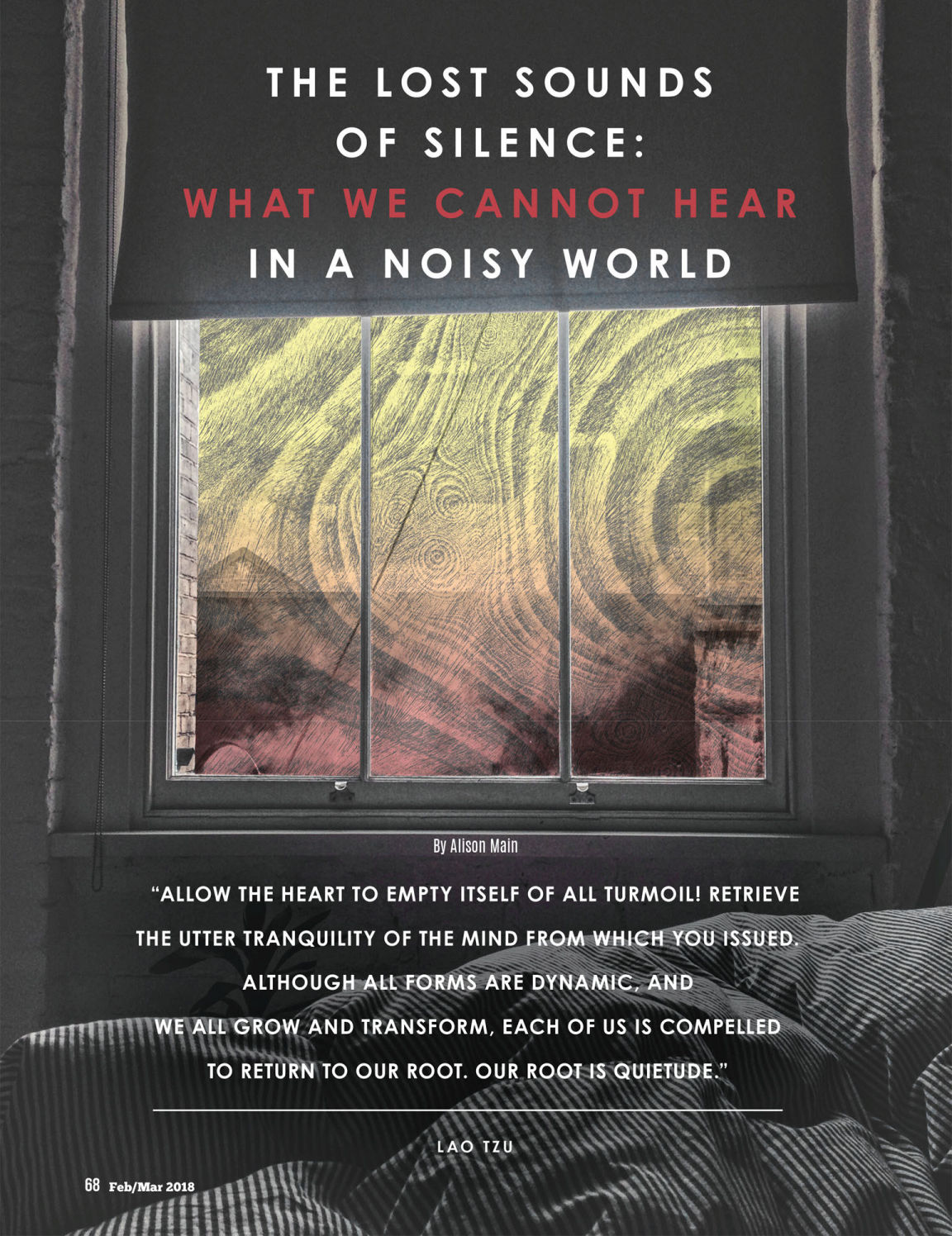
THE LOST SOUNDS OF SILENCE: WHAT WE CANNOT HEAR IN A NOISY WORLD



By Alison Main

"ALLOW THE HEART TO EMPTY ITSELF OF ALL TURMOIL! RETRIEVE THE UTTER TRANQUILITY OF THE MIND FROM WHICH YOU ISSUED. ALTHOUGH ALL FORMS ARE DYNAMIC, AND WE ALL GROW AND TRANSFORM, EACH OF US IS COMPELLED TO RETURN TO OUR ROOT. OUR ROOT IS QUIETUDE."

