

# The ozone layer depletion environmental sciences essay



**ASSIGN  
BUSTER**

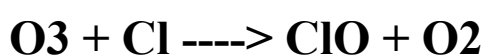
The ozone layer is a region of naturally occurring ozone gas about 15 to 30 kilometers above Earth's surface in the stratosphere. Only 10 or less of every million molecules of air are ozone. This stratospheric ozone layer protects the Earth from the UV rays of the sun for more than billions of years. If the ozone layer is worn out by human action, the consequences on the planet could be disastrous and appalling, an understanding that is just about dawning on mankind. Ozone is a bluish gas; an ozone molecule is comprised of three atoms of oxygen. The type of oxygen that we breathe in comprises of two oxygen atoms, O<sub>2</sub>. When found in troposphere, ozone is considered a dangerous and unsafe pollutant and is one of the substances responsible for producing the greenhouse effect. The Antarctic ozone hole discovery in 1985 was by British scientists Joseph Farman, Brian Gardiner, and Jonathan Shanklin of the British Antarctic Survey. Considerable loss of ozone in the lower stratosphere was first noticed in the 1970s over Antarctica, by a research group from the British Antarctic Survey (BAS), who were monitoring Antarctic atmosphere that time. The first measurements were taken in 1985, and the drop in stratospheric ozone levels in was thought to be due to instrumental faults. Instruments were replaced and later, ozone depletion was accepted as genuine fact. The thickness of ozone is measured in Dobson Unit. " One Dobson Unit is the number of molecules of ozone that would be required to create a layer of pure ozone 0.01 millimeters thick at a temperature of 0 degrees Celsius and a pressure of 1 atmosphere". Generally, the air has an ozone measurement of 300 Dobson Units, equivalent to a layer of 3mm ozone thickness. If the level of ozone falls below 220 Dobson Units, the depleted area is referred to as " ozone hole".

The ozone hole has steadily increased both in dimensions to about 27 million  
<https://assignbuster.com/the-ozone-layer-depletion-environmental-sciences-essay/>

sq. kms and span of existence from August through early December over the last 20 years. . Now global ozone is about 4% below the 1964- to-1980 average. Antarctica was an early sufferer of ozone depletion. A massive hole in the ozone layer right above Antarctica terrify and threatens not only the continent, but many others regions that could be the sufferers of Antarctica's melting icecaps which are being caused by the harmful rays of the sun sipping through the hole in the ozone layer. The main cause of this is the liberation and discharge of chlorofluorocarbons (CFCs), used in refrigeration systems, air conditioners, aerosols, solvents and in the production of some types of packaging materials. Other compounds containing bromine and other halogen compounds, nitrogen oxides (NOx) are also responsible for ozone depletion. CFC's are a common industrial product, Nitrogen oxides are mainly released as by-product of combustion processes, such as aircraft emissions. CFCs to undergo photo dissociation in presence of UV radiation, producing highly reactive chlorine free radicals.



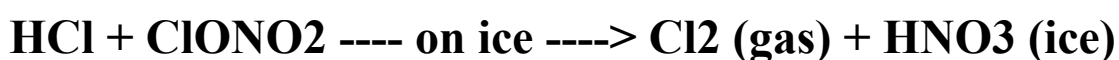
dichloro difluoro methane Chlorine free radicals may then react with ozone, thus destroying it from the atmosphere. Highly reactive ClO free radicals were formed.



Formation and decomposition of ozone in the stratosphere continues, the oxygen free radicals present can react with ClO free radicals to reform chlorine free radicals:  $\text{ClO} + \text{O} \text{ ---> Cl} + \text{O}_2$  ClO free radicals can undergo photodissociation alternatively to reform chlorine free radicals



Chlorine free radicals reformed begins the process again, resulting in a chain reaction. One chlorine atom can destroy about 1, 00, 000 ozone molecules, before it reacts with methane, nitrogen dioxide or itself . Clouds are not generally formed in the stratosphere due to its extreme dryness. Antarctica is completely surrounded by water and geographically isolated from air at higher latitudes during the winter season. These results into an isolated air mass whirling above Antarctica called the south polar vortex. With arrival of winter, a vortex of wind develops around the pole and isolates the polar stratosphere. The temperatures falls to very low levels in the stratosphere in this polar vortex, below 80 degrees, resulting in the formation of thin clouds of ice, nitric acid, and sulphuric acid mixtures. At such low temperatures, the stratospheric chemicals freeze out and form polar stratospheric clouds (PSCs). The chemical reactions occurring in the PSCs results in the large depletion in ozone during every austral spring over Antarctica. We call this as Antarctic ozone hole. In spring, temperatures starts rising, the ice dissolves, and the ozone layer starts to mend and recuperate.



Polar stratospheric clouds (PSCs) acts as the medium on which reservoir chlorine compounds are converted chlorine radicals and promote denoxification. Essentially there are two types of PSC: known as type 1 and type 2. PSCs 1 are supposed to be nitric acid and water mixtures that forms just above the frost point and can be either solid or liquid subjected on the conditions. PSCs 2, less common, are formed of water-ice crystals at lower temperatures. Antarctic temperatures below  $-88\text{ }^\circ\text{C}$  ( $-126\text{ }^\circ\text{F}$ ) are quite

often but such low temperatures are rarer in the Arctic. Every time 1 percent of the ozone layer is depleted, 2 percent more UV-B is able to hit the surface of the Earth. Reductions in stratospheric ozone will result in higher levels of UVB radiation. Epidemiological studies reveal that UV-B causes nonmelanoma skin cancer. It plays a key role in development of malignant melanoma. UVB is also linked to cataract of eyes -- a clouding of the eye's lens. Photokeratitis is an inflammation of the cornea and an acute syndrome that occurs after ultraviolet irradiation of the eyes. A dangerous form of photokeratitis is snow blindness. The life cycles of plants and their growth will change, disrupting the food chain and energy flow in ecosystems. Severe effects on animals are expected particularly to early developmental stages of fish, lobsters, shrimp, crab, amphibians and other animals including severe effects in decreased reproductive capacity and impaired larval development; other effects are difficult to foretell. Seas and oceans will be hit hard. Exposure to UVB radiation has been shown to affect both orientation mechanisms and motility in phytoplankton. This in turn reduces the survival rates for these organisms. Researchers documented alterations in the reproductive rates of young fishes, shrimps, and crabs as well as frogs and salamanders that are exposed to excess ultraviolet B. Increase in UV radiation could have an effect on terrestrial and aquatic biogeochemical cycles, thus changing both the sources and the sinks of vital elements and important trace gases e. g., carbon dioxide (CO<sub>2</sub>), carbon monoxide (CO), carbonyl sulfide (COS) and possibly other gases, including ozone. As an international measure, the Montreal Protocol was finally approved upon on 16 September 1987 at the Headquarters of the International Civil Aviation Organization in Montreal to phase out the use of ozone depleting

