

ENVIRONMENTAL DEGRADATION AND ITS MANAGEMENT

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ABSTRACT

The challenge for the chemical industries in 21st century is to provide limitless production (fuels, synthetic fibers such as nylon, rayon, dyes, antibiotics, dental fillings, vaccines, fertilizers, refrigerants, preservatives) socio-economically. Advancement of time mademasses aware of the hazardous impacts of noxious materials and eating away of natural world with their tremendous usage. There is growing pressure to deliver products and services which are environmentally compatible, As a result producers are shifting towards Green chemistry. Green chemistry is a highly demanding strategic technological go on alongside environmental safe-guard.Sustainable manufacturing practices are one of the significant environmental initiatives taken by manufacturing industries to preserve the environment and improve the quality of human life whilst performing manufacturing activities. This paper will enlighten us the current initiatives that are being taken for high-octane production and research suggestions for areas to be explored.

KEYWORDS: Environmental Degradation, Socio-Economic Impacts, Green Chemistry, Sustainablemanufacturing.

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Introduction

One of the most important characteristics of this environmental degradation is that it affects all mankind on a global scale without regard to any particular country, region, or race. The whole world is a stakeholder and this raises issues on who should do what to combat environmental degradation. The environment encompasses the whole of life on earth and the complex interactions that link the living world with the physical world. In a general sense, this International Journal of Sustainable Energy and Environment Vol. 1, No. 8, September 2013, PP: 120 - 126, ISSN: 2327- 0330 (Online) Available online at www.ijsee.com 121 covers everything contained within the air, land and water. Sudden and dramatic natural changes to the environment have occurred, and continue to occur, which have the potential to upset the whole balance of the Earth's ecosystem As early as 1896, the Swedish scientist Svante Arrhenius had predicted that human activities would interfere with the way the sun interacts with the earth, resulting in global warming and climate change. His prediction has become true and climate change is now disrupting global environmental stability. The last few decades have seen many



treaties, conventions, and protocols for the cause of global environmental protection. Few examples of environmental issues of global significance are Ozone layer depletion, Global warming, Loss of biodiversity and others.

Significant Environmental Issues

There are many options/issues and most of them so far suggested are varying degrees. These options/issues are as follows: 1. Ozone Layer Depletion 8. Hazardous waste 2. Global Warming 9. Water pollution 3. Loss of Biodiversity 10. Acid rain 4. Climate change 11. Over population 5. Exploitation of natural resources 12. Deforestation 6. Land degradation 13. Desertification 7. Nuclear issue

Ozone Layer Depletion

Earth's atmosphere is divided into three regions, namely troposphere, stratosphere and mesosphere. The stratosphere extends from 10 to 50 kms from the Earth's surface. This region is concentrated with slightly pungent smelling, light bluish ozone gas. The ozone gas is made up of molecules each containing three atoms of oxygen; its chemical formula is O₃. The ozone layer, in the stratosphere acts as an efficient filter for harmful solar Ultraviolet B (UV-B) rays. Ozone is produced and destroyed naturally in the atmosphere and until recently, this resulted in a wellbalanced equilibrium. Ozone is formed when oxygen molecules absorb ultraviolet radiation with wavelengths less than 240 nanometers and is destroyed when it absorbs ultraviolet radiation with wavelengths greater than 290 nanometers. Ozone is highly reactive and easily broken down by man-made chlorine and bromine compounds. These compounds are found to be most responsible for most of ozone layer depletion. The ozone depletion process begins when CFCs (used in refrigerator and air conditioners) and other ozone-depleting substances (ODS) are emitted into the atmosphere. Winds efficiently mix and evenly distribute the ODS in the troposphere. These ODS compounds do not dissolve in rain, are extremely stable, and have a long life span. After several years, they reach the stratosphere by diffusion. Strong UV light breaks apart the ODS molecules. CFCs, HCFCs, carbon tetrachloride, methyl chloroform release chlorine atoms, and halons and methyl bromide release bromine atoms. It is the chlorine and bromine atom that actually destroys ozone, not the intact ODS molecule. It is estimated that one chlorine atom can destroy from 10,000 to 100,000 ozone molecules before it is finally removed from the stratosphere. The major effects of ozone layer depletion are: Effects on Human and Animal Health: - Increased penetration of solar UV-B radiation is likely to have high impact on human health with potential risks of eye diseases, skin cancer and infectious diseases. Effects on Terrestrial Plants: In forests and grasslands, increased radiation is likely to change species composition thus altering the bio-diversity in different ecosystems. It could also affect the plant community indirectly resulting in changes in plant form, secondary Metabolism, etc. Effects on Aquatic Ecosystems: High levels of radiation exposure in tropics and subtropics may affect the distribution of phytoplankton, which form the foundation of aquatic food webs. It can also cause damage to early development stages of fish, shrimp, crab, amphibians and other animals, the most severe effects being decreased reproductive capacity and impaired larval development. International Journal of Sustainable Energy and Environment Vol. 1, No. 8, September 2013, PP: 120 - 126, ISSN: 2327- 0330 (Online) Available online at www.ijsee.com 122 Effects on Air



