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The Spider Webs and the Lion: How Energy and Environmental Issues Entangle China

Mark Lee

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**The Spider Webs and the Lion:
How Energy and Environmental
Issues Entangle China**

by

Mark Lee

The Institute of Land Warfare
ASSOCIATION OF THE UNITED STATES ARMY

AN INSTITUTE OF LAND WARFARE PAPER

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LAND WARFARE PAPER NO. 88, May 2012

The Spider Webs and the Lion: How Energy and Environmental Issues Entangle China

by Mark Lee

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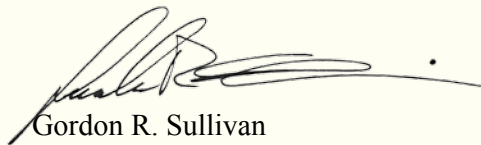
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Foreword

This Land Warfare Paper discusses seven distinct yet interrelated energy and environmental challenges currently facing China. The author discusses each of these challenges—energy demand, the water crisis, cumulative pollution effects, rapid urbanization, a must-grow-to-survive economy, the limitations of the central government and the long-standing attitude that humans can completely control nature—and their effects on China’s economic growth and stability. These issues already create unhealthy living situations and unsustainable energy sources and will soon test the legitimacy of China’s central government.

China’s efforts to extricate itself from these different webs include a green movement and a penchant for large public works projects. Yet, as the author discusses, many of these attempts are half-hearted and therefore will not have sufficient power to solve China’s energy and environmental problems. Despite warnings, China has continued to focus on rapid development, resulting in rapid destruction of the environment.

The paper examines how China’s economy is intertwined with many of the energy decisions made by its central and local governments. Its economic growth has been unprecedented, but the growing volume of environmental mismanagement is taking a toll on the people and the land. China faces a day in the near future when the impact of profligate energy consumption will dictate the curtailment of the current economic boom, threatening the rule of the Communist Party and likely destabilizing the future of the country.



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29 May 2012

The Spider Webs and the Lion: How Energy and Environmental Issues Entangle China

Introduction

When the spider webs unite, they can tie up a lion.

Ethiopian proverb¹

The rapid economic transformation of China—home to the world’s fastest-growing economy—garners worldwide attention. Economists, politicians, academics and pundits contest how soon the Chinese economy will surpass that of the United States—but not the fact that it will do so eventually. However, hidden beneath the headlines, seven complex energy and environmental challenges have sufficient influence to hinder Chinese growth. The seven far-reaching and interconnected webs within China are its insatiable energy demand, debilitating water crisis, cumulative pollution effects, rapid urbanization, a must-grow-to-survive economy, limited central government control and persistent human-over-nature ethos. Individually, each presents a significant obstacle to China’s stability and growth, but collectively their effects make them even more formidable. These challenges will significantly limit growth, inhibit development and potentially undermine the stability of China’s central government. Decisions regarding China’s energy and environmental policies will likely impact the country’s economic development, thus shifting the nation’s current course. China’s rapid growth has made it a global economic power—creating many interdependent relationships between China and other powerful nations; thus, a stumbling China presents significant challenges to the global economy.

China Rising

After the 1989 Tiananmen Square protests, leaders of the Chinese Communist Party realized that they must induce economic growth in order to retain power. Because of subsequent initiatives, China has grown its economy significantly in the past 20 years and now possesses the second largest economy in the world. China accomplished this seemingly miraculous growth—nearly 10 percent per year for the past two decades—on the back of unprecedented industrialization. These industrialization efforts drew a large number of Chinese citizens to the factory-filled cities. Rapid urbanization is one key to China’s generating and maintaining economic momentum; subsequently, its cities have required significant infrastructure creation and greatly contributed to China’s emergence as a leading consumer in several energy-related commodities.² As a nascent middle class developed, consumer consumption increased. To sustain this rate of growth, China gradually became an energy importer, since domestic supplies were no longer sufficient.

