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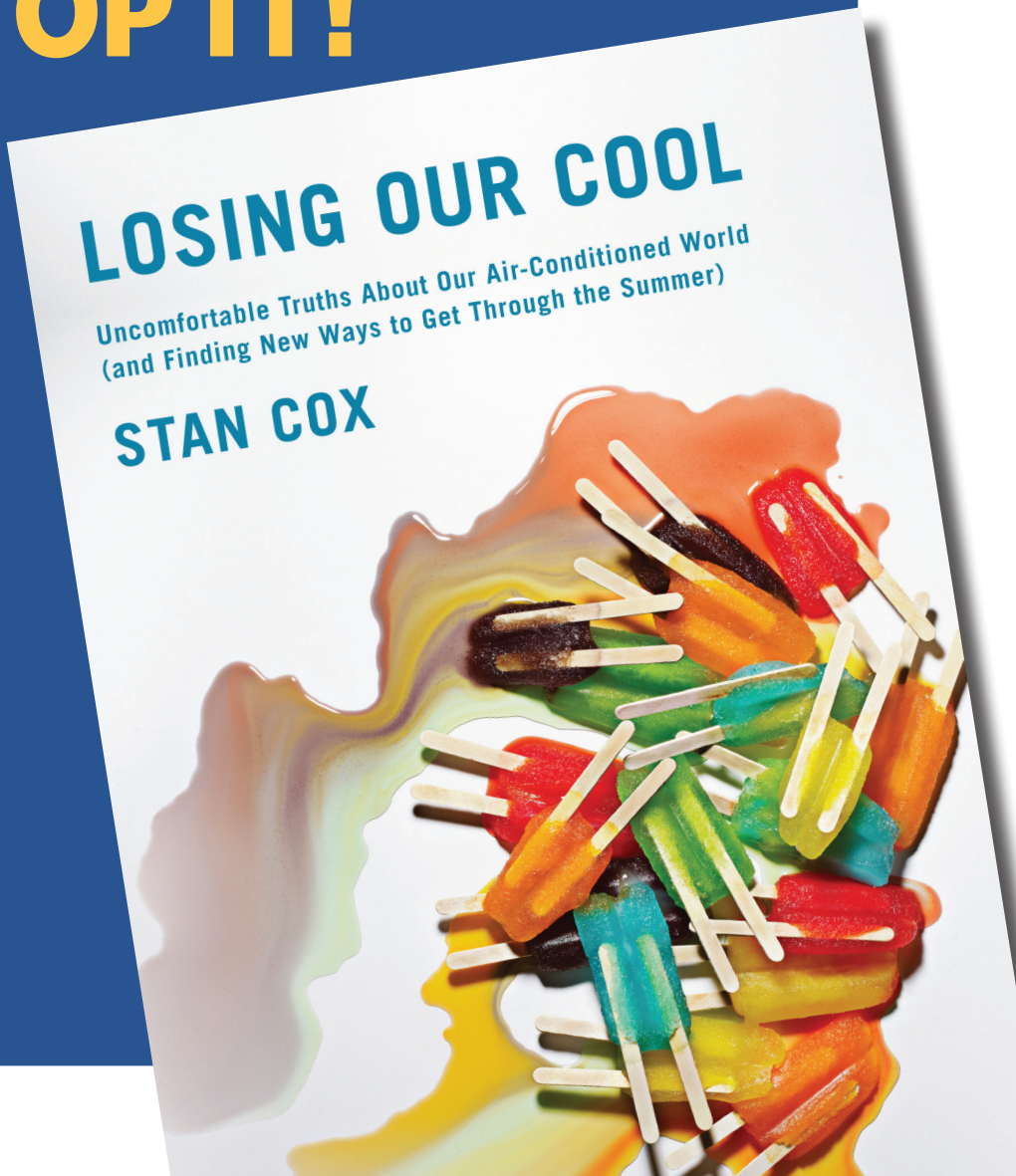
THERE'S NO POWER ON EARTH THAT CAN STOP IT!

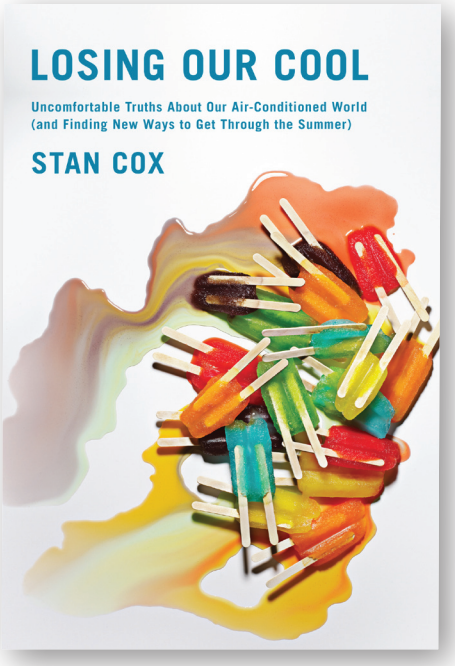
An excerpt from

LOSING OUR COOL

UNCOMFORTABLE TRUTHS ABOUT OUR AIR-CONDITIONED WORLD (AND FINDING NEW WAYS TO GET US THROUGH THE SUMMER)

STAN COX





LOSING OUR COOL

Uncomfortable Truths About Our Air-Conditioned World (and Finding New Ways to Get Through the Summer)

Before joining the Land Institute in Salina, Kansas, as senior scientist in 2000, **Stan Cox** worked as a U.S. Department of Agriculture geneticist for thirteen years. His environmental writing has been widely published. He is the author of *Sick Planet: Corporate Food and Medicine*.

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THERE'S NO POWER ON EARTH THAT CAN STOP IT!

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LOSING OUR COOL

UNCOMFORTABLE TRUTHS ABOUT OUR AIR-CONDITIONED WORLD (AND FINDING NEW WAYS TO GET US THROUGH THE SUMMER)

STAN COX

Air-conditioning and other technologies have made it so there's no place on the planet where we couldn't live. We can condition the air; we can make it right.
– Jim Roberts, air-conditioning service manager, Fort Myers, Florida, 2008

Senator Ashurst used to tell on himself the story of his maiden speech in the U.S. Senate. "Mr. President," he began, "the new baby state I represent has the greatest of potential. This state could become a paradise. We need only two things: water and lots of good people." A gruff senior senator from New England interrupted, "If the senator will pardon me for saying so, that's all they need in Hell!" We have lots of good people in Arizona. But after fifty years the search for dependable water supplies is still the big story of our state.
– Senator Morris Udall of Arizona, arguing for funding of the Central Arizona Project to supply water from the Colorado River, 1963

You may have noticed, as I have, that when the heat of your surroundings reaches a near-intolerable intensity, it becomes almost audible. I thought I started hearing the heat – as a growing, dull hum – one windless July afternoon in Phoenix as I took a walk in the 114° sun. The fact that I was strolling among the foundations of a village that had last existed six hundred years ago (on land that now borders Phoenix Sky Harbor International Airport) caused further disorientation. One obvious question still managed to penetrate the haze in my brain: what sort of extraordinary beings had lived here and sustained a thriving civilization through a thousand such summers without modern cooling technology?

From around 450 to 1450 A.D., the Hohokam people occupied this same central Arizona valley that now struggles to contain Phoenix. At their peak, they numbered between twenty-five and sixty thousand and set a record for population density in the desert Southwest that was broken only by European settlement centuries later. Throughout the Salt and Gila

river valleys, they built a sophisticated system of canals with a total length of a thousand miles and cultivated a hundred thousand acres of crops. The village of Pueblo Grande – near the now-dry bed of the Salt River, where I wandered on that second-hottest afternoon of 2009 – had been one of their many carefully planned housing developments.

