IDHAYA COLLEGE FOR WOMEN, KUMBAKONAM

DEPARTMENT OF MICROBIOLOGY

COURSE	**:**	**B.Sc., & B.Com., I**
SEMESTER	**:**	**II**
TOPIC	**:**	**UNIT-VIII**
SUBJECT NAME	**:**	**ENVIRONMENTAL STUDIES**
SUB CODE	**:**	**19UGCES**

Presented by

Dr.M.NITHYA M.Sc., Ph.D., PGDCA

Assistant Professor,

Dept. of Microbiology

MAN, ENVIRONMENT AND CLIMATE CHANGE

The climate has changed many times in the past. The evidence for this is all around us, written in the shapes of the land, the composition of the ocean sediments, and the structure of the great ice caps that cover Greenland and the Antarctic. We are now corning to the realization that man can influence the planet's environment on a grand scale. Though he may have influenced the climate already, it has so far probably been in a small way. Our concern is that he may be able to do it in a larger way, and could begin to match Nature's forces with his own in the future. What can we say about man's influences relative to Nature's? This is the central question that we face when we consider the future of mankind.

HISTORY OF CLIMATE

Looking at the record of past climatic conditions, it becomes so fuzzy as we turn back the clock beyond 500 m.y. that very little can be said about the conditions on Earth. The ice age in which we now live probably started about 20 m.y. ago in the Antarctic, and then spread to the Northern Hemisphere two or three million years ago. Figure 1, by Flohn gives a rough idea of how the temperature at mid-latitudes may have changed during the past 60 m.y. More recently, as shown in this figure, we have had a succession of warming and cooling trends lasting for a hundred to two hundred thousand years each. We have just emerged from the last cold spell, the Pleistocene Ice Age, when a great ice sheet sat over the North American Continent, and another smaller one sat over Scandinavia and Asia. This last period of glaciation only retreated 10000 yr ago, which is but a fraction of a second measured on the scale of time of the Earth's history.

Imagine the changes that must have been forced on primitive man by these glaciations of large parts of his continents, and all the changes that must have occurred in the rainfall and temperature patterns of the rest of the land! It is almost certain that many of the deserts that exist now were much smaller or were not even deserts during the last ice age, and the patterns of forests, lakes, and rivers must have been very different from those at present, even though the continents had essentially their present shape.

CLIMATE CHANGE

The world attention was first drawn to the global climate change or global warming situation by Farman (1985). Farman, while doing his research in the Arctic and Antarctic

regions of the world was fascinated by the extent to which he was discovering new phenomenon in the atmosphere, where he first saw a hole in the Ozone layer of the atmosphere. In his enthusiasm and fascination, he reported that he discovered a hole in the Antarctic region in the atmosphere and that hole he first called the ‘’Atmospheric Window’’. As research and studies continued, it was then discovered that the hole Farman discovered and named ‘’atmospheric window’’ was not a window in the atmosphere per se, but an area of the ozone lay depleted by human activities thereby creating a figment of a window which he reported earlier on. Nevertheless, this atmospheric window was then renamed Ozone layer depletion. Series of researches and studies were carried out and the outcome have clearly shown that man’s industrial and agricultural activities have been the major drivers of the Ozone layer depletion resulting to global warming or green house effects.

Traditional with research endeavors, researchers became interested in knowing the cause of this window in the atmosphere or what was responsible for this depletion of the Ozone layer. In Farman’s description of Ozone layer depletion, he likened the atmospheric cover call Ozone which is a combination of Oxygen and water vapor as a shield covering the earth atmosphere from the direct effects of sun light which has a very high content of Radioactive and Ultraviolent radiations capable of causing skin cancer and other form of impacts on human and animal health. Human activities have generated so much heat that it has weakened the lower coverage of the shield, thereby creating a gradual peeling of the lower section of the Ozone layer.

The Albedo effects of Greenhouse gases retaining the radiant energy (heat) transmitted from the Sun to the Earth is trapped and cannot escape back to the atmosphere, creating the process known as the greenhouse effect. This is what is responsible for the heating of the earth’s atmosphere. The Greenhouse gases occur naturally without which the earth’s planet would be too cold to sustain life. It is however observed that since the beginning of Industrial Revolution in the mid-1700s, however, human activities have added more and more of these gases into the atmosphere.

