"China's Unsustainable Economic Growth and Development: The Influence of Conspicuous Consumption"

James Angresano[1]
Professor of Political Economy
Chair, Environmental Studies Program
The College of Idaho

Abstract

Most of the literature analyzing the sustainability of China's economy tends to be directed at whether the country can maintain its unprecedented high rates of economic growth. Too little concern has been given to the sustainability of China's ecosystem , and the effect of rising consumption on the rapid degradation of that ecosystem. This paper will focus on the factors propelling the dramatic shift in values over the past 30 years that heavily favor higher rates of conspicuous consumption and waste, using Thorstein Veblen's classic analysis of this type of consumption. One negative effect of this consumption has been a dramatic decline of the supply and quality of water that has brought the sustainability of China's economy and ecosystem into question.

1 Contact information: jangresano@collegeofidaho.edu; 1-208 459 5207

INTRODUCTION

Much has been written about China's economic growth and development rates not being sustainable.[2] Nearly all of this literature identifies the primary cause of the problem to be the production and distribution methods adopted throughout China to achieve very high rates of economic growth (annual average real GDP growth rate has been 8% or greater since 1978) that have facilitated a dramatic increase in consumption levels. These rising consumption levels require corresponding extraction, transportation, processing of natural resources, followed by consumption and disposal of the final products. At each stage of this supply - consumption chain air, ground and water pollutants are emitted. In the case of China the extent of emissions is so severe that the sustainability of the country's ecosystem is endangered.

What is missing in nearly all of the literature concerning China's sustainability is analysis of the impulses propelling China's rising consumption. It will be argued in this paper that these levels are being driven in part by a value shift within the past few decades. This shift embodies the rampant desire to consume conspicuously - an impulse that has gone berserk in China. Conspicuous consumption can best be understood through Thorstein Veblen's classic argument forcefully presented in his *Theory of the Leisure Class* (Veblen, 1979). Such conspicuous consumption contributes significantly to China's non sustainability problem that will culminate in an ecological disaster, led by (but not limited to) worsening water pollution with corresponding dramatically reduced supplies of safe, usable water throughout the country.

---

2 For the purpose of this paper the 1987 UN Conference definition of sustainable development will be used. This conference defined development as being sustainable if it "met present needs without compromising the ability of future generations to meet their [social, economic, and other non-material] needs." An economy would be developing sustainably if were harvesting resources at a rate that would not deplete or permanently damage those resources for future generations. This explanation of sustainable development is consistent with Herman Daly's "sustainable scale of output." (Daly and Farley, 2004, pp. 373-387).

The methodology used is a qualitative political economy analysis approach that is distinguishable from the typical mainstream, neoclassical method of analysis. This political economy method abstains from adopting an analytical method built around constructing a precise, econometric model that attempts to reach some specific universal relationship that purports to explain for all economies the consumption and environmental degradation interrelationship. Instead, it seeks to provide a holistic explanation of China's sustainability problem by combining historical-institutional analysis with findings contained in selected theoretical-quantitative studies of both conspicuous consumption and water pollution. Some data will serve as the basis for analysis, particularly for the water problem. Using Veblen's theory of conspicuous consumption, it will be argued that China's growth and development experience has featured rising demands for higher levels of consumption, particularly luxury goods, that contributes substantially to ecological degradation. The levels and composition of that consumption can be partly explained by the escalating rampant desire to consume conspicuously. Summary points and conclusions are based upon patterns that can be "teased from the data" pertaining to the interrelationship among China's growth and development, consumption, and problems concerning water pollution and the supply of usable water.

This methodology has some strengths that include: (1) avoiding one fault with econometric methodology, as used by most orthodox economists, namely being reductionist by focusing on "economic" factors exclusively as THE causal factor(s). Instead, this method accounts for the influence of the non economic factors identified forcefully by Veblen that have contributed to rising consumption-water pollution - unsustainable dynamic in China; and (2) not claiming, as some econometric studies have implied, exclusivity both in terms of diagnosis and cure. The primary weakness of this methodology is its lack of precision explaining the cause and effect of the consumption-ecological degradation - unsustainable path

interrelationships. Thus, the tentative nature of conclusions and lessons drawn concerning such cause and effect will be less precise than orthodox economic studies typically purport to provide.

Two books in particular have analyzed the consumption - ecological degradation interrelationship. The premise of Herve' Kempf's *How the Rich are Destroying the Earth* (Angus, 2012) is that conspicuous consumption by the rich is the primary cause of ecological degradation. His focus, however, is all nations of the world that have adopted "capitalism."[3] Kemp argues that in economies characterized by capitalism material growth is valued above all other values. These same economies, he believes, are ruled by a powerful oligarchy that, in the name of greed, has been accumulating more and more income and assets, consuming at high levels quite conspicuously in the process. The outcome is destruction of the world's ecosystem due to such conspicuous spending by the very rich oligarchs. Kempf does draw heavily from Veblen, particularly Veblen's description of the human propensities towards dominance and emulation that stimulate the richest members of an economy to engage in conspicuous consumption and conspicuous waste. He argues that members who are lower in social status subsequently have the incentive to conspicuously consume and waste similar goods and services. The economy tends to grow too fast, with increased levels of pollution and a destructive reduction of both natural resources and the associated ecosystem services these resources perform. Ultimately Kempf forecasts the outcome to be ecological disaster for countries that practice "capitalism."

Jared Diamond's classic book, *Collapse*, has a similar theme, although consumption is not identified as the only factor triggering the "collapse" of societies (Diamond, 2005). By

3 The term capitalism typically serves as an oversimplified stereotype that confuses the actual philosophy and theoretical characteristics of capitalism from the actual philosophies, institutions and policies of countries considered as practitioners. In Kempf's case the key point is a society that elevates material values above all other values is likelier to suffer ultimately from serious ecological degradation.

"collapse" Diamond means the "drastic decrease in human population size and/or political/economic/social complexity, over a considerable area, for an extended time" (Diamond, 2005, p. 3). Diamond uses case studies from societies across many centuries to identify a number of factors that have combined in a dynamic, interactive manner to bring some societies to the brink of ecological disaster, and in a few cases to the collapse of that society. Those factors include overpopulation; excess consumption (some of it conspicuous - as in the case of the Easter Island statues); climate change - especially drought; and hostile neighbors that may invade or fail for some reason to supply a society with a vital resource it had depended upon importing; and ecological degradation. If the leaders of the society in question fail to introduce an appropriate combination of policy responses the outcome could be societal collapse.