The short, self-guided trail through Pueblo Grande is designed to take a half-hour under normal conditions, but I found myself speed-reading the plaques and finishing the trail in less than fifteen minutes. Quickly covering another few dozen steps, I ducked into the cool office of city archaeologist Todd Bostwick and asked the obvious question. Bostwick explained that survival without air-conditioning in this Valley of the Sun, as it's known, would not have required superhuman powers back in Hohokam days: "It's important to remember that the Salt River ran year-round then. They could go jump in the river or a canal to cool off whenever they wanted to. The canals were their roads, and [they] supported ribbons of green growth, which also provided cooling. They used wood, but they clearly appreciated the value of shade and would have left plenty of shade trees standing." Bostwick gestured through his window toward the village remains: "People didn't really live in those rooms. Those were chiefly for privacy. They did their work out in the shade of a ramada [an open, detached porch roofed by brush or branches]. They grew cotton and made cloth, so they probably would have employed the old trick of the wet sheet over the doorway for evaporative cooling. When it was too hot inside, they would have slept outdoors. And they were smart enough not to work in the heat of the day."

"Incidentally," Bostwick added, "I get that question a lot, the one about how the Hohokam got by without air-conditioning. But it al-ways comes from adults. For some reason, kids never ask that. The notion of comfort is as cultural as it is personal."

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Central Arizona's climate in Hohokam times was not very different from today's, says Bostwick – at most, it was just slightly cooler – but the landscape in this valley would certainly have been more tolerable without the vast expanse of heat-trapping concrete and asphalt that now covers a large portion of it. Could the valley ever have become home to millions of people without modern air-conditioning? Bostwick grinned. "Absolutely not. But here is my message: you don't need air-conditioning to build an incredibly successful culture in the desert. The Hohokam proved that. They proved it for more than a thousand years."

THE CAPITAL OF COOL

In 1940 the *Arizona Republic* crowned Phoenix "the air-conditioned capital of the world." That was more a prophecy than a description; mechanical evaporative cooling was still the predominant way of delivering comfort. But evaporative coolers (which update the Hohokam wet-sheet strategy by using simple fans to remove heat from the air, drawing it through water-soaked pads) were about to give way to increasingly cheap and efficient refrigerated air.

In that same article, the *Republic* declared, "Phoenicians do not move to new localities when they desire a climate change. They change the climate." That too, as we now know, was prophetic, but in a more dismal vein. Residents of Phoenix and the nearby cities and suburbs in Maricopa County are already living a future that awaits the rest of us. There, the

decade-by-decade warming rate has been higher than in any of the world's other big cities – and Phoenix started off near the top of the charts. The urban "heat island" effect (through which the concrete, asphalt, and steel of cities absorb solar energy and hold it in the form of heat) has raised temperatures 7.6° Fahrenheit. That figure lies toward the high end of the range of temperature increases projected for the entire planet's greenhouse future. The city is also topped by a "carbon dioxide dome," with weekday concentrations of CO_2 "equivalent to what is being predicted for 100 years from now." Sixty-seven years after the *Republic* credited residents with changing the city's climate, the residents who followed were paying the price for decades of heroic growth. In 2007, Phoenix endured a record-breaking twenty-eight days with high temperatures exceeding 110°; compare that with an average of only 6.7 such days per summer in the 1950s. The deep nighttime temperature drop, that much-loved feature of the desert climate, had shrunk by one-third within the Phoenix city limits. Heat captured during the day was being trapped in concrete and asphalt and between buildings; as a result, Phoenix residents were having to keep air conditioners running longer into the evening and night hours. Matters reached an extreme on July 15–16, 2003, when the city "cooled" down only to 96° by early morning – fifteen degrees hotter than the long-term average low for the date – and hit 117° on the after-noon of the sixteenth.

Air-conditioning's environmental damage is not limited to emissions of greenhouse gases and ozone-depleting chemicals. It has also been used as a lever to open the Southwestern desert and other ecologically vulnerable parts of the country to reckless growth. Lavish deployment

Heat captured during the day was being trapped in concrete and asphalt and between buildings; as a result, Phoenix residents were having to keep air conditioners running longer into the evening and night hours

of indoor climate control may indeed make it possible for us to live anywhere on the planet, but is that wise? Across the southern tier of states, from the desert Southwest to the Everglades, air-conditioning has played an essential role in drawing millions of people to some of the country's most fragile environments as high-powered development steam rolls ecological barriers. In 1930, Phoenix had a population size half that of Peoria, Illinois. Now, fourteen times as many people live in Phoenix as in Peoria, even though the landscape and climate around Peoria have a much higher natural capacity to support a large population. (Incidentally, there is a Peoria, Arizona. The ninth-largest city in Arizona, it has been swallowed up by Phoenix sprawl.)

It took until 1920 for Maricopa County's population to regain and surpass its level of Hohokam times. Climate control arrived soon after, and by 2009, four million people were living in the county, most of them clustered in and around Phoenix. The county government expects six million by 2030. By the turn of the millennium, a powerful air-conditioning system, once a luxury, had come to serve as a life-support apparatus for Phoenicians, and not just because of the heat. As the *Los Angeles Times* reported in 1999:

> Phoenix's air quality is well below national health standards, and its violations for particulates, ozone and carbon dioxide have been classified as "serious," a distinction shared with only one other city: Los Angeles. . . . Phoenix is teeming with those whose only job is to fight the dust battle. Pool cleaners, air-conditioning repairmen and house cleaners all report that their lives are made more miserable by dust, even as their livelihoods benefit.

> . . . Gaye Knight, the air quality advisor for the city of Phoenix, said her office receives 5,000 complaints a year about fugitive dust. . . . Valley fever, an illness whose symptoms can range from fatigue to fungus in bones or the lining of the brain, is a pathogen that lives quietly in the ground until soil is disturbed. The number of cases in Arizona has doubled in recent years, and the cost of hospitalizing valley fever patients has been put at more than $20 million. . . . A 1995 study estimated that 963 Arizonans a year die prematurely of respiratory ailments from inhaling particulates.

On the origin of those problems, the *Times* article quoted Howard Wilshire, a former senior scientist for the U.S. Geological Survey: "Undisturbed desert does not create large quantities of dust. A natural crust of algae and lichen forms in the desert and it stabilizes the soil. The problem is man. We are being exceedingly foolish with our abuse of the desert."

A square mile of desert is equipped to support small populations of appropriately adapted animal species, not 3,200 humans along with their homes, workplaces, and vehicles. Increased heat is also concentrating ozone and other components of smog in the city's air. Air conditioners are shielding residents from heat, dust, and smog but not from other health hazards. The increase in childhood and adult obesity has been accelerated, says recent research, because the ever-more-oppressive heat keeps kids confined to air-conditioned refuges. Life in a desert city involves many more, and often unexpected, perils.

By 2008, Phoenix politicians, academics, and business leaders were proudly pointing to an array of "green" initiatives

The increase in childhood and adult obesity has been accelerated, says recent research, because the ever-more-oppressive heat keeps kids confined to air-conditioned refuges. Life in a desert city involves many more, and often unexpected, perils

that would prove that, despite all of those hazards, the central Arizona desert can tolerate a population of six million people or more. Plans included new reflective roofs and buildings, vegetation and urban forestry, better insulation, a "connected oasis" of street parks, and paving materials that conserve water by allowing it to percolate into the soil below. An at-tractive light-rail system is credited with putting a small dent in car traffic, but it consists of only a single line through Phoenix and neigh-boring Tempe and Mesa.