LAO TZU

For over a decade, I lived in Manhattan, on a two-directional main thoroughfare, smack in the middle of the city. My 400-square-foot apartment was 14 stories up, in an 18-story building, across from a bustling hotel, and sandwiched between thousands of other city dwellers, fashion retailers, and tourist traps. Day and night, cars honked, buses roared, taxis screeched, helicopters circled, neighbors shouted, and service crews drilled. The sensory-stimulating energy of the city was palpable. And so was all that noise.

Our bodies and minds need quiet to rest and recover, to connect mindfully, and to imagine new possibilities. But, from our national parks to our urban centers, our world is now overrun with noise pollution. What happens when we can no longer find space for peaceful silence?

THE SOUND AND THE FURY

Many people view noise as an annoyance—the mechanized hum of a refrigerator, a jackhammer outside your window, the incessant whir of an HVAC system. But beyond mere aggravation, there are significant environmental, ecological, and physiological health risks associated with a constant state of unquiet.

Technically, sound and noise are two separate things. **Sound**, measured in terms of frequency and amplitude, is perceived by humans as an auditory sensation created by pressure variations that move in waves through a medium (such as air or water). **Noise** is considered an unwanted or inappropriate sound in an environment. What we perceive as "loudness" or "volume" is really **amplitude**, the relative strength of sound waves. Amplitude is measured in **decibels** (dB), which refer to the sound pressure level or intensity. Because our acoustical environment is comprised of a multitude of sounds, our experience of any given soundscape depends on interactions between the frequencies and amplitudes. Thus, sound levels are often adjusted for human hearing, expressed as dB(A).[1, 2]

Is there an established "safe" level of noise? A complicated regulatory history reveals a murky answer.

The 1972 Noise Control Act officially established a national federal policy headed by the Environmental Protection Agency "to promote an environment for all Americans free from noise that jeopardizes their health and welfare."[3] The same year, the National Institute for Occupational Safety and Health (NIOSH) developed an 85 A-weighted decibel recommended exposure level to reduce the risk of hearing loss from occupational noise exposure. Thereafter, the Occupational Safety and Health Administration (OSHA) adopted 85 decibels as a legal standard for workplace hearing protection.

The National Institute on Deafness and Other Communication Disorders states, "Long or repeated exposure to sound at or above 85 decibels can cause hearing loss." But that limit is based on an occupational standard for those exposed to noise in their workplace. It does not account for your everyday noise experience, such as your earbuds streaming music into your ears, your child's new beeping toy, or your laundry room's dryer.

Like many other environmental factors, the workplace standard for noise was not created with the public's health in mind. In an attempt to mitigate this discrepancy, in 1974 the EPA Office of Noise Abatement and Control (ONAC) adjusted NIOSH's recommendation for additional exposure time, establishing 70 decibels as the public's safe noise level to prevent hearing loss. But the EPA did not adjust for lifetime noise exposure, so the real average safe noise level to prevent hearing loss is probably lower.[4]

And yet there are far more health concerns than just noise-related hearing loss.

In 1978, former U.S. Surgeon General William H. Stewart said, "Calling noise a nuisance is like calling smog an inconvenience. Noise must be considered a hazard to the health of people everywhere." The World Health Organization (WHO) considers noise pollution to be an environmental burden second only to air pollution.[5]

There are many biological stressors that we experience on a daily basis. Noise is one of them. Excessive exposure to noise might be considered a non-auditory health risk in that noise may contribute to the development and aggravation of stress-related conditions such as high blood pressure, coronary disease, ulcers, colitis, and migraine headaches. There are also some indications that noise exposure can increase susceptibility to viral infection and toxic substances.[3]

The body reacts to noise with a "fight or flight" response, perceiving noise as a danger signal (even while asleep), with resultant nervous, hormonal, and vascular changes that have far-reaching consequences.[6] The EPA *Noise Effects Handbook* explains the mechanism: "Loud sounds can cause an arousal response in which a series of reactions occur in the body. Adrenalin is released into the bloodstream; heart rate, blood pressure, and respiration tend to increase; gastrointestinal motility is inhibited; peripheral blood vessels constrict; and muscles tense. On the conscious level we are alerted and prepared to take action. Even though noise may have no relationship to danger, the body will respond automatically to noise as a warning signal."[3]