The "missing point" this paper adds to the sustainability dialogue is a description of the link between the character of China's growth and development, water pollution, and sustainability as each is being influenced by the rampant conspicuous consumption now occurring throughout the country. The argument in the paper is organized as follows. The next section explains briefly the specific rates and character of China's growth and development. It will be argued that China has introduced a wider range of clean energy, energy-saving, and other pro environmental policies to a greater extent than has been done in any other country. However, the pollutants generated by the rate and mode of its economic growth and development have resulted in much more negative ecological degradation than the positive ecological effects of the many environmentally-friendly policies introduced. The third section focuses on conspicuous consumption as a primary factor that drives the demand for greater and greater levels of production and distribution. It will be argued that a primary underlying factor is the growing urge of individuals to consume conspicuously so as to demonstrate their dominance over those lower in their society's social structure. This consumption serves to signal that they

are highly reputable. Further, it will be explained that displays of dominance through conspicuous consumption and waste by the wealthiest members of a society triggers Veblen's "anti evolutionary impulse" of emulation to be manifested by spreading the desire to consume conspicuously by those lower in the social structure.

Section Four will examine in greater detail conspicuous consumption in China. The main emphasis will be that the demonstration effect of consumption by very wealthy Westerners that has been spread by globalization and the internet is a contributing factor to China's conspicuous consumption craze. This spread of conspicuous consumption activity has greatly exacerbated the country's ecosystem degradation, with one egregious effect being severe water pollution and supply problems, as the fifth section will explain in detail. The final section will summarize the main argument and draw some conclusions pertaining to the link between conspicuous consumption and the threat of unsustainability in China.

Unsustainable Rates of Economic Growth and Development

Most studies concerning China's sustainability have focused on the country's ability to sustain rapid GDP growth (Phayul.com. 2012), with little emphasis on the sustainability of the country's ecosystem services. Nevertheless, China's leaders are well aware of the ecological crisis they confront. The environment has moved to the "top of their political agenda, and they have promised increased environmental investment, set impressive targets for reducing pollution and launched grand-scale campaigns to address particularly challenging problems of environmental degradation" (Economy, 2008).

During the last 35 years China's economic accomplishments are unprecedented. The nation has experienced more economic growth and poverty reduction within that period than

most of the world's richest countries have achieved over the past century. During the last decade China has introduced a wider range of clean energy, energy-saving, and other pro environmental policies than has any other country. Each week new environmental policies are introduced. China is moving faster towards becoming a green economy than most rich countries - especially the USA. Unfortunately, the central government does not have the widespread control popular opinion believes it possesses. The provincial governments have gradually grown more powerful, and continue to resist some central government policies such as enforcing environmental protection laws while promoting high rates of economic growth. Consequently, the positive ecological effects of the many environmentally-friendly policies introduced have been far outweighed by the ecological damage caused by the extent and types of production and distribution adopted to satisfy rising demands to consume at higher and higher levels.

The serious threat to China's ability to sustain itself can be understood using the framework of interrelated factors presented in Diamond's *Collapse*. China obviously has a population problem both in absolute size and in terms of migration rates to urban areas that is creating megacities. Here the usage of resources, particularly water, is much greater per capita than in rural areas. It has been estimated that in China's urban areas "residents consume 350 percent more energy than rural Chinese, and more than 70 percent of this energy comes from dirty burning coal" (Economy, 2008). During 2008 about every 7 to 10 days another coal-fired plant, big enough to serve all the households in Dallas or San Diego become operative somewhere in China.

The consumption craze is being driven by the ever-increasing number of wealthy Chinese households. China now has more than a million "millionaires" - ranking it third in the world

behind the USA and Japan for the most millionaires.[4] The rate of growth between 2010 and 2011 of millionaires in China was over 30% (Balfour, 2011). The number of "super rich" Chinese, which includes people whose assets exceed over $100 million, "increased significantly" from 538 in 2010 to 648 in 2011, a 20% growth rate (*ChinaTimes.com*). With this dramatic increase in wealth has come a corresponding high rate of increase in the demand to consume larger and higher quality diets, housing, means of transportation, and more luxury goods - among other consumption choices Chinese households make. The ecological impact of this rising consumption is illustrated by the rapid increase in automobile ownership. As recently as 2008 it was estimated that each day about 14,000 new cars were purchased (Economy, 2008). More cars means more highway construction (the extent of roads currently being constructed exceeds the length of the USA interstate highway system), greater use of gasoline with corresponding increased CO2 emission levels, and a substantial demand for automobile tires. This demand has been met, in part, through ecological destruction in beautiful Yunnan Province where rubber plantations are transforming the province's landscape - wrecking ecological havoc in the process. Among the ecological costs are habitat destruction with a corresponding loss of biodiversity that includes some endangered species now threatened with extinction; tropical rainforest devastation; falling water tables; less food being grown; and greater dependence of the rural population on world demand and prices for rubber.[5] For those who prefer air travel China currently is building about 100 new airports. As air travel becomes more convenient and popular than train travel, the associated ecological costs will increase considerably.

Other responses to meet rising consumer demand have included construction of coal-fired plants to produce energy (discussed above), and dams built throughout southern China and

4 A "millionaire" is defined as a household whose assets in cash, stock, and bonds exceed $1 million. Real estate and luxury goods value is not included.

5 For an excellent account of Yunnan Province's ecological degradation as influenced by rising demand for more consumer goods in China see Grumbine, 2010.

in neighboring Southeast Asian countries. The multitude of ecological costs associated with dams include the impact of construction, relocation of affected families, water pollution, a greater threat of landslides, and loss of aquatic-related biodiversity. Other substantial ecological costs plaguing China can be traced to dramatic increases in aquaculture, solid waste - some of which is hazardous e-waste as well as chemicals discharged from factories, desertification due to intensive agriculture and deforestation, and water problems that are reaching crisis proportion. The impact of climate change and its interrelationship with water problems such as drought will be discussed in a later section.

Diamond includes problems with neighboring countries, especially trading partners, as a contributor to ecological degradation. In China's case the widespread invasion of foreign-owned multinational corporations that established factories for re-export within China, while creating millions of higher-paying employment opportunities, has also come at an ecological cost. When the impact of all these factors cited in *Collapse* are all taken into consideration, along with the policy makers' priorities - which remains rapid economic growth - the future is grim. As one analyst argues "[t]he Chinese people watch as environmental degradation and pollution transform their landscape, and in the process endanger their health and future livelihoods" (Economy, 2008).

Conspicuous Consumption: A Driving Force Threatening Sustainability

A prime force that is driving the degradation of China's ecosystems towards unsustainable levels is the consumption frenzy that has escalated over the past few decades. This frenzy has the same deep behavioral roots that have characterized societies worldwide for millennia, namely the strong impulse people have to demonstrate they are dominant over others, and therefore more reputable and more worthy of being considered as a member of their society's highest social

class stratum. Once this impulse is manifested in the form of conspicuous consumption and waste it triggers another impulse - namely, the desire of those lower in the social structure to emulate the consumption patterns of the wealthiest members of their own society. This, in turn, escalates the desire of the wealthiest to consume and waste even more conspicuously, triggering still more emulation behavior. Satisfying the demands for greater consumption levels requires modes and levels of production that contribute to ecological degradation. In extreme cases this pattern can contribute substantially to the collapse of such a society.

The basis for consuming greater and greater amounts of goods and services can be traced to what Thorstein Veblen described as a craving among people in any society for high social status. They seek to achieve this status by materially demonstrating that they are dominant over others.