<https://assignbuster.com/the-ozone-layer-depletion-environmental-sciences-essay/>

substances. The production and consumption of ODS in the stratosphere such as chlorofluorocarbons (CFCs), halons, carbon tetrachloride, and methyl chloroform are to be phased out by the stipulated frame of time.

## **6. 6. 4 Nuclear accidents and nuclear holocaust**

Today, nuclear energy is utilised to generate about 13 percent of the world's electricity, with almost zero green house gas emissions. It is considered as one of the cleanest sources of energy and has the capability of meeting the growing needs of an increasingly energy hungry world order. However, the bombings of Hiroshima and Nagasaki and the gruesome images of Chernobyl (not to mention the nuclear holocaust movies) have terrorized entire generations who are still unwilling to embrace the fruits of nuclear power. Because of its almost unending abilities - a single pellet of uranium fuel contains as much energy as 807 kilos of coal or 149 gallons of oil and 480 cubic meters of natural gas. Nuclear power plants can generate electricity incessantly for many months at a time, without interruption - nuclear power is looked at with much skepticism, general people scared of the impending meltdown. However, to put things in the right perspective, from the very onset, there has been a strong alertness of the potential risk of both nuclear criticality and discharge of radioactive materials. There have been three most important nuclear reactor accidents in the history of civil nuclear power - Three Mile Island, Chernobyl and Fukushima. These are the only main accidents to have happened in over 14, 000 cumulative reactor years of commercial operation in more than 30 countries. Viewed in this light and considering the fact that it has no record of harmful green house gas

emissions, nuclear power is not only sustainable but is also extremely safe for use.

## **6. 6. 5 Case studies; Social Impacts of Nuclear Disasters**

### **Case Study -Three Mile Island Nuclear Accident**

In the first known case of a nuclear disaster, in 1979, a cooling malfunction caused part of the core to melt in the reactor at Three Mile Island nuclear power plant in USA. The TMI-2 reactor was shattered. While it was not the type that end-of-the-world movies are made of, some radioactive gas was discharged few days after the accident, but not enough to cause extensive damage to local residents. As a matter of fact, there were no record of injuries or adverse health effects from the Three Mile Island accident. The Three Mile Island power station is situated near Harrisburg, Pennsylvania in USA. It had two pressurized water reactors (PWR). One PWR was of 800 MWe (775 MWe net) which started functioning in 1974. It is still one of the best performing units in USA. Unit 2 was of 906 MWe (880 MWe net) and almost brand new. Fall out of the disaster No lives were lost. However, the incident caused a huge amount of social stress as residents had to be temporary evacuated, with panic, and economic damage. As direct fallout of the incident, atomic power generation per se was put on the backburner with more than 40 reactor projects stopped. This incidentally had huge environmental implications as it led to the increased burning of coal with attendant pollution and other adverse effects.

## **Case Study – The Chernobyl disaster**

The Chernobyl disaster, by comparison was a much more disastrous nuclear accident that happened on 26 April 1986 at the Chernobyl Nuclear Power Plant in Ukraine. Chernobyl was under the direct control of the central authorities of the erstwhile Soviet Union and till date, skeptics claim that not all is known about what had actually happened. According to official sources, an explosion followed by fire discharged huge quantities of radioactive substances and contaminated the atmosphere, which diffused to Western USSR and Europe. It is generally accepted to have been the most awful nuclear power plant mishap in history of nuclear power. It is one of only two rated as a level 7 event on the INES scale (the other being the Fukushima Daiichi nuclear disaster in 2011). The IAEA has conducted extensive investigation on the consequences of the accident under the Chernobyl project. Many lives were lost directly and the long term effect on the lives of succeeding generations is yet to be properly assessed. Add to it the social stress of long term reallocation, rendering a population into overnight refugees, the political consequences of a calamity of such a huge proportion, the environmental implications leading contamination and destruction of the local eco system , not to mention material losses. However, because of the closed draconian communistic system that was in place, much of the adverse effects were glossed over.

## **Case Study- Fukushima Daiichii Meltdown**

Subsequent to a major tremor, a 15-metre tsunami disabled the power supply and cooling of three Fukushima Daiichi reactors, causing a nuclear accident on 11 March 2011 - the reactors were seismically sound, it was the



tsunami that led to their meltdown. All three cores mostly melted in the first three days. The accident was classified as 7 on the INES scale, due to high radioactive discharges in the first few days. Four reactors were closed - 2719 MWe net. After two weeks the three reactors (units 1-3) were secure with addition of water but there was no proper heat sink for removal of decay heat from the fuel. By July these reactors were being cooled with recycled water from the new treatment plant. The temperature of the reactors had dropped below 80°C by the end of October. In the middle of December an official 'cold shutdown condition' was announced. Apart from reactor cooling, the fundamental challenge was to check and stop the discharge of radioactive materials, principally from the contaminated water that leaked from the three units. There have been no report of deaths or cases of radiation sickness from the nuclear accident, but 100, 000 plus people had to be evacuated and shifted from their homes to ensure safety. The psychological fallout of Fukushima - telecast live to the world - is something whose impact is yet to be assessed. Suffice to say, policymakers in very corner of the globe are seriously considering their options as far as nuclear plants are concerned.

