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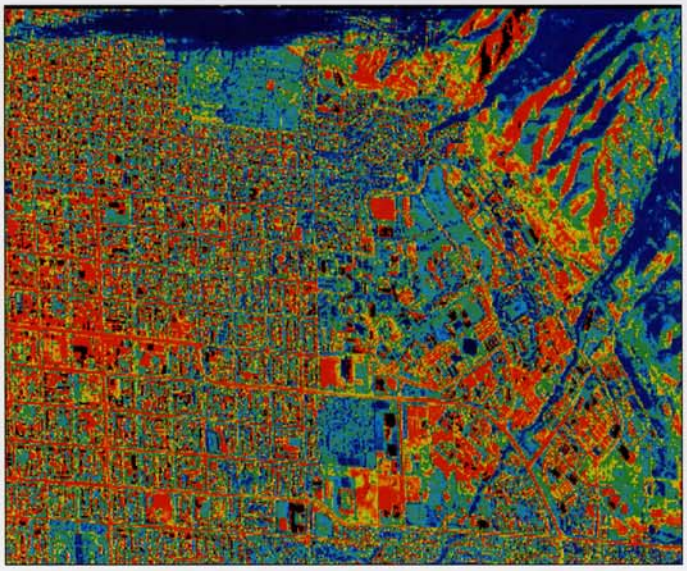
Blue Skies Ahead: Hot Ways to Cool Down Our Cities

SALT LAKE CITY IS stunning in the winter, with beautiful mountain scenery and plenty of fresh, crisp air. Summertime, however, can be another story. The hot desert sun beats down onto the city, baking the residents in 100-degree-plus temperatures and fueling the chemical reactions that make toxic smog. As air quality deteriorates in Salt Lake and other booming cities, planners and citizens' groups are looking for ways to keep their blue skies from turning brown.



Salt Lake in the summer. The red (hot) area on the left is downtown; cool green squares are parks, golf courses and cemeteries.

The problem is something called an urban heat island—the pocket of hot, rank air that settles over a city like a brooding hen on a clutch of eggs. From Shanghai to Salt Lake, summertime in the city is hotter, by as much as 5 degrees, than summertime in the suburbs. The same sun shines on town and country, but city streets and buildings soak up heat. In the country, trees provide cooling shade, and water evaporating from leaves cools the air—you never hear anyone saying that it's hot enough to fry an egg on the mountain ash.

Urban heat causes bigger problems than sweat stains and short tempers. Smog is the result of chemical reactions in the air, and higher temperatures mean faster chemistry. Hashem Akbari, a scientist at the Lawrence Berkeley National Laboratory who specializes in "cool communities" technology, estimates that on summer days, a 1-degree temperature increase boosts the smog risk in Los Angeles—always a handy case study when it comes to air-quality issues—by 3 percent. That smog, especially its toxic components like ozone, can irritate eyes, trigger asthma attacks and cause permanent lung damage. Higher temps mean more air conditioners, too. A 1-degree rise in temperature can mean a 2 percent increase in the demand for cooling power. That might not sound like much, but over a year, says Akbari, it can translate into $25 million worth of electricity in L.A. alone.

Salt Lake City is no L.A.—yet—but with its extra-wide boulevards and acres of pitch-black roofs, the Utah capital seems almost designed to develop a world-class heat island. Temperatures on those roofs, like the brand-new state court building downtown, can get up to 150 degrees in July and August, enough to heat whole neighborhoods. Not so the new R.C. Willey furniture warehouse, out by the airport. The vast 865,000-square-foot building's roof is white, so the heat bounces back up into the air; the building and the city stay cooler. "I've been up on it plenty of times," says R.C. Willey's vice president of operations, Doug Bruner. "It doesn't come up and just drill you with the heat like the black ones do." A cooler roof has meant substantially lower air-conditioning costs, too.

Can something so simple actually make a difference? Jeff Luvall and Dale Quattrochi of NASA's Marshall Space Flight Center think so. They're using a Learjet and a heat-sensing system to pinpoint problem areas in four cities that bake in the summer—Atlanta; Baton Rouge, La.; Sacramento, Calif., and Salt Lake. In a recent mapping run over Salt Lake, the city's streets and black roofs stood out as major offenders. The R.C. Willey building, by contrast, was almost invisible to the heat sensor. And one short stretch of roadway showed that there's hope for the streets, too. A grassy, tree-lined median was added to three blocks of a major street recently. Those blocks stood out as an island of cool green among a sea of red-hot streets on the map. By planting trees along hot streets and replacing black roofs with white, Luvall and Quattrochi hope that cooling can be achieved without whitewashing whole neighborhoods.

A simulation done by Akbari's research group indicated that a 4-degree drop in summer temperatures could be achieved in L.A. by planting trees over 5 percent of the city's area—about 10 million trees—and replacing dark roofs and blacktop with lighter-colored materials. That drop in temperature would result in a 10 percent drop in ozone levels, and conserve up to $175 million in cooling costs. A more aggressive program could have an even greater impact. "Cooling Los Angeles by 4 degrees," says Akbari, "would have the same magnitude effect [on smog] as turning all of the on-road vehicles into electric cars. This is so huge, nothing else compares."

THOMAS HAYDEN

This Bug's Life

Estimates for curing the Y2K bug now exceed $858 billion. Many countries with the biggest bills have made the most progress.

COUNTRY	COST BY 2000, IN BILLIONS	PERCENT OF ESTIMATED COST SPENT SO FAR
U.S.	$655	61%
Germany	$82	52
U.K.	$41	47
France	$31	49
Italy	$14	39
Spain	$11	37

SOURCE: CAP GEMINI

MARSHALL SPACE FLIGHT CENTER—NASA