and weak rule of law mean implementation is patchy. "You have to build the most sophisticated water treatment plants in the world to fulfil the law," says an executive in the chemicals industry. "The water laws are sometimes causing investors to rethink, given the amount of investment needed."

However, many question whether these tough laws and the billions spent on water infrastructure will really ease the water crisis. Some Chinese scientists have lambasted the expensive projects at the core of Beijing's water strategy, including the giant diversion system that will carry water thousands of kilometres from southern to northern China to alleviate shortages there.

That project, known as the South-North Water Transfer, will cost at least \$41bn and has forced more than 300,000 people to relocate, with engineers cutting new canals and reservoirs. Other efforts to ease the water shortages in northern China, such as the desalination plants springing up on the coast near Tianjin, are also expensive and consume large amounts of energy.

Minqin county, where Mr Wang lives, is a good example of how China's obsession with water infrastructure has backfired. Mega-projects have been a hallmark of communist rule. When Mao Zedong was in power, a giant dam was built across Minqin's only water source, the Shiyang river, in 1958, by students eager to show their devotion to their leader. But soon after the reservoir was filled, Qingtu lake, the body of water downstream that had been at the heart of the Minqin oasis, dried up.

With no more water in the lake and diminished flows in the Shiyang river, farmers in Minqin started pumping water from the ground to feed their crops. As a result the water table fell. Trees and shrubs that had kept the desert at bay for centuries died during the 1980s and 1990s. With the vegetation gone, the desert started to encroach on the once-lush area. In some places, sand dunes engulfed entire houses.

Minqin's plight eventually started to attract national attention. In 2007, Premier Wen Jiabao visited, declaring: "We should win the fight for Minqin, and not let it vanish from the map." The government allocated Rmb4.7bn to make sure that did not happen. This was a colossal amount for one of China's poorest provinces but the move mirrored China's huge outlays on water projects across the country.

However, China's approach to water management has changed little since Mao. Instead of improving the situation, the multibillion yuan programme has infuriated many in Minqin over what they consider to be useless vanity projects.

At the top of their list is Qingtu lake. It dried up several decades ago but the government has "restored" it by building a new canal

network. When water started flowing through the canals towards the lake, farmers gathered to watch it go by, shocked that so much of the precious resource could be expended to build an artificial lake when their parched fields lay nearby. The lake today resembles a small wetland among the dunes, supported by dykes, pipes and underground sealants to help keep the water in place.

“It is totally unsustainable,” says Kuoray Mao, a researcher with the University of Kansas who lived in Minqin for 18 months, referring to the new lake. “All this money is really just going to feed the bureaucracy, not to improve farmers’ lives.”

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While Minqin has its artificial lake, other parts of China are similarly grappling with the impact of water projects gone wrong. The Three Gorges Dam, completed in 2006 at a cost of Rmb254bn, has been plagued by silting, landslides, pollution and ecological degradation. Last year, the State Council, China’s cabinet, warned that the dam had “urgent problems”. Across northern and central China, the rapid expansion of irrigation infrastructure thanks to government funding has hastened the depletion of underground aquifers.

Few places have more cause for public anger than Minqin, however. “The people here are very unhappy with the government,” says one former farmer who asked not to be named. “They spent all this money to build a lake but our lives have only gotten harder.”

As part of the multimillion-dollar restoration programme, farmers’ private wells were closed and water prices were raised, making it difficult to get by. The government provides enough water to each farmer to cultivate 2.5 *mu* of land per person (slightly less than half an acre), but no more than that.

It is hard to see how areas such as Minqin can realise the vision outlined by China’s leaders, who are promising a “China dream” with higher incomes and better standards of living.

Although thousands of farmers have moved out of Minqin, suicide and depression are common among those who remain. Mr Wang, the cotton farmer, says he and his wife have thought about moving but decided against it. “No one wants us,” he says.