These rapid developments are not, however, without cost. China is home to some of the most polluted regions in the world. It also faces severe water shortages worsened by significant pollution in the already-short supply of available water. Beijing's decision to push industrialization to maintain satisfaction is not new to developing countries. The scale of urbanization and industrial development in China and its subsequent environmental costs seen in China will stretch far beyond the country's boundaries, likely impacting energy and environmental policies throughout the world.

Enter Kuznets

Economist Simon Kuznets developed a theory analyzing the relationship between economic inequalities and Gross Domestic Product (GDP) in 1954. In examining the differences between *developing* economies and *developed* economies, he found that where the income inequalities initially increase with the onset of development, economic disparity decreases once a predetermined per-capita income of a given country is reached.³ Using data from economic development in South America, Kuznets demonstrated the existence of an inverted "U" curve, thereby creating a model that became known as the Environmental Kuznets Curve (EKC).⁴

EKC recognizes that there will be greater potential environmental damage to the earth as a society develops. However, once a country's GDP rises to a certain level, there is a marked improvement in effective environmental stewardship and policy. Some economists and environmentalists call this theory the "grow first and then clean up" model.⁵ While the EKC model reveals some degree of variation for different types of pollutants, most proponents of this model believe the earliest transition point occurs when the per-capita GDP reaches approximately USD \$8,000 per year.⁶

Pollutants with an immediate or observable impact often see correction efforts sooner than pollutants that have a more subtle or gradual effect on the environment. If a pollutant makes people sick, the people from the affected town or region are more inclined to notice the pollution and take action on a local level to stop the pollution. This action, however, often does not reach the attention of the central government, so some may consider its impact quite limited. Historically, the threshold for acting on water pollution issues is generally lower than for air pollution and for the more noxious air pollutants than for pollutants with less tangible effects.⁷

The Chinese GDP is still several thousand dollars below the EKC threshold, indicating that the government and its people will fail to control environmental problems for some time to come. Given China's substantial size, ignoring these issues for a while longer may not give the government the power to reverse the current destructive environmental course. Furthermore, this model is predicated, in part, on the relatively slow-growth pattern experienced by most developing countries. China's growth has never been categorized as "slow;" rather its rapid growth has further aggravated its environmental fragility—two more reasons that add to the instability of the country's energy and environmental challenges.

The Seven Webs

In China's case, seven "spider webs"—its energy demand, the water crisis, cumulative pollution effects, rapid urbanization, a must-grow-to-survive economy, the limitations of the central government's power and the widely accepted Maoist stance that humans can control nature—contribute to tying up the "lion." Even one of these webs would present a hefty challenge for any government. The collective impact of these seven webs will decrease China's

ability to grow its GDP. Despite the lofty goals of its 12th five-year plan, implemented in 2010, the Chinese economy will be unable to generate required environmental changes ahead of the EKC.⁸ Some of the goals of this most recent five-year plan, scheduled to conclude in 2015, include GDP-related increases in nonfossil fuel consumption as well as substantial reductions in industrial water consumption (by 30 percent), energy consumption (by 16 percent) and carbon dioxide emission (by 17 percent).⁹ China cannot overcome these problems without significant changes in the Chinese government, its business practices and its overconfidence in the ability of humans to control nature.

Web One: Growing Energy Demand

Even though China touts its progress in supporting a greener economy, it remains the largest consumer of coal in the world. Despite alternative energy initiatives, coal production and consumption in China continue to accelerate. In the 1st quarter of 2009, coal production increased 28 percent from the 1st quarter of 2008,¹⁰ placing Chinese coal use at slightly less than half of the world's total coal consumption.¹¹ This rapacious consumption will be difficult to stop, let alone reverse, in the next decade. Despite the goals of this five-year plan, 2011 saw the highest annual increase in Chinese coal consumption since 2005.¹² China currently cannot build windmills and new electrical grids fast enough to offset the environmental damage done by coal production, and its capabilities indicate that it will not have sufficient means to do so anytime in the near future.

