F R H S MUN 2022

Background Guide

Beginning Security Council:

Pollution Effects on Human Health and Sustainable Community Development

FRHSMUN 2022

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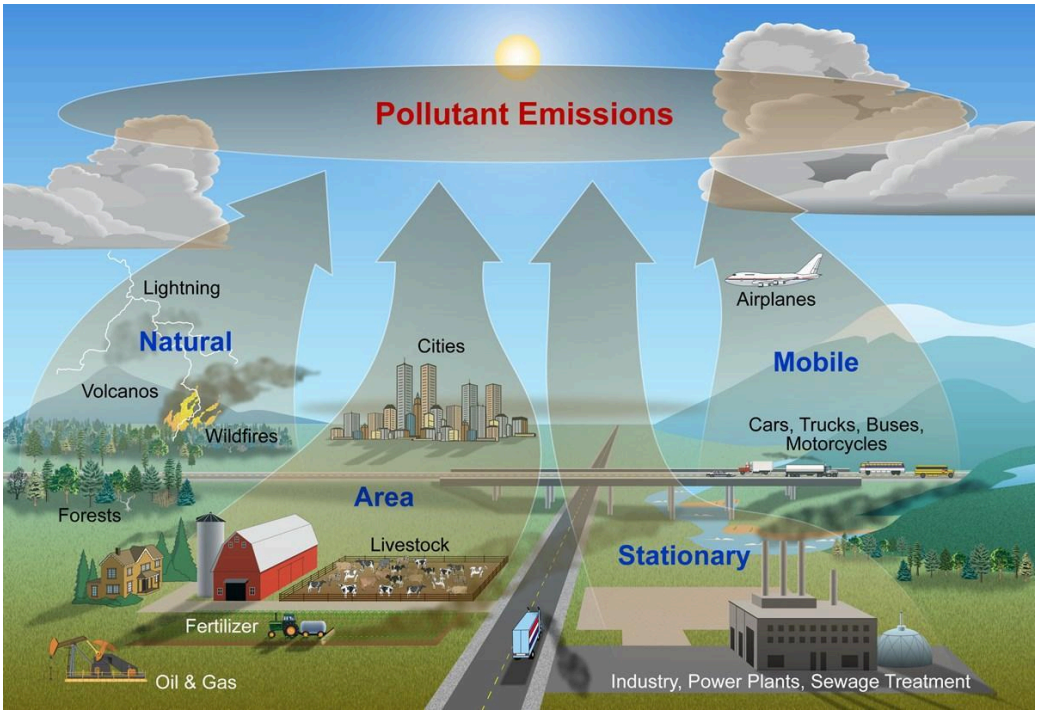
Background Guide written by Spencer Fritzler and Nicholas Doing

Air Pollution

Current Status on Air Pollution



Air Pollution kills an estimated 7 million people per year[1]. 99% percent of the world's population breaths air that is above the [WHO guideline for safe air.]