Environmental initiatives to date have yet to produce significant results, so some local residents are taking environmental matters into their own hands. Dani Moore and Chris George moved to the Phoenix area from New Jersey in midsummer 2006. As outdoor types, the new-ly weds were happy to find themselves in a desert climate, and they decided that they could live year-round without air-conditioning. Throughout the summer of 2008, they largely stuck to their plan – except on a few occasions, as when they hosted out-of-town visitors or had to allow new flooring to set in. But in 2009, they resolved to leave the thermostat set to "Off " no matter what happened. And they did. I visited them in their small brick Tempe home during the hottest stretch of that summer, on a July day when the official Phoenix high was 113°, after a low the previous night of 91°. When I arrived at two o'clock, the temperature in their kitchen hovered around 100°. "Now we know we can make it through the summer without being tempted," said George. "The worst will soon be over." As we guzzled cold water, Moore, who was doing graduate work at Arizona State University in biology (specifically, in ant behavior) admitted that the original idea for their "air-conditioning strike" had been hers. "I love

warmth anyway, and we found out that this kind of weather's not so bad." Had they thought about putting in a rooftop evaporative cooler? "We won't be living here long-term, so we are reluctant to invest in one," she said. "Besides, I'm pretty sure the homeowners' association here bans them on roofs." She said she'd found herself gazing longingly at a freestanding portable model in a store a few days before. "But I just don't think I want to have to deal with another appliance."

George was working at the *Arizona Republic* as a page designer, and he was documenting his experience through the summer in a blog on the paper's Web site. "I try not to be too preachy, but sometimes I can't help myself. And the purely practical economic argument about saving money doesn't always work." Despite tough times, he said, his blog received a lot of comments like "Well, *I'm* willing to pay for my comfort. Don't be a cheapskate." Other commenters were less polite, calling him crazy or, in one case, a "dysfunctional whack job." Whatever his own mental state, said George, his response to critics was "Do you really need to keep your house forty degrees below the outdoor temperature to be comfortable? Are you willing at least to raise your thermostat setting and try a ten-or twenty-degree difference? When you come inside from this kind of heat, that's enough to make you really feel cool." Some readers and friends responded by cutting back on their own re-source use in various ways – turning up the thermostat, for example, or using a clothesline instead of an electric dryer – but he hadn't heard from anyone else who turned off the air-conditioning altogether.

Without air-conditioning at home (even though they both had it at work), Moore and George said their perception of temperature had become more flexible; as the weather warmed up through spring and summer, they felt comfortable at warmer and warmer temperatures. They agreed that "your blood thins when you come to Arizona." Going to and from work over the summer, George had found himself using his bicycle and the light-rail system most of the time rather than driving. When you wake up in a 90° house, he said, the breeze you create by riding a bike to work feels pretty good.

Air-conditioning has helped turn the city, along with its suburbs, into a place that's not easily distinguished from any other place in America

Dani Moore and Chris George are only two of many Valley of the Sun residents who are trying to live within tighter ecological limits. But have sixty-plus years of heedless expansion already exceeded the limits of human population that this desert valley can support? Not in the view of Arizona State University president Michael Crow, who asserted in 2008 that Phoenix has a golden opportunity to demonstrate to the world that sustainability is possible. That's because, he declared, there's going to be so much more growth with which to experiment: "When Phoenix is done growing, it will be bigger than Chicago. The next massive city of the United States isn't done yet."

PUSHING OUT THE DESERT

Former vice president Dan Quayle can be forgiven for having once announced, "I love California – I practically grew up in Phoenix." Air-conditioning has helped turn the city, along with its suburbs, into a place that's not easily distinguished from any other place in America. Before air-conditioning, Phoenix was an unassuming wintertime haven for tourists and retirees. During World War II, the city acquired several military bases, and local boosters took advantage of the area's comfortable winter weather, lack of troublesome humidity, and open spaces to

reel in big business and industry. Writes Michael Logan in his 2006 book *Desert Cities: The Environmental History of Phoenix and Tucson*, "Critical to this effort was the assault on the summer heat. Tourists might be lured to the desert during the mild winters, but manufacturing firms required year-round residency." The city concentrated its efforts on bringing in "clean" industries, and succeeded early on in drawing General Electric, Sperry-Rand (now part of Unisys), and Motorola plants to the area. Neither the high-tech industries of that era nor those that came or expanded later – including communications, aviation, finance, semiconductors, health care, and, yes, air-conditioner manufacturing – would have considered locating in a Phoenix that could offer them and their employees only ceiling fans and swamp coolers to temper the heat and dust. In fact, housing construction, the area's biggest economic powerhouse, was the industry most hooked on air-conditioning.

In looking at the development of Phoenix in the 1960s and 1970s, Logan noticed a trend:

> On the one hand, resort owners and the tourist industry marketed desert landscapes and the dry, warm climate as positive community attributes. On the other hand, city dwellers and business leaders diligently sought to push the desert to the distant margins of the community's identity. . . . Shopping malls proliferated in the valley coincidentally with the expansion of the tourist resorts, but the commercial centers represent the community's effort to marginalize the desert. Shoppers would drive into the massive parking lots in their air-conditioned cars and hustle across the bubbling asphalt to the chilled interior spaces of the new malls. Only in that brief sprint in and out of the stores would the shopper experience the desert climate. In-side the malls waterfalls gurgled and ice skaters twirled.

With outdoor temperatures exceeding a dry 110° through much of the day, I'd found most area stores – even grocery stores – keeping their thermostats set above 80°. On the mezzanine level of Bass Pro Shops, it was 75°

The selling of an alternative outdoors to desert-dwellers continues in today's postmall world. Holding down one corner of the mammoth new 250-acre Mesa Riverview shopping complex along the dry bed of the Salt River is a local branch of that supreme temple to the outdoor life, Bass Pro Shops. Striving to live up to its slogan "More outdoors for your money!" the Mesa outlet has packed a whole national park's worth of "outdoors" under its towering cathedral ceiling: populations of stuffed bears, deer, lions, water buffalo, and vultures; simulated rock formations and waterfalls; a flowing trout stream, complete with a stuffed, life-size fly fisherman; and an impressive aquarium filled with striped bass, channel catfish, bluegill, and other species. A chalkboard sign advises, "Trout feeding at 1:30." Customers can also inhale plenty of simulated mountain air for their money. With outdoor temperatures exceeding a dry 110° through much of the day, I'd found most area stores – even grocery stores – keeping their thermostats set above 80°. On the mezzanine level of Bass Pro Shops, it was 75°.

In the Phoenix valley, whatever the season, the first word to come to mind after "heat" is "water?" – always with a question mark attached. City officials declare that they have demand covered for the next hundred years, claiming that decades of practice in dealing with drought mean that Phoenix households already use less water than the national average. The resources, physical effort, and brainpower marshaled to supply the water de-

manded by the city's growth have been monumental, the crown jewel being the Central Arizona Project, a 336-mile-long system of aqueducts, tunnels, pumping plants, and pipelines bringing water from the Colorado River.

However extensive those efforts, the city always manages to test the limits of its water supply. Jay Golden, assistant professor at Arizona State University's School of Sustainability, has pointed out that the city's tight water situation could undermine efforts to deal with the heat because it can make tree planting impracticable. And xeriscaping – the use of desert plants, usually native ones, in place of lawns – saves much less water in practice than in theory. Some desert plants are adapted to staying alive with very little water, but when water's avail-able, they have the ability to draw even more out of the soil than do water-intensive plants like mulberry trees. Meanwhile, for aesthetic reasons, residents tend to pack the vegetation into their yards at far higher densities than it is found in nearby natural landscapes. They also tend to water their xeric plants much more heavily than necessary. The high-curb-appeal result, what critics call "Disney Desert," is the runaway favorite style in middle-income front yards, according to a 2006 survey. Low-income residents prefer traditional green lawns, while the wealthy favor the "Oasis," also known as "California Light," in which "plants are selected for their brightly colored flowers and lush vegetation . . . the majority of plants are exotics and their density creates a tropical atmosphere." The Oasis requires daily irrigation. Re-searchers also found that the different types of vegetation are placed strategically: "In the visible front yard, desert landscaping (perceived by most as more socially correct) was the more frequent preference, while in the less visible backyard, the luscious, more water-consumptive oasis landscape was much more highly favored. Therefore, we propose that in the front yard, form follows fashion while in the backyard, form follows fantasy."