*Additional reporting by Li Wan in Beijing*

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### **Three Gorges Dam: A vanity project with dire consequences**

When the main structure of the Three Gorges Dam, the world’s largest hydropower project, was completed in 2006 it was hailed in China as a triumph of man over nature and a shining example of the Communist party’s ability to mobilise advanced technology to build grand projects, **writes Jamil Anderlini**.

But by May 2011, China’s state council was referring to the dam’s “urgent problems” of environmental degradation, resettlement of about 1.3m people and serious erosion throughout the dam’s reservoir area.

A project that was supposed to reduce reliance on fossil fuels and end centuries of devastating floods has become mired in controversy and been blamed for the extinction of species, contributing to climate change, exacerbating droughts downstream and seismic instability.

The dam was envisioned by the early revolutionary Sun Yat-sen but it was Chairman Mao Zedong who was its main champion and who had engineers thrown in prison in the late 1950s when they criticised the proposed project.

Mao did not live to see his vision poured in concrete but the plan was revived in the 1980s and approved in 1992 despite opposition from nascent environmentalists and even many officials who saw it as a ludicrously expensive and environmentally devastating vanity project.

About 1.3m people were moved from their ancestral homes, many of them unwillingly and some of them in the face of violent threats as the 660km-long reservoir was gradually filled. Official corruption was rife throughout the compensation and resettlement process.

But it was only when the dam was completed that the scale of the environmental problems became clear.

“The environmental impacts of the project are profound and are likely to get worse as time goes on,” according to International Rivers, a US-based environmental group. “The submergence of hundreds of factories, mines and waste dumps and the presence of massive industrial centres upstream are creating a festering bog of effluent, silt, industrial pollutants and rubbish in the reservoir.”

*This article has been amended since original publication to reflect the fact that Minqin county is in Gansu province*

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## Tibet: life on the climate front line

By Leslie Hook

High in the Tibetan plateau, the earth has been warming much faster than the rest of the world for the past 50 years



Tibetan women outside their home on the grassland, Qinghai province

Jiang Shenglan is hunting for caterpillar fungus, and it is not going well.

Sitting in a makeshift plastic tent in a high pass on the edge of the Tibetan plateau, the 46-year-old farmer gestures to her muddy trousers, evidence of the days she has spent crawling across mountain slopes, belly to the ground, peering into the grass. The caterpillar fungus she has been seeking is prized in Chinese medicine as an aphrodisiac and sometimes referred to as “Himalayan Viagra”. It’s nearly worth its weight in gold.

But the fungus is getting harder to find. Jiang has searched the grasses of this lonely stretch of the Tibetan plateau every year for more than a decade. She is known as the best fungus hunter in her village. But recently she has been having trouble.



Students gather outside a school in Qinghai

©Algirdas Bakas



“There’s less and less of it every year,” says Jiang. “If the weather is warm and there isn’t much snowfall, then it can’t grow.” She used to collect 20 or 30 stalks of fungus a day during harvest season. This year, after an unusually dry winter, she’s lucky to find 10.

The caterpillar fungus only grows at high altitudes in certain parts of the Tibetan plateau, where cool temperatures and snows create the right conditions for it to sprout each spring out of the corpses of caterpillar worms that have burrowed underground and died. Scientists say there are several reasons the caterpillar fungus is disappearing, including overharvesting, but Jiang sees only one. “It hardly snowed at all last winter,” she says, as she tends the coal stove inside her tent. “The disappearing caterpillar fungus has to do with climate change.”

Behind her, the mountaintops rise to more than 4,000m – high enough that some fungus hunters from outside the district die every year from altitude sickness. Yet these are only the low foothills of the Tibetan plateau. And the disappearing caterpillar fungus is only the beginning of its problems.

When the Indian tectonic plate collided with Asia some 40 million years ago, the resulting upthrust produced a giant landmass unlike any other. Spanning an area five times the size of Spain, the Tibetan plateau has an average elevation of 4,500m – nearly as high as the top of Mont Blanc – and the same geological forces are still pushing it higher each year.