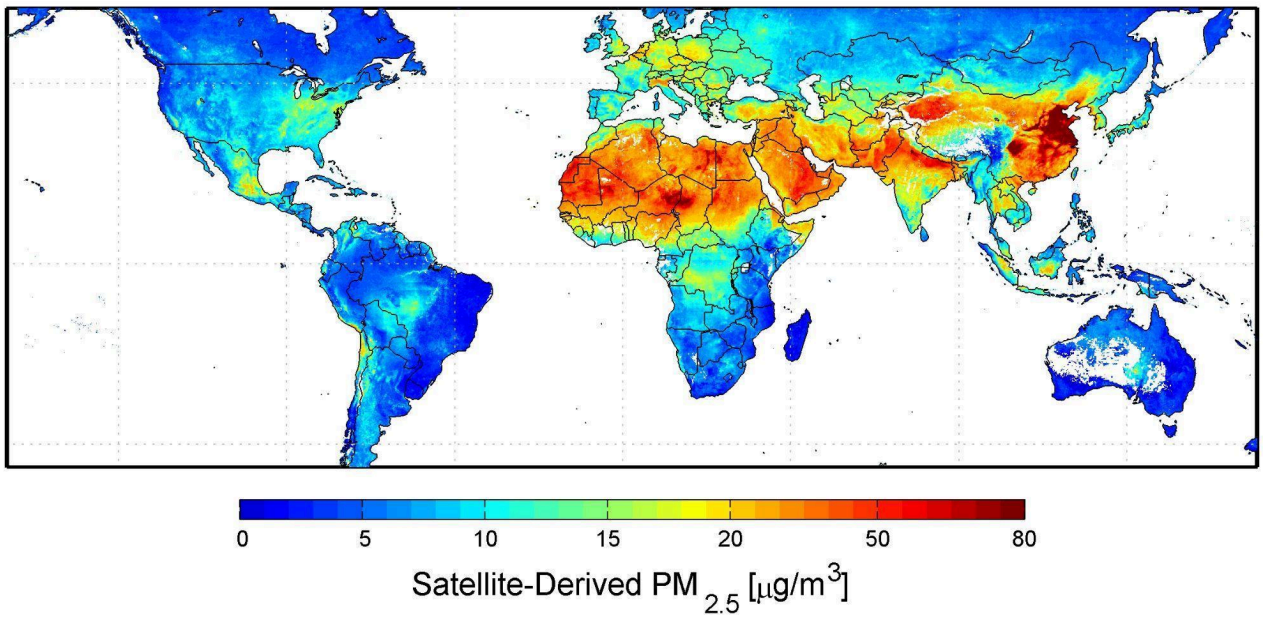
WHO Air Guideline

The World Health Organization recognizes 6 air pollutants[2]. Particulate Matter (PM), Ozone (O3), Nitrogen Dioxide (NO2), Sulfur Dioxide (SO_2), and Carbon Monoxide (CO).

[1] "Air Pollution." *WHO | World Health Organization*, 30 July 2019, www.who.int/health-topics/air-pollution#tab=tab_1.
[2] "New WHO Global Air Quality Guidelines Aim to Save Millions of Lives from Air Pollution." *WHO | World Health Organization*, 22 Sept. 2021, www.who.int/news/item/22-09-2021-new-who-global-air-quality-guidelines-aim-to-save-millions-of-lives-from-air-pollution.

The WHO however only sets guidelines for three pollutants. These guidelines are annual mean concentrations of PM not exceeding 5 µg/m3 and NO2 not exceeding 10 µg/m3, and the peak season mean 8-hr ozone concentration not exceeding 60 µg/m3[3].

Dangerous levels of Particulate Matter has been linked to cardiovascular effects such as cardiac arrhythmias and heart attacks, and respiratory effects such as asthma attacks and bronchitis[4]. Ozone exposure in various levels can cause coughing and sore or scratchy throat, make it more difficult to breathe deeply and vigorously and cause pain when taking a deep breath, inflame and damage the airways. Furthermore ozone exposure make the lungs more susceptible to infection, aggravates lung diseases such as asthma, emphysema, and chronic bronchitis, and increases the frequency of asthma attacks[5]. Nitrogen Dioxide can cause damage to the human respiratory tract and increases a person's vulnerability to, and the severity of respiratory infections and asthma. Long-term exposure to high levels of nitrogen dioxide can also cause chronic lung disease.[6]



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[3] "WHO Air Quality Guidelines 2021–Aiming for Healthier Air for All: A Joint Statement by Medical, Public Health, Scientific Societies and Patient Representative Organisations." Frontiers, www.ssph-journal.org/articles/10.3389/ijph.2021.1604465/full#:~:text=The%20new%20air%20quality%20guidelines,%2Fm3%20%5B1%5D.

[4] "How Does PM Affect Human Health? | Air Quality Planning Unit | New England | US EPA." *U.S. Environmental Protection Agency | US EPA*, www3.epa.gov/region1/airquality/pm-human-health.html#:~:text=Health%20studies%20have%20shown%20a,as%20asthma%20attacks%20and%20bronchitis.