AGRICULTURE ACTIVITIES

Methane is another extremely potent greenhouse gas, ranking right behind CO. When organic matter is broken down by bacteria under oxygen-starved conditions (anaerobic decomposition) as in rice paddies, methane is produced. The process also takes place in the intestines of herbivorous animals, and with the increase in the amount of concentrated livestock production, the levels of methane released into the atmosphere is increasing.

HUMAN CAUSES OF GLOBAL CHANGE

All the human causes of global environmental change happen through a subset of proximate causes, which directly alter aspects of the environment in ways that have global effects. We begin this chapter by outlining and illustrating an approach to accounting for the major proximate causes of global change, and then proceed to the more difficult issue of explaining them. Three case studies illustrate the various ways human actions can contribute to global change and provide concrete background for the more theoretical discussion that follows. We have identified specific research needs throughout that discussion. We conclude by stating some principles that follow from current knowledge and some implications for research.

IDENTIFYING THE MAJOR PROXIMATE CAUSES

The important proximate human causes of global change are those with enough impact to significantly alter properties of the global environment of potential concern to humanity. The global environmental properties now of greatest concern include the radiative balance of the earth, the number of living species, and the influx of ultraviolet (UV-B) radiation to the earth's surface (see also National Research Council, 1990b). In the future, however, the properties of concern to humanity are likely to change—ultra-violet radiation, after all, has been of global concern only since the 1960s. Consequently, researchers need a general system for moving from a concern with important changes in the environment to the identification of the human activities that most seriously affect those changes. This section describes an accounting system that can help to perform the task and illustrates it with a rough and partial accounting of the human causes of global climate change.

A TREE-STRUCTURED ACCOUNTING SYSTEM

A useful accounting system for the human causes of global change has a tree structure in which properties of the global environment are linked to the major human activities that alter them, and in which the activities are divided in turn into their constituent parts or influences. Such an accounting system is helpful for social science because, by beginning with variables known to be important to global environmental change, it anchors the study of human activities to the natural environment and imposes a criterion of impact on the consideration of research

directions (see also Clark, 1988). This is important because it can direct the attention of social scientists to the study of the activities with strong impacts on global change.

Because the connections between global environmental change and the concepts of social science are rarely obvious, social scientists who begin with important concepts in their fields have often directed their attention to low-impact human activities (see Stern and Oskamp, 1987, for elaboration). An analysis anchored in the critical physical or biological phenomena can identify research traditions whose relevance to the study of environmental change might otherwise be overlooked. For example, an examination of the actors and decisions with the greatest impact on energy use, air pollution, and solid waste generation showed that, by an impact criterion, studies of the determinants of daily behavior had much less potential to yield useful knowledge than studies of household and corporate investment decisions or of organizational routines in the context of energy use and waste management (Stem and Gardner, 1981a,b). Theories and methods existed for each subject matter in relevant disciplines such as psychology and sociology, but much of the research attention had been misdirected.

The idea of tree-structured accounting can be illustrated by the following sketch of a tree describing the causes of global climate change.

1. The chief environmental property of concern is the level of greenhouse gases in the atmosphere. The major anthropogenic greenhouse gases, defined in terms of overall impact (amount in the atmosphere times impact per molecule integrated over time), are carbon dioxide (CO_2), chlorofluorocarbons (CFCs), methane (CH_4), and nitrous oxide (N_2O). If the trunk of the tree represents the greenhouse gas-producing effect of all human activities, the limbs can represent the contributing greenhouse gases.

2. Both natural processes and human activities result in emissions of greenhouse gases. For instance, carbon dioxide is emitted by respiration of animals and plants, burning of biomass, burning of fossil fuels, and so forth. If each limb of the tree represents human contributions to global emissions of a greenhouse gas, the branches off the limbs can represent the major anthropogenic sources of a gas, that is, the major categories of human activity that release it. These are proximate human causes of climate change, and their impact is equal to their contribution of each greenhouse gas times the gas's radiative effect, integrated over time. For the same emissions, the representation of impact will vary with the date to which the impact is projected.