“ Projections show that, by 2050, Arizonans' demand for water from the already badly stressed Colorado will exceed what the river can provide by as much as 90 percent

If the domestic landscapes of Phoenix boil down to form and fantasy, the homeowner may be able to enjoy them most when not experiencing them physically. In dashing out to check on their drip-irrigation systems and ducking back into their cool havens, present-day Phoenix homeowners might well agree with comments made by a Washington, D.C., couple interviewed in 1961 about their brand-new central-air system: "We enjoy gardening, but even more we enjoy being able to sit indoors comfortably and look out at our garden." Their sentiment was echoed forty-five years later in a confession that writer William Saletan inserted into an otherwise stinging critique of air-conditioning that ran in the *Washington Post:* "Seven years ago, when my wife and I moved into our house, we planted a garden and built a patio in the back yard. Now, overcome by heat and mosquitoes, we're thinking of replacing them with something a bit more climate-controlled. We still want to look at nature. We just don't want to feel it."

The state of Arizona gets almost 40 percent of its water from the Colorado River, which runs on its western border. By law, water from the river has to be shared with California, Nevada, and Mexico in a way that leaves at least some water for the natural ecosystems that depend on its flow. Projections show that, by 2050, Arizonans' demand for water from the already badly stressed Colorado will exceed what the river can provide by as much as 90 percent. On the positive side, urban-

ization has the potential to reduce water use. In traditionally agricultural Maricopa County, each acre converted from irrigated farmland to residential or commercial use brings a reduction in water consumption, because households use far less water per acre than does irrigated agriculture.

However, areas conquered by the urban march have not been limited to former farmland but also include desert and other non-irrigated lands. Therefore, a decrease in water consumption by crop irrigation in the county during the 1990s was partly canceled out by the 56 percent increase in domestic water use in rapidly growing urban and suburban areas. In addition, water consumption by single-family homes doubles in summertime, and the heat-island effect increases water consumption in the city center and suburbs by encouraging greater household water use and causing more loss through evaporation. And there are plenty of watery surfaces lying there ready to evaporate in a city where more than one of every four houses has a swimming pool.

SEIZING POWER

All of Arizona's neighboring states can boast of localities where temperatures reach withering highs. California has its Death Valley, Utah its Beaver Dam Wash, New Mexico its Carlsbad. But most people in those states tend to congregate, sensibly enough, in areas with more moderate climates. Nearly three-fourths of Nevada's population, on the other hand, is crowded near the state's hottest corner, in and around Las Vegas, while three out of five Arizonans sweat it out three hundred miles to the southeast in the Phoenix area. (To be fair, although it lies in one of its state's hottest spots, Phoenix does not hold the record for Arizona's highest recorded temperature. That distinction belongs to Lake Havasu City near the California state line, which has hit 128°, compared with a record of "only" 122° in Phoenix.)

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The commonly used metric known as cooling degree-days (CDD) is the number of degrees that the daily average temperature exceeds 65°, added up through all days of the year. The National Climatic Data Center has weighted each state's CDD by its population distribution in order to compare the amount of hot weather experienced by the typical resident of each state. For California, Utah, and New Mexico, the weighted average is close to 1,000 CDD; for Nevada, it's about 2,600, and for Arizona, 3,403. Arizona runs a close second to Florida, which has the most thoroughly cooked population in the nation, with 3,650 CDD experienced by the average resident.

Heavy reliance on air-conditioning creates huge electricity demand in Arizona and Nevada. And the flow of electrical energy is growing faster in Arizona than in any other state. Consumption per person grew by 51 percent from 1981 to 2005 and now exceeds that of all the state's neighbors: 68 percent higher per capita consumption than New Mexico's, 70 percent more than Utah's, and 116 percent more than California's. Arizona has even surpassed Nevada and now uses 11 per-cent more electricity per capita than does its famously profligate neighbor to the north. Air-conditioning requires not only a lot of electricity, but vast volumes of gasoline and diesel as well. Running the air conditioners in cars and trucks throughout Arizona takes 216 million gallons of fuel annually.

The migration of millions of Americans over the past half-century from colder to warmer climates should, in theory, have reduced the total energy required for cli-

mate control. On average, home heating in the northern states consumes more units of energy, mostly from natural gas or fuel oil, than air-conditioning consumes, mostly as electricity, in the Sun Belt. As a population, Americans experienced an average of 4,822 heating degree-days (HDD, similarly computed, based on temperatures below 65°) in 1950; after more than a half-century of southward migration, that average heating requirement had shrunk to 4,260 HDD by 2007. Cooling needs rose over the same time from 1,217 to 1,424 CDD. The net result is that we now experience an average of 5,684 heating plus cooling degree-days annually, a 6 percent lower requirement for year-round climate control than the 6,039 degree-days we would be enduring if our population had simply grown to its present total without any southward migration. But, because Americans use vastly more air-conditioning than we did in 1950, we cancel out a big hunk of the energy savings that might have been achieved by the population's shift to the south. The net result is that we consume only 2.5 percent less total energy than we would be burning had those mil-lions of Americans stayed up north heating millions more houses through long, cold winters. That said, there is a lot more to the nation's environmental health than the quantity of energy we use or how we get it. What we do with that energy is at least as crucial, and Phoenix is one of many examples that demonstrate how not to use it.

Arizona's famous sunshine is, potentially, a rich source of energy. Currently, about 3 percent of its residential electricity consumption is satisfied by solar generation; that's about double the national average. By one estimate, solar sources will become economically attractive enough by 2017 to start adding two to four hundred megawatts of new capacity to the state's power infrastructure every year. But that would not come close to satisfying summer demand, which has been growing by six hundred megawatts per year.

“There is one true heavyweight power source in the Phoenix area. Head west into the desert, follow the biggest strands of power lines upstream, and you'll find the 3,875-megawatt Palo Verde nuclear generating plant

Seven percent of Arizona's electricity comes from hydroelectric sources. Power generated by dams is an especially useful contributor to the grid, responding almost instantly on hot afternoons and evenings when air-conditioning demand peaks. At such times, inlets can simply be opened wider, sending more water through the turbines. Before 1992, water flow in the Colorado River below the Glen Canyon Dam (whose turbines supply electricity to Arizona and other Southwestern states) could vary fourfold within a single summer day, reaching a peak as compressors in distant cities were pushed harder to cool homes, stores, and offices in the late afternoon. That could raise and lower the river level by more than twelve feet. At no other time in its history had the canyon experienced such large, repeated daily flashings. Damage to populations of plant and animal species downstream in Grand Canyon National Park was inevitable, and fluctuations in power output and water outflow from Glen Canyon Dam were moderated by law in 1992 to protect the park, but there are still significant ups and downs.

There is one true heavyweight power source in the Phoenix area. Head west into the desert, follow the biggest strands of power lines upstream, and you'll find the 3,875-megawatt Palo Verde nuclear generating plant. Its three white domes rise from the tan landscape and loom low against a sky that, thanks to dust, tends to be only a slightly paler shade of tan. Just as impressive as the domes covering the

three reactor cores are a half-dozen enormous water-cooling towers. The plant, built to accommodate expected growth in the region, commenced operation in 1988, and its output helps ensure that Phoenix's air conditioners will keep running as summer temperatures continue to climb. In making that cooling possible, the plant generates its own huge quantities of heat; the 15,000 gallons of water per minute required to cool the plant's radioactive cores come from treated municipal effluent. It's the only nuclear power plant in the world not located next to a river or other large body of water.