[5] "Health Effects of Ozone Pollution." US EPA, 5 May 2021, www.epa.gov/ground-level-ozone-pollution/health-effects-ozone-pollution#:~:text=Ozone%20can%20cause%20the%20muscles,trapping%20air%20in%20the%20alveoli.&text=Inflame%20and%20damage%20the%20airways,%2C%20emphysema%2C%20and%20chronic%20bronchitis.

[6] "Nitrogen Oxides." Queensland Government | Queensland Government, 29 Aug. 2013, www.qld.gov.au/environment/pollution/monitoring/air/air-pollution/pollutants/nitrogen-oxides#:~:text=Elevated%20levels%20of%20nitrogen%20dioxide,can%20cause%20chronic%20lung%20disease.

Regulations

WHO regulations, however, are not legally binding. The U.N. has passed voluntary resolutions urging nations to limit air pollution but again these resolutions have no consequence for violation. The following entities who have joined the Batumi Action for Cleaner Air (BACA), Armenia, Austria, Azerbaijan, Belarus, Belgium, Canada, Croatia, Czech Republic, Estonia, France, Georgia, Germany, Hungary, Italy, Latvia, Lithuania, Netherlands, Poland, Portugal, Republic of Moldova, Romania, Slovenia, Spain, Sweden, Switzerland, United States of America, and Uzbekistan[7].

Sources of Air Pollution

Ground level ozone is produced through reactions in the oxides of nitrogen (NOx) and volatile organic compounds (VOCs) in sunlight. These original compounds are produced from cars, power plants, industrial boilers, refineries, chemical plants, and generally any powered equipment. This leads to ozone pollution being common in urban areas.[8]

Sustainable Community Development

Background and Current Status on Urban Development

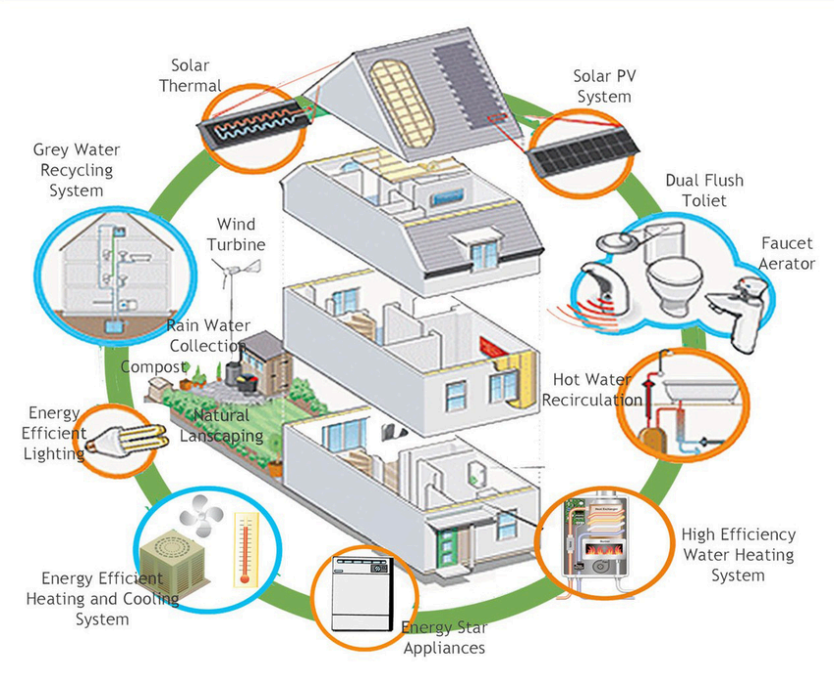
As climate change has climbed the ranks as a prominent social and political issue across the globe, moves have been made to begin mitigating and stabilizing its effects. Many nations have begun integrating more sustainable, ‘green’ and ‘eco-friendly’ buildings and infrastructure in their cities.

The switch to sustainable development has been a slow process, beginning with more energy efficient appliances and electric grids, as well as singular sustainable built and

[7] "BACA." UNECE, unece.org/baca#:~:text=At%20the%208th%20Environment%20for,ecosystems%20%E2%80%93%E2%80%93%20and%20welcomed%20the%20initiatives.