Quality: Reduction of stratospheric ozone and increased penetration of UV-B radiation result in higher photo dissociation rates of key trace gases that control the chemical reactivity of the troposphere. This can increase both production and destruction of ozone and related oxidants such as hydrogen peroxide, which are known to have adverse effects on human health, terrestrial plants and outdoor material.

Global Warming

Before the Industrial Revolution, human activities released very few gases into the atmosphere and all climate changes happened naturally. After the Industrial Revolution, through fossil fuel combustion, changing agricultural practices and deforestation, the natural composition of gases in the atmosphere is getting affected and climate & environment began to alter significantly. Over the last 100 years, it was found out that the earth is getting warmer and warmer. The key greenhouse gases (GHG) causing global warming is carbon dioxide. CFC's, even though they exist in very small quantities, are significant contributors to global warming. Carbon dioxide, one of the most prevalent greenhouse gases in the atmosphere, has two major anthropogenic (human-caused) sources: the combustion of fossil fuels and changes in land use. Net releases of carbon dioxide from these two sources are believed to be contributing to the rapid rise in atmospheric concentrations since Industrial Revolution. Because estimates indicate that approximately 80 percent of all anthropogenic carbon dioxide emissions currently come from fossil fuel combustion, world energy use has emerged at the center of the climate change debate.

Loss of Biodiversity

Biodiversity refers to the variety of life on earth, and its biological diversity. The number of species of plants, animals, microorganisms and the enormous diversity of genes in these species, the different ecosystems on the planet, such as deserts, rainforests and coral reefs are all a part of a biologically diverse earth. Biodiversity actually boosts ecosystem productivity where each species, no matter how small, all have an important role to play and that it is in this combination that enables the ecosystem to possess the ability to prevent and recover from a variety of disasters. It is now believed that human activity is changing biodiversity and causing massive extinctions. The World Resource Institute reports that there is a link between biodiversity and climate change. Rapid global warming can affect ecosystems chances to adapt naturally. Over the past 150 years, deforestation has contributed an estimated 30 percent of the atmospheric build-up of CO₂. It is also a significant driving force behind the loss of genes, species, and critical ecosystem services.

Climate Change

Climate change has become more than obvious over the past decade, with nine years of the decade making it to the list of hottest years the planet has ever witnessed. The rise in temperature has also ensured that the equations on the planet have gone for a toss. Some of the most obvious



signs of this include irregularities in weather, frequent storms, melting of glaciers, rising levels of sea etc. Going by the prevailing conditions, it is not difficult to anticipate that the planet is heading for a dramatic climate change, somewhere in near future.

