Air water and land pollution assignment

Environment, Air

Workbook, audio, more! Www. Lugubriousness’s. Com Air pollution is a general term that covers a broad range of contaminants in the atmosphere. Elution can occur from natural causes or from human activities. Discussions about the effects of air pollution have focused mainly on human health but attention is being directed to environmental quality and amenity as well. Air pollutants are found as gases or particles, and on a restricted scale they can be trapped inside buildings as indoor air pollutants.

Urban air pollution has long been an important concern for civic administrators, but increasingly, air pollution has become an international problem. The most characteristic sources of air pollution have always been ambition processes. Here the most obvious pollutant is smoke. However, the widespread use of fossil fuels has made sulfur and nitrogen oxides pollutants of great concern. With increasing use of petroleum-based fuels, a range of organic compounds have become widespread in the atmosphere. In urban areas, air pollution has been a matter of concern since historical times.

Indeed, there were complaints about smoke in ancient Rome. The use of coal throughout the centuries has caused cities to be very smoky places. Along with smoke, large concentrations of sulfur dioxide were produced. It was this suture of smoke and sulfur dioxide that typified the foggy streets of Victorian London, paced by such figures as Sherlock Holmes and Jack the Ripper, whose images remain linked with smoke and fog. Such situations are far less common in the cities Of North America and Europe today.

However, until recently, they have been evident in other cities, such as Ankara, Turkey, and Shanghai, China, that rely heavily on coal. Coal is still burned in large quantities to produce electricity or to refine metals, but these processes are frequently undertaken outside cities. Within urban areas, fuel use has shifted award liquid and gaseous hydrocarbons (petroleum and natural gas). These fuels typically have a lower concentration of sulfur, so the presence of sulfur dioxide has declined in many urban areas.

However, the widespread use of liquid fuels in automobiles has meant increased production of carbon monoxide, nitrogen oxides, and volatile organic compounds. Primary pollutants such as sulfur dioxide or smoke are the direct emission products of the combustion process. Today, many of the key pollutants in the urban atmospheres are secondary pollutants, produced by processes initiated through photochemical reactions. The Los Angles, California-type, photochemical smog is now characteristic of urban atmospheres dominated by secondary pollutants.

Although the automobile is the main source of air pollution in contemporary cities, there are other equally significant sources. Stationary sources are still important and the oil-burning furnaces that have replaced the older coal-burning ones are still responsible for a range of gaseous emissions and fly ash. Incineration is also an important source of complex combustion products, especially where this incineration burns a wide range of refuse. These emissions can include chlorinated hydrocarbons such as dioxin.

When plastics, which often contain chlorine, are incinerated, hydrochloric acid is found in the waste gas stream. Metals, especially since they are volatile at high temperatures, can migrate to smaller, resalable particles. The accumulation of toxic metals, such as cadmium, on fly ash gives rise to concern over harmful effects from incinerator emissions. In specialized incinerators designed to destroy toxic compounds such as polycarbonate phenols (BPCS), many questions have been raised about the completeness of this destruction process.

Even under optimum conditions when the urinate operation has been properly maintained, great care needs to be taken to control leaks and losses during transfer operations (fugitive emissions). The enormous range of compounds used in modern manufacturing processes has also meant that there is an ever-widening range of emissions from both the industrial processes and the combustion of their wastes. Although the amounts of these toxic compounds are often rather small, they add to the complex range of compounds found in the urban atmosphere.

Again, it is not only the deliberate loss of effluents through discharge from pipes and chimneys that needs attention. Fugitive emissions of volatile substances that leak from valves and seals often warrant careful control. Air pollution control procedures are increasingly an important part of civic administration, although their goals are far from easy to achieve. It is also noticeable that although many urban concentrations of primary pollutants, for example, smoke and sulfur dioxide, are on the decline in developed countries, this is not always true in developing countries.

Here the desire for rapid industrial growth has often lowered urban air quality. Secondary air pollutants are generally proving a more difficult problem to eliminate than primary pollutants like smoke. Smog covers the Los Angles basin. (Photo by Walter A. Lyons, AVIVA Productions. Reproduced by permission.) AIR POLLUTION AND HEALTH PROBLEMS urban air pollutants have a wide range of effects, With health problems being the most enduring concern. In the classical polluted atmospheres filled with smoke and Suffer dioxide, a range of bronchial diseases was enhanced.

