

The Densification of Denver Part one of a three-part series

# CONCRETE METROPOLIS

By Bruce Finley The Denver Post



As Denver's population surges, and developers race to meet demand, a lack of green space in the city is rankling residents. In this photo, apartment buildings north of downtown Denver are seen from the air on Sept. 25. Aerial support for photos was provided by LightHawk. RJ Sangosti, The Denver Post

## THE DENSIFICATION OF DENVER

More than a century ago, Denver's leaders — inspired by the City Beautiful movement — built toward the ideal of a "city within a park." But the last 20 years have seen immense change, as Denver's population has exploded and developers cover more and more of the city's remaining nature.

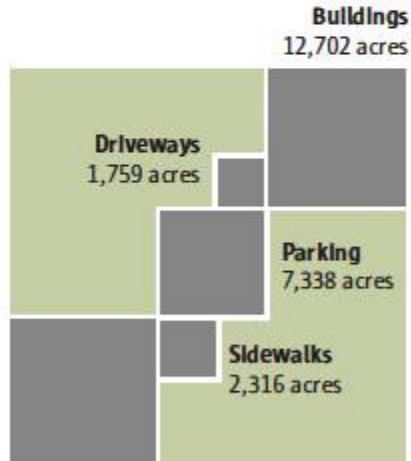
Part 1: Green space disappearing in Denver faster than in other cities. Part 2: Residents facing green-space crunch seek room to roam. Coming Monday Part 3: Push to regain green space faces obstacles of environment, equity. Coming Tuesday

## Denver a hard shell

Rapid densification rendered 38.24 percent of Denver “impervious” by 2016 — 37,813 acres out of 98,886 acres in a Denver Regional Council of Governments analysis — blocking the natural process of water filtering into the ground. Here are some of the main ways the cityscape has been transformed.

### DENVER'S SURFACE COVERAGE

- Impervious surfaces
- Natural terrain (61,073 acres)