## **6. 7 Wasteland reclamation**

According to Integrated Wasteland Development Programme, " Wasteland is a degraded land which can be brought under vegetative cover, with reasonable effort, and which is currently under utilised and land which is deteriorating for lack of appropriate water and soil management or on account of natural causes".

## Categories of wasteland -

Culturable Wasteland- refers to the land which has possibility for the development of vegetative cover but have yet not being used due to different factors such as erosion, water logging, salinity etc. The category lands are not cultivated for more than five years. Unculturable Wasteland- refers to the land that cannot be used or developed for vegetative cover, involves very high cost if they are to be brought under cultivation, such as, the desolate rocky areas and glacier areas covered with snow. Categories of wasteland - They can be landslides, industrial wastelands, ravines, sheet, rill and gully erosion, sand dunes and bar, coastal lands, shifting cultivation and lands affected by mine spills, water logged and saline lands etc. The main reasons for wasteland formations are over cultivation, deforestation, overgrazing and improper irrigation practices. The geomorphic processes become active in the absence of land management practices. Erosion of soil layers makes the land infertile and useless. According to Wasteland Atlas of India -2005: NRSA, a total 552692. 26 square Kms was designated as wasteland in India with Jammu & Kashmir, remaining unsurveyed. This is much enhanced by deforestation. Further, felling of trees intensify the lowering of water table and drought like conditions. The loss of fertility followed erosion also results in the transformation of marginal forest lands into wastelands. Land use pattern in India% of

Land Activities	14
Agriculture	22
Forest cover	38
Housing, agro forestry, roadways, industries etc	44
Grazing and pastures	58
Miscellaneous	61
Barren	14

Urbanisation and migration of population to towns and cities have given rise to many problems like more utilization of agricultural lands for housing construction, roadways, industries etc. The <https://assignbuster.com/the-ozone-layer-depletion-environmental-sciences-essay/>

balanced use of land resource is only possible by adopting and integrated land-use policy. This involves prevention of land misuse and reclamation of unutilized, degraded land, fallows, etc. Reclamation of abandoned mines and brick kilns may add some more land. As much as possible agricultural lands should not be sacrificed for non-agricultural purposes. Waste lands are broadly categorized under two groups: barren and uncultivable waste land cultivable wasteland. The first category includes lands which cannot be brought under cultivation economic use except at a very high cost whether they exist as isolated pockets or within cultivar holdings. They are mostly lands such as hilly slopes, rocky exposures, stony or leached or gully land sandy deserts.

### **Important measures for Wasteland Reclamation:**

By using abundant water and fertilizers the land can be made cultivable. Adoption of afforestation practices and agronomical practices for soil conservation. Soil testing is to be conducted and appropriate crops are to be selected and cultivated according to the local conditions. Change in irrigation patterns are to be brought. To afford safe disposal of water of the catchment areas, contour bunds are constructed. Guidance is to be provided to prevent water logging and salinity. Land may be used for settlement of landless agricultural workers.

## **6. 8 Consumerism and waste products**

Consumerism refers to the use of resources by the people. Early human society used to consume a smaller amount of resources, with the onset of the industrialisation, consumerism has shown an exponential increase. It is a social and economic order that is based on the systematic conception and <https://assignbuster.com/the-ozone-layer-depletion-environmental-sciences-essay/>

promotion of a craving desire to purchase more and more goods and services and is not always related to the needs and requirements. A product is something that is prepared, manufactured, grown or procured in great quantities so that it can be sold to the consumers. Production forms the basis for consumption. Production generally increases with its demand. This increase in production attains sustainability only when the product quality is maintained; the price is regulated and claims in advertising were adhered to. Our forefathers led a simple life with fewer wants. In modern era, our needs have multiplied and amplified. This is related to our increase in demands and due to change in the life style. As a result we have to confront a number of interrelated environmental and resource problems. In developing countries, the growing population size and the degradation of renewable resources is the key factor in total environmental impact. Excessive population pressure causes over utilization and degradation of the finite resources, and the consequence is absolute poverty, undernourishment and premature deaths. This is prevalent in the less developed countries (LDCs). The per capita resource use in LDC is small. On the contrary, in development countries, rate of per capita resources use is high. The elevated level of pollution and environmental dilapidation per capita determines the overall environmental impact. In more developed countries (MDCs), the population size is small, the resources are in abundance, people lead luxurious life-styles and consequently per capita use of resources is very towering. More the resource consumption more is the waste generation and hence greater is the deterioration of the environment. The average U. S. Citizen uses about 35 times as much as average Indian citizen and 100 times more than the average person in the poorest countries. The overall environmental impact of <https://assignbuster.com/the-ozone-layer-depletion-environmental-sciences-essay/>

both the types of consumerism may be the same. USA is well-known for maximum consumerism. Present day environmental management stresses on structural changes like large scale technological substitutions proper resource utilization less pollution, adoption of waste minimization techniques. Adopting 3 R's - reduce, reuse and recycle technologies to provide direct economic benefit and stimulate national economy.

### **Inefficient consumerism results in the following problems:**

Uncontrolled manufacture of goods inferior quality of goods uncontrolled adulteration which may lead to health and hygiene problems. Improper services may result in customer dissatisfaction and stress. Production of tons and tons of waste leading to natural resources depletion, the outcome of which is environmental imbalance. Efficient consumerism is the most indispensable element to minimize waste and to uphold economy of a nation. This can be achieved by-

1. Verification of product standards before buying from market. Product may also be standardized by certification audit such as ISO.
2. Waste minimization techniques to be adopted.
3. Recycling and proper disposal of waste materials.
4. Enactment and implementation of strict legislation.