While respiratory diseases are still the principal problem, the issues are somewhat more subtle in atmospheres where the air pollutants are not so obvious. In photo-chemical smog, eye irritation from a secondary pollutant, approximately titrate (PAN), is one of the most characteristic direct effects of the smog. High concentrations of carbon monoxide in cities where automobiles operate at high density mean that the human heart has to work harder to make up for the oxygen displaced from the blood’s hemoglobin by carbon monoxide.

This extra stress appears to reveal itself through increased incidence of complaints among people with heart problems. There is a widespread belief that contemporary air pollutants are involved in the increases in asthma, but the links between asthma and air pollution are probably rather complex and related to a whole range of factors. Lead, from automotive exhausts, is thought by many to be a factor in lowering the IIS of urban children. Air pollution also affects materials in the urban environment.

Soiling has long been regarded as a problem, originally the result of the smoke from wood or coal fires, but now increasingly the result of fine black soot from diesel exhausts. The acid gases, particularly sulfur dioxide, increase the rate of destruction of building materials. This is most noticeable with calcareous stones, which are the predominant building material of many important historic structures. Metals also suffer from atmospheric acidity. In today's photochemical smog, natural rubbers crack and deteriorate rapidly. Health problems relating to indoor air pollution are extremely ancient.

Anthracnose, or black lung disease, has been found in mummified lung tissue. Recent decades have witnessed a shift from the predominance of concern about outdoor air pollution into a widening interest in indoor air quality. The production of energy from combustion and the release of solvents is so large in the contemporary world that it causes air pollution problems of regional and global nature. Acid rain is now widely observed throughout the world. The sheer quantity of carbon dioxide emitted in combustion processes is increasing the concentration of carbon dioxide in the atmosphere and enhancing the greenhouse effect. Courtesy of IS . S. Government publication.) Solvents, such as carbon tetrachloride and the aerosol propellants chlorofluorocarbons (CIFS) are now detectable all over the globe and responsible for problems such as ozone layer depletion. At the other end of the scale, we need to remember that gases leak indoors from the polluted outdoor environment, but more often the serious pollutants arise from processes that take place indoors. Here there has been particular concern with regards to the generation of nitrogen oxides by sources such as gas stoves.

Similarly, formaldehyde from insulating foams causes illnesses and adds to concerns about our exposure to a substance that may induce cancer in the long run. In the last decade it has become clear that radon leaks from the ground can expose some members of the public to high levels of this radioactive gas within their own homes. Cancers may also result from the emanation of solvents from consumer products?? glues, paints, and mineral fibers (asbestos). More generally these compounds and a range of biological trials?? animal hair, skin, pollen spores, and dusts?? can cause allergic reactions in some people.

At one end of the spectrum these simply cause annoyance, but in extreme cases, such as found with the bacterium Legionary , a large number of deaths can occur. There are also important issues surrounding the effects of indoor air pollutants on materials. Many industries, especially the electronics industry, must take great care over the purity of indoor air where a speck of dust can destroy a microchip or low concentrations of air pollutants change the composition of surface films in component design.

Museums must care for objects over long periods of time, so precautions must be taken to protect delicate dyes from the effects of photochemical smog, paper and books from sulfur dioxide, and metals from sulfide gases. AIR QUALITY Air quality is determined with respect to the total air pollution in a given area as it interacts with meteorological conditions such as humidity, temperature, and wind to produce an overall atmospheric condition. Poor air quality can manifest itself aesthetically (as a displeasing odor, for example), and can also result in harm to plants, animals, and people, and even damage to objects.

As early as 1 881, cities such as Chicago, Illinois, and Cincinnati, Ohio, passed laws to control some types of pollution, but it was not until several air pollution catastrophes occurred in the twentieth century that governments began to give more attention to air-quality problems. For instance, in 1930, smog trapped in the Mouse River Valley in Belgium caused 60 deaths. Similarly, in 1948, smog was blamed for 20 deaths in Donors, Pennsylvania. Most dramatically, in 1 952, a sulfur-laden fog enshrouded London for five days and caused as many as 4, 000 deaths over two weeks.

