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China's Green Power Experiment: Whither the Environment?
中国のグリーン発電実験—環境の行方は？

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China's Green Power Experiment: Whither the Environment?

Jonathan Watts with a Comment on China's environment by **Robert Marks**

As it aims to reduce fossil-fuel use, the country is investing heavily in wind and solar energy. Gansu province, once known for dirty mines and oil wells, is being revitalised.



Dunhuang Solar Plant

"Ten years from now, I believe every home in Dunhuang will be powered by clean energy. The Gobi desert will be filled with blue photovoltaic panels. It will be a beautiful sight."

The remote, wind-blasted desert of northwestern Gansu could be the most unloved, environmentally abused corner of China. It is home to the country's first oilfield and several of the coalmines and steel factories that have contributed to China's notoriety as the planet's biggest polluter and carbon-dioxide (CO2) emitter.

But in the past few years, the landscape has started to undergo a transformation as Gansu has moved to the frontline of government efforts to reinvent China's economy with a massive investment in renewable energy.

The change is evident soon after driving across the plains from Jiuquan, an ancient garrison town on the Silk Road that is now a base for more than 50 energy companies.

Wind turbines, which were almost unknown five years ago, stretch into the distance, competing only with far mountains and new pylons for space on the horizon. Jiuquan alone now has the capacity to generate six gigawatts (GW) of wind energy – roughly equivalent to that of the whole United Kingdom. The plan is to more than triple that by 2015, when this area could become the biggest wind farm in the world.

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Wind turbines in Gansu

This is the other side of China's development. Although it is the world's biggest CO2 emitter and notorious for building the equivalent of a 400 megawatt (MW) coal-fired power station every three days, it is also erecting 36 wind turbines a day and building a robust new electricity grid to send this power thousands of kilometres across the country from the deserts of the west to the cities of the east.

It is part of a long-term plan to supply 15% of the country's energy from alternative and renewable sources by 2020. Most of that will come from nuclear and hydropower, but the government is also tapping the wind and solar potential of the deserts, mountain plateaus and coastlines

The scale of investment has led to hopes that China may emerge as the world's first green superpower. This is premature. Breakneck economic growth has left much of the country enshrouded in murky grey smog. But the environmental crisis is so bad that it is a driver for change.

Carbon-dioxide emissions have more than doubled in the past 10 years, taking China past the United States as the world's No 1 source of greenhouse gases. Dirty smokestacks and illegal discharge pipes contribute to the hundreds of thousands of annual premature deaths from pollution-related diseases. Environment ministry statistics suggest that 40% of river water can make people sick.

Four in five major cities are unlikely to reach the government's relatively low standards for air quality. Biodiversity is declining, while consumer demand is rising for ever more rare – and expensive – flora, fauna and minerals. More than two dozen areas have been declared "resource depleted". Droughts are becoming more prolonged and more widespread.

If environmental damage were fully factored into the state's account books, China's economic growth rate would probably be halved, Wang Yuqing – the former deputy director of the state environmental protection ministry – warned in March. He estimated environmental damage last year at about 2.5 trillion yuan (US400 billion), or 5 to 6% of China's GDP.

Government plans to tackle these problems include increasingly ambitious pollution controls, afforestation targets and hydroengineering projects, But the focus of its efforts is the attempted switch from coal to renewable energy.

The campaign faces economic and technical obstacles. Coal and gas are far cheaper and abundant, which means it will be many years before China's emissions start to fall.

But Jiuquan's planners say their region is testimony to how quick change can come when staple fossil fuels run out. The output of the first local oilfields, which opened in Yumen county in 1939, has fallen by two-thirds since the 1980s. New fields are being explored, but officials say the era of "peak oil" in Jiuquan has already passed.

"This was the cradle of the Chinese oil industry," said Wu Shengxue, director of Jiuquan's reform and development department. "But we realise that fossil-fuel supplies are

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limited. They will run out one day. So we need to find other forms of energy. Jiuquan is leading the move to renewable energy in China."

Investments in wind and solar are now more than 40 billion yuan (US$6.4 billion) a year in the region, he said, compared to about one billion yuan (US$160 million) for oil and coal combined.

The flood of money is transforming this previously poor area. Average urban incomes – once among China's lowest – have almost tripled since 2000 and are forecast to be higher than the national average by 2015.

Other regions are following. National planners have earmarked seven regions for huge wind projects, each at least 10GW in size. The state grid has struggled to keep up. Two years ago, almost a third of the turbines were wastefully unconnected.

This has prompted unflattering comparisons with the Great Leap Forward of the late 1950s, when Mao Zedong urged China's population to ramp up agricultural and steel production to unrealistic levels, with disastrous consequences.

There are echoes of that era in a banner on the street in Yumen New Town, which reads: "Make an effort to develop the economy in a fast leap!"