Exploitation of Natural Resources

Our greed for more has left us empty handed in terms of natural resources in several parts of the world. Several human activities, including the likes of mining, agriculture, fishing etc., has resulted in drastic degradation of our natural resources. While mining and agriculture have triggered large-scale deforestation, over fishing has only resulted in the reduction of population of marine creatures inhabiting the planet. If the trends continue, we are bound to exhaust those natural resources on which we are dependent, and thus dig our own graves.

Land Degradation

Land pollution, owing to human activities, and desertification, due to loss of vegetation has left the surface of the planet unsuitable for human use. Land degradation can be attributed to the fact that we have become too laid-back in terms preservation of the nature. Improper soil use, haphazard waste disposal, large-scale deforestation and other such human activities harmful for nature are on the rise, something which is invariably taking a toll on our natural surroundings.

Nuclear Issues

International Journal of Sustainable Energy and Environment Vol. 1, No. 8, September 2013, PP: 120 - 126, ISSN: 2327- 0330 (Online) Available online at www.ijsee.com 123 Nuclear power does have high potential, but the problems associated with it are no less. Radioactive waste from nuclear power plants is one of the major problems we are likely to face, especially if safety regulations are not followed properly. Chernobyl tragedy has set an example of how nuclear waste can lead to disaster for mankind, and no one would like to see another Chernobyl happening. It doesn't end here as the threat of some nation diverting its nuclear power to produce nuclear arsenal is always looming over the mankind.

Hazardous Waste

As population increases, human activities increase, which eventually increases the amount of waste produced. This waste doesn't just include those harmful gases let out in the atmosphere or toxic waste released in water bodies, but also includes nuclear waste, e-waste, medical waste and even the waste from our homes. With limited area available on the planet, and most of it being inhabited by us, we are left with no space to dispose this type of waste. The rate at which this waste is produced is far more than the rate at which it is being treated, and these just results in piling up of waste, which eventually pollutes the environment. These were some of the major global environmental issues and problems which have been threatening the planet for quite some time now. In addition to releasing gases and particles into the atmosphere, humans produce waste that is dumped on the environment. Often, this waste is hazardous and dangerous to both nature and human life. The levels of dangerous wastes continue to grow. Industries and individuals continue to be largely unaware of this major environmental problem. As a result, many people



and industries are failing to prevent the creation of hazardous waste or to limit the negative effects it produces. Individuals often throw out goods without realizing that they are headed for a landfill and could be dangerous for the environment. No matter where people put these hazardous waste materials, there is always a chance that they could find their way into the ground, and eventually into our bodies. Corporations usually want to avoid the costs associated with having to limit creation of hazardous waste. Consequently, they build landfills on site and fill them with waste, or sometimes pay to have their waste removed. Often, hazardous materials are transported to areas that accept money to take the waste. It may prove very difficult to reduce hazardous waste in the future. Unlike many other environmental problems, waste creation is something people do not often think about. IN near future, people may have to reduce not only their generation of hazardous waste, but also their consumption of many products that end up in landfills.

Water Pollution

Attention for water pollution exploded in the 1980s. The oil spill of the Exxon Valdez showed many around the world just how horrible the effects of water pollution could be. However, even the Exxon Valdez spill barely touched the surface of the problem of water pollution. The ship spilt only 5% of the oil spilt that year, and oil is just one of many pollutants that people dump into the water knowingly or unknowingly. Every year, 14 billion pounds of sewage, sludge, and garbage are dumped into the world's oceans. About 19 trillion gallons of other waste also enter the water annually. For many years, chemicals were also dumped into water bodies without concern. The problem of ocean pollution affects every nation around the world. This is especially true because water is able to transport pollution from one location to another.