So much snow and ice is stored on the plateau that scientists often call it the “Third Pole” – a name that highlights its significance to the earth’s climate. And like the North Pole, the Tibetan plateau has been warming much faster than the rest of the world over the past 50 years. Scientists are racing to understand the changes taking place in the region’s lakes, permafrost, ice and weather patterns. Of the 46,000 glaciers on the Tibetan plateau, many are shrinking.

The plateau’s height gives all these changes huge importance. Because the land mass sticks up so far into the earth’s atmosphere, it governs the Asian weather system, brewing the monsoonal rains each summer and steering westerly wind currents all the way from the Mediterranean. Its lakes, glaciers and wetlands act like a huge water tower for all of Asia. One in five people in the world get their water from river systems that are linked to the Tibetan plateau.

The environmental changes are overlaid with political tension. Most of the Tibetan plateau lies within China, covering the so-called Tibet Autonomous Region as well as parts of the provinces of Qinghai, Sichuan and Yunnan.

These areas have been controlled by China’s Communist government since 1951 but Beijing’s rule over the Tibetan people has become increasingly fraught in recent years. Many Tibetans have protested, sometimes violently, against the exclusion of the Dalai Lama, the Tibetan religious leader, from their homeland, and the restrictions imposed on Tibetans living in Chinese-controlled areas.

The region where Jiang gathers fungus is on the edge of the plateau. It’s accessible enough for her and her relatives, who are Hui Muslims and live on lower-lying farms, to travel there every year. But higher on the plateau – where only Tibetan is spoken despite 60 years of Chinese rule; and the TV and mobile phone signals fade away – the changes taking place are even more startling.

Nowhere is that more true than in Madoi New Village, a drab row of concrete blocks on one of the main roads through Qinghai province. The village, which was built by the Chinese government 10 years ago, is home to about 100 Tibetan families who have been officially labelled “ecological migrants”.

Outside the village, the grassland stretches towards the source of the Yellow River, China’s “mother river”, after which the town is named. (Madoi means “Yellow River Source” in Tibetan.)

Historically, this was a flourishing trading post thanks to its location between Xining and Yushu, the biggest towns in Qinghai province. “Madoi used to be a very rich town,” recalls Duo Hua Ben, a Tibetan agricultural official who works for the local government. When Duo was a teenager, there were more than 400,000 livestock in the prefecture, mostly yaks and sheep, providing milk, meat and wool for a human population that numbered in the thousands. Today his job is to carry out government programmes to try to save an ecosystem that once provided so much.

The first signs of deterioration became visible during the 1970s, when land ownership was delineated by the Communist government as part of broader, national reforms. Fences were built and land rights were distributed, steps that radically altered the nomadic grazing systems traditionally used to move large herds over the fragile landscape.

In the 1980s and 1990s, large patches of brown dirt began to appear in the grasslands. Local populations of pikas – a chipmunk-like mammal that lives under the ground – spiralled out of control, assuming plague-like proportions. The giant, sacred lakes near the headwaters of the Yellow River shrank to half their normal size. Thousands of smaller lakes around Madoi disappeared altogether. Wetlands became dry and dusty. The land that once nourished large flocks of yaks found itself unable to cope, and overgrazing became a serious problem.



Dechen Wangmo, who was relocated from the grasslands to the city





From left, Nantsere, 37, and Yunda, 22 – both former herders who were relocated to Madoi, and are now unemployed

The situation caused national alarm in 1997 when the Yellow River dried up over a 700km stretch. Parts of the river had disappeared before but almost never on such a scale or for so long – it lasted more than eight months.

Drought was part of the reason why the Yellow River shrivelled that year but other changes to life on the plateau were also deemed responsible. The government focused its attention on a region known as the “Three River Source”, or Sanjiangyuan in Chinese, an area roughly the size of Great Britain, out of which flows the Yellow River, the Yangtze and the Mekong, and began to come up with policies to protect it.

