

“What I Breathe In, You Breathe Out”

Take a moment with me here, I want to do something together.

Put one hand on your chest, and let the other rest over your stomach, just below your rib cage.

Now close your eyes and we're going to take some deep breaths.

Breathe in for 1, 2, 3, 4, and hold that breath for 1, 2, 3, 4, breathe out for 1, 2, 3, 4, and hold for 1, 2, 3, 4.

One more time, I'll count for you.

In for 1, 2, 3, 4, hold for 1, 2, 3, 4, out for 1, 2, 3, 4, and hold for 1, 2, 3, 4.

You can open your eyes now, or not. It's really up to you.

Slow, deep breaths can help heighten your concentration and relieve stress. They help you feel more relaxed because your body is mimicking the way it behaves when you're actually relaxed, sending signals to your brain to calm down and decrease heart rate, slow fast breathing, and lower high blood pressure.

On an average day, you'll take around 21,600 breaths. In doing so, your respiratory muscles continuously contract and relax, all day, and all night. How often do you consider the air that moves in and out of your lungs? What exactly are we breathing in and out 21,600 times a day?

The island known as Montreal is dotted with over a dozen large but unassuming metal boxes. If you passed by them, you might just think they're enclosed electrical panels, but what they're really doing is the work of monitoring the city's air. They're found all over the island including in the Botanical gardens, the Decarie interchange, and the Montreal Airport. Each station monitors a variety of pollutants in the air, coming together to create Montreal's Air Quality Index, AQI for short. This monitoring happens and is reported in real time. Through an interactive map on the city's website, you can see where the stations are, what they look like, and check their readings.

According to the World Health Organization (or the WHO), Montreal's air quality is okay. The WHO's target goal for clean air is to be under 10 micrograms of fine particulate matter per cubic meter. The particles that are included in measuring AQI are small, approximately 30 times smaller than the diameter of a human hair. They're pollutants like sulfate, nitrates and black carbon. Because these particles are so small, they're able to penetrate deep into our lungs and affect our breathing for both the short term and the long term. Fine particulate matter irritates your respiratory tract, aggravates cardiovascular diseases and can contribute to early deaths. Globally, outdoor air pollution is linked to 4.2 million premature deaths every year. In Canada, it's around 15,300 deaths every year.

In 2019 Montreal's AQI averaged out at 10 micrograms of fine particulate matter per cubic meter. So we made it into the WHO's target goal, but just barely. And while Montreal rarely ranks as one of the 10 most polluted cities in Canada, it's not often we're far off, sometimes coming in around number 13. There's a few factors that contribute to air pollution in Montreal. Industry plays a pretty big role. Montreal has the second highest GDP of all Canadian cities. It manufactures and produces aircrafts, electronic goods, pharmaceuticals, and textiles among other things. It's also one of the largest port cities in the country, handling an average of 26 million tons of cargo every year. In 2019, Montreal shipped 88.7 billion dollars worth of goods around the globe.

In addition to industry's impact on the city's air quality, there's also transportation to consider, which is part of the reason that surprisingly, January, February and March have the worst air quality of the year.

When reflecting on life in the winter, we might prefer to ignore some of its realities. Like how freezing winds can penetrate through even the thickest layers, or the degree to which snow, ice, and cold impair ease of mobility around the city. In order to cope with the winter's chill, vehicles and fuel based transportation are used far more frequently, and heaters get cranked up to keep pipes from freezing and people warm. Today, electric heating is most prevalent in Quebec, but once upon a time, really not that long ago at all, many people were using heating systems that burned solid matter such as wood, eco-logs, or coal. Wood heating might seem rustic and maybe even outdated to many of us who live in cities, but between 1990 and 2010, the number of households that were using wood heating nearly doubled. This increase in popularity can at least be partially attributed to the 1998 ice storm which temporarily displaced 600,000 people and cut electricity off for nearly 1.4 million customers in Quebec for up to 30 days in some places. After that, wood heaters must have seemed more secure. Who would want to run the risk of being left without heat in a winter storm...again?