Acid Rain

The term acid rain refers to what scientists call acid deposition. It is caused by airborne acidic pollutants and has highly destructive results. Scientists first discovered acid rain in 1852, when the English chemist Robert Agnus invented the term. From then until now, acid rain has been an issue of intense debate among scientists and policy makers. Acid rain, one of the most important environmental problems of all, cannot be seen. The invisible gases that cause acid rain usually come from automobiles or coal-burning power plants. Acid rain moves easily, affecting locations far beyond those that let out the pollution. As a result, this global pollution issue causes great debates between countries that fight over polluting each other's environments. For years, science studied the true causes of acid rain. Some scientists concluded that human production was primarily responsible, while others cited natural causes as well. Recently, more intensive research has been done so that countries have the information they need to prevent acid rain and its dangerous effects. The levels of acid rain vary from region to region. International Journal of Sustainable Energy and Environment Vol. 1, No. 8, September 2013, PP: 120 - 126, ISSN: 2327-0330 (Online) Available online at www.ijsee.com 124

Overpopulation

Yet another major global environmental issue is overpopulation. As the population of world continues to soar at an alarming rate, the pressure on the resources of the planet is increasing. The problems associated with overpopulation range from food and water crisis to lack of space for natural burial. Incessant population growth will not just result in depletion of natural



resources, but will also put more pressure on the economy. The world's population has been booming for years. The population is now threatening to reach the stage where there are simply too many people for the planet to support. The United Nations Population Fund predicts that by the middle of the next century, the world's population will stabilize at about 14 billion people. If fertility rates were decreased to 2.1 births per woman, population stabilization could be achieved sooner. Overpopulation has been disastrous for the planet. Greater populations have polluted and consumed more, ruining the environment and creating or intensifying a variety of problems. Also, with the food supply limited, increases in population make shortages in many parts of the world even worse.

Deforestation

The deforestation of forest particularly tropical rainforests is a major global problem-each year millions of hectares are lost. Deforestation rates in some countries continue to increase despite worldwide pressures. Rainforests are destroyed for wood products, and to make way for agricultural activities, mining and dams. The impacts of deforestation include: Loss of livelihood for local inhabitants □ Variable environmental conditions (susceptibility to flood, aggravated droughts, soil erosion □ etc.). Loss of biodiversity and disturbance to ecosystems □ Loss of carbon sink □

Desertification

Removing ground cover and degrading fertile land initiates desertification. Water washes away nutrients, the land becomes inhospitable. The process is accelerated by expanding populations and the need to overuse fragile areas of land.

The remedies for global environmental issues

There are some uncertainties as to what effects a change in climate might have on the earth. However, its solution lies on the coordination of national actions within regional and international frameworks. The solution will need to involve countries world-wide because the impact in one location may be felt in a completely different location. Hence, countries should develop a plan of action to cope with these problems. Some of the significant remedies/solutions are:

Recycling

Recycling can decrease the number of pollutants entering the atmosphere and has been linked to lessening global climate change. Decreasing the amount of raw materials an industry has to use to create new products slows the cutting down of trees and reduces gas emissions. Do your part to reduce waste by choosing reusable products instead of disposables. Buying products with minimal packaging (including the economy size when that makes sense for you) will help to reduce waste. And whenever you can, recycle paper, plastic, newspaper, glass and aluminum cans. If there isn't a recycling program at your workplace, school, or in your community, ask about starting one.

Water Conservation

Conserving water saves money and protects water reserves for future use. Water is necessary to the environment and makes the land habitable for all living creatures. Each person can take measures to conserve water daily by turning off the sink when water is not being used or storing rain water for daily needs such as watering a garden. International Journal of Sustainable Energy



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Reduce Oil Dependence

The world's dependence on oil causes serious harm to the environment. Electric cars replace vehicles with highly polluting internal combustion engines. Ethanol fuel, made from corn, reduces gasoline consumption.

Use Less Heat and Air Conditioning

Adding insulation to your walls and attic, and installing weather stripping or caulking around doors and windows can lower your heating costs more than 25 percent, by reducing the amount of energy you need to heat and cool your home. Turn down the heat while you're sleeping at night or away during the day, and keep temperatures moderate at all times. Setting your thermostat just 2 degrees lower in winter and higher in summer could save about 2,000 pounds of carbon dioxide each year.

