STUDY OF LAND POLLUTION

A project report submitted in

"P.G. Diploma in Value Education & Spirituality"

ANNAMALAI UNIVERSITY

By
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The Directorate of Distance Education
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Year

ANNEXURE – I

CERTIFICATE

This is to certify that the Field Project titled _____ _____ is an original work of me and is being submitted in partial fulfillment for the award of the Post Graduate Diploma in Value Education and Spirituality of Annamalai University in technical collaboration with Bramha Kumari's Education Wing. This report has not been submitted earlier to any other University or in Institution.

SIGNATURE OF STUDENT

Place :

Date :

Submitted for practical examination held on _____

Internal Examiner **External Examiner**

Annexure – II

Field Project Proposal No. _____
(To be assigned by the Directorate)

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PROFORMA FOR APPROVAL OF
FIELD PROJECT PROPOSAL (COURSE V – PGDVE&S)

Enrolment No. : _____

PCP Centre : _____

Name & Address
of the Student : _____

_____

_____

Title of the project : _____

_____

Subject Area : _____

(SIGNATURE OF THE STUDENT)

_____ For Office Use Only _____

Title of the Project : _____

APPROVED **NOT APPROVED**

SIGNATURE OF THE DIRECTOR

Date :

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ACKNOWLEDGEMENT

This project has greatly been as collaborative effort, take this opportunity to thank all who have helped in the preparation and successful completion of this project work.

I oblige by deep sense of gratitude to the management of _____ _____for their kind consent given to me to under take in the organization.

I express my deep reverences on sincere thanks to _____ for his advice and supervision of this project report.

I wish to thanks all those who have participated and supported in this study sparing their most valuable time and also for reaching to me in the most positive way in giving me the required information.

I would like to thank my friends for completion of my project report.

T.ANUPAMA

CHAPTER 1
INTRODUCTION

Introduction

Pollution represents the confluence of humans interacting with the Earth environment. Humans have always polluted their environment: just by living, we create a waste that wouldn't be there if it weren't for us. In the geologic past, this wasn't such a problem because the human population on Earth was small enough that natural systems could compensate and dissipate the pollutants. Sometimes humans would just move away from a polluted area. But, as we know from our understanding of human population growth, exponential growth means exponential amounts of pollution: with nine billion people forecasted to be on Earth this century, pollution by humans has far exceeded the ability of ecosystems to handle it.

A paper mill in New Richmond, Quebec that lacks common pollution control equipment for soot.

Compound this with modern living which has also brought up whole new types of pollution: pollution by heavy metals that were once buried in the earth along with fossil fuels, and pollution by human-created molecules (e.g., pharmaceuticals and chemicals like PCBs), pollution by radioactive waste. While some types of pollution can be handled by our environment (bacteria and other microbes can break-down natural waste products), many of these "new" pollutants are persistent: they cannot be easily broken down by natural processes. The result of population growth, natural waste production, and these "new" pollutants means that Earth systems must contend with a myriad of pollutants.

CHAPTER 2
OBJECTIVES

Objectives

- apply Earth as a System (Environmental Unity), Exponential Population Growth, and Sustainability;
- identify the most significant water and air pollutants;
- determine the source of the pollutants (e.g., point and non-point sources), the harm of the pollutants, and if available, the methods to reduce the pollutants;
- define bioconcentration, bioaccumulation, and biomagnification and know their significance to pollution and human health;
- describe the methods for treating groundwater pollution;
- identify the water quality standards in the U.S.;
- identify the legislation that protects water quality and air quality;
- explain the relationship between weather, topography, and air pollution;
- distinguish the common methods for controlling air pollution;
- explain the total costs of air pollution; and
- describe important case studies that demonstrate the concepts of pollution.

CHAPTER 3

Environmental Awareness

Environmental Awareness:

University of Illinois Extension

Knowing Your World

- Global Warming
  Nature's Response
- Acid Precipitation
  Are Things Getting Better?
- Energy & Ecosystems
  Use Some, Lose Some
- Natural Resources
  Can We Use Them Forever?
- Water Rich Water Poor

Global Warming
Nature's Response

Scientists have shown that the Earth's average temperature has risen slightly in the last few decades. But, not all scientists agree on what changes this will bring in Earth's climate.