In 2010 President Hu noted that several small-scale coal plants had been shut down the previous year.¹³ Newer and larger plants, located closer to the coal sources, have replaced these smaller plants, usually found in cities. The closure of the smaller urban plants reduced localized pollution, but the larger plants, in turn, contributed to an increase in acid rain across the same area. Despite these changes, China still is opening a new coal-fired plant every two weeks. China is not merely storing coal for emergency purposes: coal production remains the main source of electricity and heat production.¹⁴ Cheap and reliable electricity continues to be the engine of the Chinese economy, and that electricity comes from coal.

China became the second largest importer of oil in the world in 2010, slightly trailing the United States. In addition to using petrochemicals as part of its industrial processes, rapidly increasing urbanization has driven the Chinese to acquire automobiles in record numbers. Chinese consumers purchased more than 18 million vehicles in 2010, topping American car sales for the second year in a row.¹⁵ The popularity of automobiles (and the means with which to buy them) increases the demand for oil and adds more pollutants to the already abysmal air quality in most Chinese cities.

Web Two: Water Shortages

Despite its long and winding rivers, China has a water shortage. China contains almost 25 percent of the people on the planet but only 8 percent of the world's fresh water.¹⁶ Although China technically has more water than what the World Bank's predetermined level deems a "water shortage" within a country, the disconnect between water locations and population centers exacerbates the country's water shortage.¹⁷ Most of the water exists in China's southwest provinces, and most of its people live in the northeastern regions.

Beijing's need to get water to its people has prompted it to undertake many significant hydrologic projects. China has more dams than any other nation in the world, many of them built to help

control the water. Most are also used to generate hydroelectricity. The most famous Chinese dam is the Three Gorges Dam complex on the Yangtze River. The architects and supporters behind this chronically over-budget and underperforming project promised to produce approximately 10 percent of China's electricity needs.¹⁸ In addition to the \$23 billion cost needed for construction of the dam, there are human costs associated with relocating approximately 1.4 million people already displaced during the construction process.¹⁹ An additional 100,000 people are reportedly going to be forced to move out of their homes because more landslides and soil collapses than initially foreseen are likely to occur near construction sites of the Three Gorges Dam.²⁰

Despite the huge costs and complications associated with moving people from their homes, China remains undeterred by big projects. The next big project will attempt to move the water to the people. Once completed in 2014, the South–North Water Transfer Project will move water over 1,900 miles of land. If successful, this transfer could alleviate water shortages in many northern cities, including Beijing. The project will eventually have three transfer lines, the first of which will move 9.5 trillion gallons of water annually from the Yangtze to the north. In “A Dry and Anxious North Awaits China’s Giant, Unproven Water Transport Scheme,” Aaron Jaffe and Keith Schneider write that this transfer project is “tantamount to reversing the flow of the Missouri River—which drains the Great Plains and part of the Northwest in the United States—and sending it back to Montana.”²¹ Planning for the remaining two lines is ongoing, but both will be larger and longer than the first.

Water shortages have worsened since 2010 when significant drought affected China's wheat heartland. This drought led to a loss of farmland as well as crops—losses that still threaten China's food security. Nonetheless, in February 2011 Beijing asserted that China would meet food demands.²²

In China, water is not well located to support either population centers or coal industries. A typical coal-fired generation plant uses close to 12 million gallons of water a day, and the industry demands almost 70 percent of China's total water use.²³ The coal-mining process, the largest single user of water in China, will benefit from the South–North Transfer Project as much as the urban areas will. The energy plan calls for the creation of “energy bases”—including mining technology, power generation and steel production—in massive complexes in northern China that will concentrate coal-related industries closer to large coal reserves.²⁴

Web Three: Pollution

In the ongoing struggle between industry development and environmental preservation, industry has won most battles during China's phenomenal growth. China faces significant challenges as the cumulative effects of this development—namely, pollution—continue to grow. Thousands of factories line most riverbanks, spewing waste into the water and poison into the air. China's pollution problems affect water and air quality and produce increasing amounts of acid rain. The country's economic dependency on the pollution creators paints a dire future for preventing and reversing environmental problems.