Yumen oil fields

Market forces are a secondary consideration. The state grid is legally obliged to pay 0.54 yuan (less than nine US cents) per kilowatt hour (kWh) of wind energy, even though it could get the same amount of coal-fired power for 0.3 yuan (less than five US cents).

The director of the town's energy department said the fact that the government controls prices rather than the market was good for the development of wind power.

Yumen used to be known as Oil City but people are now being moved from the old oilfields to a new town in half-completed tower blocks closer to the wind farms.

"Most people left because business was bad. The environment is much better here," said Dong Suqin, 66, who relocated three years ago.

Business is also more promising. By 2020 Jiuquan plans to increase wind-power generation sixfold to 40GW. Wu predicts even faster growth between 2020 and 2030, when solar power starts starts to take off: "That's when the technology will have matured and the generating costs will be lower. By 2030, I think China will get half its energy from renewable resources and Jiuquan will be famous around the world. People here are going to be rich."

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His optimism is shared in Dunhuang, a city of ancient Buddhist grottoes and ultramodern solar farms where China's first 10MW demonstration photovoltaic plant waits to be connected to the state grid.

"We showed it can be done – this is very significant," said Song Rongwu, assistant manager at the State Development and Investment Corporation (SDIC) facility. "Ten years from now, I believe every home in Dunhuang will be powered by clean energy. The Gobi desert will be filled with blue photovoltaic panels. It will be a beautiful sight."



The Gobi desert, Asia's largest desert

That is by no means certain. Coal's rule looks stronger than ever. This year, China will – for the first time – account for half the coal burned globally, according to Yang Fuqiang of the World Resources Institute. Last year, this dirtiest of fuels increased its share of national energy supply to above 72%. Meanwhile, hydropower declined because of drought, and the wind industry had a year of consolidation.

Yang says incentives to boost the supply of clean energy are no longer enough. He wants the government to curb demand for fossil fuels by making them more expensive: "We need a cap on coal to send a strong signal to investors – 'Don't put your money in coal. Move to cleaner energy.'?"

Environmentalists see glimmers of hope in places such as Jiuquan that this might one day change. But the pace is still too slow and there is too much focus on engineering projects in the desert and not enough on consumption habits in cities.

"We cannot yet say China has finished industrialisation and the dirty phase is finished. This will last quite some time," said Li Bo of Friends of Nature, China's first green NGO. "We cannot rely solely on new technology to clean up our environment. We need to talk more about social responsibility and eco-civilisation."

Additional research by Cecily Huang

(See link here to Jonathan Watts's Guardian video from Gansu.)

Jonathan Watts is the Guardian's Asian environment correspondent. His environmental blog is here

China's Environment: A Comment

Robert Marks

Reporting from China's Gansu province, Jonathan Watts explores efforts of regional and local officials to wean that northwestern region from reliance on coal and steel industries, and instead to construct a "green" economy built around clean and renewable energy sources, in particular wind and solar. Those efforts may well be interesting and important, not just for China, but also for the whole world. On the other hand, the central Chinese state, which has surpassed the United States as the leading

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producer of greenhouse gases in 2012, continues to set energy prices, and to ensure that energy produced from coal powered plants remains cheap. Chinese industry thus remains dependent on an energy source that not only holds a dominant position, but continues to grow and to spew vast amounts of pollutants and global warming gases into the atmosphere. It's almost as if there are two Chinas—one on the leading edge of developing energy from clean and renewable sources, and the other recklessly polluting land, air, and water in a break-neck race to industrialize as rapidly as possible, and maybe, after that task is accomplished, to clean up their environment. In response to Western environmental critics of these rapidly expanding emissions, Chinese officials have asserted that this was precisely the Western approach. But even that pattern is not so clear as the pressures for continued economic development in the world's richest economies continues to drive our unsustainable dependence on fossil fuels.



Terraced rice fields

The relationship of Chinese to their natural environment is—and has been—filled with contradictions. Beginning over 3000 years ago, the Chinese state harnessed agricultural development to its strategic interests, and although the resulting processes were not without change or setbacks, the fact is that by the eighteenth century, most of the space we now call "China" had been brought under both the control of the Chinese state (at that time ruled by Manchus) and the plow. China was increasingly deforested, resources were being depleted, and it was moving inexorably into a deep environmental crisis that added to China's political tumult in the nineteenth and twentieth centuries.

On the other hand, Chinese farmers, especially in core river valley regions such as the North China plain, the Yangzi River valley, and the Pearl River delta, developed various techniques to recycle critical nutrients back to the soil.

Despite the ravages of deforestation, land that was cleared for farming 1,000 or even 2,000 years ago is still being farmed, albeit with massive inputs of synthetic fertilizer. Historian Mark Elvin pointed to this contradiction with his argument that China has seen "3000 years of unsustainable development." It is true that rice paddy production in particular, especially when paired with pisciculture and sericulture, creates more sustainable nutrient feedback loops that are less destructive of the land, and can support a dense human population. But those ecological relationships prevail mostly in China's core economic and agricultural regions.