## **6. 9 Environmental Legislation**

6. 9. 1 The Environment Protection Act, 1986 The act came out as an important constitutional implication with the background of Bhopal gas tragedy. The act was passed to ' provide for the protection and improvement of environment and for matters connected therewith''. As per the act, environment is defined as which includes ' water, air and land and the inter-relationship which exists among and between water, air and land, and <https://assignbuster.com/the-ozone-layer-depletion-environmental-sciences-essay/>

human beings, other living creatures, plants, micro-organisms and property". The law gives general powers to the Central government. Central government can undertake any measures or steps that become necessary for protecting and improving environment. The act provides for the standards that defines quality of air, water and land for different areas for different purposes. The maximum allowable limits for various pollutants are also specified under this law. The act makes EIA mandatory for the specified 29 industries. Under this act all companies must possess a sort of Spill Prevention Control and Countermeasures plan. The law requires Environmental Audit since 1993, the report of which is to be submitted to the SPCB. The law provides for the declaration of Coastal Regulation Zone (CRZ). The law prevents the reckless handling of hazardous substances except as is prescribed or stated. The act is supplemented with National Environmental Tribunals Act, 1995 and National Environmental Appellate Authority Act, 1997. Violation of act calls for penalty which may be punishable by up to 7 years imprisonment or a fine up to Rs. 1, 00, 000 with an additional fine upto Rs 5000 per day of violation.

### **6. 9. 2 The Air (Prevention and Control of Pollution) Act, 1981**

The government enacted this act to provide for " Prevention, control and abatement of air pollution." According to the law an air pollutant is "any solid, liquid or gaseous substance present in the atmosphere in such concentration as may be or may be or tend to be injurious to human beings or other living creatures or plants or property or environment". The act provides for the establishment of boards and also assigns them with powers

and responsibilities to look into such matter. The act prohibits the discharge of PM, lead, sulphur dioxide, nitrogen oxides, VOC, carbon monoxide and other toxic substances into the air, beyond the prescribed emission level.

The SPCB is assigned with the responsibility to monitor the pollution levels in air at specific sites. The act requires an approval to any industrial plant prior to its operation. The government may suggest selling of controlling equipment before granting consent to the concerned industry. The board specifies specific standards to the industries. Penalties for non-compliance are a minimum of six months imprisonment to a maximum of seven years along with a fine of Rs 5000 per day of violation.

6. 9. 3 The Water (Prevention and Control of Pollution) Act, 1974 This act was enacted in order " to provide for the prevention and control of water pollution and the maintenance or restoring wholesomeness of water". The act provides for the establishment of Boards to prevent and control water pollution. The law confers the boards with powers and responsibilities to look into the matters connected therewith. The act prohibits discharge of any poisonous, noxious or polluting matter into the water bodies whether static or free flowing. The organization has to get consent from the State Board prior to any type of new discharge into the water body and this applies for temperature discharges also. Individuals are required to comply with the effluent standards during any discharge of sewage or sullage. The law specifies the standards for small scale industries. The central and state boards are required to start a laboratory for sampling, testing and analyzing water samples. A fee is to be charged for such services. The penalties for non-compliance involves three months imprisonment and a fine of Rs 10, 000 or a fine upto Rs 5, 000 every day of violation or both plus the expenses

<https://assignbuster.com/the-ozone-layer-depletion-environmental-sciences-essay/>

incurred by the Board during inspection, sampling and analysis. If any offence has occurred with the consent of any director, officer, manager or secretary of a company and proved, he is deemed to be guilty. 6. 9. Wildlife Protection and Wildlife Protection Act, 1972 Wildlife Protection was seen for the first time in certain notification by the State administrative authorities around 1972. The main objective was to protect hunting reserves. Then was no separate legislation for the protection of wildlife. The National Forest Policy 1952 emphasized on the wildlife protection through the formulation of special laws and by setting up of Sanctuaries and Parks. It also established the Central Board of Wildlife under the Ministry of Food and Agriculture. The Wildlife Protection Act, 1972 is a major step to protect wildlife with a complex administrative structure. The act empowers the Central Government to constitute a Central Zoo Authority. The authority shall comprise of a Chairperson, Member- Secretary and members not exceeding ten in number. The chairperson and other member are appointed for a term, not more than three years. The authority sets the minimum standards for housing and veterinary care of animals in the zoo. The authority may recognize and derecognize zoos. They identify the wild animals for the purpose of captive breeding. They co-ordinate training programmes in and outside India. They also co-ordinate research and educational programmes. They also co-ordinate acquisition and exchange of animals. The act prohibits teasing, injuring and disturbing of animals. The law prohibits for the establishment of National Board of Wildlife (NBWL) and State Board of Wildlife. The State Wildlife Department is headed by chief wildlife Warden. The Act seeks wildlife protection through the creation of National Parks.

Sanctuaries. Conservation Reserve. Community Reserve. Distinction b/w  
<https://assignbuster.com/the-ozone-layer-depletion-environmental-sciences-essay/>



National Parks & Sanctuaries seen flawed. Hunting of animals in Schedule 1 is totally prohibited while that of other in schedule 2, 3 & 4 is permitted only on license. Central Government is empowered to declare any area of sanctuary. Public entry is barred and hunting without license is prohibited. Trade and commerce in animals and their products is forbidden except in specific condition. Major difference b/w reserved and protected forest on one hand and sanctuaries on the other in at the level of policy. The former are areas for regulated utilisation of natural resources as oppose to wildlife conservation, the latter is clearly for protecting wildlife. Most of the protected areas are inhabited by local communities. Activists claim that tribal rights are denied and administration is throwing open the habitats to mining and other development projects that is running the habitats. Most important aspect is the implementation of existing laws against poachers. Administrators fail due to their well off connections. The department is understaffed and do not have basic facilities to transport, education, housing in the lower rungs. Salaries are low and encounters lead to killing of the officials. NWAP, 2002 focus mainly on the manner in which wildlife should be conserved with more participation of communities. Short term economic goals should not be permitted to undermine ecological security. Natural sites are declared as ecologically sensitive zones under EPA where Government can regulate developmental activities.