There are shortages of water across the nation not simply for lack of water but for lack of clean water. In 2010 *Chinascopes*, a Chinese media outlet, indicated that 25 percent of Chinese residents do not have access to clean drinking water.²⁵ The Chinese Ministry of Water Resources found that the drinking water in 115 of 118 cities was contaminated.²⁶ Even if this latter statistic is overblown and the 25 percent statistic is more accurate, both numbers reveal that a population block larger than the entire U.S. population lives without access to clean water.

A 2005 survey indicated that half of China's cities did not meet the country's air-quality standards. Only 1 percent of China's urban populations, which total 580 million people, enjoys air that meets European Union (EU) standards.²⁷ Air pollution alone accounts for 700,000 premature deaths every year.²⁸ The Chinese government has acknowledged its air pollution problem—at least from a public affairs perspective. In preparation for the 2008 Olympic Games, Beijing instituted an intensive pollution curtailment project to better its air quality. Coal, steel and other industries were closed. Many residents were prohibited from driving their cars in Beijing on particular days (regulated by the last number in their license plates) during the months leading up to the Olympics; the Beijing government took 30 percent of its cars off the roads. As a result, 800,000 fewer automobiles were on the city streets each day.²⁹ These efforts improved the air quality enough to meet organizers' goals during the Olympics, but these goals are far below levels acceptable to the World Health Organization (WHO).³⁰ After the Olympic Games ended, the restrictions were loosened, and air quality quickly returned to its previous levels, indicated by a brown fog once again covering the city. The U.S. Embassy in Beijing called the air quality in November 2010 "crazy bad."³¹

The profligate use of coal has also intensified the acid rain problem. The acid rain that impacts China also affects Japan and South Korea, creating billions of dollars in property and crop damages throughout northeast Asia.³² Recent estimates show that 258 major Chinese cities experience acid rain.³³ The damage to buildings, statues and infrastructure is widespread. Acid rain reduces crop yields, further exacerbating the impacts of the droughts and desertification.

China is the largest producer of carbon dioxide (CO₂) in the world and will remain so for at least the near future. A coal-driven economy, it cannot abandon its economic lifeline to meet international goals. Its inability to curb its own emissions hamstrings the world's efforts to control this greenhouse gas. If the world's leading producers of pollutants were to arrive at a cap-and-trade solution to reduce these gases, the Chinese economy would bear the greatest burden.

Web Four: Rapid Urbanization

One way for China to generate economic growth is a continuation of the massive migration towards cities that the country has already experienced. It is difficult to fathom the scale of this migration. China boasts almost 50 cities with populations of more than one million. Currently, around 40 percent of the Chinese population lives in an urban environment; analysts expect that figure will rise to 60 percent by 2020.³⁴ Given the size of the Chinese population, this percentage increase represents hundreds of millions of new urban residents in the next eight years.

Urbanization, as seen in China, moves workers closer to industry but creates significant demands on already strained infrastructures. A primary source of water pollution is the semi-functional metropolitan wastewater treatment industry in China.³⁵ The new middle class has recently been able to buy the automobiles it has long coveted. Imagine the impact on air quality in Chinese cities when many of these hundreds of millions more people move into the cities and bring cars with them. Stress on the infrastructure, added water usage, demand for oil and increased pollution will only magnify in Chinese cities in the next few years.

Web Five: The Party Machine

As long as China is able to maintain adequate GDP growth, the Chinese Communist Party will retain power. The party's power at the national level remains unquestioned. However, the latitude that it cedes to local governments is a source of many problems. On paper, China has

very strict environmental protection laws. The conflict for the local governments is simple: they must adhere to environmental regulations. At the same time, the central government expects them to maximize productivity so the Chinese economy can continue to grow.