Disasters such as these romped governments in a number of industrial countries to initiate programs to protect air quality. The year of the London tragedy, the United States passed the Air Pollution Control Act granting funds to assist the states in controlling airborne pollutants. In 1963, the Clean Air Act, which began to place authority for air quality into the hands of the federal government, was established. Today the Clean Air Act, with its 1 970 and 1 990 amendments, remains the principal air quality law in the United States.

The act established a National Ambient Air Quality Standard under which federal, state, and local monitoring stations at thousands of locations, together with temporary stations set up by the Environmental Protection Agency (EPA) and other federal agencies, directly measure pollutant concentrations in the air and compare those concentrations with national standards for six major pollutants: ozone, carbon monoxide, nitrogen oxides, lead, particulates, and sulfur dioxide. When the air we breathe contains amounts of these pollutants in excess of EPA standards, it is deemed unhealthy, and regulatory action is taken to reduce the pollution levels.

A December 1998 EPA report indicates hat while air quality continues to improve, approximately 1 07 million Americans in 1997 lived in areas that did not meet the ambient air quality standards for at least one of the six major pollutants noted above. In general, though, improvements in air quality have been significant: carbon monoxide concentrations have decreased 38%; lead concentrations have decreased by 67%; nitrogen dioxide concentrations are down by 14%; ozone (smog) concentrations have been reduced by 1 9%; particulate matter concentrations decreased 26%; and sulfur dioxide concentrations decreased 39%.

At the name time that air pollution has been decreasing significantly (1970-97), gross domestic product increased 114%, U. S. Population increased 31 %, and vehicle miles traveled increased 127%. In addition, urban and industrial areas maintain an air pollution index. This scale, a composite of several pollutant levels recorded from a particular monitoring site or sites, yields an overall air quality value.

Public warnings are given if the index exceeds certain values; in severe instances residents might be asked to stay indoors and factories might even be closed down. While such air quality emergencies seem increasingly are in the United States, developing countries, as well as Eastern European nations, continue to suffer poor air quality, especially in urban areas such as Bangkok, Thailand and Mexico City, Mexico. In Mexico City, for example, seven out of ten newborns have higher lead levels in their blood than the World Health Organization (WHO) considers acceptable.

At present, many Third World countries place national economic development ahead of pollution control?? and in many countries with rapid industrialization, high population growth, or increasing per capita income, the best efforts of overspent to maintain air quality are outstripped by rapid proliferation of automobiles, escalating factory emissions, and runaway arbitration. For all the progress the United States has made in reducing ambient air pollution, indoor air pollution may pose even greater risks than all of the pollutants we breathe outdoors.

The Radon Gas and Indoor Air Quality Act of 1986 directed the EPA to research and implement a public information and technical assistance program on indoor air quality. From this program has come monitoring equipment to measure an individual's " total exposure" to Laotians both in indoor and outdoor air. Studies done using this equipment have shown indoor exposures to toxic air pollutants far exceed outdoor exposures for the simple reason that most people spend 90% of their time in office buildings, homes, and other enclosed spaces.

Moreover, nationwide energy conservation efforts following the oil crisis of the sass led to building designs that trap pollutants indoors, thereby exacerbating the problem. AIR POLLUTION CONTROL The need to control air pollution was recognized in the earliest cities. In the Mediterranean at the time of Christ, laws were developed to place objectionable sources of odor and smoke downwind or outside city walls. The adoption of fossil fuels in thirteenth-century England focused particular concern on the effect of coal smoke on health, with a number of attempts at regulation with regard to fuel type, chimney heights, and time of use.

Given the complexity of the air pollution problem it is not surprising that these early attempts at control met with only limited success. The nineteenth century was typified by a growing interest in urban public health. This developed against a background of continuing industrialization, which saw smoke abatement clauses incorporated into the growing body of sanitary legislation in both Europe and North America. However, a lack of both technology and political will doomed these early efforts to failure, except in the most blatantly destructive situations (for example, industrial settings such as those around alkali works in England).