The Earth has gone through many cycles of warming and cooling in the past. As Earth's climate changes, nature responds to bring things back into balance.

We know there has been an increase of carbon dioxide in the atmosphere during the last 100 years. We also know that carbon dioxide absorbs heat from the Earth's surface, slowing the escape of heat from the Earth's surface to space. This is the **Greenhouse Effect**. This increase in carbon dioxide (CO_2) has been partially linked to human activities, such as manufacturing and burning large areas of forest.

Some scientists think this will cause the Earth's ice caps to begin to melt, causing ocean levels to rise. Coastal cities would risk flooding. Other scientists think the Earth will adapt. One thought is that some plants will benefit from more carbon dioxide. Since plants use carbon dioxide, this may make them more efficient growers. Some evidence of this may already be occurring in some types of ocean algae. When the algae die, it sinks to the ocean floor, taking carbon with it. This is called **carbon sequestration**, and is a way the amount of carbon dioxide in the atmosphere might be reduced.

Another adaptation that may happen is a change in the Earth's cloud cover. A warmer climate may increase water evaporation. More water vapor in the atmosphere could increase cloud cover. Sunlight would be directly reflected out into space before it reaches the Earth's surface, making less available to heat the Earth.

Related Activity

If these adaptations occur, a change in Earth's climate would still take place, but the change may not be as drastic as some predict. It usually takes decades or centuries for changes in climate to take place. We will not know the total effect of the warming atmosphere on Earth's climate and ecosystems for some time.

This does not mean that attempts should not be made to reduce the amount of carbon dioxide people are putting into the air. Recently, many governments worldwide met to set up limitations on the amount of carbon dioxide and other **greenhouse gases** (gases that slow down heat escaping from the Earth). Individuals can do their part by doing things like planting trees and using products that do not release large amounts of carbon dioxide into the atmosphere.

Acid Precipitation
Are Things Getting Better?

Acid precipitation has been an important environmental topic for many years, not only in the United States, but in Europe as well. What is acid precipitation?

Acids are an important group of chemicals. All acids contain chemicals that are combined with hydrogen in a specific way. Acids are present in aspirin, carbonated drinks, and your stomach.

Another group of chemicals is called **bases**. They contain oxygen and hydrogen that are combined with other chemicals. Chemicals containing bases are called **alkaline**. Examples of alkaline substances are deodorants, ammonia cleaners, and the mortar around bricks.

Liquids are sometimes measured in terms of **acidity** or **alkalinity.** A scale called the **pH scale** is used for this measurement. The scale ranges from zero to 14. Anything with a pH below 7 is considered acidic. The lower the pH, the more acidic it is. Substances above 7 are alkaline. The higher the pH, the more alkaline it is. Liquids that are very acidic or alkaline are dangerous to handle. A substance that is neither acidic or alkaline would have a pH of 7. Absolutely pure water would have a pH of 7.

Normal rainwater has a pH of around 5.6. This is because some carbon dioxide in the atmosphere combines with atmospheric water to form a weak acid. The term **acid rain** is used when rainwater becomes more acidic.

Related Activity

Acid precipitation occurs when water (rain, snow, sleet and fog) combines with pollutants containing sulfur or nitrogen. This may bring the pH down to between 4 and 5.

Many laws and regulations have been created in United States and other countries to cut down the amount of sulfur and nitrogen that is released into the air by human activity. This seems to already be helping to raise the pH of precipitation back to normal. An Illinois State Water Survey study has shown that the amount of sulfur in precipitation has decreased the last few years over Illinois and much of the Northeastern United States.

Energy & Ecosystems
Use Some, Lose Some

Life on Earth is possible because energy flows one way through ecosystems, while matter cycles endlessly. Water and elements, such as carbon, nitrogen, phosphorous, and sulfur are examples of matter that cycles through ecosystems.

