

May/June 2012

RESOURCE

engineering and technology for a sustainable world

*People who make
a difference*

Experiencing a world without walls



PUBLISHED BY ASABE – AMERICAN SOCIETY OF AGRICULTURAL AND BIOLOGICAL ENGINEERS

A Decade of Travels in a World Without Walls

Joel L. Cuello



Between 2000 and 2010, my academic and research activities frequently drew me out of the confines of the university campus and outside of the United States, sending me over a good part of our planet—six continents, 22 countries and 59 cities, with at least one return trip made to two-thirds of those countries within the same time period.

I always traveled alone, which made meeting colleagues and new friends on the other side of my long journeys all the more welcoming and gracious. Traveling solo certainly heightened the sense of adventure at times, such as my very first trip to the West Bank in 2006, when I was met at the airport in Tel Aviv by an elderly Palestinian who could not speak a word of English, but who had been entrusted with fetching and whisking me away into the Palestinian territories in the middle of the night. Or that time in 2007 when I spent the night sleeping on the floor at London Heathrow waiting for my disrupted flight to India to be rescheduled as a result of the U.K. liquid terrorist plot, which had just been thwarted a day earlier. Most of the time though, traveling alone afforded me moments to make quiet, unhurried personal observations and to engage in intellectually honest reflections about our changing world while on the move—as an engineer, a professor, and a fellow citizen of the planet.

With the last decade dramatically book-ended by two worldwide economic recessions as well as by such watershed events as the 9/11 terrorist attacks on the United States and by China's ascension in 2010 as the world's second largest economy, our planet has been re-ordered and realigned during the

first ten years of the 21st century. From a decade's worth of memorable travels crisscrossing our world of porous boundaries, here are my notes on three trends that will reshape our globally interconnected world this century.

1. The Ascent of Cities

The ancient city of Hebron in the Judean hills (population 170,000), home to the biblical patriarchs Abraham, Isaac, and Jacob and home to Palestine Polytechnic University, my host university in the West Bank, never fails to evoke in me that heightened feeling of visiting a place that is simpler, more serene, and of another time. The Israeli occu-



"The biblical city of Hebron in the West Bank, Palestine, home to Palestine Polytechnic University, where I teach a graduate short course at the Biotechnology Research Center generally once a year."

pation has virtually isolated Hebron in many respects from the rest of the world and has unwittingly helped preserve many of the ancient city's traditions and rhythms of life. Visiting Hebron provides a glimpse of how people in ancient times, through living and working together in cities, not only gained efficiencies in their lives and economy, but also wove the tapestry of their collective ideas and narratives into a shared civilization.

In 2010, for the first time in history, the proportion of the world's population living in cities exceeded 50 percent, despite the world's cities occupying only 3 to 4 percent of the planet's land area. Indeed, the number of countries with multiple cities of more than 1 million residents continues to grow. Pakistan has 8, Mexico 12, and China more than 100. By 2030, India will have 68 such cities, while China will have 221. By the same year, the world's urban population is projected to reach 4.7 billion.

Together with the increasingly skewed shift in the world's population from the developed world to the developing world, and in general from west to east, a heavily urbanizing world has been reshaping the global economic, scientific, political, and military landscapes and will continue to do so in the coming decades.

2. A Common Rise

On my recurring visits to the United Kingdom, I keep returning to the British Museum, which, through its vast collection of historical objects and artifacts, provides a kaleidoscopic survey of human history through the seemingly inevitable ebb and flow of kingdoms and civilizations—the Assyrians, the Babylonians, the Egyptians, the Greeks, and the Romans. Even in the ensuing Dark Ages, when Europe



"I took an afternoon stroll through the open-air market Shuk Machanoh Yehuda in Jerusalem, Israel."



A guanaco roams in Patagonia at the extreme south of Chile, where the author visited in 2010 as a Fulbright Senior Specialist at the invitation of the University of Magellan's Antarctic Research Program in Punta Arenas.

descended into political turmoil and cultural backwardness until the Italian Renaissance in the early 1400s, the civilizations of China's Tang Dynasty, the Islamic Empire, and the Maya in Mesoamerica took their turn to rise and reach their peak. Indeed, the successive waxing and waning of kingdoms and civilizations across millennia have become the basic plot line of human history.

But traveling the world in the first decade of the 21st century, one finds that human history is getting a significant rewrite. With the globalization of trade, information, labor, investment, and capital, our history no longer follows the moribund script of the successive rise and fall of kingdoms and civilizations but one that portrays the common and simultaneous rise of states and civilizations across the globe—a development that is unique and unprecedented in human history.

The economic numbers attest to the trend. For instance, *Foreign Affairs* has reported that the proportion of global GDP produced by Europe, the United States, and Canada fell from 68 percent in 1950 to 47 percent in 2003 and, by 2050, will decline further to only 30 percent—smaller than it was in 1820. Conversely, an overwhelming proportion of the world's GDP growth between 2003 and 2050, about 70 percent, will occur outside of Europe, the United States, and Canada.

The World Bank has predicted that by 2030 the number of middle-class people in the developing world—those capable of purchasing durable consumer products, such as cars, appliances, and electronics—will be 1.2 billion (greater than the combined population of Europe, the United States, and Canada), a rise of 200 percent since 2005. Thus, there is consensus that the main driver of global economic expansion from now on will be the economic growth of newly industrialized countries, such as China, India, Brazil, Indonesia, etc. The rise of these countries does not mean that Europe, the United States, and Canada are declining in absolute economic terms. It just means that a host of other countries are now rising together toward parity over the long term with today's already developed countries.



A mid-day walk through a traditional Chinese village near Zhejiang University, where the author is a visiting professor.