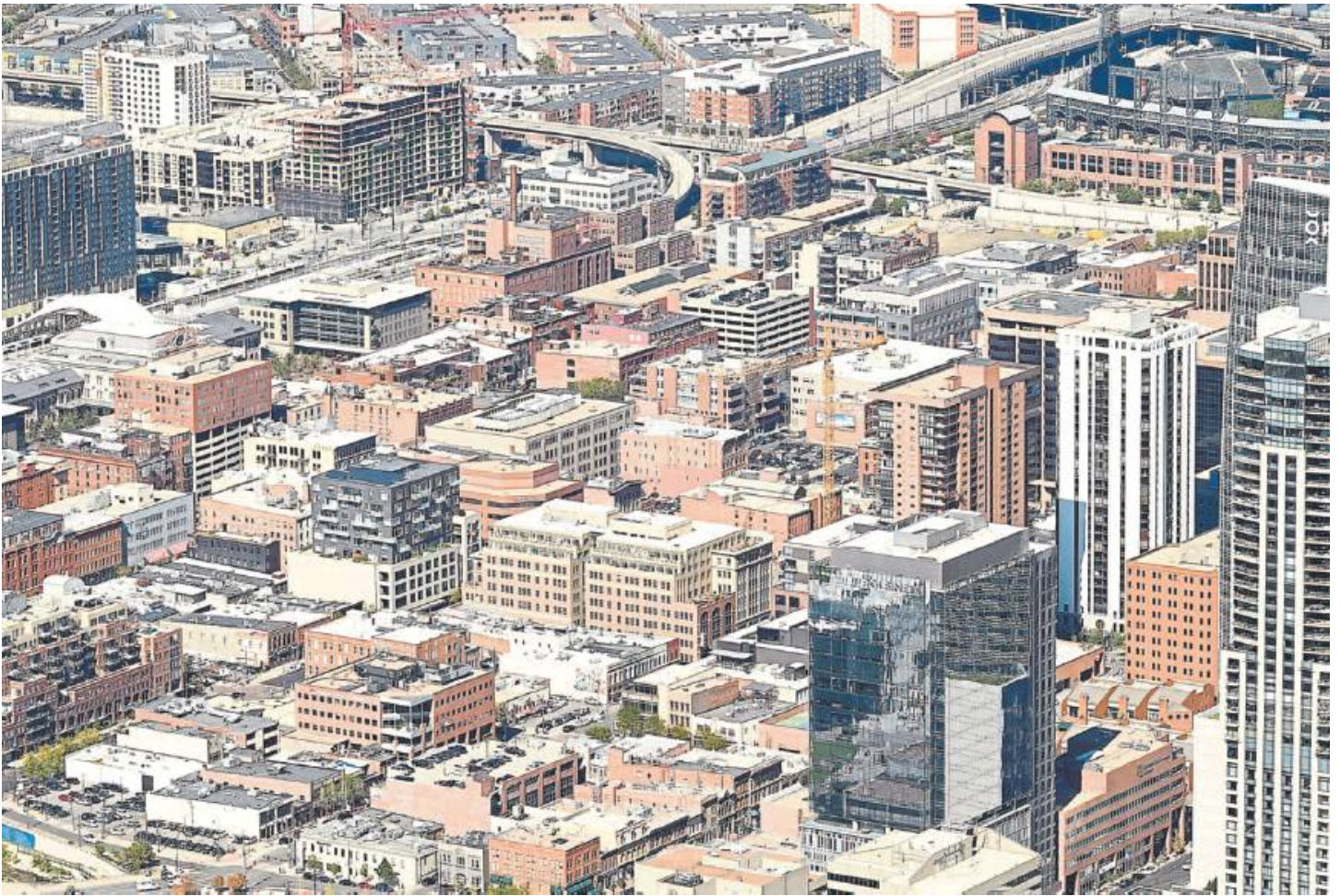
**Roads**  
13,700 acres

Source: DRCOG

Note: Impervious acres don't add up to 37,813 due to rounding

Jeff Neumann, The Denver Post





Buildings in downtown Denver are seen from the air on Sept. 25. Up to 69 percent of the Mile High City is expected to be paved or covered by 2040. Denver ranks nearly last among major U.S. cities, including New York, in park space as a percentage of total area. Aerial support for this photo was provided by LightHawk. RJ Sangosti, The Denver Post