3. Major human proximate causes, such as fossil fuel burning, are conducted by many actors and for many purposes: electricity generation, motorized transport, space conditioning, industrial process heat, and so forth. A tree branch, such as one representing fossil fuel burning, can be divided into twigs that represent these different actors or purposes, each of which acts as a subsidiary proximate cause, producing a proportion of the total emissions. It is possible to make such a division in numerous ways. Fossil fuel burning can be subdivided according to parts of the world (countries, developed and less-developed world regions, etc.), sectors of an economy (transportation, industrial, etc.), purposes (locomotion, space heating, etc.), types of actor (households, firms, governments), types of decisions determining the activity (design, purchase, utilization of equipment), or in other ways. Different methods may prove useful for different purposes.
4. The tree structure can be elaborated further by dividing the subsidiary proximate causes defined at the previous level into their components. Such analysis is important for high-impact activities.

FIREWORKS AND CELEBRATIONS

Fireworks are a class of low explosive pyrotechnic devices used for aesthetic and entertainment purposes. The most common use of a firework is as part of a fireworks display (also called a fireworks show or pyrotechnics), a display of the effects produced by firework devices.

Fireworks take many forms to produce the four primary effects: noise, light, smoke, and floating materials (confetti for example). They may be designed to burn with colored flames and sparks including red, orange, yellow, green, blue, purple, and silver. Displays are common throughout the world and are the focal point of many cultural and religious celebrations.

Fireworks are generally classified as to where they perform, either as a ground or aerial firework. In the latter case they may provide their own propulsion (skyrocket) or be shot into the air by a mortar (aerial shell)

The most common feature of fireworks is a paper or pasteboard tube or casing filled with the combustible material, often pyrotechnic stars. A number of these tubes or cases are often combined so as to make when kindled, a great variety of sparkling shapes, often variously colored. A skyrocket is a common form of firework, although the first skyrockets were used in

warfare. The aerial shell, however, is the backbone of today's commercial aerial display, and a smaller version for consumer use is known as the festival ball in the United States. Such rocket technology has also been used for the delivery of mail by rocket and is used as propulsion for most model rockets.

Fireworks were originally invented in China. One of the cultural practices for fireworks was to scare away evil spirits. Cultural events and festivities such as the Chinese New Year and the Mid-Autumn Moon Festival were and still are times when fireworks are guaranteed sights. China is the largest manufacturer and exporter of fireworks in the world.

PYROTECHNIC DEVICES

BENGAL FIRES

Bengal fires are pyrotechnic candles designed to burn slowly and often used to provide indirect lighting for structures.

SAFETY

Improper use of fireworks may be dangerous, both to the person operating them (risks of burns and wounds) and to bystanders; in addition, they may start fires after landing on flammable material. For this reason, the use of fireworks is generally legally restricted. Display fireworks are restricted by law for use by professionals; consumer items, available to the public, are smaller versions containing limited amounts of explosive material to reduce potential danger.

Fireworks are also a problem for animals, both domestic and wild, which can be frightened by their noise, leading to them running away, often into danger, or hurting themselves on fences or in other ways in an attempt to escape.

COMPETITIONS

Pyrotechnical competitions involving fireworks are held in many countries. The most prestigious fireworks competition is the Montreal Fireworks Festival, an annual competition held in Montreal, Quebec, Canada. Another magnificent competition is Le Festival d'Art Pyrotechnique held in the summer annually at the Bay of Cannes in Côte d'Azur, France. The World Pyro Olympics is an annual competition amongst the top fireworks companies in the world. It is held in Manila, Philippines. The event is one of the largest and most intense international fireworks competitions.

HALLOWEEN

CANADA

Both fireworks and firecrackers are a popular tradition during Halloween in Vancouver, although apparently this is not the custom elsewhere in Canada.

IRELAND

In the Republic of Ireland and Northern Ireland there are many fireworks displays, during the Halloween season. The largest are in the cities of Belfast, Derry, and Dublin. The 2010 Derry Halloween fireworks attracted an audience of over 20,000 people. The sale of fireworks is strongly restricted in the Republic of Ireland, though many illegal fireworks are sold throughout October or smuggled from Northern Ireland. In the Republic the maximum punishment for possessing fireworks without a licence, or lighting fireworks in a public place, is a €10,000 fine and a five-year prison sentence