So why isn't the public adequately protected from this environmental hazard? In 1982, the Reagan administration abruptly terminated funding for the Office of Noise Abatement and Control. With a lack of federal support, the responsibility to control noise fell to the individual states. But, since the Act itself was never officially repealed, that left local and state governments floundering as they attempted to determine who

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MAPPING NOISE

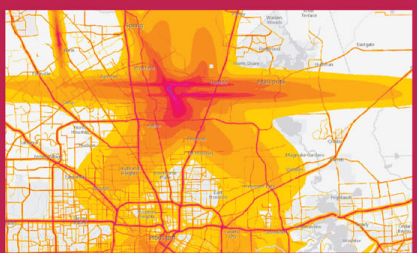
The US Department of Transportation collected data from the Federal Aviation Administration (FAA) and the Federal Highway Administration (FHA) to create a National Transportation Noise Map. Results showed that 98% of Americans are exposed to around 50 dB from road and aviation related noise. But some 19 million people experience a constant noise level around 80 dB or higher. Planes create the largest disturbance, but roads have a significant impact as well. Anyone who has lived under the flight path of a 747 Airbus knows the cringeworthy pain of the daily and nightly arrivals and departures. But living adjacent to busy highways and byways is no picnic either.

How noisy is your neighborhood?

Los Angeles

Miami

New York



Houston

+ Reference: National Noise Pollution Map. US Department of Transportation. https://maps.bts.dot.gov/arcgis/apps/webappviewer/index.html?id=a303ff5924c9474790464cc0e9d5c9fb

has authority over noise regulation. While the EPA in theory still oversees the semi-defunct Noise Control Act, it effectively lost its ability to control noise more than three decades ago.[6] Which means we're surrounded by noise, and we don't know if that noise is safe.

NOT ALL IS QUIET ON THE WESTERN FRONT

Not just an urban problem, our man-made clamor also impacts the natural world. On the one hand, noise pollution disconnects us from the healing powers of nature. It's rejuvenating to bask in the song of birds, the sound of a brook, and the rustling of leaves as we walk through majestic landscapes, whether mountains or valleys. But beyond the harm to our natural havens, noise pollution has a significant impact on wildlife species and ecological balance.

A 2017 study from scientists at Colorado State University and the National Park Service (NPS) showed that anthropogenic noise pollutes 63 percent of all U.S. protected lands, including city and county parks, state and national forests, and national parks, monuments, and refuges. The researchers pulled more than a million hours of recorded data from 492 protected sites across the United States. They also found that 21 percent of the protected areas revealed human noise levels that were 10 times (or greater) the background levels. And elevated noise was found in critical habitats of endangered species, with 14 percent experiencing a 10-fold increase in sound levels.[7]

Noise can have a significant impact on a species, sometimes disrupting an entire ecosystem, including the cultural and biodiversity resources in protected areas. It can affect a species' ability to detect predators, locate food, and find mates, as well as mask wildlife communications and interfere with their ability to pick up on signals from other species. Clinton D. Francis, PhD, Assistant Professor, Cal Poly Biological Sciences was one of the researchers on the project. He says, "The masking of cues between animals is one of the biggest problems. A good example is a nocturnal acoustic predator like the owl. They are highly specialized with hearing, listening to the rustling sounds made by their prey. It doesn't take much in terms of raising background [noise] levels to the point that owls can't even detect these sounds. Similarly, other animals can't hear and evade their predators. Failure to hear those sounds could become a huge problem."

In natural lands, the typical sources of manmade noise include cars, planes, development, and land extraction like mining, logging, and drilling. The Natural Sounds and Night Skies Division of the National Park Service works to preserve the natural soundscape of our nation's protected areas. The NPS Quiet Parks program aims to provide national park units with resources for reducing park-generated noise sources, understanding each park's unique acoustic environment, and starting conversations about noise reduction.[5]

But on a positive note, as Francis says, "In the face of other difficult problems like climate change, noise pollution is a relatively easy one to potentially fix. It could make a really big difference for a lot of wildlife. Sound mitigation could allow a lot of species to persist."