Veblen recognized the central importance within a society of people's "drive to excel his neighbor" (Veblen, 1979, p. viii). This drive is manifested through consuming in a conspicuous, wasteful manner in order to signal to the rest of society not only one's wealth, but their having achieved higher social status and reputability. This status and reputability rests upon people's ability to demonstrate their "pecuniary strength" through tangible evidence that enables them to consume in such a manner. This evidence "consists of unduly costly goods that fall into accredited canons of conspicuous consumption, the effect of which is to hold the consumer up to a standard of expensiveness . . . in his consumption of goods and his employment of time and effort" (Bagwell and Bernheim, 1996, p. 350). Some argue that such behavior is not unlike the sexual signals sent by peacocks as part of their mating ritual. As such "conspicuous consumption mirrors other ostentatious behavioral and morphological traits found across the animal kingdom" (Sundie, et. al., 2011).

High social status and reputability are also achieved by consuming in a wasteful manner. Some of the reputability that follows from lavishly consuming both conspicuous leisure and consumer goods "lies in the element of waste that is common to both" (Halsall, 1999). To be considered wasteful a good or service is both expensive and there exists, much less expensive goods or services that provide similar functions are readily available. As such the expensive good does not serve the primary needs of human life. Rather, it is consumed as a means to enhance one's reputability by signaling the extent of their wealth.

Those lower in the social structure, having received these signals from the wealthy class, then seek to emulate the norm of reputability established by those above them in social status. "Members of each stratum accept as their ideal of decency the scheme of life in vogue in the next higher stratum, and bend their energies to live up to that ideal" (Halsall, 1999). The base motive held by upper middle and middle members of the social structure is their strong "desire to live up to the conventional standard of decency in the amount and grade of goods consumed . . . The standard is flexible; and especially it is indefinitely extensible" thus it escalates, demanding more and more consumption" (Veblen, 1979). Those lower in social status use pecuniary means by also consuming conspicuously and wastefully in an attempt to signal that rank within the higher social class (Bagwell and Bernheim, 1996, p. 350). Veblen noted that "this propensity for emulation expresses itself in pecuniary emulation; and this, so far as regards the Western civilized communities of the present, is virtually equivalent to saying that it expresses itself in some form of conspicuous waste. The need of conspicuous waste, therefore, stands ready to absorb any increase in the community's industrial efficiency or output of goods, after the most elementary physical wants have been provided for" (Veblen, 1979, p. 110).

Over time dissatisfaction with one's relative social status becomes the norm. Achieving one level of social status keeps becoming a launching point for the individual's vain effort to "place a wider and ever-widening pecuniary interval between himself and this average standard" (Veblen, 1979, p. 31). The attempt to widen the interval is achieved through even more and more conspicuous consumption and waste - driven by the desires of dominance and emulation - as individuals continue to make an "invidious comparison which prompts . . . [them] to outdo those with whom we are in the habit of classing ourselves" (Veblen, 1979, p. 103). As this pursuit of higher income levels and demonstrations that one can consume wastefully escalates, more ecological degradation is the outcome. The case of China provides an egregious example of this consumption-ecological degradation pattern.

Conspicuous Consumption in China

Former Chinese leader Deng Xiaoping astutely noted that a change in economic strategy that included opening China to foreign influence would come at a price, stating that "when you open the door, some flies get in." Since its economy was opened to foreign influence in the late 1970s China has been dramatically influenced by signals coming from globalization, particularly the endless messages glorifying consumerism. In response, the Chinese government, business firms, and individuals have changed their spending habits in very conspicuous ways. This was demonstrated to the world during the 2008 Summer Olympic Games which China hosted. It lavishly spent an estimated $40 billion, mostly for infrastructure and venues for athletic events. However, by 2012 few of these expensive venues were in use, and some have been deserted or demolished. The famous Bird's Nest, site of the opening ceremonies as well as the track and field events, with a seating capacity of 90,000 is a prime example. According to one observer

"the only tenants now are tourists who pay $7 to visit the souvenir shop," (Wines, 2010) and there are more hawkers outside the stadium than tourists paying to go inside.

The dramatic increase in billionaires, super-rich millionaires, and other millionaires has stimulated a consumption of luxury goods frenzy, signaling to other Chinese their *nouveau riche* status. It is estimated that the demand for luxury goods in China is growing at the fastest rate of any country in the world. Research done by Bain Capital indicted that in 2010 luxury goods sales in China increased by 30%. Other research predicts that before 2020 the country will become the world's largest single market with annual consumption of luxury goods to be almost $15 billion (Woke, 2011). Signals from such an increase in conspicuous consumption received by those lower in social status influenced them as to how their own new-found wealth should be spent. One account of such behavior in the ancient Chinese city of Yichang is illustrative. This city contains two groups of "middle class" - the newly rich and the white-collar workers. According to a Chinese observer, "[b]oth groups are trying to live an elegant life and are eager to be recognized by the public. A luxury car is the most preferred consumption item, which, they believe, stands for money and social status. Businessman Chen Chang regards a sport utility vehicle as the symbol of a weekend warrior (*China Daily*, 2012).

Another prime source of signals shaping consumption desires comes from advertisements on both television and the internet. One popular internet source that is driving conspicuous consumption is the program "Gossip Girl." The editor of the Chinese version of *Cosmopolitan* magazine notes that the "[c]olors, textures and proportions were all used to incorporate fashion into every aspect of the show. . . . For sure, the series will influence Chinese young ladies' fashion tastes" (Woke, 2011). According to the Chinese Market Research Group the program is watched avidly by young Chinese girls wishing to emulate the programs stars by "show[ing]

their privileged social status" through purchasing the same expensive brands of clothing worn by these "stars" who, of course, enjoy high social status and reputability.

There are many other examples of conspicuously consumed goods and services throughout China. Real estate is among the most wasteful, and ecologically damaging examples. Not only do individuals compete by purchasing more lavish apartments and homes, but Chinese cities compete with one another by building infrastructure and office buildings. Unfortunately, the conspicuous waste is substantial. "According to Colliers International, a real estate firm, Beijing's central business district offices will stand roughly 38 percent vacant this year." This is 12% points greater than the vacancy rate in the USA's worst major business office market - San Bernardino, California" (Wines, 2010). Such vacancy rates are common for many other Chinese cities as mayors and provinces compete with one another by building lavish infrastructure and office buildings in the hope of attracting new business.

Among the upper class tastes have increased dramatically to consume "carbon-intensive activities such as yachting, golfing and car clubs" (Economy, 2008). Government officials have responded to these conspicuous tastes by emulating the Western "model" of leisure. For example, in the face of severe water shortages in Beijing city planners continue to propose "building more golf courses, swimming pools, and even a ski slope (Wong, 2011). The ecological impact from the construction and consumption of these leisure activities pales in comparison, however, to the impact of what has become the symbol of conspicuous consumption throughout China - ownership of luxury automobiles.