Drive Less and Drive Smart

Less driving means fewer emissions of pollutant gases. Besides saving gasoline, walking and biking are great forms of exercise. Explore your community mass transit system, and check out options for carpooling to work or school. When you do drive, make sure your car is running efficiently. For example, keeping your tires properly inflated can improve your gas mileage by more than 3 percent. Every gallon of gas you save not only helps your budget; it also keeps 20 pounds of carbon dioxide out of the atmosphere.

Buy Energy-Efficient Products

When it's time to buy a new car, choose one that offers good gas mileage. Home appliances now come in a range of energy-efficient models, and compact florescent bulbs are designed to provide more natural-looking light while using far less energy than standard light bulbs. Avoid products that come with excess packaging, especially molded plastic and other packaging that can't be recycled. If you reduce your household garbage by 10 percent, you can save 1,200 pounds of carbon dioxide annually.

Use the "Off" Switch

Save electricity and reduce global warming by turning off lights when you leave a room, and using only as lighter as you need. And remember to turn off your television, video player, stereo and computer when you're not using them. It's also a good idea to turn off the water geyser when you're not using it. While brushing your teeth, shampooing the dog or washing your car, turn off the water until you actually need it for rinsing. You'll reduce your water bill and help to conserve a vital resource.

Plant a Tree

If you have the means to plant a tree, start digging. During photosynthesis, trees and other plants absorb carbon dioxide and give off oxygen. They are an integral part of the natural atmospheric exchange cycle here on Earth, but there are too few of them to fully counter the increases in carbon dioxide caused by automobile traffic, manufacturing and other human activities. A single tree will absorb approximately one ton of carbon dioxide during its lifetime.

Encourage Others to Conserve



Share information about recycling and energy conservation with your friends, neighbors and co-workers, and take opportunities to encourage public officials to establish programs and policies that are good for the environment.

Improvement of Structures for Education/Awareness

To promote action by all citizens, including children, the Government should improve environmental education, with emphasis placed on the global environmental issues and the role of forests. Furthermore, education on energy issues should be improved and offered at a variety of settings such as schools, local communities and at homes. The Government should have to develop facilities for environmental education where a broad range of generations, from children to adults, can learn about environmental problems, especially global environmental problems. In addition, the Government should also promote learning through experiencing nature, by promoting educational activities at National Youth Houses and National Children's Centers, and by constructing Visitor Centers and Multiple-use Forest Promotion Facilities. At the same time, urban parks should provide opportunities for residents to International Journal of Sustainable Energy and Environment Vol. 1, No. 8, September 2013, PP: 120 - 126, ISSN: 2327- 0330 (Online) Available online at www.ijsee.com 126 about the environment through educational activities. At schools, students should be given practical training for environmental protection and the creation of a better environment through workshops learn and teaching materials, in addition, textbooks should be printed on recycled paper.

Conclusions

There are several challenges and threats to solving the climate problem by countries world-wide. They can be classified as economic, institutional, psychological, and informational. Significantly large number of countries in the world lack adequate institutions to cope with climate change analysis and this will present serious problems in developing national plans and actions. The need for institutions and appropriate organizational arrangements is crucial to mitigation analysis in any country. The environment encompasses the whole of life on earth and the complex interactions that link the living world with the physical world. In a general sense, this covers everything contained within the air, land and water. Time also is a key factor as historic issues have an influence on the status of the environment - locally and globally. Sudden and dramatic natural changes to the environment have occurred in the distant past, but only relatively recently has one species had the potential to upset the whole balance of the Earth's ecosystem, that's the man kind. The global population has risen dramatically during the last century. The rise of industry and its rapid expansion has been a major source of pollution. This has caused changes in the balance .of our environment. The threat of global climate problem is growing and due to the nature of the problem, national actions through regional and international mechanisms are required. However, these actions must be carried within a sustainable and equitable development framework. The paper discussed several options and policies but implementing them require detailed analysis to ensure that national benefits are maximized. The importance of local control and management within a politically committed environment cannot be over-emphasized in ensuring sustainable development.

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