More than twenty years' worth of spent nuclear fuel, along with other, less dangerous wastes, have accumulated on the heavily secured six square miles of desert around the plant. The spent fuel – more highly radioactive than the fuel that originally went into the reactor – also has to be kept cool. It sits out there in the desert in deep pools of water or steel canisters because, as Alan Weisman put it in his 2007 book *The World Without Us* (which imagines the fates to be met by the whole range of civilization's artifacts upon the extinction of the human species), "there's nowhere else to take it." He adds that the structure sheltering the plant's atomic swimming pool "was intended to be temporary, not a tomb, and the masonry roof is more like a big-box dis-count store's than the reactor's pre-stressed containment dome. Such a roof wouldn't last long with a radioactive fire cooking below it."

There was never any way that Phoenix's long-sustained boom could continue indefinitely at the same pace. And as the 2010 census approached, there were indirect indications that the city's population growth might have stopped or even reversed: mortgage foreclosures were at epidemic levels, water hookups were down, trash collectors were taking in smaller hauls, police were getting fewer calls, and sales tax revenues were down. The *Arizona Republic*'s analysis of these and other trends suggested that "Phoenix has anywhere from a few hundred to several thousand people fewer than projected." Local leaders were wringing their hands. But the city wasn't actually shrinking; it just was not expanding as fast as it had for the previous sixty years. If the population trend actually turned negative, it could give the area's environment a small break, something it hasn't gotten for a very long time.

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FLORIDA'S NEW FRONTIER

Two thousand miles southeast of Phoenix, the brand-new town of Ave Maria, Florida, sits at the center of an eight-square-mile tract consisting mostly of bland-looking, semitropical countryside. The small downtown's beige-and-brown skyline is dominated by the sharply arched roof of a one-hundred-foot-tall church known as the Oratory. Facing the Oratory is Ave Maria University, and clustered around the town center are new streets densely lined with spic-and-span houses. Stubs of yet-unbuilt streets lead off in all directions. Founded in 2007, the town of a little more than five hundred residents is situated near the fringe of the Big Cypress Swamp in Collier County, thirty miles northeast as the gull flies from the bustling beaches of Naples. But with its narrow, curving streets, quaint architecture, fresh paint, and (on a warm Tuesday afternoon in December) almost total absence of any human presence, Ave Maria can give a visitor the feeling that he's dropped into a village in some unidentifiable European nation that has suffered an all-out attack by power washers.

Ave Maria is the creation of Domino's

Pizza founder and prominent conservative Catholic Tom Monaghan, in alliance with the Barron Collier Company, which was founded in the 1920s by the region's original big-time developer of the same name. During its creation, Ave Ma-ria was the largest single construction site in the country. According to the *Naples Daily News*, "In order to make the property suitable for development, Barron Collier had to carve about 20 percent of the town into retention ponds and use the salvaged dirt to raise the surrounding land between 3½ and 5 feet." In addition to the university, the town plan calls for eleven thousand residences, seven hundred thousand square feet of retail space, four hundred hotel rooms, two schools, and two golf courses. Even as southwest Florida staggered under the impact of recession in 2009, Ave Maria's developers insisted that, within twenty years, the town would have 25,000 residents and the university more than 5,000 students. Much of the controversy surrounding Ave Maria has focused on the question of how it can exist simultaneously as a Catholic enclave and a municipality. But Ave Maria is also an especially striking incarnation of south Florida's most persistent affliction: over-development. It's a problem that has persisted for decades, regardless of the valleys and peaks of the business cycle.

Agribusiness, led by Big Sugar, once posed the greatest threat to south Florida's ecosystems. The long struggle to save the Everglades from agriculture and suburban growth west of Miami and up and down the state's southeast coast is far from over. After some vigorous and contentious restoration efforts in the 1990s, wrote Michael Grunwald in his 2006 book *The Swamp: The Everglades, Florida, and the Politics of Paradise*, "the Everglades were still dying – just a bit slower than before." Now the chief threat to Florida's remaining natural lands comes from residential developments like Ave Maria in the southwest and the tentacles of transportation and commerce that feed them. As the housing bonanza of the early 2000s hit its peak, Grunwald and others lamented the fact that local governments and developers in southwest Florida were creating new environmental crises faster than the older mistakes made on the east side of the state could be corrected. When the national economy toppled, this southwest coast had farther to fall than did most parts of the country. Lee and Collier Counties – which, respectively, contain the coastal cities of Fort Myers and Naples – were hit early and hard as the foreclosure crisis and high unemployment swept through in 2007–08. But the damage done by past overdevelopment won't be easily undone; indeed, further ecological destruction is almost assured, even with slowed housing construction.

Naples was hard to find on a map and even harder to get to, at least for people who wanted to visit. Mosquitoes, on the other hand, knew right where Naples was located and they did not need a highway or an airport to be able to reach town

The area's transformation has been remarkable. In 1950, according to a history of the Collier Mosquito Control District,

> Naples was a sleepy little town surrounded by water and as yet undiscovered by tourists and escapees from the frigid north. . . .
>
> In fact, Naples was hard to find on a map and even harder to get to, at least for people who wanted to visit. Mosquitoes, on the other hand, knew right where Naples was located and they did not need a highway or an airport to be able to reach town. And reach town they did! They severely limited outdoor activities and, in general, made life less than desirable during the mosquito season.

By 1960, as air-conditioning was com-

ing on the scene, Collier County still had a scant 16,000 inhabitants. The population curve then bent sharply upward, reaching around 350,000 today. An additional 150,000 or so tourists converge on the area from December through February. In the boom year of 2007 (the most recent year for which the

U.S. Bureau of Economic Analysis has data), Naples had the second-highest per capita income among the nation's metropolitan areas. In 2009, as business and real estate continued to tank, the Associated Press found the wealthy still congregating in Naples and other scenic spots: "Although many Americans are poorer now than at the end of 2007, the geographic distribution of wealth likely hasn't changed much be-cause there have been fewer Americans moving." If anything, well-to-do non retirees were moving into already-wealthy areas, partly because "the Internet, wireless technology, and the ability to fly commercial in and out of almost any airport in the country have freed [high-income earners] to move elsewhere in significant numbers."

Perennial winter-only residents amount to only 5 percent of the area's year-round population, but their lifestyle would appear to have a bigger environmental footprint per person than that of those who stay put. Seasonal residents may be avoiding the big heating bills they might face if they stayed year-round in their northern homes; however, they are maintaining dual residences, often making more than one round trip per year between them, and often running the air-conditioning in the Florida home during their summer absence in order to protect their possessions from the ravages of humidity.

Writer John Rothchild moved from Miami Beach to Everglades City, south of Naples, in 1973. Affluent migrants from the north – whom Rothchild thought of as the "green and pink people," based on their fashion preferences – were by that time accounting for much of Naples' growth, at least during the winter, when both temperatures and mosquito populations were down. The city's long white beach, he wrote, was "a wonderful beach, supportive of the spirit of the town, the water tepid and placid. . . . There is nothing more lulling than sharing the Naples beach with its Republicans on a windless day." Migrants and visitors, whatever their income level, came to southwest Florida to soak up the warmth, but today, windows stay closed and air conditioners hum year-round; even in winter, a drive-by survey of any Naples neighborhood finds almost all houses with windows sealed and the air-conditioning activated, even on a beautiful 80° day.

Some south Florida owners of high-value vehicles pay $60,000 to $400,000 for "car condos," individually owned, climate-controlled rooms that protect vehicles from the elements

As in many upscale areas, sidewalk café–style dining is popular, but most eating and drinking is done indoors, with windows shut. Such a highly mobile population also demands large volumes of space for high-value goods that must not be exposed to the sticky atmosphere. Naples' industrial area features numerous storage facilities, with heavy emphasis on air-conditioned space for items susceptible to heat and damp. That includes air-conditioned car storage: some south Florida owners of high-value vehicles pay $60,000 to $400,000 for "car condos," individually owned, climate-controlled rooms that protect vehicles from the elements. Area residents can drop their cats, dogs, and ferrets off at air-conditioned "pet resorts." Air-conditioned golf carts, pioneered in Arizona and introduced at Orlando's Falcon's Fire course in 2007, will surely catch on in Lee and Collier Counties, which together are home to more than 150 golf courses. The indoor version

of that old Florida institution, miniature golf, is also available in Orlando.