The rise Of environmental awareness in the current century has reminded us that air pollution ought not to be seen as a necessary product of industrialization. This has redirected responsibility for air pollution towards those who create it. The notion of “ making the polluter ay” is seen as a central feature of air pollution control. The century has also seen the development of a range of broad air pollution control strategies, among them: 1. Air quality management strategies that set ambient air quality standards so that emissions from various sources can be monitored and controlled. . Emission standards strategy that sets limits for the amount of a pollutant that can be emitted from a given source. These may be set to meet air quality standards, but the strategy is optimally seen as one of adopting best available technology not entailing excessive costs (BATTENED). 3. Economic strategies that involve charging the party responsible for the pollution. If the level of charge is set correctly, some polluters will find it more economical to install air pollution control equipment than continue to pollute. Other methods utilize a system of traceable pollution rights. . Cost-benefit analysis, which attempts to balance economic benefits with environmental costs. This is an appealing strategy but difficult to implement because of its controversial and imprecise nature. In general, air pollution strategies have either been air quality or emission based. In the United Kingdom, emission tragedy is frequently used; for example, the Alkali and Works Act of 1 863 specifies permissible emissions of hydrochloric acid. By contrast, the United States has aimed to achieve air quality standards, as evidenced by the Clean Air Act.

One criticism of using air quality strategy has been that while it improves air in poor areas it leads to degradation in areas with high air quality. Although the emission standards approach is relatively simple, it is criticized for failing to make explicit judgments about air quality and assumes that good practice will lead to an acceptable atmosphere. Until the mid- whiniest century, legislation was primarily directed towards industrial sources, but the passage of the United Kingdom Clean Air Act (1956), which followed the disastrous smog of December 1952, directed attention towards domestic sources of smoke.

While this particular act may have reinforced the improvements already under way, rather than initiating improvements, it has served as a catalyst for much subsequent legislative thinking. Its mode of operation was to initiate a change in fuel, perhaps one of the oldest methods of control. The other well-tried aspects were the creation of smokeless zones ND an emphasis on tall chimneys to disperse the pollutants. As simplistic as such passive control measures seem, they remain at the heart of much contemporary thinking.

Changes from coal and oil to the less-polluting gas or electricity have contributed to the reduction in smoke and sulfur dioxide concentrations in cities all around the world. Industrial zoning has often kept power and large manufacturing plants away from centers of human population, and " superstar's," chimneys of enormous height, are now quite common. Successive changes in automotive fuels?? lead-free gasoline, low- Latinity gas, methanol, or even the interest in the electric automobile?? are further indications of continued use of these methods of control.

There are more active forms of air pollution control that seek to clean up the exhaust gases. The earliest of these were smoke and grit arresters that came into increasing use in large electrical stations during the twentieth century. Notable here were the cyclone collectors that removed large particles by driving the exhaust through a tight spiral that threw the grit outward where it could be collected. Finer particles could be removed by electrostatic reciprocation. These methods were an important part of the development of the modern pulverize fuel power station.

However, they failed to address the problem of gaseous emissions. Here it has been necessary to look at burning fuel in ways that reduce the production of nitrogen oxides. Control of sulfur dioxide emissions from large industrial plants can be achieved by desertification of the flue gases. This can be quite successful by passing the gas through towers of solid absorbers or spraying solutions through the exhaust gas stream. However, these are not necessarily cheap options. The Atlantic converter is also an important element of active attempts to control air pollutants.

Although these can considerably reduce emissions, they have to be offset against the increasing use Of the automobile. There is much talk of the development of zero pollution vehicles that do not emit any pollutants. Legislation and control methods are often associated with monitoring networks that assess the effectiveness of the strategies and inform the general public about air quality where they live. A balanced approach to the control of air pollution in the future may have to look far more broadly than simply at technological controls.

It will become necessary to examine the way we structure our lives in order to find more effective solutions to air pollution. AIR POLLUTION INDEX The air pollution index is a value derived from an air quality scale that uses the measured or predicted concentrations of several criteria pollutants and other air-quality indicators, such as coefficient of haze (COHO) or visibility. The best-known index of air pollution is the pollutant standard index (SSI). The SSI has a scale that spans from O to 500.