In 2000, the “Three River Source” was designated a national nature reserve. The blueprint for restoration efforts was drawn up by China’s highest policy making body, the State Council, and within a few years, Rmb7.6bn (£800m) had been allocated to the area for “ecological protection and construction” projects. Madoi and towns like it were at the forefront of these efforts.

The plan tried to fix all the things that seemed to be going wrong. Poisonous chemicals were sprinkled across the plains to kill the pika hordes. The dirt patches were targeted by a huge grass-planting campaign. Fences were built around the most degraded grasslands to keep out animals.

But the plan’s most important component was far more controversial: to save the land, the government decided that the region’s traditional Tibetan herders had to go. “The grassland had become totally overloaded, so we needed to reduce the number of people and livestock living there,” says Sun Faping, a social economist who was influential in guiding the policy.

“At the time they were quite enthusiastic,” says Sun. The herders who moved under the relocation programme in Sanjiangyuan were given a free house and a living allowance if they gave up their flocks. “But it is a big change for them. They can’t raise livestock so they need to find jobs.”

Sun explains that there are schemes to retrain the herders – but the future looks tough from Madoi New Village. Rows of identical concrete houses built just 10 years ago are already starting to crumble. Inside, the stories are largely the same. “I don’t have anything here,” says Nantsere, a former herder who keeps two horses in his yard. “Life on the grasslands is much better. On the grasslands we had yaks and sheep, and here we have nothing to do, no work.” Nantsere still wears the trademark cowboy hat of a herder, even though it is now eight years since he moved off the grassland.

He agreed to move because the government provided a free house and offered him a monthly stipend of Rmb200-Rmb300 (£21-£31). Nantsere’s two sons, seven and eight, now attend the local primary school, where they learn Mandarin – a language their father neither reads nor speaks.

The neighbours have similar stories. Wangden, 45, says the government stipend is barely enough to live on. Before the move, his family relied on its flock for meat, butter and milk; now they have to buy everything. “Our situation here is bad,” he says, as his youngest son, who is five, runs around in the yard. “Things were better before, when we were raising sheep.” One of Wangden’s relatives prepares tea – using store-bought cow’s milk, instead of the yak’s milk they used to have. No one in the new village seems to have a job.



A Tibetan family in Qinghai province

The only sign of the vaunted government training programmes is a small shop in Madoi that advertises “Handicrafts made by ecological

migrants”, as if they are a tourist attraction.

Similar relocation programmes are being implemented across the plateau. A recent study by Human Rights Watch calculated that across all Tibetan areas more than 600,000 nomadic herders have been moved into government-built towns, many falling into poverty as they go.

Local officials in Madoi say that moving herders into settlements is not only about saving the environment but about improving quality of life – bringing them closer to schools, medical care, electricity and running water. Just like every local government in China, the officials in Madoi believe they have a duty to boost GDP, and the town’s propaganda magazine is filled with colourful charts that illustrate local incomes increasing and GDP rising year after year.

Traditionally, herders measured their wealth by the size of their flock and their wife’s jewellery and had little use for money. Now, the ecological migrants are part of the market economy, living off a stipend and buying their essential items in convenience stores. Chinese officials view that as progress; not all Tibetans agree.

“The government has achieved something that they wanted a long time back: a way to control the nomads,” says Tenzin Norbu, who heads the environmental department of the Tibetan government in exile in India. “If you want to say that Tibet is part of China, everything has to fall under central command ... When they are constructing resettlements, it is like kids with Lego toys.”

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Driving across the plateau towards the source of the Yellow River, the grassland rolls away under a heavy sky. The weather changes quickly here. Locals say the sky is like the face of a child, laughing one minute and crying the next.