Symbolic of the region's environmental predicament are the names chosen for the Florida teams that compete in the world's most heavily refrigerated sport. The minor-league ice hockey team that plays in Lee County's Germain Arena is known as the Florida Everblades, while the National Hockey League team based across the state in Broward County is the Florida Panthers. A sport once considered alien to this semitropical state has taken its mascot names from the ecosystem and the species most threatened by just-as-alien overdevelopment. A more recent project christened after the ecosystem it is helping to destroy – the Big Cypress Swamp – is Naples Big Cypress Market, which lies beyond the city's southern frontier. The complex's centerpiece is an 87,000-square-foot air-conditioned flea market. It also features a mini-winery, performance stage, farmers' market, and tiki bar. Maybe sun and fun once were enough to keep people here happy, but, according to Big Cypress Market's developer, "A lot of people are looking for some-thing other than going to the beach and golfing down here. They go shopping to be entertained to some degree."

"AN ALL-OR-NOTHING THING"

Six million years ago, south Florida lay under a shallow sea. Then the state's original land developers – microscopic marine organisms – went to work. Their calcium-rich remains gradually built up a solid limestone floor, and large parts of that floor rose into the sunshine over the past hundred thousand years as sea levels fluctuated. That water and sunshine have been drawing throngs of new residents to Florida for more than a century, with the bulk of that migration coming in the age of air-conditioning. Florida has gone from being the least populous state in the South to the fourth most populous in the entire country.

"A lot of people are looking for something other than going to the beach and golfing down here. They go shopping to be entertained to some degree

Gary Mormino is a professor of history at the University of South Florida, in St. Petersburg, and the author of *Land of Sunshine, State of Dreams: A Social History of Modern Florida*. "It's inconceivable," he told me, "that there would be a Florida of eighteen and a half million people today without air-conditioning." In each of the nearly 150 book pro-motion events he's done since publishing *Land of Sunshine*, says Mormino, "I make sure to ask the audience this question: what made today's Florida possible? Every time I have asked that question, the first answer I've gotten has been 'air-conditioning.' "

It wasn't only air-conditioning, of course. "No matter how long you've lived in this state – fifty years or one week – you'll know the factors that have created present-day Florida," says Mormino. "There's Walt Disney, Fidel Castro, World War II." Then there has been a series of technological revolutions: insecticides to fend off the vast mosquito populations, automobiles and the interstate highway system to bring tourists, and television and *Miami Vice* to help create the state's image.

"But for all practical purposes, air-conditioning was essential to the development of the Sun Belt in general and Florida in particular. It was unquestionably the most significant factor."

Florida can even lay claim to being the home of air-conditioning. In 1851, Dr. John Gorrie of Apalachicola received a patent on an ice-making machine run by a steam-driven compressor; he suggested that the compressor "could be powered by horse, water, wind-driven sails, or steampower." A physician at the

U.S. Marine Hospital, Gorrie used the ice thus produced as the cooling source for an air-conditioning system meant to benefit yellow fever and malaria patients. The state of Florida chose Gorrie as one of its representatives in the U.S. Capitol building's Statuary Hall, where each state is permitted to place statues of two of its most prominent citizens.

Mormino's colleague Raymond Arsenault says that if he were to rewrite his celebrated 1984 article on air-conditioning and Southern culture today, there is little he would need to change. In Florida, the transformation wrought by air-conditioning has, if anything, intensified. For a quarter-century after Arsenault published his paper, cooling technology continued to draw swarms of new people and new ways to the Sunshine State. For one thing, the vast retail jungle that now stretches almost unbroken from St. Petersburg to south of Naples, with its countless square miles of big-box rooftops and parking lots, says Arsenault, "simply could not be the case without air-conditioning, which explains both the demographics and the economy that comes with it. It's sort of an all-or-nothing thing. Naples [where, in some zip codes, the average household spends $35,000 to $40,000 on retail goods annually, far and away the highest rate in Florida] wouldn't be Naples; it would be, maybe, a small fishing village." Arsenault once called the shopping mall "the cathedral of air-conditioned culture," and south Florida's postmall retailing trends – urban pedestrian walkways that combine shopping, eating, and entertainment on the one hand and big-box stores on the other – also depend heavily on climate control.

The spacious, pleasant offices of the Florida studies program led by Arsenault and Mormino are located in a Dutch co-

On Florida's oppressive and ever-expanding roadways, the average vehicle's air conditioner consumes seventy-three gallons of gasoline per year. The only states with higher averages are Arizona, at seventy-six gallons per vehicle, and Hawaii, at ninety-four

lonial revival house built in 1904 by early St. Petersburg developer Peter Snell. The house was moved from the Tampa Bay waterfront to the University of South Florida campus in 1993. It had been built for a hot climate, with big porches and windows, big eaves, French doors, high ceilings, and transoms over interior doors. But today its windows are caulked permanently shut and its air-conditioning system is always on or at the ready. "That really is a shame," says Arsenault. But, he says, if there were no air-conditioning, the heat would probably drive him back to his native Minnesota.

Arsenault is not alone. That is why Florida needs people like Jim Roberts, a longtime air-conditioning contractor who lectures at a local college and once had a call-in radio show on the subject of climate control. Roberts says that at this soggy tail end of the continent, the biggest comfort issue is the humidity, which is more of a problem here than almost anywhere else in the United States. There is plenty of sensible heat (which is what we track as we watch the mercury climb) in southwest Florida; however, the region's humid air is also heavily loaded with latent heat – the energy that has to be removed from water vapor in order to condense it. Wringing water out of air takes a tremendous amount of energy. As Roberts says, "It's not that hard to hold sensible heat down to an acceptable level, but it's very hard to control latent heat." Because of the high moisture content of the warm atmosphere, he says, south Florida has the highest number of indoor "cooling hours" in the entire country, 40 percent more than even Houston, and more than six times what people in upstate New York endure. On Florida's oppressive and ever-expanding roadways, the average vehicle's air conditioner con-

sumes seventy-three gallons of gasoline per year. The only states with higher averages are Arizona, at seventy-six gallons per vehicle, and Hawaii, at ninety-four.

It comes as no surprise when Roberts says, "Today, everybody down here has air-conditioning." By the turn of the millennium, the local press found that neither home builders nor air-conditioning contractors could recall the last time a house without air-conditioning had been built in southwest Florida. It had come to the point that a house-hold without air-conditioning constituted breaking news. In July 2006, a diligent *St. Petersburg Times* reporter managed to track down three local families who were voluntarily sweating out a hot summer with natural ventilation. You'd think a Neanderthal clan had been discovered alive in the foothills of the Alps. But one of the nonrepresentative home owners, native Floridian John Stewart, insisted that the peculiar lifestyle that he and his wife Sheila lead is in part their response to the breakneck development that has hit the Tampa Bay area: "There's no moral issue here. I just see what air-conditioning has done to Florida. How many people would live in Florida if there were no air-conditioning? Would Pasco County [north of Tampa–St. Petersburg] have been turned into nothing but bland subdivisions?"

The Stewarts are not alone in living with the heat and humidity of south Florida. Just eight miles north of shiny new Ave Maria in Collier County is the very different town of Immokalee. Established a century before Ave Maria and now situated amid orange groves and fields of tomatoes and other vegetables, Immokalee is home to twenty thou-sand people, many of them immigrant agricultural workers. The Coalition of Immokalee Workers has won headline-making victories in recent years, pushing Subway, Taco Bell, and other fast-food chains to pay more for the tomatoes that Immokalee workers pick. But those workers go home each day to trailer parks that present a dramatic contrast to Ave Maria's Euro-style storefronts and mini-McMansions.