The smell of wood fire burning and the sight of smoke spiraling out of chimneys toward the sky are generally synonymous with warmth, comfort and respite from winter weathers. A wood fire can seem harmless, especially when you consider the impacts that getting energy from sources like fossil fuels and natural gasses have on the environment. But wood heating is a massive source of air pollutants like carbon monoxide, nitrogen oxide, and volatile organic compounds. A study showed that 42.7% of fine particle emissions in Quebec from 2002 to 2008 were coming from residential wood burning, while 41% came from industry, 15.6% from transportation, and 1.2% from other sources. In 2015, Montreal began rolling out by-laws that limited the use of these heating systems. Then, in 2018 a new by-law banned the use of any units not approved by the Environmental Protection Agency. The ban has been effective too, especially in the winter months when fireplaces were used most frequently contributing to dangerous winter smog.

In Montreal, April through October will generally have the best quality of air, with the exception of July. Since 2014, Montreal's smog days have been going down, but since 2016 poor air quality days have been going up. A study published in 2019 showed that between 2016 and 2018, fine particle pollution levels increased by 5.5%. This might be in part due to a growing economy, but in that 2016-2018 time frame, something else happened. There were record breaking wildfires in British Columbia, the bulk of which occurred over the month of July. 2017's B.C. wildfires were the worst in the province's history at the time, and then the wildfires of 2018 surpassed that record. Because air's movement is not dictated by boundaries or borders, it can go...everywhere. Which means that the impacts of smoke and the particulate matter that gets released into the atmosphere by an event like a wildfire, or any other type of pollution has an affect on the air that we breathe, even if it happens all the way across continents.

So, barring the month of July, Spring through fall provides a reprieve from the worst of the air pollution. But these months come with an increase in another airborne irritant that affects our breathing, pollen. Since over a million people in Quebec suffer allergies caused by hay fever, you've probably seen its effects first hand. Whether it's through your own experience of an incessantly itchy roof of your mouth, or listening to others gripe about their congested and running nose, or maybe the feeling of growing concern as you listen to your neighbour through the thin wall that separates your apartments sneeze more times than you can even count.

You're also probably familiar with Ragweed, a pollen producing and hay fever causing invasive species that is commonly found in Quebec. While the plant is native to North America, its range was far more limited before the arrival of European colonizers. Soil samples show that Ragweed travelled Westward with them alongside the colonial project, perhaps by seeds that were picked up by their wagon wheels, or during the cutting down of forests and clearing for farmland. Because of the global travel made by European colonizers, Ragweed has spread widely and can now be found on every continent except Antarctica.

Ragweed is resilient and can grow in even the worst of soil. You might see it along sidewalks, highways, vacant lots, construction sites, industrial areas, and even in the city's snow dump sites. Its seeds can lay dormant for up to 40 years, and a single plant can produce up to one billion pollen grains a season.

For some of us, ragweed troubles begin when the plant first blooms in July producing and emitting pollen into the air, continuing to do so until October when it dies off in the frost. But as the climate changes, and earth's average temperature warms, the length and timing of our seasons are affected too. Warmer temperatures mean an earlier Spring and with that, an earlier, longer allergy season. An increase in CO₂ in the atmosphere contributes as well, as this gas helps plants to grow bigger. In combination, these two things mean more pollen in the air for longer periods of time. An increase in pollen is more pronounced from south to north so the more northern that the city is located, the higher the pollen counts it'll have. Making it no surprise that pollen rates in Montreal are already steadily increasing.

People who live in cities also experience allergies more so than those who live rurally. When pollen lands in areas with vegetation, it clings to soil or plants. But, when pollen hits concrete, it'll settle for a moment, only to be brought back up again with the next passing gust of wind, and again with every gust that follows. There's also the issue of the sex of plants. Some plants are only male or only female, which means they can only make pollen or they can only make seeds. These are called dioecious plants. A lot of the vegetation that is planted through urban planning and greening projects end up being male dioecious plants as the flowers and fruits from female vegetation will fall to the ground, getting crushed into the sidewalk and inevitably needing to be cleaned up. As a result, cities, including Montreal, end up with a high density of male plants, happily producing and spreading pollen all around town, making the warm weather harder to manage for the 1 in 5 people who experience seasonal allergies. With just a bit of smarter planning, we could make our air a lot more breathable for a lot of people.

So, one last time, let's take another moment and come back to where we started.

Take a deep breath in, and a deep breath out. Focus on your lungs as they expand to fill with air, observe how they contract as you release each deep breath. In each release of air, remember that what you are breathing out, I am breathing in.