There is something desolate about this silent expanse, where the atmosphere is so thin that newly arrived visitors gasp for breath every couple of steps. It’s much too harsh, and too high, for trees or shrubs to survive. But for those who know what to look for, the landscape is rich. Our Tibetan driver, Gonpo, points out wild asses, foxes, pika and eagles.



Grasslands near Madoi

In the barrenness, the billboards erected by the government to pay homage to its environmental initiatives strike a jarring note. “Natural Grassland – Grazing Livestock is Forbidden” reads a giant sign outside Madoi. Barbed-wire fences run along the road to drive home the point but because this is a tourist area, they are hung with prayer-flag-like banners to improve the aesthetic. Further along, a lone billboard next to a stream proclaims: “Geologic Environmental Protection”, without explaining what that means.

Other signs of government interventions are easy to spot. There are man-made eagle nests to encourage more of the pika’s predators to the region. A heavy truck crawls along the dirt road towards the Yellow River source, carrying concrete for a tourist reception centre that is under construction. A pickup full of Chinese workers is driving the other way: a team of grass planters, who have been sowing seeds for the past seven years.

When we near Ngoring Lake, the largest in the Yellow River source area, a freshly fallen coat of snow has turned the grassland to a gleaming white. The only interruptions are the brown edges of abandoned houses and sheep pens that poke out from the snowfall, the vestiges of herding families who have moved away. Many of the residents of Madoi New Village used to live here.

There are still a few Tibetan families living near the lake, like 25-year-old Tsengbala, who sports sunglasses, a black leather jacket and



a purple Nike hat. At first blush he looks like he could fit in on the streets of Beijing or Shanghai – except he doesn't speak Chinese and sports two gold incisors, a common sign of wealth among Tibetans.

Tsengbala has been here since he was five – the same age as his eldest son is now – herding yaks by the side of the lake, and riding in local horse races. “I'd rather live here than in a city,” he says. “This is the way of life passed down from generation to generation. I learnt it from my father, and I will pass it on to my son.”

Tsengbala has never heard of climate change. He looks quizzical when asked if temperatures are getting warmer in general. “Well, winter is cold, and summer is hot,” he explains, mystified at the question. “So things are getting warmer this time of year,” he says, referring to the coming summer.

But he says the grassland here has been improving for the past couple of years, as the lake has been rising. After shrinking to half its normal size in the 1990s, Ngoring Lake has been growing steadily, and is now larger than its historical average.

Local officials often cite the overflowing waters of Ngoring as proof that their plan to save the grasslands is working. (At one point artificial rain was even used to try and boost the water level.)

But scientists say the real reasons behind the lake's rise are more sinister: the permafrost that covers more than 80 per cent of the Tibetan plateau is melting rapidly. By some estimates, a fifth has already disappeared. Climate change has also led to increased rain and snowfall in the Madoi area, leading to rising lake levels.

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In a similar way, almost all of the government's “ecological restoration” programmes have been called into question by recent research.

The poisoning of the pikas, for example, has been found to introduce toxins all the way up the food chain and a recent study found that pikas, far from destroying the grassland, actually improve the quality of the soil because their burrows help it to retain water. Further studies have shown that grazing by livestock or wild animals also increases the quality of the grasses growing on the grassland, instead of degrading it – a belief that has been central to the government's relocation efforts. And the policy of moving herders into towns turns out not only to be bad for the herders but also for the environment, which is better equipped on the plateau to withstand human populations that are spread out rather than concentrated.



A Tibetan boy on the road from Ngoring Lake

More and more research has shown that the science behind the state's policies is misguided or incomplete. Inside China, the topic has become somewhat controversial. The government has already spent more than a billion dollars on “restoring” the plateau and few scientists are willing to criticise its approach. Several top Chinese scientists who study the ecology of the region declined to be interviewed for this article, saying the subject is too sensitive. Others were forced by their institutions to cancel scheduled interviews. “We just want for the government's policies to be based on science,” said one university professor who researches the plateau, and asked that her name not be used for fear of recrimination.