Given the choice between increased productivity and less pollution, local leaders resoundingly choose productivity. Often local officials receive shares in the factories, further complicating their motivation and efforts to police them. History has so far shown that the party will step in only after an environmental catastrophe captures the attention of the nation. In 2007 the Tai Lake in Jiangsu Province turned green with an algae bloom created from the discharge of raw pollution. The lake was soon covered in a green slime, rendering the water unfit for drinking and cutting of the supply of drinking water to millions. The provincial party secretary came forward with strong denouncements of the region's industry but then promptly arrested the environmental whistleblower.³⁶ Algae still exists on the lake, and the industry still operates—while the activist whistleblower remains behind bars.

Web Six: A Must-Grow-to-Survive Economy

In *The Party: The Secret World of China's Communist Rulers*, Richard McGregor writes that “in large part, the Party's legitimacy still depends on the economy. Economic growth is the single most important pillar supporting the Party at home and the force behind the power that China now projects around the world.”³⁷ China has enjoyed close to 10 percent growth in GDP every year for the past 20 years. This remarkable achievement has pulled hundreds of millions of people out of poverty. The rapid economic growth has created great expectations for financial earnings among the Chinese people—expectations that may be hard to fulfill in coming years. While experts will vary on the exact figure, it is easy to see that China must maintain a certain—and relatively high—level of GDP growth for the Party to retain legitimacy. Referring to the economy, Deng Xiaoping—revered leader of the Communist Party of China in the 1980s—once said, “Black cat, white cat, all that matters is that it catches mice.”³⁸ In likening economic development to “mice” in this metaphor, Deng suggested that he would, if necessary, look to non-communistic “cats” to get the job done. Recently pollution and water shortages have made those Chinese “cats” too weak to catch the “mice.” These environmental problems have already begun to have detrimental effects on China's economy and will continue to do so without substantial changes to infrastructure and energy policy in the near future.

Web Seven: The Earth is Ours to Shape

The efforts of Emperor Yu present an historical perspective of a human presiding over and ultimately controlling nature. Around 2100 BCE, during the time of the great floods, the young Yu held back the waters of the Yangtze River through extensive dredging, land reformation and mountain removal spanning 13 years.³⁹ His efforts confirmed the Confucian premise that the Chinese people can win in the face of nature's challenges—and sometimes even change nature's path to meet their own needs.⁴⁰

More than 4,000 years ago, the problem in Beijing was not Mongols, warlords or any of the other modern-day challenges. Instead, it was elephants. In 2000 BCE, elephants were common as far north as Beijing and lived throughout most of China. The loss of crops to elephants remained a serious hindrance to human populations for centuries. As early as 500 AD, the Chinese learned that systematically controlling the environment allowed them to drive out the pachyderms: systematic deforestation deprived the elephants of much-needed shade.⁴¹ While

some elephants remained in China as late as the 1700s, they were driven back to small enclaves near the Burma border much sooner than that.⁴²

While this early example of controlling the environment is not uniquely Chinese, it presents documented evidence of attitudes pervasive through China's history—attitudes that reveal support for altering nature in attempts to better serve the human population. China consistently believes that the “next big project”—the next Three Gorges, the next South–North Water Transfer Project—will be the solution to whatever ecological challenge it faces. This reliance on the perceived ability to move heaven and earth creates a false sense of security.