The original source of almost all energy in an ecosystem is the Sun. All of the energy the sun releases does not reach Earth. One one-billionth of the Sun's total energy output actually reaches the Earth. Of all the energy that does reach Earth, slightly less than 34 percent is reflected back to space by clouds. The Earth itself reflects another 66 percent back to space. Less than one percent of the total energy that reaches Earth is used by plants for photosynthesis. Plants are often called **producers** because of their ability to make their own food from the sun's energy.

When scientists discuss energy, they often refer to the Laws of Thermodynamics. The First Law of Thermodynamics states that energy can neither be created or destroyed. The Second Law states that energy is constantly converted from high quality to low quality. High quality energy is capable of performing a large amount of work, while low quality energy is capable of performing less work. Scientists know that energy always changes from high to low quality when work is performed. During the change, some energy is lost in the form of heat, which cannot do work. The amount of energy lost as heat is often as high as 90 percent of the total energy involved.

Putting all this together in an example, if 1,000,000 units of solar energy were to reach Earth, one percent or 10,000 units, would be available for plants to use. Of these 10,000 units, plants would lose 90 percent, or 9,000 units, as heat.

Related Activity

If an animal then ate the plants, it would only receive 1,000 units of energy. These animals are called **primary consumers** because they cannot produce their own food. Cows and sheep are examples of primary consumers. If another animal eats the cow or sheep, it would only receive 100 units of energy, since the cow or sheep would lose 900 units as heat. Animals that eat other animals are called **secondary consumers.** Scientists believe that four or five of these energy transformations are the most possible before the amount of energy transferred is too small to support life.

Natural Resources Can We Use Them Forever?

People use many of the Earth's natural resources. All of the products we use have a natural resource base. Minerals, forest products, water, and soil are just a few of the natural resources humans use to produce energy and make things people use.

Some natural resources can be reproduced within a few years or decades. These are called **renewable resources**. Trees are an example of a renewable resource. Oil, minerals, and soil take hundreds, thousands and even millions of years to be made. These are called **non-renewable** resources.

It is very important we use renewable and non-renewable resources wisely. If a resource is used and thrown away, eventually the resource becomes scarce. When the supply dwindles, its price will increase. Products that are made from that resource would increase in price too.

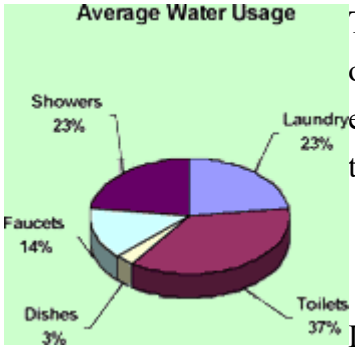
Related Activity

Sometimes resources become so rare they can no longer be used. In these cases, substitute resources may be used, which may make a poorer quality product, or one that is more expensive. If substitutes can not be used, some products could no longer be made.

Wise use of resources includes not throwing away products that are reuseable or recyclable. When these products are reused or recycled, it maintains resource availability, uses less landfill space, and uses less energy.

Water Rich Water Poor

Much less than one percent of the Earth's water is available for human use. This still represents a huge amount of water. This water is not distributed evenly over the planet. Areas that have large water needs may have to bring water in from long distances to service homeowners, businesses and agriculture. For example, southern and central California gets most of their water from northern California, which receives more rainfall.



The Middle East and Mexico suffer from water shortages. Much of the shortage in developing countries is from poor use of existing water supplies, due to pollution and waste.

Related Activity

In Illinois, there is usually enough water to use for drinking, agriculture, and manufacturing. As cities grow larger and industries expand, however, water use increases. This may require creating additional sources of water, by either drilling more water wells, or making a lake. Taxes and increased water bills usually pay for construction of public water supplies. By conserving water use, existing water supplies can be used longer, allowing towns, cities, and industries to grow without the need to find additional sources of water.

What are some ways individuals can conserve water?