In China more automobiles are sold than in any other country, and demand for luxury cars is rising rapidly. It is estimated that the annual growth rate over the 2012 - 2017 period will be between 15% to 20%. Driving this demand for luxury cars is "the nation's burgeoning young and affluent population, particularly 25 - 35 year old males, who are looking to display their

wealth and 'make a statement'" (Harjani, 2012). One analyst noted there is rising "popular resentment" against some "princeling sons of the Chinese elite [who] engage in conspicuous consumption such as driving a red Ferrari." Such resentment was fueled by the son of prominent former Chinese government official, Bo Xilai, who was leading a campaign to revive the spirit of Mao Zedong. One of his orders was for students and government officials to "reconnect with the countryside" by engaging in agricultural work. Meanwhile his son "was driving a car [Ferrari] worth hundreds of thousands of dollars and as red as the Chinese flag" (*Wall Street Journal*, 2011).

In another instance a Chinese man, upon returning to his home province from the USA where he earned an MBA degree, was surprised by "all of the Hummers, Porsches and Land Rover SUVs, as well luxury Mercedes-Benzes and BMW high-performance sedans, that were screaming past me on the bumpy roads in that remote small county" (*AsiaOneMotoring*, 2012). Another observer reported that in the city of Erdos located in Inner Mongolia it is difficult to count how many millionaires have recently been created thanks to the coal mining industry. In this city "nearly all of the vehicles seen in Erdos' streets or parking lots carry the brands of premium foreign carmakers and have large engines. Among the brands that are common there are BMW and Mercedes (*AsiaOneMotoring*, 2012).

Finally, there is the case of a super rich Shanghai family who, according to a family friend, daughter recently completed high school. For a graduation presents her parents purchased a Lamborghini at a cost of almost $1 million. However, fearful that their daughter would hurt herself if she were to drive the car they refused to allow her to obtain a driver's license. Consequently, somewhere in Shanghai this luxury car is parked in a garage - a quintessential display of conspicuous waste. Unfortunately, there also is "waste" in the form of the overwhelming amounts of by-products produced by China in the production, distribution and

use of these conspicuously consumed goods. Among corresponding contribution to ecological degradation have been ever more severe water pollution and supply problems.

China's Severe Water Pollution and Supply Problems

The severity of China's water problem was identified by Premier Wen Jiabao in 1999 when he said "[t]he survival of the Chinese nation is threatened by the country's shortage of water" (McAlister, 2005). The water shortage and pollution problems combine to contribute to lower quantity and quality of agricultural production, consumption of unhealthy water by humans and livestock, and the impact upon non-human living things that are dependent upon water. In some provinces problems are caused by reduced water flows in rivers. In Hubei Province the 2011 drought resulted in lower levels for about 1400 lakes that were "so low they are unusable or virtually 'dead" (Kurtenback, 2011). This problem led to a reduction of hydroelectric power generated by about 20% which had a negative effect on the ability of some manufacturers, particularly petrochemical and plastics, to maintain desired output levels.

Another example of the severity of the water shortage problem is demonstrated by the case of Poyang Lake in Jiangxi Province. The lake's surface area shrunk over 98% from more than 3000 square kilometers to about 50 square kilometers, with the main causes being rapid economic growth and its demands for natural resources (including water), and climate changes including a long drought that have caused the stream flows that used to replenish the lake to dry up (Obrien, 2008). Negative consequences have included a drinking water shortage; the exodus of finless porpoises that are in danger of becoming "functionally extinct" (Yardley, 2007); Siberian cranes' that migrate becoming a species whose existence is threatened; a large decline in the population of carp that many Chinese living near the lake depend upon as a primary source of

protein; an increase in debilitating snail diseases such as schistosomiasis (a disease that results from infection of the blood spread by parasitic flatworm snails known as schiistosome that live along banks of irrigation ditches, rice fields, and slow moving water); and less water for crop irrigation.

There are many other cases of serious water shortages throughout China.[6] A decade ago Chinese scientists reported that in the Qingdao area of Shandong Province over 2000 lakes that provided water to the Yellow River were "disappearing due to climate change and overutilization (Economy, 2004). In Hebei Province's city of Shijiazhuang the conflict between the demand for water to promote rapid economic growth (over 10% a year) and rising population growth led to rapidly declining supplies of groundwater. As a result, municipal wells have drained about two-thirds of the local groundwater. During late summer, 2010 in Chifeng, Hebei Province, water shortage caused cracks that were as deep as 10 meters appeared on agricultural land. With such a shortage farmers had to delay harvests to avoid injury. The state-run Xinhua news agency reported that according to Chifeng's hydrological bureau, 62% of the city's 51 reservoirs have run dry with over 250,000 people facing a shortage of drinking water. Meanwhile in Beijing the estimated water shortage will soon reach 200 million to 300 million cubic meters (*CNN.World*, 2010). The city's current usage of water is not sustainable, as its population is increasing by about 500,000 people each year. Faced with a "chronic water scarcity" due to high demand and dwindling water resources, it is recognized that "Beijing cannot sustain a larger population" (Wong, 2011).

Some scientists estimate that the aquifers throughout northeastern China may be drained within 30 years (Yardley, 2007), based upon the assumption that a sustainable water supply is

6 This water shortage problem is not limited to China. The groundwater beneath northern India has been receding about 1 foot per year for the past 10 years. Human consumption is almost entirely to blame. As more underground water is pumped to irrigate cropland at a rate faster than the natural replenishment process, severe shortages of water are occurring.

between 1000 to 1500 tons of water required per person per year. This amount is 2 to 3 times greater than the available supply of water to the North China Plain (McAlister, 2005). Throughout China there are over 650 cities, with the rapid growth of megacities that are rapidly draining their underground aquifers. Very few cities can supply their residents with sufficient amounts of clean drinking water straight from the tap. In nearly every city residents either boil their water or buy it in bottles.

Some officials believe the shortage problem will be reduced by completion of the South-to-North Water Diversion Project that is designed to transfer water from southern to northern China. Some analysts describe this project as "China's most ambitious attempt to subjugate nature" (Wong, 2011). However, the canal network to transport this water north may not be completed for another 50 or 60 years. The project is the largest water diversion project ever attempted. It is attempting to link China's four main rivers – the Yangtze, Yellow, Huaihe and Haihe rivers– and requires the construction of three diversion routes, stretching south-to-north across the eastern, central and western parts of the country. The estimated total cost will exceed $60 billion, about twice the anticipated cost of the Three Gorges Dam. Since water is so heavy, diverting it long distances has high construction and ecosystem costs (McAlister, 2005). Critics believe that other costs of this project will be displacing people from their homes, as well as more water pollution - while not ultimately reducing the cost of water to the average Chinese person. Some fear a major environmental disaster could also occur.[7]

These fears have a firm basis. In 2011 officials finally admitted that there are "urgent problems" with this project, especially its environmental impact as well as a "staggering" human

7 China's typical response to water shortages has been to try to tame its river (case of Yangtze over the millennia) - the "typical mindset is to dig its way out of a hole and fight challenges with massive engineering projects." It would be much more efficient and have a much lower life cycle assessment rating if conservation were to be emphasized since water is underpriced, and irrigation methods are wasteful. About 45% of water used in agricultural sector for irrigation evaporates off the surface of open canals. See Larson, 2010).

relocation cost (Wong, 2011). One problem is that serious damage may be done to rivers in the south, polluting them severely and reducing the ecosystem services they provide. When the South-North water diversion plan was conceived "the amount of water to be diverted [was] based on calculations of water flow in the Han done from the 1950s to the early 1990s; since then, the water flow has dropped, partly because of prolonged droughts, but planners have made no adjustments." Fears are that the higher rate of water diverted "will exert a huge damaging impact on the river" (Wong, 20110). Some Chinese scientists fear the diversion could destroy the ecology of the southern rivers, making them as useless as the Yellow River" (Wong, 2011).