The National Park Service offers suggestions on how to minimize your noise footprint both in nature and at home.

When visiting a national park

- Speak softly when having conversations, especially on hiking trails and at campsites.
- Be aware that the noise you make could affect other visitors, and encourage friends and family to do the same.
- Be considerate of campground quiet hours.
- Look for mute options on electronic equipment such as cell phones, watches, or cameras.
- Turn off cell phones and/or avoid using speakerphone.
- Consider leaving personal music devices in the car or at home.
- Avoid using external speakers that others can hear.
- Participate in non-motorized recreational activities (i.e., hiking, bird-watching, snowshoeing, canoeing).

What you can do at home

- When possible, use non-motorized tools for yard work (e.g., rakes instead of leaf blowers).
- Consider noise when purchasing home appliances and yard equipment (manufacturers typically provide sound level information in product manuals).
- Be considerate of neighbors when operating motorized equipment.
- Use mass transportation.
- Join a carpool or ride your bike to work.

+ Reference: https://www.nps.gov/subjects/sound/difference.htm

NOISES OFF

Imagine a beautiful autumn afternoon. There's a scent of pumpkin spice in the kitchen and an invigorating chill in the air as you wrap yourself in your favorite burgundy sweater. You're just sitting down to write or read when, suddenly, you're jarred out of your reverie by a loud, buzzing, mechanized noise. It takes only a split second to spy a nearby landscape crew with one (or more) gas leaf blowers (GLBs) in full force.

Disrupting communities around the country, GLBs produce noise levels around 100 decibels (at point of use), exceeding levels recommended by the WHO, EPA, and OSHA. Not only can this level of noise damage hearing, interfere with sleep, and increase blood pressure, adrenaline, and heart rates, but it can also cause sleep disruption, chronic high blood pressure, ischemic heart disease, and hearing loss. More than a mere annoyance, the GLB whir penetrates walls, windows, and most ear plugs, making it impossible to enjoy peace and quiet in our homes, all for the sake of pristinely manicured lawns.[8]

In hundreds of towns and villages across the country, community members have organized to fight this insidious form of noise pollution. Sydney MacInnis, Vice President of EcoPel (Environmental Coalition of the Pelhams) in Pelham, New York says, "When I was growing up, at a time before leaf blowers, everyone waited until the yard was filled with leaves and then did a huge rake up. But now, with these aggressive machines that disturb the peace and hurt the ears, sending up dust and pollen, creating noxious exhaust, and clearing soil from the roots of plants, it somehow seems necessary that every homeowner must blow their lawn every week. Until a homeowner speaks with their landscaper, there is an expectation that the lawn will be 'leaf free' each week."

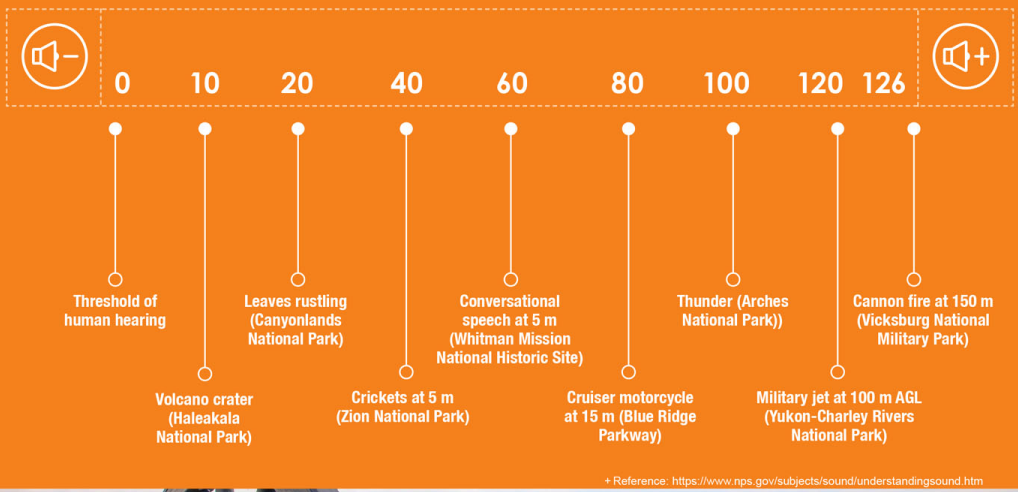
Taking a meditative perspective, MacInnis expresses, "Very few people are really aware of this external noise from the leaf blowers, because there is already way too much noise between our ears. Leaf blower awareness could be part of a mindfulness practice that helps our children, our plants, our community, and Mother Earth."