The chart shows that clothes washing, showers/baths, and flushing toilets make up 80 percent of a households water usage. Using low flow devices on showerheads, toilets, and faucets will make a big difference in the amount of water a household uses.

For example, an older toilet uses 5 to 7 gallons per flush. New low flow toilets only use 1.6 gallons per flush. Standard showerheads use 5 gallons per minute, while low flow showerheads use 2.5 gallons per minute. Frontloading washing machines will use only 40 percent of the water a top loading washer will use. Water savings can add up quickly.

Repairing leaky faucets and toilets will also conserve water. Even a small drip will waste many gallons of water in a day.

CHAPTER 4

Environmental Degradation

Environmental degradation:

Environmental degradation is the deterioration of the environment through depletion of resources such as air, water and soil; the destruction of ecosystems and the extinction of wildlife. It is defined as any change or disturbance to the environment perceived to be deleterious or undesirable.

There are many forms of environmental degradation. When habitats are destroyed, biodiversity is lost, or natural resources are depleted, the environment is hurt.

Environmental degradation can occur naturally, or through human processes. The largest areas of concern at present are the loss of rain forests, air pollution and smog, ozone depletion, and the destruction of the marine environment.

Pollution is occurring all over the world and poisoning the planet's oceans. Even in remote areas, the effects of marine degradation are obvious.

In some areas, the natural environment has been exposed to hazardous waste. In other places, major disasters such as oil spills have ruined the local environment.

RAIN FOREST DESTRUCTION:

The atmosphere and oceans are not the only parts of the environment being damaged. Rain forests are being quickly destroyed as well, and their survival is questionable.

E.O. Wilson, a biologist at Harvard, called the depletion of rain forest areas "the greatest extinction since the end of the age of dinosaurs."

Unlike some environmental issues, rain forest depletion has fortunately received significant public and media attention.

Despite the opposition to the cutting down of rain forests, the problem continues. Every year, Brazil chops down an area of forest the size of the state of Nebraska.

In addition to the Amazon's rain forests, many other forests are being cut down as well. In Indonesia, Zaire, Papua-New Guinea, Malaysia, Burma, the Philippines, Peru, Colombia, Bolivia, and Venezuela, rain forests that were once great have been lost.

According to some estimates, 50 million acres of rain forest are cut down every year. The United Nations says the figure is closer to 17 million acres. The World Wildlife Fund says that every minute, 25 to 50 acres are cut or burned to the ground.

The world's growing population has been a primary cause of rain forest destruction. More people need land to live on and wood products to consume. Limiting population growth may be the first in a series of steps that would limit the destruction of the rain forests.

SMOG:

In many areas around the word, smog has reached extraordinary levels. Some governments have quickly reacted with severe measures in response to the problem.

The word smog is a combination of the words smoke and fog. The term was invented by a Glasgow public health official, Des Voeux

Smog causes a smoky dark atmosphere to arise over cities. It decreases visibility, and creates a haze throughout the area.

Numerous studies have monitored smog throughout the world. Some of the world's dirtiest cities have millions of inhabitants, all of whom are threatened by the smog.

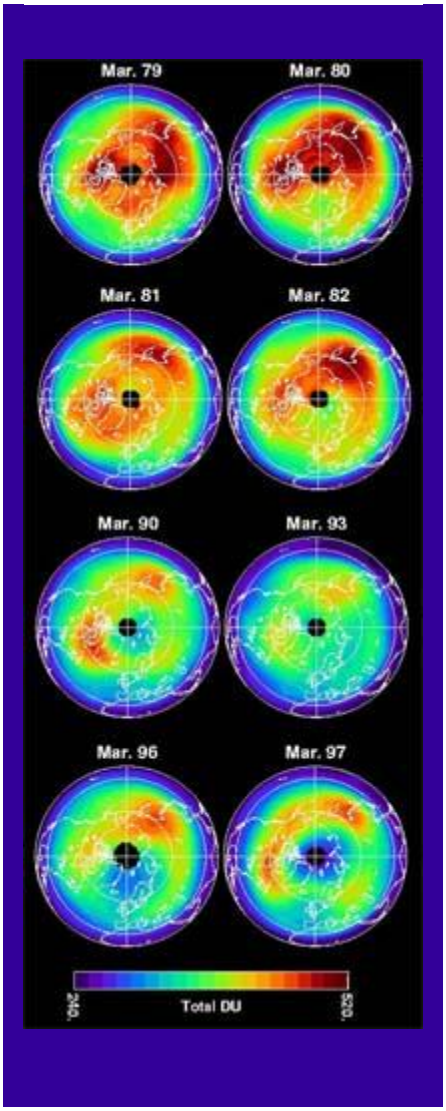
Modern Los Angeles suffers severely from smog, as London did in the 19th century. These two areas released certain chemicals into the air and created a foggy atmosphere. In London, where fog levels have now fallen far below those of years ago, people were often unable to see their hands and sometimes could not walk around.