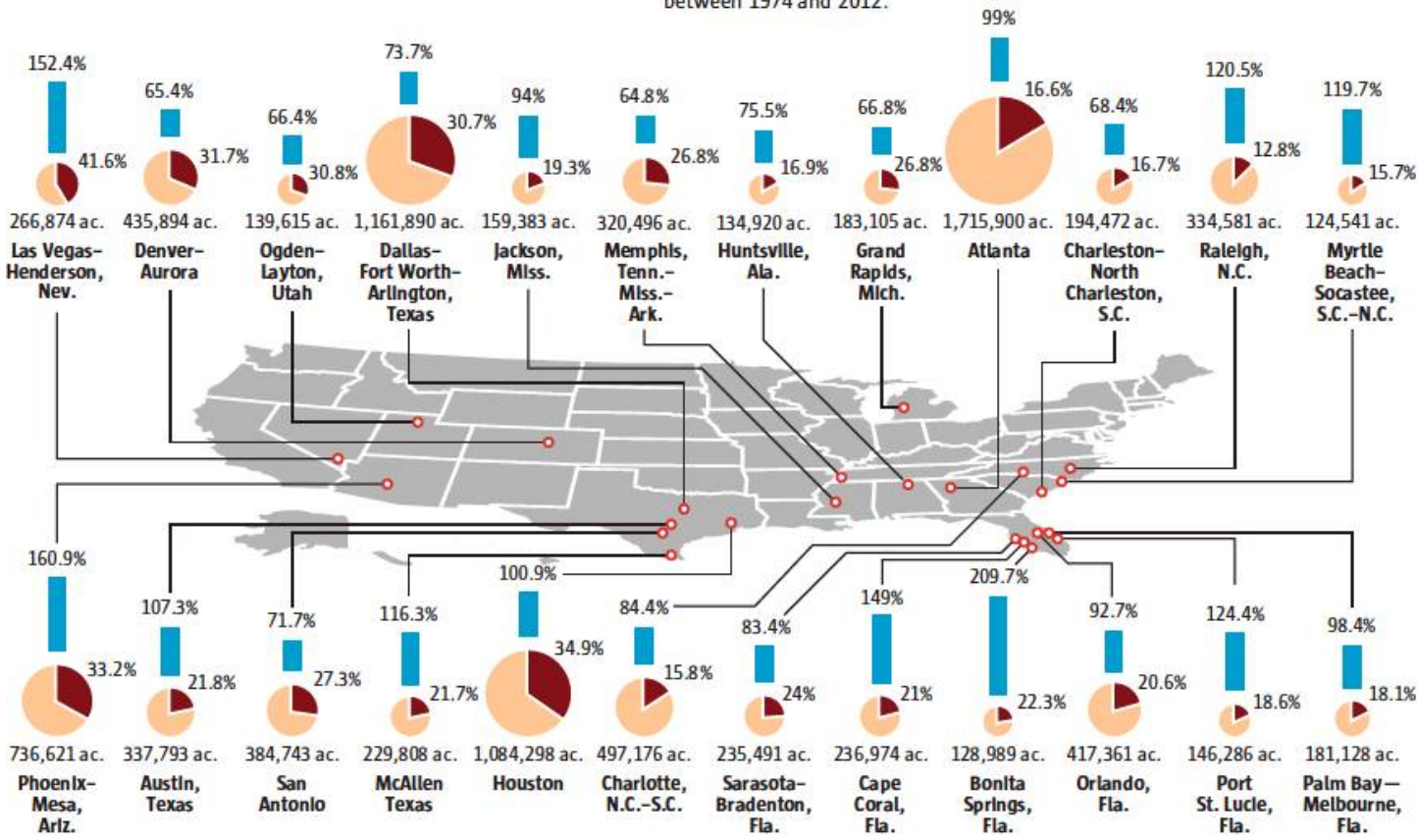


# U.S. cities increasingly cover natural green space

**HOW TO READ THIS CHART**

- 66.4% ← This is how much the impervious surface grew between 1974 and 2012
- 30.8% ← This is the percentage of impervious surface within the metro area in 2012
- 139,615 ac. ← This is the total size of the metro area, in acres

Federal data from 1974 and 2012 show a national shift in the major metro areas toward “imperviousness” — replacing green space with concrete, pavement and other material as developers install buildings, roads, parking lots, commercial plazas and paths. This shift has implications for flooding and heat amid climate change and affects the growing number of people, whose ancestors evolved in contact with nature. This chart maps the 24 metro areas of at least 123,553 acres (500 square kilometers) with the greatest increase in impervious surface between 1974 and 2012.



Source: USGS

Jeff Neumann, The Denver Post

Tent-hunting at REI, Jackie Von Feldt and her friends lamented that they choke inside booming Denver and were preparing an escape. They wanted peace, and calming views, with room to roam and starlit night coolness they could savor in silence. So they pored over an array of ultra-light shelters for a trip into Colorado’s mountain wilderness that, hopefully, wouldn’t entail too much traffic.

“You definitely have to leave the city. I wish it wasn’t like that,” said Von Feldt, who grew up in Wichita, where a carefully platted park gave residents a natural oasis.

“It just feels hectic being in the city,” she said. “You cannot get that detachment from the chaos.”

Von Feldt is caught in a green-space crunch that is hurting Americans as cities grow denser, more paved over and more crowded. Denver epitomizes this diminishment of nature in the city, a trend worldwide with 55 percent of humanity living in urban areas and a projected 2.5 billion more people on the way by 2050.

Large areas of Denver overhauled to sustain an exploding population now are so built up and paved over that residents rapidly are losing contact with nature. Excluding the undeveloped area around the airport, nearly half the land in Denver’s city limits is now paved or built over — up from less than 20 percent in the mid-1970s, a Denver Post analysis of city and federal data found.

And that figure could approach 70 percent by 2040.

Denver's elected leaders and developers over the past 20 years drove this shift toward high-rise towers, yard-devouring duplexes and shopping plazas — and away from Denver's "city within a park" heritage that a century ago incorporated natural preserves of 100-plus acres.

