
Opening Extract from...

The New North

The World in 2050

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THE NEW NORTH

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PROLOGUE

Flying into Fort McMurray

My nose was pressed against the rear window glass of a Boeing 747. It was a direct flight from Edmonton to the booming new oil city of Fort McMurray, Alberta, in the broad belt of boreal forest that girdles the globe through Alaska, Canada, Scandinavia, and Russia. The scene below morphed from urban concrete to canary-yellow canola fields, then gradually from fields to a deep shag carpet of evergreen forest jeweled with bogs. The forest was crisscrossed here and there by roads, and patched with clearings, but grew more desolate by the minute. In under an hour, the transformation from urban metropolis to farmland to wilderness was complete.

Then, suddenly, the woods dissolved into gleaming homes, the newest residential subdivision of Fort McMurray. Freshly cut survey lines radiated outward in all directions through the woods. Bulldozers and work crews ground away at roadbeds and building pads, engraving a sort of master blueprint into the landscape for hundreds more homes in waiting. Small wonder. The median price of a home in Fort McMurray had just surged to $442,000, more than $100,000 higher than in my home city of Los Angeles.[1] The aggressive transformation taking place beneath my window was just one of many I was about to see over the next fifteen months.

This was not my first trip to the North. I'd already been studying cold, remote places for fourteen years, beginning with a doctoral dissertation studying the Iskut River, a tree-tossing torrent that rips through a remote corner of British Columbia. Something about the rawness of the place, the sense of danger and frontier, hooked me hard. The sight of fresh grizzly-bear footprints, smashed just minutes before over my own, was a shivery thrill.

I finished school, became a geography professor at UCLA, and started a long series of research projects in Alaska, Canada, Iceland, and Russia.

My specialty was the geophysical impacts of climate change. In the field I would measure stream flows, survey glacier snouts, sample soil, and the like. Back home in Los Angeles I would continue the research from my desk, extracting numbers from satellite data like little digital polyps. But all this would change in 2006. The flight to Fort McMurray was the beginning of my attempt to gain deeper understanding of other phenomena now unfolding around the northern quarter of our planet, and how they fit in with even bigger global forces reverberating throughout the world as a whole.

From my scientific research, I knew that amplified climate warming had begun in the North, but what might that mean for the region's people and ecosystems? What about its ongoing political and demographic trends, or the vast fossil fuel deposits thought to exist beneath its ocean floors? How would it be transformed by even bigger pressures building around the world? And if, as many climate models suggest, our planet becomes one of killer heat waves, fickle rain, and baked croplands, might new human societies emerge in places currently unappealing for settlement? Could the twenty-first century see the decline of the southwestern United States and European Mediterranean, but the ascent of the northern United States, Canada, Scandinavia, and Russia? The more I looked, the more it seemed this northern geographic region was highly relevant to the future of us all.

I was about to burn through almost two years of my life going to places you've heard of, like Toronto, Helsinki, and Cedar Rapids, and others you maybe haven't, like High Level, Tromsø, and the Belcher Islands. I was about to fly on helicopters and airplanes, rent cars, ride buses and trains, and live on a ship. My goal was to see with my own eyes what is happening with these places, and to ask the scientists, business owners, politicians, and ordinary residents who live and work in them what they saw happening and where they thought things might be heading. After studying it for years, I was about to discover the North—and its broader importance to our future—for the very first time.

CHAPTER 1

Martell's Hairy Prize

"Prediction is very difficult. Especially about the future."

—Niels Bohr (1885–1962)

"The future is here. It's just not evenly distributed yet."

—William Gibson (1948–)

On a cold April day in 2006, Jim Martell, a sixty-five-year-old businessman from Glenns Ferry, Idaho, shot and killed a strange beast. Cradling his rifle, he ran with his guide, Roger Kuptana, to where it lay slumped on the snow. Both men wore thick parkas as protection against the icy wind. They were on Banks Island, high in the Canadian Arctic, some 2,500 miles north of the U.S. border.

Martell was an avid big-game hunter and had paid about forty-five thousand dollars for the right to bag *Ursus maritimus,* a polar bear, one of the most coveted trophies of his sport. Kuptana was an Inuit tracker and guide who lived in the nearby village of Sachs Harbor. Polar bear hunting is strictly regulated but legal in Canada, and the hefty license and guide fees provide important revenue to Sachs Harbor and other Inuit towns like it. Martell had permission to take down a polar bear and only a polar bear. But that was not what lay bleeding in the snow.