### **6. 9. 5 Forest Policy and The Forest Conservation Act, 1980**

The Forest Department was formed in 1864. This was followed by the Forest Act 1865, but enacted in the year 1878, when the Britishers realized the importance of Indian Forest to be a permanent source of revenue. The Forest

Policy of 1894 gave more importance to public benefit & agricultural use. There were many provisions but never implemented. Indian Forest Act, 1927 witnessed wide powers given to the State. The State could determine three categories of Forest - reserve forest, protected forest and village forest. Forest officers of any rank were given wide range of powers. The act merely reflects the colonial policy and administration. The Indian Forest Policy, 1952 focused more on the role of forest as revenue generators. It realized the necessity of balanced and complementary use but even then reiterated the colonial principles. During this period large tracts of forests were cleared and replaced with monoculture plantations of rapidly growing commercially valuable species.

### **Forest Conservation Act, 1980**

The purpose of this act is to provide for the conservation of forests. The act extends to whole of India except the state of Jammu and Kashmir. The Central Government may constitute an Advisory Committee to advise the Government relating to granting of approvals or any matters related to conservation of forests. Whoever fails to abide by the given rules shall be punishable with a simple imprisonment for a period that may extend up to 15 days. Without prior approval of the Central Government the act prevents the State Government, to cease a ' reserved forest' partially or wholly; from giving any forest land for non-forest purpose such as cultivation of cash crops, horticultural or medicinal plants and to clear naturally growing trees for the purpose of reforestation. Hence, this act sought to prevent the state from disposing the forest lands in an arbitrary manner. But the administrators were hand in gloves with the offences or simply closed their

eyes to let the activities go on. The 1989 amendment permitted the forest officers to be prosecuted and to be subjected to fine similar to other persons. The government adopted and started the concept of social forestry in order to provide fuel wood to the domestic users. The scheme comprised of 3 components:-Community woodlots on common village lands. Strip plantations? Along the roadsides and canal bank. Farm forestry.

## **6. 10 Issues involved in enforcement of environmental legislation**

Environmental law without enforcement seems to be useless. The governments are generally assigned responsibility to administer statutes and bring prosecutions in order to enforce compliance. Often the Government is found to transgress the law and the entire responsibility falls on the citizens who then pursue court for the enforcement of orders. To keep pace with the rapid environmental degradation more stringent laws are to be brought in and enforced. In spite of all, some landmark decisions of the higher judiciary exerted a strong impact on the country's environmental law. The principal environmental enforcement agencies in our country are the SPCBs and the CPCB. The opportunity of these authorities under the Water act and Air act can be labeled as 'residual' in nature. Under these Act, SPCB is allowed to collect samples of any sewage or trade effluent or any emissions from any chimney, etc. The result and report of such sample analysis is however, not acceptable as proof in any legal proceeding, unless the comprehensive procedure prescribed by the law has been tracked. The SPCB have the power to inspection of any place for the purpose of investigating any factory, record, register, or document. The violation of most of the environmental

pollution laws are criminal in nature and entice penalties and possible imprisonment. Infringements of, environmental zoning notifications is however, civil in nature. India is an active participant in international forums and has ratified various Multilateral Environmental Agreements. This includes the Ramsar Convention on Wetlands, 1971; CITES, 1973; the Montreal Protocol, 1987; the Basel Convention, 1989; Convention on Biological Diversity, 1992, Cartagena Protocol on Biosafety, 1992; the UNFCCC and its Kyoto Protocol; the Rotterdam Convention On the Prior Informed Consent Procedure for Certain Hazardous Chemicals and Pesticides in International Trade, 1998; and the Convention on Persistent Organic Pollutants, 2001 at Stockholm. The marine pollution in India is regulated by the Territorial Waters, Continental Shelf (CS), Exclusive Economic Zone (EEZ) and Other Maritime Zones Act, 1976. This Act proclaims India's sovereignty and dominion over the natural resources in the Continental Shelf and the EEZ, and deliberates exclusive jurisdiction to the central government to protect and preserve the marine environment.. This is accompanied by the Merchant Shipping Act, 1958, which administers the civil and criminal accountability regimes in case of oil spills. The CRZ notification, 1991, governs the development along the coastal stretches. The notice prohibits 13 categories of activities, including the setting of new industries and the expansion of existing industries. Exceptions being those activities which need water front and foreshore facilities. The notification classifies the coast into four categories, depending on their environmental sensitiveness to permit or to restrict different types of activities. As per our Constitution, water is in the 'state list'. The states have jurisdiction over the withdrawal of ground water from surface water sources. However, a comprehensive Act to cover <https://assignbuster.com/the-ozone-layer-depletion-environmental-sciences-essay/>

groundwater extraction is lacking. A model Bill to regulate and control the groundwater management was prepared in 2005, which has been adopted by some states, but, yet to be passed as a law. Few states like Maharashtra have enacted distinct laws to regulate the withdrawal of groundwater to the degree that it affects the supply of drinking water. The Indian Forest Act, 1927 provides the states with authority over both public and private forests, and controls the extraction of timber for profit purposes. The forests are categorized into reserve forests, village forests and protected forests. Once an area is declared as a reserve forest, all earlier personal and community rights over the forest will stand null and void. Admittance to the forest and access to forest products becomes a matter of state privilege. A Central Empowered Committee has been set up by the Supreme Court to oversee the timber accessibility in India and control all wood-based industries, such as saw-mills, veneer and plywood plants, which require former permission to maneuver. Twenty five wetland sites are declared by India under the Ramsar Convention on Wetlands, 1971, all of which are well protected, as per Wildlife (Protection) Act, 1972. Recently, conservation reserves (state-owned land) and community reserves (community or private land) are created to better the socio-economic conditions of people living in ecologically sensitive areas as well as ensuring wildlife conservation. The Government also regulates trade in wildlife as per CITES, 1973. The Noise Pollution (Regulation and Control) Rules, 2000, were prepared to standardize and control noise producing and generating sources. It lays noise limits and specifies the existence of silence zones around hospitals, schools, courts, colleges, religious places and any such area declared by the authority. The Factories Act, 1948, as division of its general environmental, health and safety (EHS) <https://assignbuster.com/the-ozone-layer-depletion-environmental-sciences-essay/>

has the provisions relating to hazardous processes in factories and ensures safe working conditions. The EPA, 1986 serves as the most comprehensive act well supported by many other subordinate acts and rules. This act is also known as Umbrella Act. This illustrates to what degree the Indian judiciary can be concerned in the enforcement of environmental laws.