It took a long time for governments to act to control smog. The Clean Air Act of 1970 in the United States limited legal smog levels. The Environmental Protection Agency now measures levels of smog and regulates smog producers.

Despite government action to reduce them, smog levels remain very high in many cities. Even those areas that do successfully reduce smog may be the victims of smog blown in from other locations.

ozone depletion:

Ozone is present in the stratosphere. The stratosphere reaches 30 miles above the Earth, and at the very top it contains ozone. The suns rays are absorbed by the ozone in the stratosphere and thus do not reach the Earth.



Ozone is a bluish gas that is formed by three atoms of oxygen. The form of oxygen that humans breathe in consists of two oxygen atoms, O_2. When found on the surface of the planet, ozone is considered a dangerous pollutant and is one substance responsible for producing the greenhouse effect.

The highest regions of the stratosphere contain about 90% of all ozone.

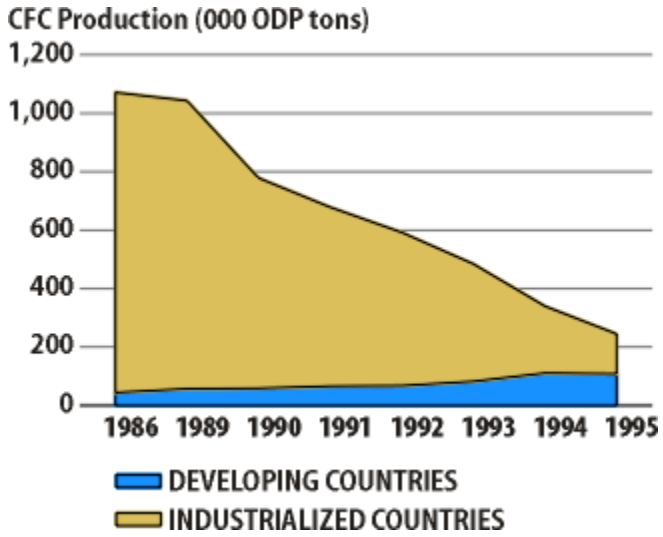
In recent years, the ozone layer has been the subject of much discussion. And rightly so, because the ozone layer protects both plant and animal life on the planet.

The fact that the ozone layer was being depleted was discovered in the mid-1980s. The main cause of this is the release of CFCs, chlorofluorocarbons.

Antarctica was an early victim of ozone destruction. A massive hole in the ozone layer right above Antarctica now threatens not only that continent, but many others that could be the victims of Antarctica's melting icecaps.

In the future, the ozone problem will have to be solved so that the protective layer can be conserved.

CLORO FLORO CARBON (CFC):



The graph above shows how the levels of chlorofluorocarbons, or CFCs, have changed over time.

Recently, the trend has been for CFC production to decrease sharply. As the graph shows, it was primarily the industrial nations that were responsible for most CFC production until some years ago.

Eventually, environmentalists and scientists realized the dangers that CFCs posed to the atmosphere and convinced governments in wealthy nations that they had to reduce CFC production. The wealthier countries have been able to make agreements to reduce CFCs and, as the graph proves, have largely fulfilled these agreements.