At first glance the creature looked well enough like a polar bear, albeit a small one. It was seven feet long and covered with creamy white fur. However, its back, paws, and nose were mottled with patches of brown. There were dark rings, like a panda's, around its eyes. The creature's face was

flattened, with a humped back and long claws. In fact, it had many of the features of *Ursus arctos horribilis,* the North American grizzly bear.

Martell's bear triggered an international sensation. Canadian wildlife officials seized the body and submitted DNA samples to a genetics lab to find out what it was. Tests confirmed the animal was indeed a half-breed, the product of a grizzly bear father and a polar bear mother.[2] It was the first evidence of grizzly/polar bear copulation ever reported in the wild. News outlets announced the arrival of a "Hairy Hybrid"[3] and the blogosphere erupted with either wonderment and proposed names—"pizzly?" "grizzlar?" "grolar bear?"—or outrage that the only known specimen had been shot dead. A "Save the Pizzly" Web site hawked T-shirts, coffee mugs, and stuffed dolls. Martell was subjected to angry criticism; in response he pointed out that the world would never have learned of the thing—whatever it was called—if not for his fine shot.

For this bizarre tryst even to have happened required that a grizzly wander far north into polar bear territory, a formerly rare phenomenon that biologists are now beginning to see more often. Journalists were quick to make a climate change connection: Was this, they wondered, a preview of nature's response to global warming? But scientists like Ian Stirling, a leading polar bear biologist, were rightly skeptical of drawing strong conclusions from what was, after all, an isolated event. That changed in 2010, when a second specimen was shot. Tests confirmed it was the offspring of a hybrid mother; in other words, *they are breeding*.[4] The coming decades will show whether Martell's bear, now stuffed and snarling in his living room, is just the latest biological indicator among many that something big is going down on our planet.

If you enjoy watching wildlife in your backyard, perhaps you've noticed something. All around the world there are animals, plants, fish, and insects creeping to higher latitudes and elevations. From spittlebugs in California to butterflies in Spain and trees in New Zealand, it is a broad pattern that biologists are discovering. By 2003 a global inventory of this phenomenon found that on average, plants and animals are shifting their ranges about six kilometers toward the poles, and six meters higher in elevation, every decade. Over the past thirty years phenological cycles—the annual rhythm of plant flowering, bird migrations, birthing babies, and so on—have shifted earlier in the spring by more than four days per decade.[5]

If these numbers don't sound large to you, they should. Imagine your lawn crawling north, away from your house, at a speed of five and one-half feet each day. Or that your birthday arrived ten hours sooner each year. That's how fast these biological shifts are happening. Life-forms are migrating—and it's going on right outside your window.

The 2006 pizzly story—like the record-shattering Atlantic hurricane season in 2005, or the strange weather patterns that rained out the Winter Olympic Games in Vancouver while burying the eastern U.S. seaboard with "Snowpocalypse" in 2010[6]—is yet another example of something that might have been triggered by climate change or might not. Such events are eye-catching in the news of the day but not, taken in isolation, conclusive of anything. In contrast, while the painstaking statistical analyses of decades of field research on spittlebugs and trees may not rouse the daily news cycle, it does me. It is deeply important, a compelling discovery that provides real understanding about the future. It is a megatrend, and megatrends are what this book is all about.

The Thought Experiment

This is a book about our future. Climate change is but one component of it. We will explore other big trends as well, in things like human population, economic integration, and international law. We will study geography and history to show how their preexisting conditions will leave lasting marks on the future. We will look to sophisticated new computer models to project the futures of gross domestic product, greenhouse gases, and supplies of natural resources. By examining these trends collectively, and identifying convergences and parallels between them, it becomes possible to imagine, with reasonable scientific credibility, what our world might look like in forty years' time, should things continue on as they are now. This is a thought experiment about our world in 2050.

It can be fun imagining what our world might look like by then. Robots and flying cars? Custom-grown body parts? A hydrogen economy? As any disappointed sci-fi buff will tell you, the pace of reality is usually slower than human imagination. Fans of George Orwell's book *1984,* the television series *Lost in Space* and *Space 1999,* the films *2001: A Space Odyssey,* and (it's looking like) *Blade Runner*—set in a perpetually raining 2019 Los

Angeles—see their landmark years come and go. But outside of the ongoing technical explosions in information and biotechnologies, our lives are considerably less different than the writers of these fictional works imagined they would be.