Her accusation that the policies are unscientific is serious, because one of the main stated principles of the Chinese government is “scientific development”. Environmentalists in the west often look longingly at the fact that there is virtually no debate among China's leaders about whether or not the world's climate is changing. But that doesn't make it easier to craft policies that deal with the problem.

So if the Tibetan herders and the pikas aren't responsible for the disappearing grasslands, what is? Scientifically speaking, no one is entirely sure. A landmark research paper published in 2009 by Richard Harris, a biologist at the University of Montana, reviewed all the evidence so far, and found that the gaps in research are too big for any of the current hypotheses to be definitively proven. Even the true extent of the degradation is unknown,

he said, because there is no standardised way to measure grassland quality across the plateau.

Within this uncertainty, though, several theories have been gaining ground. The melting permafrost is seen as a key part of the explanation: in some areas, its cycle of freezing and thawing breaks up the ground and displaces the thin soil cover. In others, the natural watering pan provided by the upper layer of the permafrost in spring no longer exists, because of the melting. As a result, grasses die of thirst and the soil turns to sand. As the permafrost melts, it releases carbon and methane into the air, exacerbating the greenhouse effect.

Land ownership and fencing have also come under scrutiny. “In the past, herders moved from place to place to graze their livestock. Now that land ownership is specified, some places have extremely serious overgrazing,” says Xu Jianchu, a grasslands specialist at the Kunming Institute of Botany.

One thing everyone agrees on is that not enough research has been done to really understand the changes. Politics is part of the reason:



Tibet, after all, is a restive place and protests against Chinese rule are common there.

Troubled border politics add to the mix. “If you were looking at data from around the world, we know more about Antarctica or Greenland than we know about the Third Pole region,” says Lonnie Thompson, a glaciologist who has been travelling to the Tibetan plateau to take glacial core samples for the past 30 years. “Part of this is political because of the boundaries of so many countries, and many countries here don’t get along well with each other – so exchanging information, getting people to work together using common techniques [can be challenging].”

Another impediment is the gruelling logistics of working on the plateau: it can often take a week or more of driving from Lhasa to get to a research site, and some projects require scientists to spend months in areas with no mobile phone signal. Working in Antarctica is much more convenient by comparison, Thompson says.

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At a time when China’s pollution often makes headlines – thanks to Beijing’s smog and the growing protests over polluting factories – the subtle shifts on the Tibetan plateau are relatively hidden from public view. But what they portend could be far-reaching. A polluting power plant can shut down in a matter of hours, or upgrade its equipment within a few months. But the earth’s warming climate will keep heating up for the next hundred years, even if humans were to stop emitting carbon tomorrow.

China itself is the world’s biggest carbon emitter, and Beijing has pledged to curb carbon emissions and support renewable energy. But at the same time, China is shifting towards a way of life that increasingly depends on extracting as much as possible from the environment. That’s also reflected in China’s approach to Tibet, where rising investment means more mines, more dams and more power lines. Even the Three River Source area, so carefully protected, is scarred with gravel mines and road construction projects.

The government’s efforts to restore the grasslands are hardly set to slow down. As the State Council’s billion-dollar programme comes to an end, the government is finalising a second programme that is similar – only much bigger. “Phase Two” will cost Rmb20bn, and include more fence building; more pika poisoning; more grass planting; and more “ecological migration”.

The people living on the plateau have little choice but to adapt. In the caterpillar fungus hunters’ camp, Jiang’s younger brother gestures to the fields next to their plastic tents. “We used to be able to dig up [the fungus] on the grassland right here, but now we have to climb all the way up the mountain to find it,” he explains. As the climate changes, the fungus hunters will have to climb ever higher.

*Leslie Hook is a Beijing-based correspondent for the FT and a Nieman Fellow at Harvard*

*Additional reporting by Wan Li*

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