UNITED STATES

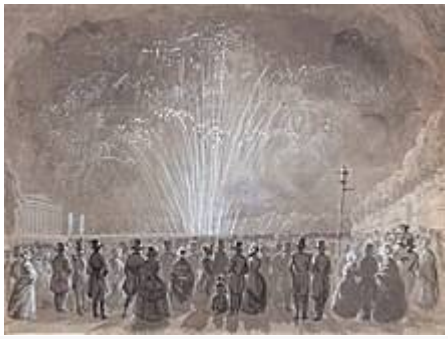
Two firework displays on All Hallows' Eve in the United States are the annual "Happy Hallowishes" show at Walt Disney World's Magic Kingdom "Mickey's Not-So-Scary Halloween Party" event, which began in 2005, and the "Halloween Screams" at Disneyland Park, which began in 2009.

FIREWORKS CELEBRATIONS THROUGHOUT THE WORLD

AUSTRALIA

In Australia, fireworks displays are used in the public celebration of major events such as New Year's Eve.

FRANCE



A firework display by the British illustrator Ebenezer Landells. Possibly the display given by Napoleon III on Queen Victoria's 1855 visit to Paris.

In France, fireworks are traditionally displayed on the eve of Bastille day (14 July) to commemorate the French revolution and the storming of the Bastille on that same day in 1789. Every city in France lights up the sky for the occasion with a special mention to Paris that offers a spectacle around the Eiffel Tower.

HUNGARY

In Hungary fireworks are used on 20 August, which is a national celebration day

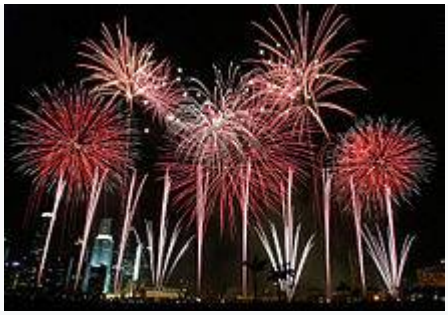
India

Indians throughout the world celebrate with fireworks as part of their popular "festival of lights" (Diwali) in Oct-Nov every year.

JAPAN

During the summer in Japan, fireworks festivals are held nearly every day someplace in the country, in total numbering more than 200 during August. The festivals consist of large fireworks shows, the largest of which use between 100,000 and 120,000 rounds (Tondabayashi, Osaka), and can attract more than 800,000 spectators. Street vendors set up stalls to sell various drinks and staple Japanese food (such as Yakisoba, Okonomiyaki, Takoyaki, Kakigōri (shaved ice), and traditionally held festival games, such as Kingyo-sukui, or Goldfish scooping.

SINGAPORE



The Singapore Fireworks Celebrations (previously the Singapore Fireworks Festival) is an annual event held in Singapore as part of its National Day celebrations. The festival features local and foreign teams which launch displays on different nights. While currently non-competitive in nature, the organizer has plans to introduce a competitive element in the future.

Even today, men and women attend these events wearing the traditional Yukata, summer Kimono, or Jinbei (men only), collecting in large social circles of family or friends to sit picnic-like, eating and drinking, while watching the show.

The first fireworks festival in Japan was held in 1733.

UNITED KINGDOM

One of the biggest occasions for fireworks in the UK is Guy Fawkes Night held each year on 5 November, to celebrate the foiling of the Catholic Gunpowder Plot on 5 November 1605,

an attempt to kill King James I. *The Guardian* newspaper said in 2008 that Britain's biggest Guy Fawkes night events were:

- After Dark fireworks, Sheffield
- Bangers on the Beach (Holyhead Round Table charity fireworks), Holyhead
- Battel Bonfire in Battle, East Sussex
- Blackheath Fireworks, London
- Bught Park fireworks, Inverness
- Fireworks with Vikings, Tutbury, Staffordshire
- Flaming Tar Barrels, Ottery St Mary
- Glasgow Green fireworks
- Halloween Happening fireworks, Derry
- Midsummer Common, Cambridge
- Sparks in the Park (Cardiff Round Table charity fireworks), Cardiff The main firework celebrations in the UK are by the public who buy from many suppliers.

WHAT ARE THE HEALTH EFFECTS OF USING FIREWORKS/FIRECRACKERS?