## **6. 11 Environment impact assessment (EIA)**

According to IAIA, " the process of identifying, predicting, evaluating and mitigating the biophysical, social and other relevant effects of development proposals prior to major decisions being taken and commitments made". In other words, EIA is a tool, seeking to ensure sustainable development through the evaluation and assessment of those impacts which may arise out of a major activity or project, that are likely to exert environmental impacts. Hence, it is anticipatory- environmental impacts are presumed, participatory- requires involvement of people from various strata and diverse background, systematic-the entire process follows definite steps and rely on multidisciplinary input. Originally it comes from Section 102 (2) of NEPA, 1969. USA. The process of EIA rests on 3 pillars: Statutory framework - In 1972, the National Committee on Environmental Planning and Co-ordination (NCEPC) was formed under DST under the 4th Five year plan. Those days NCEPC was directed to undertake EIA of all major development projects. In 1980, DoE was established which was upgraded to MOEF in 1985. In 1986, MoEF enacted the EPA, 1986, which made provision for EIA. Environment clearance (EC) is subjected to the stipulated standards under Water Act, Air Act, Noise Pollution Rules, Forest Conservation Act, Hazardous Waste Rules etc, in addition to the stringent regulations of the State government on the

local conditions. Administrative Framework- involves how the EC system works. Earlier, the process was centralized and conducted by MoEF solely. Presently it is decentralized to some extent between the Central and State government. MoEF serves as the apex body. In the Centre, the main body involved in the process is Impact Assessment Agency (IAA) assisted by Regional offices of MoEF and CPCB. IAA with the help of relevant authorities prepares questionnaires, checklists, notifications to amendment w. r. t environmental laws. It seeks clarifications and conduct site visits, if necessary. It comprises of 6 expert committees called Environment Appraisal Committee (EAC) in the following categories of projects—Industry, Thermal Power, River Valley and Hydroelectricity, Mining, Infrastructure & Miscellaneous, and Atomic Power. For convenience IAA was subdivided into three divisions to look into specific projects. tab21. River Vally1. Industrial1. Ports & Harbour2. Irrigation2. Thermal2. Tourism3. Hydil Power3. Mining3. Human settlements4. Communication5. Projects inecologically fragileareas. If deemed necessary IAA may consult experts from water resource management, Pollution Control, forestry, ecology, landscape planning, authorized by Central govt. The Forest Conservation Division also examines the project that involve forest land diversion in non-forest uses. There are 6 regional offices of MoEF at Bangalore, Bhopal, Bhubaneshwar, Lucknow, Shillong and Chandigarh with HQ at New Delhi. The CPCB, formed in 1974, acts as research organization by collecting, analyzing and spreading information. Its technical staff and experts comprise the expert committee by IAA. However, it plays no direct role in the EC process. At State level the process is done with the help of DoE and SPCB. The DoE is headed by a cabinet minister and formulate guidelines. The states of Maharastra, Gujrat, <https://assignbuster.com/the-ozone-layer-depletion-environmental-sciences-essay/>

WB and Karnataka have EAC under DoE that will issue EC. In AP, EAC is under SPCB which works under DoE. For the rest of the States, the NOC is issued by the Member-Secretary or Chairman of PCB. SPCB hold public hearings, the minutes and findings of which needs to be furnished to IAA within 30 days. C. Procedural framework - involves the process or the steps in the process. The cost of undergoing EIA is around 1- 5% of the project cost. The different steps are:-The proponent in consultation with the consultant shall have to notify in writing by submission of the project proposal, generally to the office of SPCB. The proposal contains all relevant information regarding location and land use. The consent from forest department or Airport Authority if required should also be submitted along with the project proposal. Screening is the next stage. New projects costing more than equal to 100 crores and existing projects going for expansion or modernization costing more than equal to 50 crores will go through the process of EIA. Projects are also catagorised so that it moves to the relevant departments. For EIA, either IAA or to the state govt. Category I Projects get the EC from central govt. while category II gets the EC from the state. The other category, III is exempted from the purview of EIA. In the third stage, the terms of reference is detailed according to the guidelines for different sectors published by MOEF. Impacts are generally divided into 2 broad categories quantifiable and non-quantifiable criteria. This is known as scoping.

## **Categories of Projects**

Category I—EIA mandatory from the Central govt for 30 categorics of industries - mining, river valley, ports, harbour, tourism etc. The appraisal is



done by central level expert (EAC). Category II--- EIA mandatory from the State govt for 3 types of thermal Power plants-Captive coal and gas based thermal plants upto 250 MW capacity, coal based power plants upto 250 MW with conventional technologies and coal based power plants upto 500 MW with fluidized bed technology. The appraisal is carried out by SEAC and EC granted by SEIAA. Category III - The projects do not required EIA, such as defence related road construction projects, production of bulk drugs based on genetically engineered organisms, laying of pipelines, conveying systems and essential facilities etc.

## **Categories of Projects**

The existing environmental status of the study area is to be described.

Comparison of project induced changes on environment with the environmental changes without the project is to be assessed. The primary data for given parameters are to be recorded and if available, it should be supplemented with secondary data. This stage is often referred to as base line data collection. Impact prediction is perhaps the most crucial step where mapping of environmental consequences of the project is done in all aspects. In this stage the alternatives are to be identified, predicted and compared. The alternatives are ranked for the selection of the best environmentally optimum economic benefits to the community at large. A mitigation plan is to be drawn for selected option to reduce or to avoid the environmental impacts, supplemented with EMP, Risk assessment report, disaster management plan, rehabilitation plan etc. In the subsequent step, the decision makers should have a clear information about the environmental scenarios without the project, with the project and with the project

alternatives. With all other reports and documents in hand, the proponent prepares the EIA report in a supposedly logical and transparent manner. The IAA examines whether all the procedures have been followed as per the MoEF notifications or not. The executive summary is called the Environment Impact Statement (EIS). The law now requires that the public must be informed and consulted on the proposed project. The proponent provides the office of SPCB with the executive summary of the project in both English and vernacular along with all copies of forms relating to the project. Twenty copies of each of the documents must be submitted to the SPCB. Public access to these summaries can be available at District Collectors office.

