

How trees prevent air pollution assignment

[Environment](#), [Air](#)



Many cities are notorious for their dangerously high levels of air pollution and the resulting health issues, such as asthma and emphysema. Summer heat and vehicle emissions are just a few of the contributing factors that increase air pollution levels. However, healthy trees planted effectively along roads, buildings and in parking lots can decrease overall air pollution levels for city residents. Trees can remove both gaseous air pollutants and particulate matter. Gaseous air pollution enters a tree through leaf stomata and is either held in intracellular cavities or processed into usable nutrients.

According to David Knack's report, "The Effects of Urban Trees on Air Quality" for the USDA Forest Service, particulate matter usually collects on the surface of trees. The particulates often enter the ground by either being washed off the tree by precipitation or falling to the ground with leaves and twigs. Larger trees tend to be much more effective, by approximately 70%, at removing air pollutants than smaller trees. Over the course of one year, trees removed an estimated 1, 821 metric tons of air pollution in New York City.

Trees reduce surrounding air temperature and create their own microclimates through transpiration and the effects of tree canopies. Tree canopies not only provide shade but they also reduce solar radiation absorption and provide heat storage. The larger the tree canopy, the greater the reduction of surrounding air temperature. Decreasing air temperature is effective in reducing air pollution because many of the chemicals that create pollution are temperature dependent. Shade from trees planted in parking lots can create small reductions, 1 to 2%, of the levels of harmful emissions produced from car ignitions.

<https://assignbuster.com/how-trees-prevent-air-pollution-assignment/>

Trees can keep buildings cooler in the summer and more insulated in winter. By blocking solar radiation and creating a cooler microclimate, trees offer buildings protection from summer heat. During winter, trees can provide effective wind breaks and block drafts from entering structures. This lowers the amount of energy used to heat or cool the building and reduces the air pollution created in the production of energy. For trees to be the most effective in improving air quality they need to be placed in appropriate locations. According to Francisco Scooped in his article, “ Urban

Forests in Florida: Do they reduce air pollution? ” on the University of Florida BIAS Extension website, scattered trees are less effective in reducing air pollution. Stands of trees or dense evergreens provide more effective removal of particulate matter and protection from solar radiation than scattered deciduous trees. Trees surrounding buildings should be placed in areas that provide protection from solar radiation in summer and block winter wind. The types of trees used are as important as their placement. Healthy, hardy and long lived trees are the best choice.

Avoiding trees that require frequent maintenance will lower the amount of pollution emitted by fossil-fueled machines like chainsaws, leaf blowers and wood chippers. Knack's studies revealed that mulberry, cherry, linden and honeysuckle trees were especially effective in reducing ozone levels. Trees help to settle out, trap and hold particle pollutants (dust, ash, pollen and smoke) that can damage human lungs. Trees absorb CO₂ and other dangerous gases and, in turn, replenish the atmosphere with oxygen. Trees produce enough oxygen on each acre for 18 people every day.

Trees absorb enough CO₂ on each acre, over a year's time, to equal the amount you produce when you drive your car 26,000 miles. Trees remove gaseous pollutants by absorbing them through the pores in the leaf surface. Particulates are trapped and filtered by leaves, stems and twigs, and washed to the ground by rainfall. Air pollutants injure trees by damaging their foliage and impairing the process of photosynthesis (food making). They also weaken trees making them more susceptible to other health problems such as insects and diseases.

The loss of trees in our urban areas not only intensifies the urban "heat-island" effect from loss of shade and evaporation, but we lose a principal absorber of carbon dioxide and trapper of other air pollutants as well. Some of the major air pollutants and their primary sources are: Carbon dioxide: Burning oil, coal, natural gas for energy. Decay and burning of tropical forests. Sulfur dioxide: Burning coal to generate electricity. Hydrogen fluoride and silicon tetrachloride: Aluminum and phosphate fertilizer production, oil refineries, and steel manufacturing.

Ozone: Chemical reactions of sunlight on automobile exhaust gases. Ozone is a major pollutant in smog. Methane: Burning fossil fuels, livestock waste, landfills and rice production. Nitrous oxides: Burning fossil fuels and automobile exhausts. Chlorofluorocarbons: Air conditioners, refrigerators, industrial foam. The burning of fossil fuels for energy and large scale forest fires such as in the tropics are major contributors to the buildup of CO₂ in the atmosphere. Managing and protecting forests and planting new trees

reduces CA levels by storing carbon in their roots and trunk and releasing oxygen into the atmosphere.

Trees help to settle out, trap and hold particle Laotians (dust, ash, pollen and smoke) that can damage human lungs. Trees absorb CA and other dangerous gases and, in turn, replenish the atmosphere with oxygen. Trees produce enough oxygen on each acre for 18 people every day. Trees absorb enough CA on each acre, over a year's time, to equal the amount you produce when you drive your car 26, 000 miles. Trees remove gaseous pollutants by absorbing them through the pores in the leaf surface.

Particulates are trapped and filtered by leaves, stems and twigs, and washed to the ground by rainfall.