They replaced Denver's original pattern of settlement amid green space with an increasingly dense format that has enabled population growth by 41 percent, from 498,402 residents in 1998 to 704,621 in 2018. This heavily built cityscape is replicating, a recent aerial survey revealed, like the circuitry inside computers.

This denser development covers more and more of Denver's 155-square-mile area, including the River North, Uptown, Cherry Creek and Highlands neighborhoods, and the 44th Avenue and South Broadway corridors. It's intensifying as City Council members approve future high-density projects across the South Platte River floodplain encompassing the Elitch Gardens Theme & Water Park, Colfax Avenue, Loretto Heights and the already jammed Colorado Boulevard from Interstate 25 north past the old University Hospital campus and Park Hill Golf Course to Interstate 70.

The question is whether "livability" will improve, especially for children and the majority of workers who cannot afford frequent escapes.

The Denver Post's analysis found:

- Green space in Denver is disappearing faster than in most other cities, with paved-over cover increasing from 19 percent of the city in 1974 to 48 percent in 2018 (not including Denver International Airport), federal and city data show. Up to 69 percent of the city is expected to be paved or covered by 2040. Only New York and a few mega-cities exceed that level of what planners call "imperviousness."
- Denver ranks nearly last among major U.S. cities, including New York, in park space as a percentage of total area. It also ranks nearly last in park acres per resident.
- City leaders are overriding residents' desire for increased green space as they sign off on more high-density development.
- The dwindling of nature in Denver could lead to potentially overwhelming increases in storm-water runoff, and is causing worsening heat-wave impacts and likely hurting residents' physical and mental health.

The situation has reached a point that clashes with the "green" images Denver economic development officials project to promote growth, tourism and the outdoor recreation industry.

"There's a ton at stake. This is something to be concerned about — not just for some big net loss of biodiversity, but for what it means for people to interact with nature on a regular basis," said Liba Goldstein, a Colorado State University conservation biologist who has helped guide efforts to nurture nature north of Denver in Fort Collins.

"We benefit from regular interaction with nature. It is good for human health. ... We all know we have big obesity and mental health problems on the rise in cities. As people are more and more connected to computers, technology, and less and less connected to nature, it is harder to generate interest and enthusiasm and curiosity in young people," Goldstein said.

“This all has major impacts on our own health and well-being. We are going to be less happy and less healthy. We will be leading shorter, less happy lives. And we will miss out on what is spectacular, unique and interesting about the natural world.”

Denver’s transformation has been happening gradually, and The Post — analyzing city and federal data, interviewing officials and developers, talking with residents — tried to determine the cumulative impacts.

### **A city increasingly “impervious”**

The pace of Denver’s shift from natural to an increasingly built urban environment — roofs, roads, parking lots, park trails, other ground coverings — may be accelerating. In 1974, 19 percent of Denver was built over, according to federal U.S. Geological Survey data. In 2012, about 32 percent of that area was covered (roughly the same as the broader Denver-Aurora area tracked by USGS), the city and federal data show.

Denver officials now estimate the paved-over portion has increased to nearly 40 percent. And it’s 48 percent if the largely undeveloped 52-square-mile property around Denver International Airport isn’t included, said Brian Muller, a University of Colorado urban design professor and director of the school’s Community Engagement and Design Center. Using high-resolution imagery to assess Denver’s changing landscape, Muller has projected 66 percent imperviousness by 2040, and up to 69 percent if DIA is excluded, assuming likely expansions of transit and roadways.

“You’re looking at 95 percent imperviousness now in the newly developed parts of Denver — a very high rate,” Muller said in an interview.

“Other cities are going this way, towards very compact development without much open space,” he said. But Denver’s shift is extreme. “We’re not retaining much of our natural landscape. There are multiple processes going on that are generating imperviousness: the large buildings, some on residential lots, and when we build impervious trails in parks.

“You’re looking at substantial increases, more or less in line with the population growth. ... Denver should be very careful in how it manages green space.”