[8] "Ground-Level Ozone (O3) Pollution." ADEQ Arizona Department of Environmental Quality | Our Mission is to Protect and Enhance Public Health and the Environment, www.azdeq.gov/ground-level-ozone-o3-pollution#:~:text=Ground%2Dlevel%20ozone%20comes%20from,solvents%2C%20and%20motorized%20lawn%20equipment.

maintained buildings similar to the ‘Pixel Building’ in Melbourne Australia, and the ‘Marco Polo Tower’ in Hamburg Germany. [9]



Urban areas are often touted as the lead proponent of climate change, however they offer distinct advantages over widespread land use. They allow for living spaces and economic centers to be confined to smaller overall land areas, thereby allowing for preservation of ecosystems and smaller energy use for transportation of electricity and materials.

Urbanization opens up currently underutilized opportunities for advancements in sustainable living among the majority population of developed countries. As research on resource depletion and pollution unveils more room for growth, it is imperative that steps are taken to integrate more sustainable options as development continues worldwide.

Eco-Friendly Construction Materials

As environmental reform becomes more vital by the day, further construction, urban planning and architectural development in urban areas requires an update considering the materials, and energy sources.

Breakthroughs in green construction have long existed, however for the most part there has been little global implementation of these methods. Materials such as permeable pavement or pavered walk and roadways hold the key to mitigating numerous long standing urban issues. Increased opportunity for percolation of precipitation back into groundwater as a result of said road paving materials prevents flooding after heavier rain seasons, and allows for more stable regeneration of aquifers, that cities often rely on for their water supply.

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[9] Syahid, Ahmad, and Mohammad Ali Tareq. “Figure 2: Illustrated List of Sustainable Features in Homes .” *ResearchGate*, 31 July 2018, https://www.researchgate.net/figure/Illustrated-list-of-sustainable-features-in-homes_fig2_301794433.

Concrete often used for sidewalks, roadways, building foundations, ect. has a high carbon footprint when compared to the majority of other commonplace building materials. The cement industry alone accounts for 8% of all global carbon emissions[10]. More eco-friendly options to the concrete problem include “Hempcrete” a concrete like material made from the fibers in Hemp stems, and “Ashcrete” which is a recycled concrete alternative, and a derivative of ash from coal burning plants. Another emerging alternative is Ferrok, which is created when recycled steel dust and other materials are forged together to create a much stronger version of concrete. Most importantly Ferrok absorbs carbon during the drying and hardening process, making the material carbon neutral.[11]

Outside of cities in more suburban and rural communities, there are also green alternatives for residential home construction. On the broader scale of home construction, earth-based materials and methods such as adobe, cob, and “Rammed Earth” are largely regarded as historical construction techniques, however they have risen in popularity for their cost efficient, eco-friendly, and temperature regulating qualities. Other green foundational and framing materials include bamboo, recycled steel, straw bales, and recycled wood.

More niche parts of home and building structure may be substituted, such as fiberglass insulation to sheeps wool. Proper insulation may also lead to reduced energy use and cost associated with heating and cooling systems. Passive solar heating through large windows or skylights paired with proper insulation can reduce or eliminate the need for AC systems in urban buildings and residential homes.

Global Responsibility and Accountability

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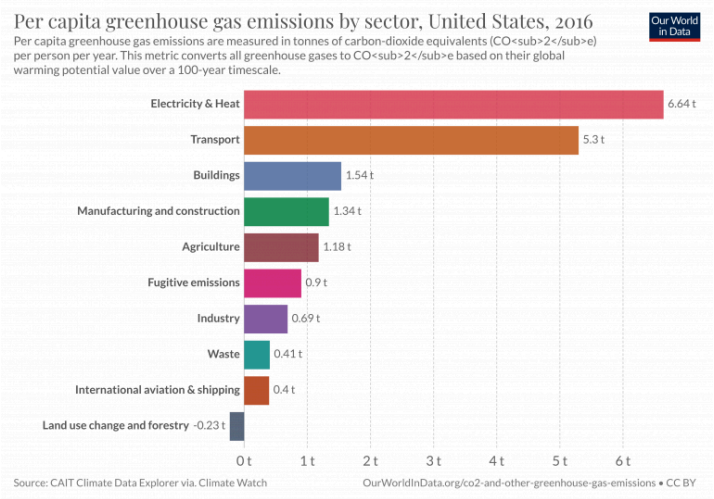
10 “Concrete Needs to Lose Its Colossal Carbon Footprint.” *Nature News*, Nature Publishing Group, 28 Sept. 2021, https://www.nature.com/articles/d41586-021-02612-5#:~:text=But%20concrete%20has%20a%20colossal,into%20moulds%20before%20it%20dries.