Greater pollution ensuing from this project also is feared. Already water brought north "to Tianjin from the Yangtze is so polluted that 426 sewage treatment plants have to be built" - thus diverting public funds to building these plants. Some scientists fear water diverted to Beijing may be unsuitable for drinking (Wong, 2011). According to Dai Qing, an environmental advocate who has written critically about the Three Gorges Dam "[w]hen water comes to Beijing, there's the danger of the water not being safe to drink" (Wong, 2011).

Water pollution is becoming the most serious environmental problem in many emerging economies, am is particularly severe in China. Overall, it has been estimated that 90% of Chinese cities and 75% of its lakes suffer from some degree of water pollution, while about 40% of the water supply is now so heavily polluted that it is unusable for any purpose. Over 75% of the water in the rivers flowing though China's urban areas are believed to be so polluted that "they are unsuitable for human contact" (Economy, 2004). One study indicated that "The Yellow River . . . is so polluted it can no longer supply drinking water (Wong, 2011).

Contributing to this problem is China's industrial sector that is near the beginning of the supply chain designed to satisfy rising consumer demand. This sector dumps "an astonishing 40 to 60 billion tons of untreated wastewater into rivers and lakes every year . . . As a result, 90

million people in China are directly exposed to water pollution on a daily basis" (McAlister, 2005). These percentages, and other data provided in this chapter may be too conservative because "polluters and some local officials tend not to report environmental accidents" (World Bank, 2007). A 2010 survey revealed that "water pollution is 2007 was more than twice as severe as official figures that had long omitted agricultural waste" (Ansfield and Bradsher, 2010).

Of China's total environmental cost in 2004, Over 50% was due to water pollution. Specific costs included "economic losses due to water shortages caused by water pollution, and the costs of pollution abatement, agricultural losses, impact on human health, and of drinking water protection" (World Bank, 2007). There are two main causes of water pollution. One is from toxic substances contained in industrial waste (especially industrial wastewater from unregulated smaller firms) being discharged into a body of water, and the other is the cumulative effect of pollutant discharge such as municipal waste, nitrogen fertilizers, and pesticides running off agricultural land over a long period of time. According to a study by Zhang, Tian, Zhang, and Li, 1996) the use of nitrogen fertilizer to increase agricultural output has risen runoff has increased the nitrate content in groundwater, thus reducing the quality of drinking water in nearby villages and cities.

An example of a serious water pollution problem occurred in Tai Lake, Wuxi - Jiangsu Province. A toxic chemic spill occurred in November, 2005 into a river that emptied into Lake Wuxi. A few years later this lake "suddenly had turned rancid with the water being filled with a blue-green algae that smelled rotten. Discharge from Wuxi factories producing paper, photographic film, dye, fertilizer, cement, and other products demanded globally combined to poison the province's vast network of lakes, rivers and canals. Fishermen lost their jobs as fish died as the toxic chemical runoff proved deadly to aquatic life" (Cha, 2007). Water from taps intended for drinking was very dirty and unhealthy to consume, and the price of clean, safe

drinking water quickly increased from RMB 1 a bottle to RMB 6. Local officials tried to introduce reforms to clean up the lake and improve the Wuxi environment. They were willing to reduce the local economy's output by about 15%, with some workers losing their jobs and some factories that were heavily polluting the lake were being closed down. However, officials from other cities in China offered owners of Wuxi's industrial firms incentives to relocate to their city. As a result, the water pollution problem was shifted from Wuxi to other cities seeking to promote more rapid economic growth (Cha, 2007).

Pollution in the village of Dacilou near Beijing caused by toxic waste from a zinc-plating factory near the village contaminated the water. The villagers suffered from diarrhea which was caused by the meat or egg products from the chickens, pigs and ducks that also drank the contaminated water. New wells that were drilled also contained contaminated water, and the villagers could not afford to purchase clean water due to the very high price. The government closed down the zinc-plating plant. Unfortunately, many other villages throughout China suffer similar problems and polluting factories that caused most of the water contamination problem are still operating. The negative impact then includes declining incomes for workers after factories are closed down, and as poverty will rise and people may be forced to relocate (Zhang, 2006).

Toxic waste dumped by factories has created severe water pollution in the Huai River, Henan Province. The problem began in 1994 when heavy rains caused the smaller streams and rivers that flow into the Huai River to flood, dumping more than 38 billion gallons of highly polluted water ("a toxic mix of ammonia and nitrogen compounds, potassium permanganate, and phenols") into the Huai River (Economy, 2004). The water turned black, over 25 million pounds of fish were killed, and thousands of people became sick with dysentery and diarrhea. Pigs that were fed the polluted water refused to eat for the next few days. The economic loss

was estimated to be about $1 billion.[8] Ten years later the extent of groundwater pollution was still extreme, so the city attempted to dig deeper and deeper wells. Unfortunately this caused a dramatic reduction in the supply of underground water so that other water sources have become necessary (Economy, 2004). A final example concerns China's second largest river. It was reported in 2008 that severe water pollution has made one-third of the Yellow River unusable even for agricultural or industrial use due to extensive waste and sewage being discharged into the river system, with about 75% coming from industry and the rest from households.

The Dynamics of the Water Problem

The many aspects of the water problem have a dynamic interrelationship with other environmental problems, as indicated in **Diagram 1 (see below)**. One effect of rapid economic growth plus population growth is that more waste (some of it toxic) is dumped or runs off the streets or land into bodies of fresh water. One of the most damaging pollutants that affects water is CO2. Oceans absorb about 30% of the CO2 put into the atmosphere, and this creates carbonic acid. One effect of this acidification is to reduce the ability of organisms that "calcify" such as coral, snails, oysters and other mollusks, to build shells and skeletons sturdy enough for them to survive.

Competition for water among regions seeking to grow rapidly may result in some cities or provinces that are upriver diverting water for their own use. Unfortunately, this may create shortages of water supplies for downriver cities or provinces. Some members of the Chinese

8 Policies designed to prevent a similar disaster were introduced along the Huai River, including pollution prevention at factories, sewage treatment plants, agricultural pollution treatment, with some improvement in water quality.