District Industry Centre, Office of municipal Corporation, Zila Parishad office, Regional MOEF offices and SPCB. SPCB issues notice in at least two newspaper mentioning the date, place and time of public hearing at least 30 days in advance. Public suggestions are invited within 30 days from the date of publication. The hearing panel comprises of the District Collector, MoEF representative, SPCB representative, state govt. representative for relevant sector, not more than 3 representatives of the local bodies such as municipalities and panchayats and not more than three senior citizens nominated by the District Collector. The local residents and environmental groups can participate and submit briefs to the SPCB. In the penultimate stage, the impact assessment authority reviews the report minutely w. r. t the guidelines by MOEF, conducts site visits and then comes to a decision to grant or reject the EC to the project within 90 days from receipt of documents. Decision is conveyed to the proponent within 30 days thereafter.

The last step is monitoring the clearance conditions, done both during construction and operative phases. This ensures whether commitments

<https://assignbuster.com/the-ozone-layer-depletion-environmental-sciences-essay/>

made are followed or not and the assumption in the EIA report is correct or not. Corrective actions are to be taken if the impacts exceed the predicted levels. The proponent is also required to submit the project report, bi-annually to the RO of MOEF and SPCB office.

## **6. 12 Citizens actions and action groups**

Environmental issues have emerged as a major concern for people welfare since the beginning of the 21st century. The idea of environment protection can be seen starting from the Vedic period." O mother earth let thy bosom be free from sickness and decayMay we through long lifeBe active and vigilantAnd serve thee withDevotion"--RigvedaLate Prime Minister Pandit Jawaharlal Nehru and Mrs. Indira Gandhi persistently campaigned for protection, conservation and development of the environment, since the Stockholm UNCHE, 1972 Conference. Several Policies were formulated and legislation enacted. The UN has shown a sweeping transformation in the attitudes, approaches and policies with reference to relations with NGOs and their participation. Measures have been undertaken to strengthen cooperation with NGOs in virtually all areas of activity such as policy research and analysis; policy dialogue; monitoring and advocacy; development activities; humanitarian work like responding to emergencies, promoting human rights, democratization, disarmament and peace; and dissemination of information and raising public awareness. Government agencies work with NGOs to: Augment people's participation in various programmes; To outspread coverage of programmes to the areas that are inadequately served by government staff; To test and repeat innovative approaches; andTo accomplish greater cost effectiveness. NGO and CSOs

can play an increasingly important role in democratizing societies and the challenges. Governments and business may counterattack their advocacy, but the potential roles that NGOs can play in developing and deploying solutions often result marvelous results.

### **Energy and Research Institute (TERI),**

TERI, established in 1974 as self-governing not-for-profit research organization. It works with the mission of developing and promoting technologies, policies and institutions for proficient and sustainable use of natural resources. It is engaged in imparting environmental education through various projects, workshops, audio visual aids and quizzes. TERI works in the field of Energy and its efficient utilization Environment issues Sustainable development and sustainable use of natural resources Sustainable forestry and biodiversity Adoption of renewable energy technologies and Reduction of waste generation

Started in 1980, the Centre for Science and Environment (CSE) is an independent, public organisation with the objective to increase public awareness in science, technology, environment and development. Greenpeace is an International organization was engaged in campaigning against environmental degradation since 1971. It covers 40 countries across Europe, the Americas, Asia and the Pacific. Green Peace's works in the field of marine pollution, oil spills and their impacts on environments, sewage problem, dumping issues, mining, pesticides and fertilizer issues, radioactive discharges, etc.

### **The Chipko Movement**

The Chipko Movement began in 1973 against illegal felling of trees and rolling them down the slopes of the Himalayas in the upper Alakananda

<https://assignbuster.com/the-ozone-layer-depletion-environmental-sciences-essay/>

valley village. Such acts led to massive soil erosion, landslides and devastating flood. The villagers and Dasholi Gram Sarajya Sangh, under the leadership of Chandi Prasad Bhatt and Sunderlal Bahuguna came forward protesting against such illegal felling. The main protagonist of the movement were the women folks who protested by embracing and encircling the tress and hence the name ' chipko'. The movement adherents are known as " tree huggers." Sunderlal Bahuguna spread the message " Ecology is permanent economy". For Bahuguna, shortsighted forest management is an indication of a deeper malady, which is the anthropocentric vision. He asserts that man is the " butcher of Earth." Their appeal to Mrs. Indira Gandhi put an end to the felling of trees. Instead the development of local industries were encouraged which was based on conservation and sustainable use of forest wealth to benefit the locals. The movement has been contributory in the social and ecological fragmentation of the hill sects and also to the conceptual clashes between subcultures of the movement and it helped redefining the role of gender. The Chipko Movement has saved about 100, 000 trees from excavation. of saplings. Approximately 250 years ago, similar movement was started by the Bishnois of Rajasthan. A large group of 24 villages under the leadership of Amrita Devi laid down their lives to protect the trees against the Maharaja of Jodhpur.

### **Case Study - Tehri Dam Movement**

Tehri is located in Tehri Garhwal District in the state of Uttarakhand and lies at the confluence of the Bhagirathi and Bhilangna rivers. Tehri Dam, a multipurpose rock and earth filled embankment dam, is the mightiest dam in India, 2nd highest in Asia and presumed to be the 8th highest in world.