FIREWORKS AND HEALTH HAZARDS

During **fireworks** displays, suspended particulate matters (SPM), carbon monoxide, nitrogen oxides, hydrocarbons, and sulfur dioxide in the air increase to unprecedented levels. High SPM levels may cause eye, throat, and nose problems, and may lead to headaches as well as reduced mental sharpness

The SPM levels can cause throat, nose, eye related problems. It can lead to headaches and reduced mental acuity. It has much more severe effects in people with heart, respiratory or nervous system disorders. It can aggravate problem for people suffering from cold allergies or coughs and can also cause congestion of throat and chest.

Unwanted second noise has harmful effects as well. Standard noise level set by the Department of Environment and Natural Resources (DENR) for the ambient environment is 60 dB during daytime and 50 decibels during night time. Fireworks can be loud and can exceed 140 decibels. Noise at 85 decibels above can damage hearing. Increase in the sound levels can

lead to restlessness, temporary or permanent hearing loss, high blood pressure, and sleep disturbance.

Fireworks can also cause respiratory problems such as: chronic or allergic bronchitis, bronchial asthma, sinusitis, rhinitis, pneumonia and laryngitis.

TYPES OF EFFECTS

CAKE (FIREWORK)

A cake is a cluster of individual tubes linked by fuse that fires a series of aerial effects. Tube diameters can range in size from ¼–4 inches (6.4–101.6 mm), and a single cake can have over 1,000 shots. The variety of effects within individual cakes is often such that they defy descriptive titles and are instead given cryptic names such as "Bermuda Triangle", "Pyro Glyphics", "Waco Wakeup", and "Poisonous Spider", to name a few. Others are simply quantities of 2.5–4 in (64–102 mm) shells fused together in single-shot tubes.

CROSSETTE

A shell containing several large stars that travel a short distance before breaking apart into smaller stars, creating a crisscrossing grid-like effect. Strictly speaking, a crossette star should split into 4 pieces which fly off symmetrically, making a cross. Once limited to silver or gold effects, colored crossettes such as red, green, or white are now very common.

CHRYSANTHEMUM

A spherical break of colored stars, similar to a peony, but with stars that leave a visible trail of sparks.

DAHLIA

Essentially the same as a peony shell, but with fewer and larger stars. These stars travel a longer-than-usual distance from the shell break before burning out. For instance, if a 3 in (76 mm) peony shell is made with a star size designed for a 6 in (152 mm) shell, it is then considered a dahlia. Some dahlia shells are cylindrical rather than spherical to allow for larger stars.

DIADEM

A type of Chrysanthemum or Peony, with a center cluster of non-moving stars, normally of a contrasting color or effect.

FISH

Inserts that propel themselves rapidly away from the shell burst, often resembling fish swimming away.

MINE

A mine is a ground firework that expels stars and/or other garnitures into the sky. Shot from a mortar like a shell, a mine consists of a canister with the lift charge on the bottom with the effects placed on top. Mines can project small reports, serpents, small shells, as well as just stars. Although mines up to 12 inches (305 mm) diameter appear on occasion, they are usually between 3–5 inches (76

TYPES OF FIRES

Not all fires are the same. Per NFPA 10, burning may be classified into one or more of the following fire classes and your fire protection specialist will select the right fire extinguisher size and agent for the hazard.

Class A

Class A fires are fires in **ordinary combustibles** such as **wood, paper, cloth, rubber, and many plastics**.

Class B

Class B fires are fires in **flammable liquids** such as **gasoline, petroleum greases, tars, oils, oil-based paints, solvents, alcohols**. Class B fires also include **flammable gases** such as **propane** and **butane**. Class B fires do not include fires involving cooking oils and grease.

Class C

Class C fires are fires involving **energized electical equipment** such as **computers, servers, motors, transformers, and appliances**. Remove the power and the Class C fire becomes one of the other classes of fire.

Class D

Class D fires are fires in **combustible metals** such as **magnesium, titanium, zirconium, sodium, lithium, and potassium**.

Class K

Class K fires are fires in **cooking oils and greases** such as **animal** and **vegetable fats**.

TYPES OF FIRE EXTINGUISHERS

Water and Foam

Water and Foam fire extinguishers extinguish the fire by taking away the **heat** element of the fire triangle. Foam agents also separate the **oxygen** element from the other elements.

Water extinguishers are for Class A fires only - they should not be used on Class B or C fires. The discharge stream could spread the flammable liquid in a Class B fire or could create a shock hazard on a Class C fire.