Academy of Sciences have estimated that the south-north water diversion project "would reduce the flow of the middle and lower stretches of the Han [River] significantly, 'leading to an uphill situation for the prevention of water pollution and ecological protection'" (Wong, 2011).

The water shortage problem is made worse by China's inefficient use of water as the economy grows. It has been estimated that "China uses about 15 times more water to produce a unit of GDP than developed economies" (McAlister, 2005). In addition, rising population size puts pressure on water demand, and also contributes to increased amounts of water pollution as more human waste must be processed. This is a particularly serious problem in the provinces of Henan, Shandong, Hebei, and Liaoning through which the Yellow River flows (Yang and Zehnder, 2001).

The water pollution problem has become more serious because excessive dumping of toxic wastes reduces the absorption capacity of water to the extent that bodies of water cannot fully clean themselves (through a hydrologic cycle that is solar powered) of the pollution they receive. The ability of water to self purify works "as long as we do not overload water systems with slowly degradable and non-degradable wastes or withdraw water from underground supplies faster than it is replenished (Miller, 2005, p. 71) "When the self-purifying capacity of the catchment area is exceeded, however, large quantities of these waste substances accumulate in the oceans, where they can harm aquatic life. The water itself evaporates and enters the atmosphere as pure water vapor. Much of it falls back into the ocean; what falls on land is the previous renewable resource on which terrestrial life depends" (La Riviere, 2000, p. 182). This problem is occurring in some bodies of water throughout the world as both the amounts of pollutants discharged into bodies of fresh water and withdrawing water are occurring at rates that exceed water's ability to self purify. Increased water pollution throughout China has contributed to the spread of cholera, typhoid, schistosomiasis and cancer. More water pollution

spreads disease when people and livestock (e.g., pigs, chickens, ducks) drink the water, and the same livestock is later consumed.

Other negative effects of water pollution are to reduce the supply of fish available to be caught and eaten. This is caused by more chemicals discharged into fresh water resulting in some aquatic plants blooming at a faster rate, with more blue-green algae being produced. Each year the amount of wastewater dumped into the Yellow River exceeds 4 billion tons, and wastewater now accounts for about 10% of the Yellow River's volume. One result is less oxygen in fresh water and also less penetration of light into the water, thus causing some water plants and fish to die. Another negative outcome has been to push about a third of the river's native fish species towards extinction. In addition, much of the river also has become unfit for irrigation (Larimer, 2008).

Water problems are also increasing due to climate change, particularly where the amount of annual rainfall has decreased while air temperatures have risen. The Yellow River's ecosystem has been changing as a result. It has been reported that in Qing Hai Province almost 75% of the lakes have actually disappeared, and desertification has increased dramatically. In the same provinces glaciers are shrinking at a rate of 7% a year (Larimer, 2008). Back in 2003, a UN study of the province concluded that "about one out of six people does not have regular access to an adequate and affordable supply of clean water and this could increase to at least one out of four people by 2050" (Miller, 2005). Currently there is a serious shortage of clean water for drinking, and therefore a higher price for water.

The Huai River is typical of China's water problems, with "about 60 million people having limited access to clean water while almost 10 times that number drink contaminated water daily" (Economy, 2004). In an effort to increase the supply of water so as to boost grain production as well as to keep the price of water lower, wells are being dug and dams built

throughout China. Well digging has contributed to a decreased supply of groundwater because the rate at which the groundwater is being replaced (by the natural process by which aquifers naturally replenish their supply of water) is less than the rate at which the water is being pumped out. Also, in some provinces (Beijing and Tianjin) more wells were deserted 1985-1997 than new wells introduced (Yang and Zehnder, 2001, p. 79).

Water tables in aquifers are falling. It seems that opening up new sources is not likely to alleviate the water shortage problem since the rate of abandonment of dry wells is greater than rate of new sources of water coming from digging new wells. Most of the increase of water withdrawal is due to expansion of use by cities and industries, with daily human and industrial consumption contributing heavily. Irrigation demands are under pressure, but with the withdrawal of water in China exceeding sustainable amounts greater shortages are assured unless significant conservation policies are introduced. Also contributing to the reduced water supply is the problem that sometimes at least half of the water intended to irrigate crops is lost through leaky irrigation channels or by draining into rivers or groundwater.

China has built almost 25,000 dams, and construction of new dams continues. According to one environmental expert these dams make worse "the twin threats of pollution and scarcity. The reduced water flow destroys the river's ability to flush out heavy pollutants" (Larimer, 2008). This may, unfortunately, occur on a massive scale following the completion of the Three Gorges Dam. Some scientists have concluded completion of the dam will change water levels and silt deposition downstream, and both of these effects will increase the production of the snails (Oncomelania) that cause the intestinal disease known as schistosomiasis.[9] Another problem is that the same marshlands that were covered with reeds

9 Schistosomiasis affects humans and bovines - especially those living in marsh and lake regions in tropical and subtropical zones in China. Over 50 million people live in such regions, and Over 6 million of these people at risk live in the Dongting Lake region (See Yue-Sheng, et. al.).

will generate fewer positive ecosystem effects because there will be more grass beaches or reed-grass beaches which increases the snail breeding area, with negative health effects on the river region population.

Concerning the growing scarcity problem, water shortages will contribute to rising prices of water. According to one report "water prices in China will inevitably and necessarily rise 500-5,000% over the next decade, when and if water is actually available" (McAlister, 2005). As water prices rise farmers that need to purchase water will produce less food. A subsequent effect will be rising food prices, which may trigger social instability. Water shortages will result in even greater reductions of agricultural products supplied if desertification occurs (as farm land turns to sand). Once this occurs the threat of air pollution increases due to soil erosion and sandstorms. These problems are likely to worsen in severity due to the combined consequence of population growth, deforestation, overgrazing, and unsustainable farming on steep and easily erodible slopes that have greatly diminished the ability of its soil (especially in hilly or mountainous areas) to absorb water. One report that focused on increased water shortages concluded that in China a huge dust bowl is being created as the deserts spread. In the process the output of grain is declining. It has been forecast that due to water shortages and rising temperatures China's agricultural output will decline over 30% over the next 50 years (United States Government, 2009). As prices rise the poorest families will be hurt. In extreme cases of desertification environmental refugees will be the result as millions of farmers and their families will need to migrate because they will not be able to secure reliable access to water, and thus will become increasingly unable to earn sufficient income to remain farmers (Larimer, 2008). Eventually, as water shortages worsen the cycle of rising food prices and desertification could further increase the threat of massive social instability among poorer

farmers and environmental refugees throughout China. Another shortage that rising consumption levels has been exacerbating concerns aquatic life in and near China.