WHITE NOISE

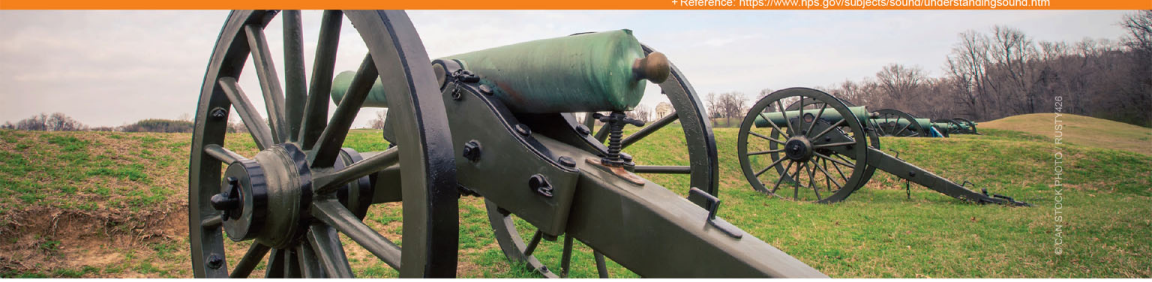
Any new parent knows the sublime pleasure of finally getting their newborn to sleep, scoring those precious few cat naps between feedings and restless cries. To assist, there's a growing list of gadgets on the market that promise your baby (and you) a solid night's sleep. Leading the pack of sleep sound devices is the oft-heralded white noise machine, typically marketed for use with babies and young children. However, research suggests that exposing infants to continuous white noise—which is intended to soothe infants and drown out disturbing noises—may delay hearing and possibly language development. Unlike speech or music, white noise, like radio static or an air conditioner's hum, is random sound with no distinguishable auditory pattern.[9]

Another recent study evaluated 14 infant sound machines (ISMs), raising the volume to the loudest level to measure the sound levels at three distances: hanging directly on the crib rail, positioned table-side next to the crib, and placed across the room from the crib. According to the recorded measurements, all sound machines were above the recommended volume of 50

SOUND PRESSURE LEVELS MEASURED IN NATIONAL PARKS



+ Reference: https://www.nps.gov/subjects/sound/understandingsound.htm



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decibels when measured from crib or table-side distance, and some even reached levels of 85-plus decibels.[10] The study also showed that ISMs can generate sound levels in excess of adult occupational noise limits, some of them even reporting higher measurements than the more conservative limits created for infants in hospital nurseries. Exposure to these devices may place infants at risk of developing noise-induced hearing loss or auditory developmental problems.[10]

Parents and consumers can still take precaution when using these devices, such as placing the ISM as far as possible from the infant and never in the crib or on the crib rail, playing the ISM at a low volume, and operating the ISM only for a short duration of time.[10]

From a consumer standpoint, the white noise machine is representative of a larger problem in consumer product engineering and sales, and a microcosm of our unregulated noisy world. What's really needed to protect public health are policy revisions—not just for safer sound machines, but for all other noise-generating products as well. Protective policies would require manufacturers to limit their products' maximum output noise levels, print warnings about noise-induced hearing loss on packaging, and install timers to turn off after a certain period of time, particularly if the device is targeted toward infants and sleep.

Short of policy legislation coming into play any time soon, we as cautious consumers must discern what is healthy and harmful, both for the vitality of our soundscapes and for the health of our bodies. With the world's significant increase in population growth and urbanization, noise pollution continues to climb. Add to this the expansive spectrum of man-made noise-generating products and our blithe unawareness that the world is just too darn loud. We need to take steps now to protect ourselves from noise pollution, because we could all benefit from more quiet time.

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