Phase 1 was completed in 2006. The Tehri Dam holds back a reservoir for meant for irrigation, municipal water supply and about 1, 000 MW of hydroelectricity. The relocation of more than 1, 00, 000 local people has led to prolonged legal battles over resettlement rights. This in turn delayed project completion. The construction began in 1978 after viability studies but the project was delayed due to its financial, environmental and social impacts. It posed further concerns about the geological stability of the dam. Moreover, Tehri dam is positioned in the Central Himalayan Seismic Gap, that fall in the major geologic fault zone. This region in particular was the site of a 6. 8 Richter scale earthquake in 1991, with its epicenter 500 kilometers from the location of the dam. Since 2005, construction of the reservoir has reduced the flow of Bhagirathi water from the normal 1, 000 cubic feet / second to 200 cubic feet / second. This acute water supply reduction became central to the protests against dam.

### **Case Study- The Silent Valley Movement**

In 1976, the Kerala State Electricity Board announced their plans to construct a 240 MW capacity hydroelectricity project on Kunthipuzha River flowing through Palakkad and Mallapuram districts of Kerala. The dam of 130 meters height was proposed to be built between two hillocks through which the river flows. Being practically uninhabited it remains a well preserved forest with cardamom, black gram, rice, bean plants, etc. The total area is 90 sq. km, surrounded by ridges, falls within the biosphere reserve and is a home to several endangered and endemic species like Lion tailed Macaque, Great Indian Hornbill and Nilgiri Tahr. Rare plants such as Hydnocarpus, used for treating leprosy, and Rauwolfia serpentina used for treating high blood

pressure, are found there. It was presumed that the damage from such project would be huge, submerging about 530 ha of evergreen forests. The protest against such project was headed by Kerala Sasthra Shahitya Parishad and in 1980, the then prime minister directed to abandon the project and declared it as National Park in 1985.

## **The Appiko movement**

Appiko movement was a ground-breaking movement founded on environmental conservation in India. The villagers of the Uttara Kannada district of Karnataka State were inspired by the Chipko movement. In 1983, men, womenfolk and the children of Salkani under the leadership of Panduranga Hegde, "hugged the trees" in Kalase forest. In 1950, forest cover was more than 81 percent of Uthara Kanara. The government declared this forest district as "backward" and then started the process of "development". A chain of hydroelectric dams constructed to harness the river waters. The conversion of the natural variegated forests into monoculture of teak and eucalyptus plantations parched up the water sources, which directly affected the forest dwellers. Paper and pulp mill, plywood factory sprouted in the area and overexploited the forest resources. This resulted in the shrinking of forest to about 25 % in 1980 and submergence of forest and crop lands. The paper, pulp and power intended for people's development made them poor and miserable.

## **Case Study - Narmada Bachao Andolan**

Started in 1985 NBA is one of the most powerful mass movements against the construction of huge dam across the Narmada River. There are plans to construct more than 3000 big and small dams along the river course. It is a <https://assignbuster.com/the-ozone-layer-depletion-environmental-sciences-essay/>

multi crore project venture that would generate big revenue. The proponents claimed that this project will produce about 1450 MW of electricity and supply potable water to about 40 million people covering thousands of villages and towns. Dams like Tawa and Bargi Dams have already been completed. Opponents protested that this project will rather devastate human lives and biological diversity by destroying thousands of acres of forests and cultivable land. On the other hand, it will by and large dispossess thousands of people of their livelihood. The proposed Sardar Sarovar Dam and Narmada Sagar will dislocate more than 250, 000 people. Resettlement or the rehabilitation of these people becomes the most important issue. These two proposals are already under construction, funded by US\$550 million loan by the World Bank. Protestors came up with the issue through hunger strikes, the mass media, massive marches and rallies and the through the on screen showing of several documentary films, pressurizing the world bank to withdraw its financial support from the project. The movement was led by prominent leaders like Medha Patkar, Baba Amte, Arundhati Roy, and Amir Khan etc.

## **6. 13 Public awareness**

We can do our own bit to Save our Planet and Save ourselves" The warnings about global warming have been extremely clear for a long time. We are facing a global climate crisis. It is deepening. We are entering a period of consequences." - Al Gore

Use of less fossil fuels. Saving electricity by switching off lights, fans, air-conditioners, computers etc., when not required

Buying energy-efficient products such as CFL bulbs, Recycling paper, plastics, glass and minerals whatever we can. By planting more trees like



afforestation, reforestation etc. By preventing deforestation. Using solar heaters to heat water. Harnessing alternate sources of " clean" energy such as wave and wind energy. Avoid wastage of food and water.

## **6. 14 Using an environmental calendar of activities**

### **Plastic to oil By the IOC**

A method to convert plastic waste into fuel by IOC has given a new impetus to the waste management business and prospects. The next step is setting up of a Rs 7. 08 crore pilot plant to further mature the process. The process involves converting one of the world's most polluting material into the most wanted commodity. A useful technology can lead to the setting up of a commercial plant that can change waste plastic management into a 'profit making center', or waste to wealth. The consequences of 11 experiments performed at the IOC, R&D centre, at Faridabad in UP, in 2003, have ascertained that the conversion of plastic-to-petrol process invented by the couple, Umesh and Alka Zadgaonkar does operate certainly. One Kg of plastic waste yields 40-60% liquid petroleum. The raw materials used can be polyvinyl chlorides, PET bottles, polythene bags, broken buckets etc. The cost of production is a meager Rs 7 / liter. The result of the experiments is of important business prospects in India, which produces about 7, 000 tonnes of waste plastic every day. The invention was first reported in June 2003. The inventor's formula involves heating the shredded plastic waste, in oxygen free condition, using coal and a ' secret chemical'. The products formed include about 80% liquids in fuel range, 5% coke and 15% gases in LPG range. One kg of plastic and 100 gm of coal blend out one liter of fuel, which comprises the gasoline range. With further processing, it yields refined

petrol. The inventors discovered the process and the catalyst that breaks long hydrocarbon chain molecules of plastic materials into smaller segments of petroleum products. IOC official opines that fractionation can yield industrial furnace oil which is ready to use, but production of gasoline requires stabilization additives and, for petrol, the cetane number needs to be increased. A low cetane number often causes ignition hitch, hampering the smooth running of an engine. IOC facilitated to improve the liquid quality by reducing the diene and high chlorine content.