The index represents the highest value of several subsidence; there is a subsided for each pollutant, or in some cases, or a product of pollutant concentrations and a product of pollutant concentrations and COB. If a pollutant is not monitored, its subsided is not used in deriving the AS'. The subsided of each pollutant or pollutant product is derived from a SSI monogram that matches concentrations with subsided values. The highest subsided value becomes the SSI. The SSI has five health- related categories: good (0-50); moderate (50-100); unhealthy (100-200); very unhealthy (200-300) hazardous (300-500).

CLEAN AIR ACT (1 963, 1 970, 1990) The 1970 Clean Air Act and major amendments to the act in 1 977 and 1990 river as the backbone of efforts to control air pollution in the United States. This law established one Of the most complex regulatory programs in the country. Efforts to control air pollution in the United States date back to 1 881 , when Chicago and Cincinnati passed laws to control smoke and soot from factories in the cities. Other municipalities followed suit and the momentum continued to build.

In 1952, Oregon became the first state to adopt a significant program to control air pollution, and three years later, the federal government became involved for the first time, when the Air Pollution Control Act was passed. This law granted funds to assist the states in their air pollution control activities. In 1 963, the first Clean Air Act was passed. This act provided permanent federal aid for research, support for the development of state pollution control agencies, and federal involvement in cross-boundary air pollution cases.

An amendment to the act in 1965 directed the Department of Health, Education, and Welfare (HEW) to establish federal emission standards for motor vehicles. (At that time, HEW administered air pollution laws. The EPA was not created until 1970.) This represented a significant move by the federal government from a supportive to an active role in setting air-pollution policy. The 1967 Air Quality Act provided additional funding to the states, required the states to establish Air Quality Control Regions, and directed HEW to obtain and make available information on the health effects Of air pollutants and to identify pollution control techniques.

All of these components of the law were designed to assist the states, but they further demonstrated increasing federal involvement in the issue. The Clean Air Act of 1970 marked a dramatic change in air pollution logic in the United States. Following the passage of this law, the federal government, not the states, would be the focal point for air pollution policy. This act established the framework that continues to be the foundation for air pollution control policy. The impetus for this change was the belief that the current state-based approach was not working. Public sentiment was growing so significantly that environmental issues demanded the attention of high- ranking officials. In fact, the leading policy entrepreneurs on the issue were president Richard Nixon and Senator Edmund Muskie of Maine. These men ND other leaders devised a plan with four key components. First, National Ambient Air Quality Standards (NANAS) were established for six major pollutants: carbon monoxide, lead (in 1977), nitrogen dioxide, ground-level ozone (a key component of smog), particulate matter, and sulfur dioxide.

For each of these pollutants, sometimes referred to as criteria pollutants, primary and secondary standards were set. The primary standards were designed to protect human health; the secondary standards were based on protecting crops, forests, and buildings if the primary standards were not capable of doing so. The act stipulated that these standards must apply to the entire country and be established by the EPA based on the best available scientific information. Related, the EPA was to establish standards for less common toxic air pollutants.

Second, New Source Performance Standards (NSP) would be established by the EPA- These standards would determine how much air pollution would be allowed by new plants in the various industrial sectors. The standards are to be based on the best affordable technology available for the control of pollutants at sources such as power plants, steel factories, and chemical plants. Third, mobile source emission standards were established to control automobile emissions. These standards were specified in the statute (rather than left to the EPA), and schedules for meeting these standards were also written into the law.

It was thought that such an approach was crucial in having success with the powerful auto industry. The pollutants regulated were carbon monoxide, hydrocarbons, and nitrogen oxides, with goals of reducing the first two pollutants by 90% by 1 975, and nitrogen oxides by 82% by 1975. The final component of the air quality protection framework involved the implementation of the above procedures. Each state would be encouraged to devise a state implementation plan (SIP), which would indicate how the state would achieve the national standards.

This gave each state some flexibility while still maintaining national standards. These plans had to be approved by the ERA; if a state did not have an approved SIP, the EPA would administer the Clean Air Act in that state. However, since the federal government is in charge of establishing pollution standards for new mobile and stationary sources, even the States with an SIP have limited flexibility. The main focal point for the states was the control of existing stationary sources, and if necessary, mobile sources.