Carbon Dioxide

Carbon Dioxide fire extinguishers extinguish fire by taking away the **oxygen** element of the fire triangle and also be removing the **heat** with a very cold discharge.

Carbon dioxide can be used on Class B & C fires. They are usually ineffective on Class A fires.

Dry Chemical

Dry Chemical fire extinguishers extinguish the fire primarily by interrupting the **chemical reaction** of the fire triangle.

Today's most widely used type of fire extinguisher is the multipurpose dry chemical that is effective on Class A, B, and C fires. This agent also works by creating a barrier between the **oxygen** element and the **fuel** element on Class A fires.

Ordinary dry chemical is for Class B & C fires only. It is important to use the correct extinguisher for the type of fuel! Using the incorrect agent can allow the fire to re-ignite after apparently being extinguished succesfully.

Wet Chemical

Wet Chemical is a new agent that extinguishes the fire by removing the heat of the fire triangle and prevents re-ignition by creating a barrier between the **oxygen** and **fuel** elements.

Wet chemical of Class K extinguishers were developed for modern, high efficiency deep fat fryers in commercial cooking operations. Some may also be used on Class A fires in commercial kitchens.

Clean Agent

Halogenated or **Clean Agent** extinguishers include the halon agents as well as the newer and less ozone depleting halocarbon agents. They extinguish the fire by interrupting the **chemical reaction** and/or **removing heat** from the fire triangle.

Clean agent extinguishers are effective on Class A, B and C fires. Smaller sized handheld extinguishers are not large enough to obtain a 1A rating and may carry only a Class B and C rating.

Dry Powder

Dry Powder extinguishers are similar to dry chemical except that they extinguish the fire by separating the **fuel** from the **oxygen** element or by removing the **heat** element of the fire triangle.

However, dry powder extinguishers are for Class D or combustible metal fires, only. They are ineffective on all other classes of fires.

Water Mist

Water Mist extinguishers are a recent development that extinguish the fire by taking away the **heat** element of the fire triangle. They are an alternative to the clean agent extinguishers where contamination is a concern.

Water mist extinguishers are primarily for Class A fires, although they are safe for use on Class C fires as well.

Cartridge Operated Dry Chemical

Cartridge Operated Dry Chemical fire extinguishers extinguish the fire primarily by interrupting the chemical reaction of the fire triangle.

Like the stored pressure dry chemical extinguishers, the multipurpose dry chemical is effective on Class A, B, and C fires. This agent also works by creating a barrier between the oxygen element and the fuel element on Class A fires.

FIREWORK AND SAFETY

In 2017, eight people died and over 12,000 were injured badly enough to require medical treatment after fireworks-related incidents. Of these, 50% of the injuries were to children and young adults under age 20. Over two-thirds (67%) of injuries took place from June 16 to July 16. And while the majority of these incidents were due to amateurs attempting to use professional-grade, homemade or other illegal fireworks or explosives, an estimated 1,200 injuries were from less powerful devices like small firecrackers and sparklers.

1. Fireworks packaged in brown paper are made for professional displays – avoid buying.
2. Always have an adult supervise fireworks activities, especially with sparklers.
3. Back up to a safe distance immediately after lighting fireworks.
4. Never point or throw fireworks at another person.
5. Keep a bucket of water or a garden hose handy in case of fire and to douse used fireworks before discarding in trash.
6. Never allow young children to play or ignite fireworks.
7. Never carry fireworks in a pocket or shoot them off in metal or glass containers.
8. Never try to re-light or pickup fireworks that have not ignited fully.
9. Never place a part of your body directly over a firework device when lighting.
10. Make sure fireworks are legal in your area before buying or using them.

ANTI-FIRE CRACKERS CAMPAIGN -AWARENESS CREATED FOR REDUCING THE USAGE OF FIREWORKS

This is a government initiative to discourage the use of fire crackers on the occasion of Diwali. Some of the activities taken up as part of this initiative are

- Schools are advised to sensitize children and staff about the harmful effects of fire crackers so that they use safer alternatives e.g. lights, flowers etc to celebrate the festivals.
- Heads of Schools are asked to personally address the school assembly in order to dissuade children from using fire crackers.
- Rallies are organised to sensitise public about the ill-effects of fire crackers