Covering natural terrain with concrete and asphalt increases the volume and velocity of storm-water runoff. Denver officials in 2014 estimated it would cost \$1.47 billion to upgrade the city’s storm drainage infrastructure to handle the surges so that flooding on streets would stay under one foot deep. Water contamination also worsens as road grit, petroleum and chemicals whoosh off hard surfaces into the South Platte watershed. Denver officials recently began an effort to try to turn back the clock and restore natural processes, a limited effort to re-engineer waterways that could slow flows and harness the H2O.

Other U.S. cities, such as hurricane-plagued Houston, also are struggling with increased storm-water deluges set off by overdeveloping urban terrain.

### **Less room to roam**

Denver’s 155-square-mile area includes 6,238 acres of parks and open space (the city counts 831 acres of golf courses, 137 acres of road medians and 204 acres for future parks), which is 6.2 percent of the total area, an inventory provided to The Post shows. That ranks the lowest among major U.S. cities, according to Trust for Public Land rankings, which used an 8.2 percent figure for Denver. The city also owns about 14,000 acres of noncontiguous park property in the mountains.

By comparison, New York City has designated 21 percent of its area as parks; Washington, D.C., 22 percent; San Diego, 23 percent; and Los Angeles, 13 percent; Trust for Public Land data show. Commonly used comparable “peer cities” also beat Denver, with Minneapolis devoting 15 percent of its area to parks; Portland, Ore., 18 percent; Boston, 17 percent; Seattle, 12 percent; and Chicago, 10 percent.

The rapid population growth in Denver — the city has added nearly 10,000 new residents a year since 2010 — intensifies the impact.

Park space per person in Denver has fallen to 8.9 acres per 1,000 residents, down from 9.4 acres per 1,000 residents in 2006 and 9.5 acres per 1,000 residents two decades ago — far below the national average of 13.1 acres per 1,000 residents, city data show. (By comparison, Portland offers 23 acres per 1,000 residents.) Denver officials project the acreage will decrease further to 7.3 acres per 1,000 residents as Denver’s population tops 857,000 before 2040.

It would take at least 1,500 acres of new green space to stop the decline and hold steady at about 9 acres per 1,000 residents, and 3,000 new acres of parks to approach the national norm of 13.1 acres per 1,000 residents, city planners said. Denver parks planners recently identified 625 city owned acres that could become future green space.

Yet Denver stands out as one of the only major cities in the U.S. that has not drawn on public funds to expand public green space — until voters in November approved a ballot initiative establishing a sales tax that will raise \$45 million a year to go toward parks.

In addition, Denver’s rules for developers rank among the most permissive when it comes to installing buildings without a requirement to offset impact by establishing new public green space. Only “master-planned” development on parcels larger than 10 acres — relatively rare — must leave 10 percent of the total area open, according to city community development officials. That open space, under Denver’s current rules, can include paved-over courtyards or plazas. For example, city officials recently told high-rise developers they could include construction of recreation center buildings as part of their required parks and open space.

### **Higher and hotter**

One result of all this is that Denver’s denser urbanization exacerbates climate-driven heat waves.

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CU urban design researchers determined that Denver’s temperatures have increased by at least 3 degrees over the past two decades — above the increase from global warming. When more surfaces are paved or covered over, temperatures spike because concrete and asphalt absorb sunlight and then release it, the urban equivalent of a hot pack.

Since 2012, Denver has experienced more than 50 days a year with temperatures topping 90 degrees. A 2014 Climate Central analysis of National Weather Service data found that Denver has one of the nation’s most severe “heat island” effects, with a 4.9-degree increase compared with the surrounding, and mostly treeless, high prairie.

The spiking heat dissipates in leafy central neighborhoods, said professor Austin Troy, chairman of CU Denver’s department of urban and regional planning. Hardest hit are the mostly paved downtown areas,



RiNo and newly overhauled areas along the concrete I-25 and I-70 corridors, Troy said. Trees can help ease the heat. But Denver lags in trees and shrubs, with a 9.6 percent cover in 2009, compared, for example, with a 53 percent cover in Atlanta, a 2012 urban forestry study found.