Fish populations worldwide have been declining rapidly over the past few decades. The total weight of fish caught in oceans, rivers and lakes peaked in 2000, and has declined since then. Marine biologists have concluded that "as a result of overfishing, we are nearing the end of the line for fish stocks and whole ecosystems in the world's oceans, and that it is time we arranged things differently (Clover, 2006). The extent of the declining fish population problem in Asia is worse than in the rest of the world. China's freshwater catch peaked about 1987 and has declined since, although aquaculture output has soured (Blume, 2007). Unfortunately, China's rapid economic growth has contributed towards reducing future fish harvests. Heavily polluted waters due to chemical and pesticide runoffs have been extensive, resulting in "China's coastline [becoming] so swamped by algal red tides that large sections of the ocean no longer sustain marine life (Kahn and Yardley, 2007). In 2010 the largest oil spill China has yet experienced not only contaminated Yellow Sea beaches, but led to the banning of fishing around Dalian for many weeks. Sadly, due to pollution in the Yangtze River as well as greatly increased travel by transport ships whose propellers disrupted the sensory system of the Chinese River Dolphin (*Baijitun*) these poor creatures have become "functionally extinct" with researchers efforts to located surviving dolphins being unsuccessful. This extinction is a testimony to the high level of external costs that are the result of China's rapid economic growth and increasing conspicuous consumption that includes increased aquaculture fish production to satisfy the growing demand for fish (Cody, 2006).

Among the causes for this dramatic decline in fish populations has been human population growth and rising incomes that fuel demand for more fish.[10] In China this factor is exacerbated by its dramatic increase in per capita consumption of fish that is forecast to increase "four-fold" to 36 kilograms by 2020. Rising conspicuous consumption is an important contributor to increasing demand for certain fish species that are rapidly declining in population. An Australian marine scientist argues that "it's vital to understand social contexts of consumption such as the rising popularity of Southern Chinese cuisine along with notions of social status and conspicuous consumption as China's nouveau riche display their wealth" (Godfrey, 2012). Increasingly rare, expensive seafood for which Chinese demand has been increasing includes sea cucumber, shark fin, napoleon wrasse and grouper. The napoleon wrasse and leopard coral grouper sell for between $100 and $200 per kilogram in Chinese restaurants.

To satisfy rising demand there has been rapid growth of inland aquaculture in China, with the increased acreage devoted to farms producing carp, tilapia, river crab and shrimp in particular increasing by a factor of 10 since 1999. It has been estimated that China's aquaculture output on farm-built ponds, reservoirs, and offshore area cages is over 70% of the world's aquaculture output (Brown 2004). While this growth has created many jobs, boosted rural incomes, and improved the diet of millions of Chinese the environmental problems it has caused, particularly water pollution, have been extensive and are increasing. One study revealed that many aquaculture fish ponds are "filled with murky born water and teeming with eels, shrimp and tilapia, much of it destined for markets in Japan and the West" (Barboza, 2007). These

10 Additional causes are (1) overfishing - driven by rapid increases in technology that enable fishing fleets to more easily find fish, then to catch enormous quantities not only of the target fish, but of many other forms of sea life that are killed in the process; (2) poor management of fisheries, partly due to the inherent governance problem caused from fish being located in oceans where property rights are those of an "open access regime" - meaning that no one has ownership of the rights to the fish so that it is difficult, if not impossible, to exclude anyone from fishing in the same waters; and (3) water pollution caused by rapid industrial growth, oil spills, and the expansion of aquaculture which creates runoff of chemicals, pesticides, and other costly by-products of aquaculture farms.

farms are discharging wastewater that further pollutes the water supply. Another source of the water pollution is from illegal drugs used to keep stressed fish in toxic aquaculture ponds from dying, as these drugs contain substances that could lead to higher rates of cancer and liver disease among those who consume the fish. Overall, rising demand for fish - especially from those Chinese who consume conspicuously, is another factor contributing to the nation's water pollution and reduced supplies of clean water.

Summary and Conclusions

A substantial threat to the sustainability of China's ecosystem are the negative effects to the ecosystem from the increasing volume of by-products generated by a modes of consumption and distribution propelled by widespread conspicuous consumption. Such consumption has been disproportionately influencing the character of the country's growth and development - with significant ecological damage (especially rising water pollution and the declining supply of safe water) occurring in the process of rising demands for luxury, among other, goods and services, being satisfied. This dramatic degree of ecological degradation is occurring despite the central government's widespread efforts to introduced environmentally-friendly policies. While manifestations of conspicuous consumption can be identified in virtually all other societies, the extent and nature of such consumption has been more extreme in China.

As Veblen argues, the impulse to be dominant over other members of every society is universal, as is the impulse to emulate the consumption behavior of those higher in the social status. These impulses need to be recognized, and then linked to ecological degradation. Chinese policymakers face the significant challenge of accepting that these impulses are both a reality and a cause of unsustainable production, distribution and consumption practices. Further

research needs to use this contention as the basis for identifying policies that will encourage consumption patterns that are compatible with sustaining China's ecosystem.

SOURCES

Angus, I. 2012. 'Review of Herve Kempf. *How the Rich are Destroying the Earth*.' 2008. Translated by. Leslie Thatcher. Chelsea Green Publishing. Published in Energy Bulletin. June 13. http://www.energybulletin.net/stories/2012-06-13/%E2%80%98conspicuous-consumption%E2%80%99-destroying-earth-book-review

Ansfield, J. and Bradsher, K. . 2010. 'China Report Shows More Pollution in Waterways,' *New York Times*, February 10. http://www.nytimes.com/2010/02/10/world/asia/10pollute.html

AsiaOneMotoring. 2012. 'China continues conspicuous consumption of luxury cars.' January 2. http://www.asiaone.com/Motoring/News/Story/A1Story20120102-319453.html

Bagwell, L. S. and Bernheim, B. D.. 1996. 'Veblen Effects in a Theory of Conspicuous Consumption.' *The American Economic Review.* 86, (3), 349-352.

Balfour, F. 2011. 'China's Millionaires Leap Past 1 Million On Growth, Savings.'" *Bloomberg. Com News*. June 1. http://www.bloomberg.com/news/2011-05-31/china-s-millionaires-jump-past-one-million-on-savings-growth.html

Barboza, D. 2007. 'In China, Farming Fish in Toxic Waters,' *New York Times*, December 15. http://www.nytimes.com/2007/12/15/world/asia/15fish.html

Blume, C. 2007. 'Asian Fishing Communities Suffer as Fish Stocks in Region Decline,' *Voice of America*. June 18. http://www.voanews.com/english/archive/2007-06/2007-06-18-voa11.cfm?CFID=182532654&CFTOKEN=25060141

Brown, L. R. 2004. *Outgrowing the Earth.* New York: W. W. Norton.

Cha, A. E. 2007. 'In China, a Green Awakening,' *Washington Post.* October 6. http://www.washingtonpost.com/wp-dyn/content/article/2007/10/05/AR2007100502472.html

China Daily. 2012. 'Conspicuous Consumption.' January 27. http://chinadailyapac.com/article/conspicuous-consumption

ChinaTimes,com. 2012. "China and India see fastest growth in new Millionaires: BCG." June 5. http://www.wantchinatimes.com/news-subclass-cnt.aspx?id=20120605000054&cid=1102&MainCatID=0

Clover, C. 2006. *The End of the Line*. Berkeley: University of California Press.