> **Clearly nonfunctional air-conditioning units hang at precarious angles from some windows, while a large share of the trailers have no air-conditioning at all. The Coalition of Immokalee Workers maintains that the trailers are unfit for human habitation**

Half of all mobile homes in the United States can be found in the southern half of Florida, and those occupied by well-heeled retirees can be quite luxurious. But many of those in Immokalee are of an entirely different species. Clustered in sandy lots at the center of town or scattered around its fringes, the bare aluminum boxes have windows hardly bigger than slits. Clearly nonfunctional air-conditioning units hang at precarious angles from some windows, while a large share of the trailers have no air-conditioning at all. The Coalition of Immokalee Workers maintains that the trailers are unfit for human habitation.

WATER EVERYWHERE . . .

In south Florida, as in Arizona, it seems that every struggle, sooner or later, comes down to a matter of water. The lower peninsula was once covered by an extraordinary array of ecosystems collectively known as the Everglades. The Everglades are sustained now as then by vast sheets of fresh water that creep continuously and imperceptibly southward toward the Gulf of Mexico. However, over the past century, thanks to encroachment from the coasts and farming in the interior, the Ever-glades are down to half their original size.

In the state's southwestern counties, the ecosystem under threat is very different from the more easterly "River of Grass" that has been under siege by Miami-area urbanization and sugarcane farming for so many years. The victim here is the Big

Cypress Swamp – a vast, flat mosaic of cypress forests, wet prairies, pinelands, and marshes. The swamp's flora and fauna are just as sensitive to disruption of natural water flows and fragmentation of habitat as are those of the grassy tracts farther east.

To date, most attention has been focused on the region's most charismatic inhabitant, the Florida panther. The big cats require large undisturbed ranges (one-to four-hundred square miles per animal), and their numbers have been thinned severely by the spread of subdivisions and commercial centers across the landscape. But the panther's plight is only one highly visible indicator of much broader ecological degradation.

The Florida Coastal and Ocean Coalition, comprising eight environmental groups, summed up the impact that lax regulation has had on the state's landscape:

> An in-depth analysis of satellite imagery by the *St. Petersburg Times* shows Florida has lost 84,000 acres of wetlands to development since 1990. The U.S. Army Corps of Engineers approves more permits to destroy wetlands in Florida than in any other state. Between 1999 and 2003, it approved more than 12,000 wetland permits and rejected just one. The state's permitting rules for wiping out wetlands do not require developers to filter out nutrients, the most common pollutants hurting our water-ways. Excess nutrients cause algae blooms and invasive aquatic weed infestations, harming habitat and sea life. The areas of the state that suffer the most from water pollution problems have also lost the most wetlands to urban development. State law discourages regulators from calculating the cumulative toll of issuing thousands of wetland permits every year, even though losing wetlands makes the coast more vulnerable to hurricanes. Without wetlands to filter runoff, Florida's shallow-water aquifers – and thus our drinking water supplies – are at risk.

The vast majority of fresh water wasted in South Florida is not really from lawn sprinklers. Rather, it is the amount drained off every day to keep the whole place dry

South Florida leads the nation in water consumption per person – a quantity that doubled between 1950 and 2000. And there are more people than ever using water. Although four hundred people per day moved out of Florida between 1980 and 2000 (most of them, according to Gary Mormino, fed up with runaway growth, sprawl, and water woes), another thousand moved *into* the state each day. Sadly for them, the Florida that people thought they were moving into isn't there any-more. Even the most heroic efforts to square the circle – to keep both the remaining natural lands and the accelerating commercial development of south Florida supplied with clean water – have fallen far short. There simply is not enough to go around. Cynthia Barnett dis-cussed the enigma of chronic water shortages in this water-rich region in her 2007 book *Mirage: Florida and the Vanishing Water of the East-ern United States:* "While farmers use far more water than the general public, growth and development drive the fate of Florida's groundwater." In south Florida's suburbs, keeping the taps running while keeping the streets dry – that is, ensuring that developments don't revert to their natural state as wetlands – is a technological feat performed daily by hydrologists and engineers. "The vast majority of fresh water wasted in South Florida is not really from lawn sprinklers. Rather, it is the amount drained off every day to keep the whole place dry," wrote Barnett.

Back in the 1980s, some scientists began suspecting that you can't manipulate such vast quantities of water and replace so much soggy land with houses and pavement and not affect the local climate. The state's coastal cities and the peninsula's interior had warmed by several degrees on average between 1924 and 2000. The group Environment Florida found that in the period 2000 to 2006, the number of days with highs above 90° had increased significantly. The draining of wetlands thereby generated more business for air-conditioning contractors, but it has aggravated Florida's water headaches. Human-caused changes in the landscape of south Florida directly reduced July–August rainfall by an estimated 11 percent between 1900 and 1993.

In South Florida, nature's ultimate retaliation could come (naturally enough) in the form of water, this time salt water. Under moderate global-warming scenarios, rising seas could flood 15 percent of Lee County and 18 percent of Collier County, including parts of Naples as soon as 2050. In that scenario, says Gary Mormino, "I'd expect that because the threatened coastal areas are some of the most expensive real estate around, the state legislature or Congress would come to their aid with bigger and bigger sea walls – a kind of coastal fortress." But in even more dire scenarios, such as those that foresee the melting of the Greenland ice sheet, no fortress would be large or strong enough. Most of Collier and Lee counties would rejoin the Gulf of Mexico, with some of the higher-elevation subdivisions surviving as neatly paved islands.

Asked about the region's building boom in 2002, Al Hoffman, then-CEO of leading developer WCI Communities, told the *Washing-ton Post*, "There's no power on earth that can stop it!" At the time of Hoffman's prophecy, WCI had done as much as any company to make Naples the second-fastest-growing metropolitan area in the country. Today, Hoffman is gone, WCI is in bankruptcy, and board chair Carl Icahn sold his six million company shares in late 2008 for two cents (not two cents per share, just two cents). Unless or until the seas rise, however, Hoffman will probably be proven right: no power on earth, not even an economic crisis, appears capable of putting a stop to the area's overdevelopment. Naples still has one of the highest per capita incomes in the nation, so there's plenty of money power still in the system to help push roads and subdivisions into new territory. Since the 1950s, when northerners looking for a future home in the sun would shell out the widely advertised "ten dollars down and ten dollars a month" for southwest Florida swampland that might one day be dredged, drained, and built upon, the region's energies have been focused on moving real estate. Writer John Rothchild has put it best: "As Detroit must sell cars, Florida must sell property." Neither cars nor housing plots are selling as well as they once did, but Florida development shows little sign of falling into long-term retreat.

Under moderate global-warming scenarios, rising seas could flood 15 percent of Lee County and 18 percent of Collier County, including parts of Naples as soon as 2050

"NOW IT'S SILENT"

Ave Maria and similar communities planned but yet to be built are intended to be anchors of ecologically friendly development in the region. County governments, newly sensitive to environmental concerns, now emphasize elements such as high-density villages, transportation nodes, and mass transit that, they argue, will soften the impact of inserting new, large human populations into the Big Cypress ecosystem. But Conservancy of Southwest Florida spokesperson Nicole

Ryan told me that the land and water there simply can't handle the numbers. "We'll have glorified subdivisions leapfrogging one another twenty miles east of Interstate 75 [the former eastern boundary of sprawl]," said Ryan, "and everyone will be driving into Naples."