Finally, a shift toward taller buildings adds to perceptions of being trapped by blocking views of the mountains, prairie and sky. Denver had six buildings higher than 13 stories in 1950, city records show. Today there are 151. Developers have filed a master plan with the city to build several skyscrapers taller than 40 stories, as high as 59 stories, south of downtown along the South Platte.

## **Rising discomfort**

Denver officials are approving denser development even though residents object.

Since 2003, city surveys have documented that residents favor more green space.

Two years ago, intensifying discomfort led to complaints about “a new concrete jungle,” reflected in news stories, with residents lamenting that development decisions were foisted on them without opportunities to prioritize noncommercial values of beauty, peace and functioning natural ecosystems.

Historically, Denver residents demanded green space along with development. An 1894 plan for “the parks and boulevards system” of Denver began a tradition of deliberately interspersing settlement with green space, driven by civic leaders who aimed to improve human health as the nation industrialized.

Mayor Robert Speer was inspired by the Chicago World’s Fair in 1893 that celebrated a classical balance achieved by preserving nature inside cities, according to Denver historian Tom Noel at CU Denver, whose 1985 book on the City Beautiful movement explored Denver’s aspirations of being a city within a park.

Speer faced public demands for greater livability. He set out to double park acreage, establishing the Civic Center and other large green spaces. He gave away 10,000 elm trees to residents who promised to plant them around their homes.

But density and “compact cities” have emerged as modern priorities. This push toward a denser high-rise format in Denver “is a fairly new trend” driven by developers trying to capitalize on an influx of younger millennial residents, Noel said.

“A lot of people fight it, a lot of old-timer geezers like me,” Noel said. “A lot of the population is not in agreement.”

Some environmentalists have looked favorably on “infill” development as a way to contain urban sprawl — though suburbs around Denver still are devouring more semi-arid high plains prairie despite water scarcity. A compact configuration also enables energy and transportation efficiency. (Cities cover roughly 3 percent of the Earth, and people in them consume 70 percent of the energy and emit 75 percent of the carbon dioxide.)

“Denser cities are good, if they’re done right,” said Chris Hawkins, the Nature Conservancy’s Denver-based urban conservation program director.





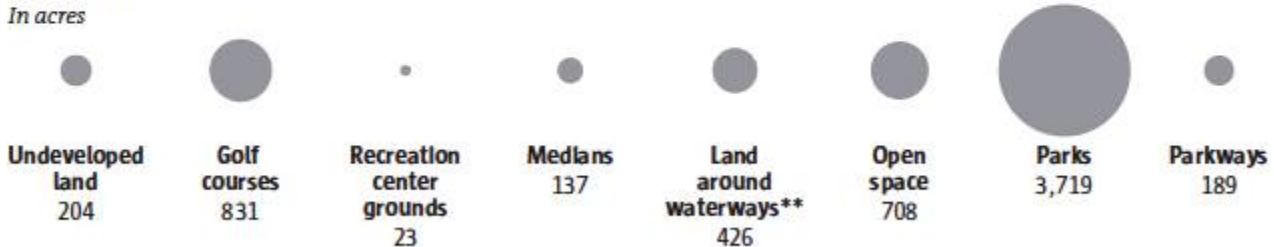
Bob Taylor, a scientist with the U.S. Geological Survey, uses a special tool to measure heat around homes and buildings on April 26 in north Denver. Taylor has spent the last two summers measuring heat around neighborhoods in Denver to gather data for a study. Denver had six buildings higher than 13 stories in 1950, city records show. Today there are 151. RJ Sangosti, The Denver Post

**Denver’s new cityscape: Nearly twice as much parking space as park**

“But as

The 6,238\* acres of green space that Denver officials have counted inside the city seems increasingly small compared with six times as much built-over space (37,815 acres), including expanded roads, walkways, buildings and 7,338 acres of paved parking lots.

