



WATER IN THE MODERN ECONOMY: CHANGING EMERGING MARKET WATER USE AS A DRIVER OF FARMLAND PRICES

INTRODUCTION

As people in the emerging economies of India and China make the transition to western standards of living there is an often-overlooked issue – their water consumption is rising dramatically. To put the water issues of the emerging economies into perspective here are some quick facts:

- China has only 8% of the world's fresh water to meet the needs of 22% of the world's people.
- In India, urban water demand is expected to double—and industrial demand to triple—by 2025.
- To support the diets of the additional 1.7 billion people expected to join the human population by 2030 at today's average water consumption would require 2,040 cubic kilometers of water per year—as much as the annual flow of 24 Nile Rivers.

WATER IN THE MODERN ECONOMY

Overall water is never lost, but local availability levels can have a dramatic impact on agriculture, food supply and general economic development. Some examples of the water intensity of a modern economy can be found below. The production of:

- 1 kg wheat uses 1,300 L water
- 1 kg eggs uses 3,300 L water
- 1 kg broken rice uses 3,400 L water
- 1 kg beef uses 15,500 L water
- 1 pair jeans (1,000g) uses 10,850 L water
- 1 cotton shirt (medium, 500 gram) uses 4,100 L of water
- 1 disposable diaper (75g) uses 810 L of water
- 1 bed sheet (900g) uses 9,750 L of water¹
- Note: 1 L of water weighs 1 kg

CHINA'S WATER CHALLENGE

The challenge facing China is how to meet the water needs of its growing urban and industrial sectors without undermining its agricultural productivity. Agriculture accounts for 70% of global water consumption and 70% of the grain produced in China comes from irrigated land. However, China is seeing its irrigation supply reduced on three fronts:

- the diversion of water from rivers and reservoirs to cities;
- the depletion of underground supplies in aquifers; and
- the increasing pollution caused by rapid industrialization.

Economically, farms often can't compete with factories for water. A thousand tons of water produces approximately one ton of wheat, which has a market value of around \$300 to \$400, whereas the same amount of water used in industry can yield approximately 50 times as much revenue.

By 2025, Chinese non-irrigation water consumption is expected to increase by 75% over 1995 levels, leaving even less water available for irrigation and creating significant additional need to import food crops. China is already facing water shortages as per capita water

resources are only 2,200 cubic meters – 31% of the world's average. By 2030, China, with a population estimated to be 1.6 billion, will drop to 1,760 cubic meters per capita – almost 25% lower than today.

For China there is a solution to its water problem. Given the high water inputs into food commodities, importing wheat can be thought of as a cost-effective way to import water.² With its booming economy and huge trade surpluses, China might solve its water shortages by importing more of its food which will require even greater reliance on swing suppliers like Canada.

GLOBAL WATER SUMMARY

The following is a quick summary of the water situation in key countries representing approximately 50% of the world population:

- **China:** Population – 1.3 billion – A groundwater survey revealed that the water table under the North China Plain, an area that produces over half of the country's wheat and a third of its corn, is falling fast. A World Bank study indicates that China is mining underground water. The shortfall in the Hai basin of nearly 40 billion tons of water per year (1 ton equals 1 cubic meter) means that when the aquifer is depleted, the grain harvest will drop by 40 million tons—enough to feed 120 million people.
- **India:** Population – 1.1 billion – India's 100 million farmers have drilled 21 million wells. India's grain harvest, pressured both by water shortage and the loss of cropland to non-farm uses, has been flat since 2000. A 2005 World Bank study reported that 15% of India's food supply is produced by mining groundwater, meaning 175 million Indians are fed with grain produced with water from irrigation wells that will go dry.
- **United States:** Population – 301 million – Groundwater is the source of drinking water for about half the total population of the US and nearly all of the rural population, and it provides over 50 billion gallons per day for agricultural needs.³ The U.S. Department of Agriculture reports that in parts

of Texas, Oklahoma, and Kansas—three leading grain-producing states—the underground water table has dropped by more than 30 meters. As a result, farmers in the southern Great Plains, are being forced to return to lower-yielding dry-land farming. Fortunately, irrigated land accounts for only one fifth of the U.S. grain harvest, compared with close to three fifths of the harvest in India and four fifths in China.

- **Pakistan:** Population – 164 million – Observation wells near the twin cities of Islamabad and Rawalpindi in the fertile Punjab plain show a fall in the water table between 1982 and 2000 that ranges from 1 to nearly 2 meters a year. The former director of Pakistan's Arid Zone Research Institute, expects that within 10–15 years virtually all the basins outside the canal-irrigated areas will have depleted their groundwater supplies, depriving the province of much of its grain harvest.
- **Iran:** Population – 71 million – Iran is over-pumping its aquifers by an average of 5 billion tons of water per year, the water equivalent of one third of its annual grain harvest.
- **Saudi Arabia:** Population – 25 million – Water-poor and oil-rich, agriculture in Saudi Arabia relies heavily on subsidies; Saudi Arabia developed an extensive irrigated agriculture based largely on its deep fossil aquifer. After several years of supporting wheat prices at five times the world market level, the government was forced to face fiscal reality and cut the subsidies. Its wheat harvest dropped from a high of 4.1 million tons in 1992 to 2.7 million tons in 2007, a drop of 34%. Some Saudi farmers are now pumping water from wells that are 4,000 feet deep, nearly four fifths of a mile or 1.2 kilometres. The Saudi government has announced plans to phase out wheat production entirely by 2016 due to water shortages.⁴

CONCLUSIONS

We believe that the water issues in China and India will put greater demand on the world agriculture commodity markets, produce higher real commodity prices over time and create large demand for productive farmland in politically stable regions of the world with stable export capacity. Once such region which has all these characteristics is western Canada with its large farmland base, first world infrastructure, political stability and a huge exporting capacity.

ENDNOTES

- 1 Chapagain AK, Hoekstra AY, Savenije HHG, Gautam R (2006). "The water footprint of cotton consumption: An assessment of the impact of worldwide consumption of cotton products on the water resources in the cotton producing countries". *Ecological Economics* 60 (1): 186–203.
- 2 Agcapita Farmland Investment Partnership – September 2008 Briefing
- 3 US Geological Survey
- 4 Lester R. Brown, Earth Policy Institute

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