This philosophy, coupled with Maoist idealism, led to decades of environmental calamities that still impact China. Mao turned a folk tale about the “foolish old man who removed the mountains” into a battle cry in the war against nature.⁴³ Many ill-fated projects used a form of this approach; their only commonalities were failure and ecological disaster. For example, the 1970s decision to fill Lake Dianchi with rock from nearby mountains only served to kill off an abundant fish population, ruining the microclimate of Kunming and improving neither the environment nor the circumstances of the local citizens.⁴⁴

Attempts and Aspirations

China is trying to extricate itself from these different webs with full force and the monolithic zeal it has often relied upon. The 12th five-year plan specifically addresses striving for a balance among economic growth, energy, water and the environment.⁴⁵ In many instances, the scale of these efforts and the scope of China's accomplishments are truly remarkable. Nevertheless, it remains to be seen whether fulfillment of these aspirations will have the desired impact.

Beijing is struggling to implement a feasible and effective energy policy. The disconnect between the aspirations of the plan and political reality in China creates possibly the biggest obstacle. The most recent plan requires a reduction in the consumption of two key economic elements: water and coal.⁴⁶ Other five-year plans have, of course, established goals, only some of which have been met. For example, the 10th five-year plan called for a 10 percent reduction in sulfur dioxide (SO₂)—a key coal pollutant—but by the end of the plan's timetable, SO₂ pollution had increased by 27 percent.⁴⁷

The 12th five-year plan recognizes, for the first time, that China must reduce its coal consumption and still find a way to increase electricity production. The plan establishes significant goals in solar and wind generation. These increases could allow alternative energy sources to produce up to 15 percent of China's needs. However, these aspirations are becoming increasingly difficult to achieve: the complexity of the energy problem, China's insatiable appetite for growth and the inefficient and ineffective government consistently create obstacles to these goals.

Go Green

In many ways, China has embraced the green movement. It understands the challenges posed by coal dependency and the hefty price that each coal-fired kilowatt places at the doorstep of the Chinese people. Beijing is aggressively seeking ways to increase mining and energy efficiency while also reducing the amount of water required and pollution created. The fact remains, however, that 70 percent of China's energy comes from coal and that dependence will be difficult to reduce, especially given political realities.

In an effort to wean itself off coal, China has invested billions in wind power. China already has more generating capacity than the United States—slightly more than 40 gigawatts (GW)—from wind turbines. This impressive figure is overshadowed, however, by the reality that 25 percent of the turbines are not actually connected to any power distribution grid.⁴⁸ These infrastructure limitations have three main explanations:

- The northeast region of China has the best and oldest wind grids in the country, but these grids are already at maximum capacity and therefore cannot carry any more electricity through their systems. Grid owners must limit the amount of wind-powered electricity in order to maintain a stable grid. These providers have no incentive to upgrade their grids, but without necessary upgrades, they will not be able to produce more “green” energy.
- Bureaucratic disputes between state and local governments create constant tension, as they quarrel with companies to determine who should pay to connect the wind farms to the grid. While both parties are proud to brag about the number of wind power projects in their province, it appears that actually getting the electricity to the grid remains a secondary task.⁴⁹ A gap between the central-planning agencies and the local governments contributes to this challenge. China’s central-planning administration requires approval of all new wind projects that register more than 50 megawatts (MW); local governments can approve smaller projects. In “Beyond the Numbers: A Closer Look at China’s Wind Power Success,” Haibing Ma and Lini Fu report the detrimental effects this policy has had on the creation of new wind projects, explaining that “most wind farms built for China’s northeastern grid have an installed capacity of precisely 49.5 MW.”⁵⁰
- Many areas of China also use steam generated from the coal-fired plants to heat people’s homes. These regions are in a quandary because they must use coal so that people do not freeze, even though there is surplus wind-generated electricity available.

Move Heaven and Earth

The Three Gorges Dam and the South–North Water Transfer Project are two examples of China’s willingness to undertake massive public works projects to set conditions for its continued success. Coal mining currently consumes 20 percent of China’s water. Beijing is in discussions about a plan to build a 1,000-mile pipeline from the Yellow Sea to the coal-mining area. At the end of this pipeline, a nuclear-powered desalinization plant will provide fresh water for the coal industry. But China’s great projects come with human costs as well. Recent estimates show that the Three Gorges Dam will ultimately affect close to six million people—all of whom will have been displaced without compensation.