Novelists, historians, and journalists have exhausted entire thesauruses in their attempts to capture the exuberance with which Florida has welcomed hordes of diverse new residents and all sorts of zany enterprises for over half a century. But – as I asked Ellen Peterson, chair of a southwest Florida Sierra Club chapter – if the environment that originally attracted people to her part of the state is largely gone, why do people keep coming? "A lot of people who live here don't know what it used to be like, so they don't know what they're missing," she said. "Fifteen years ago, just sitting on my porch, I'd hear a symphony of fish every evening, when they were jumping in the Imperial River. Now it's silent, and it's all because of development." The sun and winter warmth are still there, says Peterson, but not much else is left. "Now this area looks like everywhere else. It's all one damn strip mall. One intersection on Bonita Beach Road has pharmacies on three of the four corners! Speculation and greed have ruined it here." And the frontiers of human activity threaten to converge, with new suburbs on the far side of the state elbowing their way into the eastern Everglades, toward the development encroaching from the southwest. As Michael Grunwald put it, "In coming decades . . . south Florida could become an uninterrupted asphalt megalopolis stretching from Naples to Palm Beach. Perhaps it could be called Napalm Beach."

Patty Huff lives in Everglades City, an outpost thirty miles south of Naples in the coastal Ten Thousand Islands area. The town was established by Barron Collier as his original headquarters, but after it was hit by Hurricane Donna in 1960, he and the county government moved to Naples. Says Huff, who moved to town in the 1980s, "It was a company town until around 1960, and Collier owned all the houses. Most of the original houses in the area were built on stilts, both to keep them out of floodwaters during storms and to allow more air circulation in hot weather." Now, with air-conditioning, the stilts are a liability: "The cool air goes right through the floor and out," she says. Today, most houses in the town sit flat on concrete slabs.

“ The old houses once achieved excellent air flow. Most were built “shotgun” style, so the front and back could be opened up and the sea breeze could whistle through

Huff says the old houses once achieved excellent air flow. Most were built "shotgun" style, so the front and back could be opened up and the sea breeze could whistle through. "Most of them, like ours, were 'up-graded' in the fifties and sixties, with new kitchens and bathrooms and air-conditioning, and the front and back porches were enclosed. That's what was done with ours well before we moved here. We've been told that originally the kitchen was out on the open back porch, to keep the heat out of the house." Sealing up the houses was as much for protection against mosquitoes as for cooling, says Huff. "I understand that people used to smear their screens with tar to keep out the no-see-ums," those maddening midges that can work their way through normal screens. "Somehow people managed to live down here in those days."

Other architectural features of old Florida houses that helped with cooling were reflective tin roofs, roof vents, double roofs, dormers with windows on three sides, and, later, attic fans. Rita Parker, born in Ever-glades City in the mid-1930s, was among those who managed a happy

life there. "Southwest Florida can be a miserable place," she acknowledges, "but we had a good time, and grew up healthy. We lived outside mostly, where it was a lot cooler than in the house. But we clung to the shade. There was a real small strip of beach at the south end of the is-land, so we swam, used the garden hose a lot. I got along just fine with-out it [air-conditioning] until I was in my midforties. I remember going to Miami, into a big department store, and saying, 'Wow! What's this?'"

After that, there was no turning back, and Parker would certainly rather reminisce about the old days than relive them. We were having our conversation on a mild December day, but, she said, "At some point this afternoon, I'll have to close up and put on the air conditioner."

In *Up for Grabs*, John Rothchild (who, with his wife, lived in Ever-glades City in the 1970s) listed the characteristics that he saw longtime rural Floridians sharing with their neighbors in the heart of the Deep South. Among familiar stereotypes involving pickup trucks and bee-hive hairdos, Rothchild slipped in a reference to "the acceptance of physical discomfort." I asked Gary Mormino if he thought the people who lived in inland Florida before the age of air-conditioning really were more heat-tolerant. "Think about it," he said. "What was the option? But it's true – it was a tougher generation. Besides, suffering was supposed to be good for the soul. A lot of people think that once air-conditioning came along, there was no looking back." But there was considerable resistance, especially when it came to cooling schools. "You can imagine the debates they had," Mormino said. "The old school board member would say, 'When I was a boy, we sweated and it made us tough, and, besides, air-conditioning costs too much money!'"

In 1959, Hollywood, Florida, home owner Harvey Ford was hauled into court by irate neighbors who said his newly installed secondhand air conditioner was a nuisance in a neighborhood of otherwise open windows, because, said one neighbor, "that infernal noise blasts us out of bed every night"

Indeed, before air-conditioning, people seemed to revel in Florida's moist warmth. In 1956, at a time when fewer than 4 million people called Florida home and only 10 to 15 percent of the state's households had any type of air-conditioning, the *Tampa Tribune* celebrated the growing popularity of an oversized screened porch that had come to be known as the "Florida room." The article noted that the Florida room was quickly "becoming the center of family living. Families are gathering there for lunch and evening snacks, they're taking guests there (in-stead of to the living room), and they're making it TV-viewing headquarters. For this time of year and almost year-round in Florida, the out-door life is the desirable one, with blossoming trees and fragrances of neatly kept lawns simply asking to be enjoyed."

In 1959, Hollywood, Florida, home owner Harvey Ford was hauled into court by irate neighbors who said his newly installed secondhand air conditioner was a nuisance in a neighborhood of otherwise open windows, because, said one neighbor, "that infernal noise blasts us out of bed every night." Such conflicts could escalate into an arms race in which Floridians bought their own air conditioners and shut their windows against the noise made by neighbors' units. (Forty-eight years later, the soundproofing was complete. Following a tornado that killed twenty residents of Lake County, some political leaders argued against installing tornado warning sirens in central Florida, partly on the grounds that they "are too difficult to hear inside air-conditioned Florida homes and may confuse residents.") It was also in 1959 that the price of air-conditioning dropped to the point that a builder could cool an entire house for the cost of adding a Florida room, so

life turned increasingly indoors in the 1960s and 1970s.

In August 2009, the University of Florida's Bureau of Economic and Business Research reported that Florida, like Arizona, had stopped growing. Based on surveys of residential electric hookups, building permits, and homestead exemptions, the bureau estimated that the state's population had dropped by almost sixty thousand between April 2008 and April 2009. For the first time since the post–World War II contraction of 1946, Florida appeared to be shrinking.

Down in the southwest corner, Collier County's population had held steady, but Lee County had shrunk at four times the rate of the state as a whole. By then, the state government had already swung into action. Starting in February 2009, the state senate's Select Committee on Florida's Economy had been busy "streamlining" regulations and relaxing environmental policies. "The overarching economic policy of growth management was approved when Florida was bursting at the seams," committee chair Don Gaetz told the press. "Economic policy ought to be tied to economic reality."

Just as air-conditioning has allowed affluent societies to expand into thermally hostile environments, it is now being looked to as means of extending our current way of life into a thermally hostile future. The goal of this book is not to blame air-conditioning for the many ills with which it is linked or to make you feel guilty for using it. Banning air-conditioning today would be about as popular as Prohibition was in the 1920s, and would do little to bring the deeper environmental, political, economic, and social changes that are needed. Air-conditioning is no longer a just a product of the culture and the economic system; it's an essential component. It was a crucial tool in creating a post-industrial world that now cries out to be transformed. With some forethought, we can hold on to many of the benefits we derive from air-conditioning without the squandering of resources that it now entails.

Any energy strategy for the coming decades will be forced to deal with how we handle summer comfort

Undoing some of air-conditioning's harm could require no more than turning switches to "Off," opening windows, and going outdoors. Other climate-control dilemmas are now built so deeply into the structure of society that backing out will be much more difficult. But any energy strategy for the coming decades will be forced to deal with how we handle summer comfort. To ask hard questions about air-conditioning need not raise specters of malaise, poor health, social turmoil, and economic collapse; besides, hazards like those are becoming a bit too familiar already. Turning down or even turning off the flow of refrigerated air could improve our quality of life, but only if even bigger adjustments are made in the wider economy and society. If that can be accomplished, we might find ourselves more relaxed, healthier, less stressed at work, and happier at leisure. Children could have better lives, adults could worry less, and social relations could grow warmer. **CT**

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