New Angles on Noise Pollution

In Paris and other cities, sensors monitor noise from passing vehicles and snap pictures of offenders' license plates. The technology is part of a new generation of tools and approaches intended to help address noise pollution. Credit: Courtesy of Bruitparif.

CITY DWELLERS AROUND THE WORLD noted one surprisingly welcome side effect of the lockdown phase of the pandemic era: less noise. Urban soundscapes have largely returned to form, but that peaceful interlude served as a loud and clear reminder to planners and policy makers that the audible does shape city life—and can, in turn, be shaped by policies that include thoughtful land use and design. Inger Andersen, executive director of the United Nations Environment Programme, highlighted the issue in the *Financial Times* earlier this year, writing that "city planners should take both the health and environmental risks of noise pollution into account."

Of course, the underlying insight here is not new. Citizens have probably complained about various forms of city noise, from construction to concerts to rude neighbors, for as long as cities have existed. While a relatively quiet urban neighborhood might register an ambient level of about 50 decibels, higher levels can begin to interfere with conversation; a busy roadway can measure about 70 decibels (about equal to a vacuum cleaner), and a train crossing that road can push the decibel reading to 90 or higher.

Studies documenting the health effects of noise pollution, which range from sleep distur-bances to cognitive issues to heart disease, date back at least to the 1970s. The World Health Organization, along with regulators in the United States, Europe, and elsewhere, has highlighted the issue for decades, often spurred by a panoply of noise activists.

"The good news is, there is much more interest today," says Arline Bronzaft, a City University of New York professor emeritus who conducted some of the earliest studies docu-menting the impact of city noise on health and well-being. Trained as an environmental psychologist, Bronzaft continues to advocate for quieter built environments as a board member of the environmental nonprofit GrowNYC. Today, she says, there's much more research, and an openness to policy experimentation. "Now that you've got the data," she says, the question is becoming, "what are you doing about it?"

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The answer is a work in progress, but we may be at a pivotal moment for thinking about "built soundscapes." The tools available to assess the challenge have radically improved. And that may help planners and policy makers devise and enable better design and policy strategies to cope with the problem.

Maybe the most prominent example involves the evolution of tools to measure sound, which have become more sophisticated and are being deployed in new ways. Recently, for example, authorities in Paris and other French cities have begun to experiment with "sound radar" devices meant to function like speed cameras: triggered by noise that exceeds code decibel limits, the sensors photograph the offending vehicle's license plate and fine the owner.

The French sensors were developed by Bruitparif, a state-backed agency devoted to studying city acoustics in Paris and elsewhere. Similar technology is being tested in New York, Edmonton, and other cities. Most cities already have some sort of noise ordinances in place, but such rules are rarely enforced in a systematic or consistent way. The advanced new sensors could help remedy that.

Still, there's an argument for going deeper in thinking about sound—using technology as a planning tool, not just a punitive one. Erica Walker, professor of epidemiology at the Brown University School of Public Health and founder of Brown's Community Noise Lab, spent years creating the "2016 Greater Boston Noise Report," mapping noise data she collected at some 400 locations around the city. The experience gave her a different perspective on soundscapes.

"I started as pro-quiet," Walker says. In fact, she explains with a laugh, she was partly interested in finding out whether city noise codes might help her get some loud neighbors to pipe down.

Creating her noise report brought Walker into contact with a cross section of situations, teaching her that "neighborhoods and sound are complex." Because ordinances focus almost exclusively on sound as a nuisance, they're often incomplete or counterproductive, she explains. Since some level of sound is inevitable in a city, Walker says, considerations of how the acoustic environment affects residents and their interactions with each other should be built into planning and development: "Now I'm anti-quiet—but for peace."