CNN.World. 2010. 'Water shortages reach crisis levels in China.' September 13. http://articles.cnn.com/2010-09-13/world/china.water.crisis_1_water-shortages-water-supplies-drinking-water?_s=PM:WORLD

Cody, E. 2006. 'Pollution Leaves Beloved Dolphin of the Yangtze 'Functionally' Extinct,' *Washington Post*, December 14. http://www.washingtonpost.com/wp-dyn/content/article/2006/12/13/AR2006121302039.html?nav=rss_world

Daly, H. E. and Farley, J. 2004. *Ecological Economics*. Washington: Island Press.

Diamond, J. 2005. *Collapse*. New York: Penguin Books.

Economy, E. C. 2008. 'Economic miracle, environmental disaster,' *CNN. Tech*. October 27. http://articles.cnn.com/2008-10-27/tech/what.matters.huai_1_china-chinese-people-pollution?_s=PM:TECH

Economy, E. 2004. *The River Runs Black*. 2004. Cornell University Press.

Godfrey, . 2012. 'Is China's taste for luxury a threat?' *SeafoodSource.com*. July 16. http://www.seafoodsource.com/newsarticledetail.aspx?id=16941

Grumbine, R. E. 2010. *Where the Dragon Meets the Angry River.* Washington DC: Island Press.

Halsall, P. 1999. 'Thorstein Veblen: Conspicuous Consumption, 1902.' *Modern History Sourcebook*. http://www.fordham.edu/halsall/mod/1902veblen00.asp

Harjani, A. 2012. " China's Luxury Auto Market Speeds Up as Mass-Market Sales Slow " CNBC.Com. April 23. http://www.cnbc.com/id/47138448/China_s_Luxury_Auto_Market_Speeds_Up_as_Mass_Market_Sales_Slow

Kahn, J. and Yardley, J. 2007. 'As China Roars, Pollution Reaches Deadly Extremes,' *The New York Times.* August 26. http://www.nytimes.com/2007/08/26/world/asia/26china.html

Kurtenback, E. 2011. 'China power woes as drought worsens supply crunch,' *San Francisco Chronicle*, http://www.sfgate.com/cgi-bin/article.cgi?f=/n/a/2011/05/16/financial/f221541D27.DTL&feed=rss.business May 16, 2011.

Larimer, B. 2008. 'Bitter Waters,' *National Geographic*, 213, May, 146-169. http://ngm.nationalgeographic.com/2008/05/china/yellow-river/larmer-text
La Riviere, J. W. Maurits, 'Threats to the World's Water,' 2000. in Goldfarb, T. D. *Notable Selections in Environmental Studies*, 2nd ed. Guilford, CT: Dishkin/McGraw Hill, 2000, 181-190.

Larson, C. 2010. 'Growing Shortages of Water Threaten China's Development, *Yale environment 360* July 26. http://e360.yale.edu/content/feature.msp?id=2298

McAlister, J. 2005. 'China's water crisis,'" *Deutsche Bank AG Asia-Pacific Equity Research*. March 22. http://www.cbiz.cn/download/aquabio.pdf

Miller, Jr., G. T. 2005. *Sustaining the Earth*, 7th edition. Pacific Grove, CA: Thompson.

O'Brien, C. 2008. 'Global Warming Hits China,' **Forbes.com** January 6. http://www.forbes.com/2008/01/04/poyang-lake-china-oped-cx_cob_0106poyang.html

Phayul.com. 2012. 'World Bank says China's economic growth unsustainable, Suggests reforms to avoid social unrest.' February 28. http://www.phayul.com/news/article.aspx?id=30971&t=1

Sundie, J. M., Kenrick, D. T., Griskevicius, V., Tybur, J. M., Vohs, K.D. and Beal, D. J. 2011. 'Peacocks, Porsches, and Thorstein Veblen: Conspicuous Consumption as a Sexual Signaling System.' *Journal of Personality and Social Psychology*, 100 (4), 664-680.

United States Government, Select Committee on Energy Independence and Global Warming. 2009. 'China and the United States Facing Similar Global Warming Challenges,' http://globalwarming.house.gov/impactzones/china

Veblen, T. 1979. *The Theory of the Leisure Class*. New York: Penguin Books.
Wall Street Journal. 2011. '"Conspicuous Consumption By China Elite Breeds Resentment.' December 3. www.parapundit.com/archives/008400.html

WantChina Times. com. 2012. 'China and India see fasted growth in new millionaires: BCG.' June 5. http://www.wantchinatimes.com/news-subclass-cnt.aspx?id=20120605000054&cid=1102&MainCatID=0

Weber, C. M. 2011. 'The Thinning of Veblen's 'Conspicuous Consumption' in the Modern Language of Economics'" Unpublished paper. http://cameroneconomics.com/cc.pdf

Wines, M. 2010 'After Summer Olympics, Empty Shells in Beijing.' *New York Times*. February 6. http://www.nytimes.com/2010/02/07/weekinreview/07wines.html?pagewanted=print

Woke, L. 2011. 'Conspicuous consumption of luxuries on the rise." *China Daily*, December 26. www.chinadaily.com.cn/bizchina/2011-12/26/content_14327078.htm

Wong, E. 2011. 'Plan for China's Water Crisis Spurs Concern.' *New York Times*. June 1. http://www.nytimes.com/2011/06/02/world/asia/02water.html?pagewanted=all

World Bank. 2007. Development, Natural Resources and Environment Unit (EASRE). 2007. "Water Pollution Emergencies in China," *The World Bank.* June. http://siteresources.worldbank.org/INTEAPREGTOPENVIRONMENT/Resources/Water_Pollution_Emergency_Final_EN.pdf

Yang, H. and Zehnder, A. 2001. 'China's regional water scarcity and implications for grain supply and trade,' *Environment and Planning*. 33, 79-95.

Yardley, J. 2007. 'Beneath Booming Cities, China's Future Is Drying Up,' *The New York Times*. September 27. http://www.nytimes.com/2007/09/28/world/asia/28water.html?_r=1&oref=slogin

Yue-Sheng, L., Raso, G., Zheng-Yuan, Z., Yong-Kang, H., Ellis, M. K., and McManus, D. P. 2007. 'Large Water Management Projects and Schistosomiasis Control, Dongting Lake Region, China.' *Emerging Infectious Diseases*. 13 (7) , July, 973-979. http://www.ncbi.nlm.nih.gov/pmc/articles/PMC2878251/

Zhang, Y. 2006. 'China's Groundwater Future Increasingly Murky,' *Worldwatch Institute*, November 28. http://www.worldwatch.org/node/4753

Zhang, W.L., Tian, N, Zhang, X., and Li, Q. 1996. 'Nitrate Pollution of Groundwater in Northern China," *Agriculture, Ecosystems and Environment*. Volume 59, pp. 223-23