Air pollutants injure trees by damaging heir foliage and impairing the process of photosynthesis (food making). They also weaken trees making them more susceptible to other health problems such as insects and diseases. The loss of trees in our urban areas not only intensifies the urban “ heat-island” effect from loss of shade and evaporation, but we lose a principal absorber of carbon dioxide and trapper of other air pollutants as well. Some Of the major air pollutants and their primary sources are: Carbon dioxide: Burning Oil, coal, natural gas for energy.

Decay and burning of tropical forests. Sulfur dioxide: Burning coal to generate electricity. Hydrogen fluoride and silicon tetrachloride: Aluminum and phosphate fertilizer production, oil refineries, and steel manufacturing. Ozone: Chemical reactions of sunlight on automobile exhaust gases. Ozone is a major pollutant in smog. Methane: Burning fossil fuels, livestock waste,

<https://assignbuster.com/how-trees-prevent-air-pollution-assignment/>

landfills and rice production. Nitrous oxides: Burning fossil fuels and automobile exhausts. Chlorofluorocarbons: Air conditioners, refrigerators, industrial foam.

The burning of fossil fuels for energy and large scale forest fires such as in the tropics are major contributors to the buildup of CA in the atmosphere. Managing and protecting forests and planting new trees reduces CA levels by storing carbon in their roots and trunk and releasing oxygen into the atmosphere. Trees and other vegetation must use what is in their environment. So it is not surprising to find that they absorb pollutants (natural or man made) which may be absorbed successfully or may cause the vegetation to die.

Vegetation plays an unexpectedly large role in cleansing the atmosphere, a new study finds. The research, led by scientists at the National Center for Atmospheric Research (NCAR) in Boulder, Colo. , uses observations, gene expression studies, and Computer modeling to show that deciduous plants absorb about a third more of a common class of air-polluting chemicals than previously thought. The ways that trees can help to clean the air should not be overlooked. Trees are an important, cost-effective solution to reducing pollution and improving air quality.

Trees help to lower air temperatures and the urban heat island effect. This reduction of temperature not only lowers energy use, it also improves air quality, as the formation of ozone is dependent on temperature. Trees also reduce pollution by actively removing it from the atmosphere. Leaf stomata, the pores on the leaf surface, take in polluting gases which are then

absorbed by water inside the leaf. Some species of trees are more susceptible to the uptake of pollution, which could negatively affect plant growth.

Ideally, trees should be selected that take in higher quantities of polluting gases and are resistant to the negative affects they can causes study across the Chicago region determined that trees removed approximately 17 tons of carbon monoxide (CO), 93 tons of lawful dioxide (ASS), 98 tons of nitrogen dioxide (NON), and 210 tons of ozone in 1 991. The new study, results of which are being published this week in Science Express, was conducted with co-authors from the University of Northern Colorado and the University of Arizona. Plants clean our air to a greater extent than we had realized," says NCAR scientist Thomas Karl, the lead author. " They actively consume certain types of air pollution. " The research team focused on a class of chemicals known as oxygenated volatile organic compounds (Voss), which can have long-term impacts on the environment and human health. " The team has made significant progress in understanding the complex interactions between plants and the atmosphere," says Anne-Marie Schmeltzer of Ann.'s Division of Atmospheric and Space Sciences.

The compounds form in abundance in the atmosphere from hydrocarbons and other chemicals that are emitted from both natural sources—including plants?? and sources related to human activities, including vehicles and construction materials. Eventually, some Voss may evolve into tiny airborne particles, known as aerosols, that have important effects on clouds and human health-By measuring VOCE levels in a number of ecosystems in the

United States and other countries, the researchers determined that deciduous plants appear to be taking up the compounds at an unexpectedly fast rate—as much as four times more rapidly than previously thought.

The uptake was especially rapid in dense forests and most evident near the tops of forest canopies, which accounted for as much as 97 percent of the VOCE uptake that was observed. The scientists moved their research into their laboratories and focused on poplar trees. The species offered a significant advantage in that its genome has been sequenced. The team found that when the study trees were under stress, either because of a physical wound or because of exposure to an irritant such as ozone pollution, they began sharply increasing their uptake of Voss.

At the same time, changes took place in expression levels Of certain genes that indicated heightened metabolic activity in the poplars. The uptake of Voss, the scientists concluded, appeared to be part of a larger metabolic cycle. Len order to metabolize these chemicals, the plants start increasing the levels of enzymes that transform the chemicals into less toxic substances. At the same time, as it turns out, the plant draws down more Voss, which can be metabolize by the enzymes. Our results show that plants can actually adjust their metabolism and increase their uptake of atmospheric chemicals as a response to various types of stress,” says Channel Bass of the University of Northern Colorado, a co-author. “ This complex metabolic process within plants has the side effect of cleansing our atmosphere. “ Once they understood the extent to which plants absorb Voss,

the research team fed the information into a computer model that simulates chemicals in the atmosphere worldwide.

The results indicated that, on a global level, plants are taking in 36 percent more Voss than had previously been accounted for in studies of atmospheric constitutionality's, since plants are directly removing the Voss, fewer of the compounds are evolving into aerosols. A poet (Joyce Kilmer) once said: " I think that shall never see A poem lovely as a tree.