**GREEN SPACE**  
In acres



\*Figures do not add up to total due to rounding \*\*Natural Resources Management Zones Source: DPR Jeff Neumann, The Denver Post

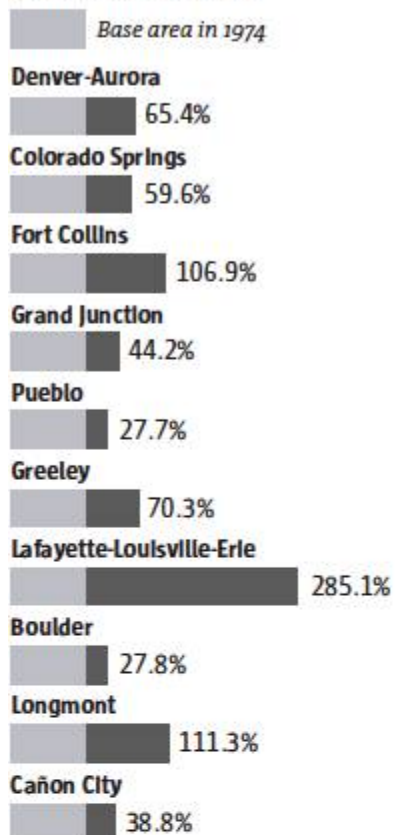
**Colorado’s Increasingly Impenetrable cities**

In Colorado’s 10 largest metro areas (by acres), impervious surfaces, such as roads, buildings and parking lots, increased by an

cities continue to become denser, we think it is important for them to continue to keep people and nature at the fore of many decisions,” Hawkins said. “We believe many cities find a way to balance denser, more vertical, transit-oriented sustainable development with the

average of 83.7 percent from 1974 to 2012.

**PERCENT CHANGE OF IMPERVIOUS AREA**  
by metro area, 1974–2012

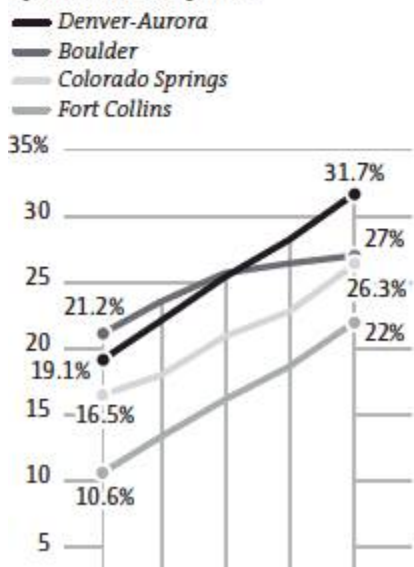


Source: USGS  
Jeff Neumann, The Denver Post

**Natural terrain vanishing  
In Colorado’s major cities  
as population grows**

From 1974–2012, Colorado cities have greatly increased the amount of land impervious to water.

**IMPERVIOUS AREA**  
by metro area, in percent



creation of new parks and open space. We think Denver can do the same and are working to support those goals.”

**Parks of the future**

Developers in Denver acknowledged a shift toward greater density and less green space. A balance is possible — if cities prioritize creating more green space, said Mike Zoellner, president of the real estate company ZF Capital and vice chairman of the Urban Land Institute Colorado, which encourages smart urban design.

“From a land-use point of view, we see open space as a critical component. Cities have been falling behind in paying for and getting open space,” Zoellner said.

Greenways and parks “make for better communities. The value for real estate around parks is better,” he said. “The recent sales tax increase to fund parks is the community saying, ‘We want the city to buy more parks and build more parks.’ That’s a positive thing and the development community is very supportive of that.”

Directors of the Colorado Association of Home Builders and Home Builders Association of Metro Denver declined to discuss green space. The metro Denver association’s chief executive-elect, Chérie Talbert, who also runs a developers’ political committee, said in an email that members work with local governments “to ensure the new communities we build agree with the character of the area, including the right density.”

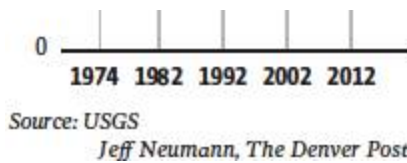
However, “attainably priced housing is a goal of both builders and city leaders,” Talbert said. “As the cost of both land and labor continue to rise, building at greater densities helps us address that goal.”

But if Denver fails to add significant new green space, “you will become more and more of a concrete metropolis, much more like the bigger mega-cities of Southern California and the Bay Area. You could get to that point,” said Charlie McCabe, director of the Trust for Public Land’s Center for City Park Excellence, which advocates for nature in cities.