We've discovered quarks and flung people into space, yet still depend on the internal combustion engine. We've cracked DNA and grown a human ear on a mouse's back, yet are still dying of cancer. We've created fluorescent green pigs by inserting jellyfish genes into them (*Green Eggs and Ham,* anyone?), yet still catch wild fish from the sea and use dirt and water to grow our food. Nuclear power is but a pale shadow of what was hoped for it in the 1950s. We still use boats, trucks, and trains to move goods. And even in this unprecedented era of globalization, the fundamental principles of our markets and economies differ surprisingly little from the days of Adam Smith, more than two hundred years ago.

But in other, sneakier ways, things have changed profoundly. Imagine describing to a 1950 California tomato farmer how in the next fifty years he would grow genetically programmed seeds, see the water in his state tilted from one end to the other, and experience a tripling of the state's population. Imagine explaining he would one day compete with Chinese farmers to sell tomatoes to Italians who would blend them with beans from Mexico to make canned goods for British supermarkets.[7]

Any of these would blow our yesteryear farmer's mind. But to us, they are familiar, even boring. They fly below our radar because they have crept upon us, hiding in plain sight over the course of decades. But that doesn't mean transformations like these aren't huge, fast, and profound. Big changes often just sort of ease their way in. And quietly change the world.

What will our world look like in 2050? Our distribution of people and power? The state of the natural world? Which countries will lead, and which ones suffer? Where do you think *you'll* be in 2050?

The answers to these questions, at least in this book, derive from a core argument: The northern quarter of our planet's latitudes will undergo tremendous transformation over the course of this century, making them a place of increased human activity, higher strategic value, and greater economic importance than today. I loosely define this "New North" as all land and oceans lying 45° N latitude or higher currently held by the United

States, Canada, Iceland, Greenland (Denmark), Norway, Sweden, Finland, and Russia.

These eight countries, which control vast territories and seas extending as far north as the Arctic Ocean, comprise a new "Northern Rim" roughly encircling that ocean. Developments in these Northern Rim countries, here coined the NORC countries, or "NORCs," are explored in Parts II and III (Chapters 5 through 10). Part I (Chapters 2 through 4) presents powerful worldwide trends in human population, economics, energy and resource demand, climate change, and other factors keenly important to our global civilization and ecosystem. Besides imagining what life might be like for most of us by 2050, these first chapters identify some critical world pressures that are stimulating the New North into existence.

Before beginning our travels around this 2050 world, there are some rules to establish.

The Rules

Fortunately, we have the tools, the models, and the knowledge to construct an informed thought experiment of what we might expect to see unfold over the next forty years. However, as in any experiment, we must first define the assumptions and ground rules upon which its outcomes are contingent.

1. **No Silver Bullets.** Incremental advances in technology for the next forty years are assumed. No cold nuclear fusion or diesel-growing fungus[8] will suddenly solve all our energy problems; no God-like genetic engineering to grow wheat without water. This is not to say a radical technology breakthrough can't or won't happen; only that the possibility will not be entertained here.
2. **No World War III.** The two "world" wars in the first half of the twentieth century recast the map and forged economic, political, and infrastructural changes that reverberate to this day. A nuclear or major, multicountry, conventional war like World War II would be a game changer and is not imagined here (indeed, empirical evidence suggests that over the long run we may be becoming somewhat less violent[9]). However, the possibility of lesser armed conflicts, like the

ones ongoing today in the Middle East and Africa, is evaluated. Major laws and treaties, once made, are assumed to stay in place.

3. **No Hidden Genies.** A decades-long global depression, an unstoppable killer disease pandemic, a meteorite impact, or other low-probability, high-impact event is not imagined here. However, this rule is relaxed in Chapter 9 to explore six plausible, if unlikely, outcomes, like an abrupt climate change or the collapse of global trade—both of which have happened before and could happen again.
4. **The Models Are Good Enough.** Some of the conclusions reached in this book stem from experiments using computer models of complex phenomena, like climate and economies. Models are tools, not oracles. All have their flaws and limitations.[10] But for the broad-scale purposes of this book, they are excellent. I will focus on the robust, uncontroversial messages of these models rather than push the limits of their capabilities. This rule is relaxed in Chapter 9 to explore some plausible outcomes lying outside our current modeling capacity.

The purpose of these rules is to introduce conservatism to the thought experiment. By favoring likely, forseeable trajectories over unlikely, exciting ones, we avoid sacrificing a more probable outcome to a good story. By pursuing multiple lines of argument rather than one grand idea, we avoid the so-called "foxes and hedgehogs" trap, by lessening the likelihood that an important actor will be overlooked.[11] By concentrating on the most robust simulations of computer models, we steer the conversation toward the science that is best understood, rather than poorly understood.