3. Resource Wars

I still find it wondrous to leave one world in a winged tube and, in just about 10 to 15 hours, arrive at the end of the journey in an altogether different world. This was how it felt for me when I left Los Angeles and arrived for the first time in Beijing in 2000. Beijing felt like another world in many ways, but it was the people—or how they were dressed—that looked most foreign to me. The majority still dressed in drab-colored Mao jackets, and the faces I saw in the streets appeared mostly grave, unsmiling, and even pensive. But fast forward ten years, and the contrast cannot be more strikingly clear. The city itself, of course, underwent physical transformations many times in the last decade, but the people of Beijing themselves look transformed—many fashionably dressed and the majority radiating a mix of optimism, confidence, and ambition. Arriving in Beijing today feels just like arriving in Tokyo, Seoul, Singapore, Manila, Sydney, Mumbai, Tel Aviv, Riyadh, Paris, London, or Sao Paulo—that is, arriving in a global city that is vitally a part of the globalized economy.

And while some in academic and policy circles are still debating whether the world of the 21st century is one where all nation states will democratize or one where people will align themselves along civilizational lines and subsequently engage in a clash of civilizations, what is clear is that the world has already decided to live by another system that is neither ideological nor cultural. In the world of the 21st century, capitalism serves not only as an economic system but as

a new shared global civilization, with its language, principles, and practices embraced universally.

In addition to lifting millions of people out of poverty and into the middle class across the world and enabling global corporations to post record profits worldwide, globalization has had the added bonus of making the world a more stable and peaceful place. Indeed, despite the highly visible wars in Afghanistan and Iraq in the last decade, the number of countries experiencing some form of major political violence—which had increased continuously through the Cold War period from 1946 until 1992 when the Soviet Union collapsed—declined progressively, dropping from a peak of about 30 percent of all countries in 1992 to only 13 percent of all countries in 2010. An integrated global economy makes nation states more disinclined to wage war against one another, given that war would prove ruinous for all.

In an era of greater peace, however, a new brand of conflict is emerging in a world with an integrated economy, that is, the competition between nation states for all types of resources. Time was when only western firms gained control of foreign energy and other resource assets. Today, Brazil, Russia, India, and especially China have been scouring the planet to lock down resource supplies to sustain their burgeoning economies. With China overtaking the United States as the world's largest energy user in 2010, and with China projected to be the world's top oil consumer by 2027, China has aggressively been securing foreign resource reserves in Central Asia, Africa, the Middle East, and Latin America.

Collectively, we humans currently use about 50 billion tonnes of planetary resources per year which, without restrictions, could jump to 140 billion tonnes per year by 2050. This would be equivalent to collectively consuming resources of a



In Cairo, Egypt, I tried the local means of gas-saving, desert transportation.

total weight roughly equal to that of Mount Everest! How we produce or manage and use our resources—food, water, energy, fuels, minerals—constitutes the biggest challenge of the globalized world of the 21st century. This also happens to be the biggest engineering challenge of the 21st century.

On my visit to Oslo in 2010, my host took me to the Norwegian Nobel Institute, where we were shown the stately conference room where the five-member Norwegian Nobel Committee gathers every year to select the recipient of the Nobel Peace Prize. On the walls of the conference room hang the pictures of all individual Peace Prize laureates, including Martin Luther King, Jr. (1964), Henry Kissinger (1973), Mother Teresa (1979), Nelson Mandela (1993), and Jimmy Carter (2002). But the picture that really caught my eye was that of Norman Borlaug, the American who was awarded the Peace Prize in 1970 for “his leadership of the Green Revolution in developing countries and helping to reduce world hunger.” To achieve the innovative design of sustainable food production systems for a more secure and peaceful world, we certainly need more Norman Borlaugs today.

The Places We Go

To travel the world during the first decade of the 21st century was to see the common rise of nations transpiring across the globe. A disquieting obstacle that is posing a clear and present danger to all nations today, however, is the fast-increasing and unsustainable global use and consumption of the planet's resources. With everyone on the planet heading



“I admired the Nobel Peace Prize conference room at the Norwegian Nobel Institute in Oslo, Norway.”



Conferring with colleagues at the Biofuels Research Center in tropical Coimbatore in southern India on the sustainable production of biofuels from *Jatropha* and algae.

toward emulating the western ways of living and consumption, one estimate shows that if everyone on the planet today lived like the typical American, we would need the equivalent of 5.4 Earths to sustain our needs. Rephrasing the biggest engineering challenge of the 21st century, how do we seek worldwide economic growth and development without relying on the increased exploitation of the Earth's resources?

During the first wave of globalization in the 16th century when people were literally circling the globe for the first time, conquering other peoples and plundering their resources, a small group of native tribes in North America were at the same time quietly sowing the seeds of resource sustainability. The Iroquois, architects of the Seven Generation Sustainability enshrined in The Great Law of the Iroquois, practiced an ecological concept that requires thinking seven generations ahead to ensure that the decisions made today would benefit their descendants seven generations into the future.

During this second and present wave of globalization in the 21st century, there is a worldwide imperative to redesign the very foundation of globalization if our shared economic civilization in this integrated world is to last—demanding a complete disavowal of the principle of resource plunder and accelerating the universal embrace of the practice of resource sustainability.

Mark Twain, with insights he had gained through his travels, offered that “travel is fatal to prejudice, bigotry, and narrow-mindedness.” Through my travels in the past decade, it has been my ardent hope that, by the middle of the century and certainly by the end of this millennium, not only will engineering be fatal to resource depletion, wastage, and reckless misuse, but more than that—engineering will be fatal to hunger, poverty, and unsustainable development.

ASABE member **Joel L. Cuello**, professor, Department of Agricultural and Biosystems Engineering, The University of Arizona, Tucson, USA; cuello@email.arizona.edu.