“This is not just about nature and parks. It is about your quality of life,” McCabe said. “You would be losing some of your quality of life.”

**Blaming population growth, lack of funds**

Denver leaders say soaring land prices and population growth limit their options to preserve nature beyond limited landscaping. Parks department officials said they lack funds to establish green space, even



though general fund revenues have increased rapidly as a result of the development boom.

Public discomfort and green-space complaints “are very common themes and concerns that arise in a city that is growing, particularly as exponentially as we have grown,” Mayor Michael Hancock said in an interview after his latest State of the City speech, in which he invoked former leaders’ City Beautiful vision of creating a city within a park.

“And because we are growing, and because we don’t have enough houses to accommodate all the people who want to live in the city, densification is going to have to be one of the things that we are going to have to do, particularly around our transit-oriented development sites,” Hancock said. “But we must do it in a way that people don’t feel like they are in a jungle. That means we gotta communicate, work with and value neighborhoods, and really have conversations with people who live there today.”

No new park covering 50 acres or more, let alone the parks of the past of 100-plus acres, has been established in Denver for more than a decade.

Parks crews focus on maintaining and improving existing parks, installing playground equipment and landscaping, which in some cases entails paving over natural terrain.

Meanwhile, City Council members have approved developers’ proposals for new high-density development along the South Platte at the Elitch’s amusement park, Loretto Heights campus, RiNo, the former CU hospital, Park Hill Golf Course and the Gates Rubber factory. They have allowed developers to build higher and smaller units in return for agreements to offer housing at prices Denver workers might afford.

The city’s latest “Game Plan” documented a shortage of green space. City planners are wrestling with the implications.

“We’re way down because so many people have moved to the city,” said Deputy Parks and Recreation Director Scott Gilmore, a longtime champion of exposing children to nature. “And we’re going to keep dropping because so many people want to come to Denver.”

But establishing significant new green space in Denver? “I don’t think it is feasible, to be honest,” he said. “We would have to spend a lot of money. And do you want to take peoples’ homes just to build parks? I mean, where are we going to get land? It is an infill city. We don’t have a ton of land.”

The nascent effort to address stormwater flooding by creating naturalistic green corridors could add a couple hundred acres of green space around the city — though public access would be limited.

“Certainly, as lots are developed, and redeveloped at higher density, just the roofs cover more space than they used to, in addition to the skyscrapers around them and the paved areas to provide access to them,” said Mark Tabor, Denver’s chief parks planner and architect of the game plan.

“Yeah, there’s less space for landscaping. There’s less space, unfortunately, and really critically, for street trees and trees on private property — what we are trying to promote in our game plan,” Tabor said. “We need to take a strong look at how we can provide for new development, but, at the same time, not lose the benefits of land that has been built over or built up.”



## The great escape

For residents, the green-space crunch compels frequent escapes in vehicles. It favors those with the economic power to reach nature. Yet those who flock out for recreation in the mountains increasingly face crowds, trampled terrain and impaired natural processes. The annual visitation at Rocky Mountain National Park, 90 minutes northwest of Denver, has increased by 60 percent since 2008. Boulder officials say they see more Denver residents heading onto their foothills trails.

It was the promise of parks and open space that enticed Elaine Conoly, 28, to move from Texas for graduate studies in accounting at CU Denver. Conoly said she checked a visitors bureau website and got the impression that Denver was green with more parks than other cities, along with at least 300 days a year of blue skies and sunshine.

For the past five years, she's been renting a third-floor condo north of downtown in RiNo, paying \$1,400 a month and lamenting that there's no significant green space nearby.

"I would have to drive. Like, Washington Park would be the closest," Conoly said on a sidewalk near 32nd and Blake streets.

"What I would desire would be, like, four times a week I'd take a jog around a park, a walk around a park, or a bike ride around a park." Instead, she makes it to a park about twice a month. This compels escapes to the mountains.

"And that is a hassle when everyone is going," she said, recalling a three-hour drive with her snowboard to the mountainside slopes at Keystone Resort.

"You are going to sit in the traffic."

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