Another of China's contradictions, therefore. is the relationship between core and periphery. The Chinese imperial state (roughly 500 BCE-1900 CE) was expansionist. From core regions in the north, the state extended its sway over new lands, environments, and peoples. Hundreds if not thousands of different peoples with their own ways of organizing themselves politically, socially, culturally, and environmentally confronted the powerful Chinese state. As James C. Scott points out in a recent book, many chose to flee to the highlands in a region he calls "Zomia" that

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includes much of upland Southeast Asia as well as parts of what is now south and southwest China. Others acculturated themselves to Chinese ways, and still others resisted as best they could. Mongols in the grasslands to the north of China's Great Wall, Tibetans on their far western high plateau, and the Naxi in the southwestern mountains all had their own written languages, and were able to maintain some measure of cultural autonomy, but those appear to be more exceptional cases. The imperial Chinese state distinguished between two groups broadly as the "cooked" and the "raw" barbarians, and saw transforming those peoples' exotic environments into Chinese farm landscapes as a means of bringing them the benefits of Chinese civilization. China's central state has long tapped resources from peripheral regions for strategic and economic purposes.

One significant long-term outcome of the relationship of Chinese to their environment, therefore, has been not just the loss of biodiversity, but also the simplification of political, cultural, and socioeconomic systems into increasingly Chinese forms and the extension of Chinese power over the peoples on their periphery.

Added to these long-term historical processes in the twentieth century has been the establishment in 1949 of a Communist-led state committed to mobilization to assure the most rapid industrial growth possible. For the first 30 years inspired mostly by visions arising from Mao Zedong and conditioned by China's isolation both from the capitalist world system and after 1960 from the Soviet world as well, China's developmental strategies depended on extracting surpluses from agriculture to be used for industrialization. The Maoist emphasis on "self reliance" was a virtue made of necessity. Over the last 30 years, China's developmental strategy has mostly followed principles first enunciated by Deng Xiaoping and his followers, emphasizing the privatization of productive resources and full engagement and integration with the capitalist world economy.

Regardless of the developmental approach, both the Maoist and Dengist policies have had devastating environmental impacts, from massive deforestation under Mao to extensive pollution of land, air, and water concurrent with the rapid industrial development and automobilization of the past two decades. Arguably, the environmental impacts of China's industrial development have been more severe than experiences anywhere else in the world, with the possible exception of the Soviet Union. Where Mao called for "man to conquer nature," with predictable environmental results, the contemporary modernist agenda insists that China needs to develop first and clean up its environment later. The result has been to intensify the pressures not just on China's environment, but that of the whole world.

Polluted land, air, and water have dire consequences for the health and wellbeing of people down wind or down stream from the sources of that pollution, prompting thousands of "mass incidents" in which people in China protest at the gates of factories or in front of local government offices demanding that environmental clean up. A "green" movement thus arose in the 1990s (the first "green" NGO, the Friends of Nature, was formed in 1993), and it continues to work within the confines of the political system to press an environmentalist agenda.

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Protesters in Dalian in China's northeast demand closure of a polluting chemical plant

The Chinese central state established a national Environmental Protection Agency charged with developing and implementing environmental policies. Despite the commitment of the EPA officials, and their far-sighted efforts to get environmental legislation adopted at the national level, those regulations have to be implemented at the local level. And there, local officials more often support rapid (and polluting) industrialization over environmental protection: their advancement and promotion is dependent on economic growth, and it seems that most (but certainly not all) local officials pay little heed to cleaning up or preventing environmental messes.

The region reported on here—Gansu—is among China's most peripheral and poorest regions, and the evidence provided by Watts is that it is being "developed" for the purpose of producing energy for export to industrial enterprises and urban centers of consumption much further to the east in and around Beijing and possibly as far away as Shanghai. China's rulers have remade environments elsewhere—in particular the Three Gorges Dam on the Yangzi River, and the various dam projects in China's southwestern Yunnan province—for the same purpose, and with enormously destructive environmental impacts. Is there reason to think the prospects for Gansu are much different, even though the renewable energy resources are wind and solar?

Whether the Gansu experience Watts reports on here will transform China's economy and relationship to its environment, or recapitulate earlier patterns from either its imperial or communist past, remains to be seen. If past is prologue, the prognosis is not promising. I hope I'm wrong.

Robert B. Marks is Richard and Billie Deihl Professor of History at Whittier College. He is the author of China: Its Environment and History (2012), The Origins of the Modern World: A Global and Ecological Narrative from the Fifteenth to the Twenty-first Century (2007), and Tigers, Rice, Silk, and Silt: Environment and Economy in Late Imperial South China (1998).

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