Her Community Noise Lab project is focused on reworking the soundscape dialogue between citizens and policy makers; among other initiatives, that has included creating a free app called NoiseScore to make sound measurement an accessible, collaborative activity. City officials in Asheville, North Carolina, used the tool as part of their effort to incorporate more community feedback into revisions to the city's noise code, which was updated in the summer of 2021. While that still boils down to crafting ordinances, it's an example of technology broadening the discussion, rather than simply serving as an enforcement tool. "They didn't start with: 'We're going to put these sensors up across the city and punish people if they are doing this or that,'" Walker says. "They wanted to understand all of the partners' perspectives."
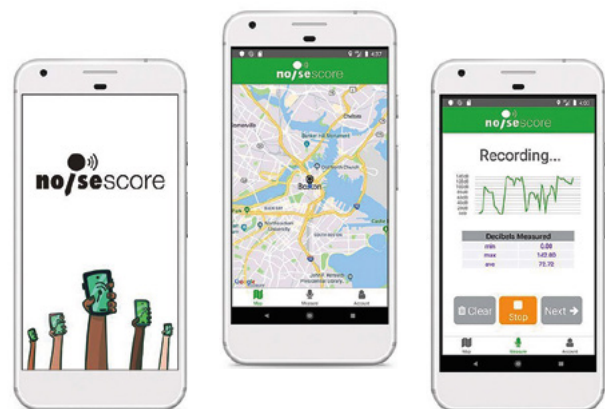
The NoiseScore app encourages a collaborative approach to understanding neighborhood noise levels. Credit: Courtesy of NoiseScore.

Tor Oiamo, a professor in the Department of Geography and Environmental Studies at Toronto Metropolitan University who conducted a recent public health noise study in that city, notes that more sophisticated sensors, mapping, and modeling software are creating opportunities for planning with sound in mind. In the years ahead, he says, the tools at hand could include a kind of global noise database similar to those tracking air pollution. But there's an obvious challenge: "The difficulty in mitigation with a city that's already built is that the structure is in many ways locked in," he says.

In some cases, cities have found ways to modify or add to existing infrastructure. Bronzaft's groundbreaking research in the 1970s—she documented the negative impact of a New York subway traveling on an elevated line near a school—resulted in the installation of sound-muffling acoustic tiles in classrooms, and the use of rubber pads on tracks throughout the subway system to lessen train noise. Other train systems now use rubber tires, and the next wave of quiet mass-transit innovation includes maglev trains and electric buses.

Oiamo also points to successful efforts in Amsterdam and Copenhagen to revise traffic patterns, with the specific goal of reducing noise in residential zones. And he credits Toronto with a thoughtful approach to its current Port Lands development project: because it's reminiscent of a master-planned neighborhood, it's possible to factor the soundscape into the design process. In addition, many of the most measurably useful ways to mitigate urban noise overlap with thoughtful land use: more green space and trees, careful consideration of building density (strategic density can actually create pockets of quiet), and so on.

Land works have been used to mitigate urban noise for years, from the berms around the edges of New York's Central Park to trees and sound barriers along highways. A more recent tech-forward iteration comes from German firm Naturawall, which has designed "plant walls"— galvanized steel frames with a relatively slim profile, filled with soil and sprouting a thick layer

Some solutions to urban noise pollution take their cue from nature, including plant walls that can block sound levels equivalent to typical city traffic. Credit: Courtesy of Naturawall.

of foliage and flowers. The walls, currently in use in some German cities, are said to block sound levels roughly equivalent to typical city traffic. Other companies, including Michigan-based LiveWall, are undertaking similar projects around the world.

None of these strategies offers a silver bullet. But Oiamo, like Bronzaft and Walker, emphasizes that at this point, there is plenty of expertise to draw upon to improve our built soundscapes. Newer technologies are helping define the issues with greater nuance and offering fresh solutions. While sensors helping issue tickets for noise violations may not represent the kind of holistic approach Walker or Bronzaft has in mind, they're a start. As the subject gets more attention and technological options proliferate, soundscape experts are sensing the potential for real, if incremental, progress. "There's a million things to do," says Oiamo. That's the challenge—and the opportunity.

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