11 Gunshinan, Jim. “The Benefits of Building a Hempcrete House.” *Treehugger*, Treehugger, 19 Feb. 2021, https://www.treehugger.com/hempcrete-house-5113218.

The top five carbon emitters account for 58.41% of global carbon emissions[12]. These nations such as the United States and China also account for the large majority of product production, military and economic power, establishing their hold on the climate issue. [13]



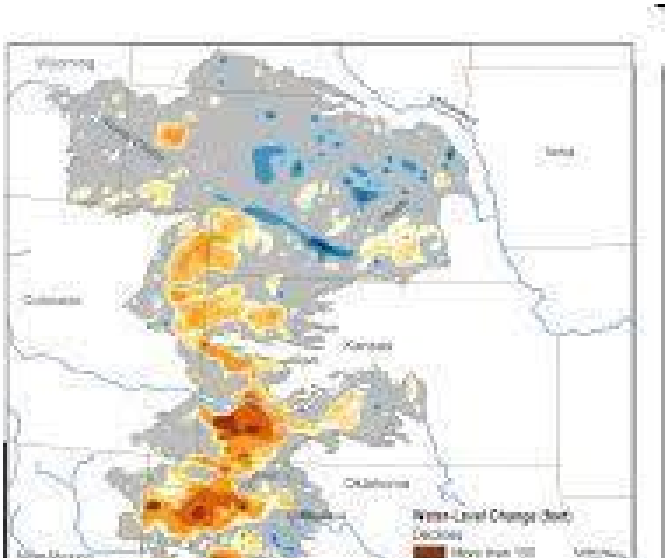
The nations which are least responsible for carbon emissions will experience the worst life-threatening effects of climate change, as many of them do not possess the resources to mitigate the potential damage. Without the large resilient economies associated with the industries responsible for most of the factors of environmental degradation, millions of people in developing countries will lose their homes and livelihoods to droughts, floods, fires and intolerable temperature conditions.

In the likely event that there is no effective program to avoid environmental collapse by the big emitters, there will be a significant need for efforts to help peoples around the world adapt to these new conditions. Within that question is how much the responsibility of achieving those adaptations falls to the larger global carbon contributors?

The Water Problem

Approximately 6% of the world does not have access to clean water, that percentage is prone to increase on the basis of continuous unaltered water source depletion and pollution. [14]

Consideration for minimizing water use and water pollution in both construction and continued residence/commercial use needs to be an area of focus. As aquifers are depleted consistently on the basis of being



12 "CO2 Emissions by Country." *Worldometer*, https://www.worldometers.info/co2-emissions/co2-emission

13 Ritchie, Hannah, and Max Roser. "Emissions by Sector." *Our World in Data*, 11 May 20

14 Scott, Michon. "National Climate Assessment: Great Plains' Ogallala Aquifer Drying Out." *National Clima* https://www.climate.gov/news-features/featured-images/national-climate-assessment-great-plains%E2%80%

the main source of water for major towns and cities. In the United States the Ogallala aquifer located under the western plains is close to exhaustion after being the main water source for most of the surrounding states. Without more conscientious planning going into watersheds and sources, global communities will lose access to clean water, and agriculture won't be the only industry to suffer.

Guiding Questions

- How Can the UN oversee the unified integration of more environmentally friendly development as global populations grow?
- How should responsibility for potential necessary adaptation be divided among nations?
- How can water be better regulated to be more sustainable in urban areas?