A Growing Awareness among China’s Population

The disconnect between the central and local governments for environmental compliance likely ensures that environmental catastrophes will continue to occur in China. China is witnessing emerging environmental activism and growing awareness among its citizens. Strangely—and fortunately—in a land where protests are illegal, most officials allow localized protests about environmental issues. While the leaders of these protests are often identified and persecuted, their efforts to get the central government to notice their environmental grievances can lead to action.

Nearly 10 percent of all mass protests in China every year occur over environment-related issues.⁵¹ This percentage reflects more than 1,000 protests every month. The Chinese people

are beginning to understand the correlation between industrial pollution and the adverse health effects that they suffer—and are beginning to believe their voices supporting environmental standards can make a difference. The very personal effects of pollution on people's day-to-day lives have contributed to the growing number of protests. For example: one study estimates that the death rate along part of the Huai River is a third higher than the provincial average; the cancer rate is twice the provincial average.⁵² Protests are not the only means of attracting the attention of the government. In 1997 a government official admitted to a reporter that “for years no boy from [certain villages in] the Huai River area has been healthy enough to pass the physical examination required to enter the [People's Liberation] army.”⁵³ Such long-term effects on the quality of life among the Chinese people are becoming more well-known and therefore more difficult for the Chinese government to ignore or disregard. Yet despite its acknowledgment of this serious, wide-reaching crisis, China continues to falter when faced with the challenge of implementing workable clean-energy projects.

Conclusion

All of the efforts to develop the Chinese economy have come with a hefty environmental price. China achieved rapid industrialization with the establishment of many unregulated industrial parks. These parks, while feeding the Chinese economy, have poisoned the air and the land, prompting a crisis unlike anything China has ever faced. Industrialization has drained China of its water supplies, which have fallen to dangerously low levels, while also ensuring that much of the remaining water is unfit for consumption.

China's rapid development and equally rapid destruction of the environment place it in peril. The danger is not only to the stability of China but also to the climate throughout the rest of the world. This system is so interrelated that the sheer magnitude makes it difficult to fathom, much less find successful methods to change the current trajectory. In many ways, any one of these energy and environmental challenges magnifies the difficulty of the other challenges. China relies on coal for its energy production and is the largest consumer of coal in the world; it is therefore no mere coincidence that the country is also the largest producer of greenhouse gases. Continued reliance on coal-fired plants represents a significant atmospheric challenge. China already claims 20 of the 30 most polluted cities in the world.⁵⁴ Most of the coal that China uses comes from its northwest provinces. Not only is this far from population centers, it is also in a mostly water-poor region. The production of coal requires significant amounts of water. The location of the power plants near the coal generates production efficiencies but increases the water demand in a water-poor area. The lack of pollution regulations imposed on the power plants allows the populated areas to get electricity, but these regions are also affected by acid rain as the pollutants from power plants fall back to Earth.

Like the lion in the parable, China currently finds itself ensnared by these webs. How China chooses to extract itself from these webs could establish a blueprint for the rest of the world's efforts to build its own version of sustained growth. China's efforts to wean itself off coal will strengthen its capability to manufacture alternative energy products. Improving such capability will allow the goods to be sold across the global economy and will also enable other nations' alternative energy projects. Unfortunately, time is against these efforts; water shortages and rampant pollution could result in decreased productivity and satisfaction.

Recent Chinese economic growth has been unprecedented, but the growing volume of environmental mismanagement is beginning to take its toll on the people and the land. China can

ill afford to wait for its GDP to rise to Kuznets' recommended level. It faces a day in the near future when profligate energy consumption will dictate the curtailment of the current economic boom, threatening the rule of the Communist Party and forcing China down an unfamiliar and potentially dangerous path.

Endnotes

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