Why even try to project forty years into the future anyway? To imagine the world in 2050, we must closely study what is happening today, and why. By forcing our minds to take the long view, we can identify factors that might seem beneficial in the near term, but lead to undesired consequences in the long term, and vice versa. After all, doing good things (or at least, less bad things) for the long term is a worthy goal. I certainly don't believe the future is predetermined: Much of what does or does not happen forty years from now rests on actions or inactions taken between now and then. Indeed, the power of societal choice is so strong that it's still possible to avert many of this book's worst projections.

Some of the changes I will present will be perceived as good or bad, depending on the reader's own perspective. To be sure, some of them, like species extinctions, no one wishes to see. But others, like military spending and energy development, evoke valid, strongly opposed reactions. My goal is not to argue one side or another, but to pull together trends and evidence into a bigger picture as well and objectively as I can. The reader can take it from there.

But before we can intelligently discuss the future, we must first understand the past. In roughly historical order of their rise in significance, here are four global forces that have been busily shaping our 2050 world for tens to hundreds of years.

FOUR GLOBAL FORCES

The first global force is demography, which essentially means the ups, downs, and movements of different population groups within the human race. Demographic measures include things like birth rates, income, age structure, ethnicity, and migration flows. We shall examine all of these in due course but for now, let us start with the most basic yet profound measure of all: the total number of people living on Earth.

Before the invention of agriculture some twelve thousand years ago, there were perhaps one million persons in the world.[12] That is roughly the present-day population of San Jose, California. People foraged and hunted the land, living in small mobile clans. It took *twelve thousand* years (until about 1800 A.D.) for our numbers to grow to one billion. But then, oh boy, liftoff.

Our second billion arrived in 1930, a mere 130 years later. The global Great Depression was under way. Adolf Hitler led his Nazi Party to stunning victory in Germany's Reichstag elections. My Italian immigrant grandfather, then living in Philadelphia, was thirty-three years old.

Our third billion came just thirty years later in 1960. John Kennedy beat Richard Nixon in the U.S. presidential race, the first satellites were orbiting the Earth, and I was a scant seven years from being born.

Our fourth billion took just fifteen more years. It was 1975 and I was eight. The U.S. president Gerald Ford escaped two assassination attempts (one by Charles Manson's murderous henchwoman Lynette "Squeaky" Fromme), the Khmer Rouge had taken over Cambodia, and the movie *Godfather II* ran away with six Academy Awards, including one to the Italian-American actor Robert De Niro. My baby brother was born.

Our fifth billion came in 1987, now just twelve years after the fourth. The Dow Jones Industrial Average closed above 2,000 for the first time in history and the Irish rock band U2 released their fifth album, *The Joshua Tree*. Standing outside Berlin's Brandenburg Gate, U.S. president Ronald Reagan exhorted Soviet leader Mikhail Gorbachev to "tear down this wall." The world's last dusky seaside sparrow died of old age on a tiny island preserve in Florida's Walt Disney World Resort. A self-absorbed college sophomore at the time, I only noticed *The Joshua Tree*.

Our sixth billion arrived in 1999. This is now very recent history. The United Nations declared 1999 the International Year of Older Persons. The Dow Jones climbed above 11,000 for the first time in history. Internet hookups ballooned and millions of songs, to the dismay of U2 and the rest of the music industry, were swapped for free on Napster. Hugo Chávez became president of Venezuela, and a huge chunk of northern Canada quietly assumed self-rule as the new territory of Nunavut. By then, I was a young professor at UCLA, working toward tenure and starting to notice things. The world vacillated between nervous fretting about Y2K and excitement over the dawn of a new millennium.

11,800 years . . . 130 years . . . 30 years . . . 15 years . . . 12 years. . . . The length of time we need to add another billion has petered down to nearly nothing. One billion is more than triple the 2010 population of the United States, the third most populous country on Earth. Imagine a world in which we added one-plus USA, or two Pakistans, or three Mexicos, *every four years*. . . . Actually, this requires no imagination at all. It is reality. We will add our seventh billion some time in 2011.

This extraordinary acceleration, foreseen over two centuries ago by Thomas Malthus,[13] burst into popular culture again in 1968 when Paul Ehrlich, then a young biology professor at Stanford, jolted the world with *The Population Bomb,* a terrifying book forecasting global famines, "smog