The developing nations often cannot afford the luxury of a clean environment. Development usually means a high level of environmental damage, especially if a country has few laws restricting production of chemicals such as CFCs.

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. In Third World nations without pollution restrictions, acid rain tends to be very high. In Eastern Europe,

AIR POLLUTION:

Every day, the average person inhales about 20,000 liters of air. Every time we breathe, we risk inhaling dangerous chemicals that have found their way into the air.

Air pollution includes all contaminants found in the atmosphere. These dangerous substances can be either in the form of gases or particles.

Air pollution can be found both outdoors and indoors. Pollutants can be trapped inside buildings, causing indoor pollution that lasts for a long time.

The sources of air pollution are both natural and human-based. As one might expect, humans have been producing increasing amounts of pollution as time has progressed, and they now account for the majority of pollutants released into the air.

Air pollution has been a problem throughout history. Even in Ancient Rome people complained about smoke put into the atmosphere.

The effects of air pollution are diverse and numerous. Air pollution can have serious consequences for the health of human beings, and also severely affects natural ecosystems.

Because it is located in the atmosphere, air pollution is able to travel easily. As a result, air pollution is a global problem and has been the subject of global cooperation and conflict.

Some areas now suffer more than others from air pollution. Cities with large numbers of automobiles or those that use great quantities of coal often suffer most severely from problems of air pollution.

Deforestation:

Deforestation is the process of destroying or removing a forest ecosystem. In its place, a different form of ecosystem will come about.

This is different from the process of clear-cutting a forest. Clear-cutting only removes the current trees, but allows new ones to grow in their place because it does not fundamentally change the ecosystem.

It is often hard to measure deforestation. The definitions of forests and deforestation are continually changing, and data acquired by scientists is not always accurate and reliable for analysis.

Over the course of history, humans have often destroyed forests. Settlers often burned trees down to have land to plant crops, and the Native Americans burned forests to develop grasslands full of large game animals.

A few major causes are responsible for deforestation. Expanding agriculture and animal herds can cause trees to be removed, as can the harvesting of wood to be used as fuel. Other important factors leading to deforestation are timber harvest, grazing, and random fires.

Besides killing trees and ruining forest ecosystems, deforestation presents many other problems as well. Species may become extinct due to the loss of their habitat, erosion and flooding can occur, and desertification and decreased land productivity may also result. The general climate of an area can also change, and more carbon dioxide can be released.

Deforestation has become a major issue around the world. Some countries have developed programs aimed at reducing deforestation by creating incentives to adopt less wasteful ways of living.

CHAPTER 5
Land Pollution

Land Pollution:

All types of waste can be found on land. Some is left behind after human activities and some is washed ashore from boats and sewage outlets.

Waste:

The definition of waste depends on what is viable to recycle, both economically and environmentally. Landfill is the major method for waste disposal. Landfills are holes in the ground where the waste is placed, perhaps the site of a disused quarry or pit, or they may be purposefully excavated.

Landfills may be noisy with traffic, dusty and smelly: in addition, wind blown litter, pests and flies may be a problem. Landfills contain a mixture of wastes, some of which may be soluble, toxic and reactive during decomposition. When full, landfills are landscaped and may appear no different from the surrounding countryside. Although some old ones are being built on, they are not really suitable for habitation.

Biodegradable matter in landfills is decomposed by bacteria, producing large quantities of carbon dioxide and methane - both greenhouse gases. Methane is potentially explosive and can cause fires. Pollutants such as heavy metals, toxic chemicals and the result of a chemical reaction between the mixture of different wastes may contaminate the environment.

In the short- term, landfills appear the cheap option. But in the long term they are a huge financial burden. This is because they need to be monitored for landfill gas and contamination of nearby land, waterways and groundwater, for many decades after they are closed.

People who live near landfill sites may be exposed to chemicals released into the air, water, or soil. Air contamination includes off-site migration of gases, dust and chemicals bound to dust, especially during the operation of the site. Local surface water and groundwater can become contaminated, and these may in turn contaminate drinking water supplies or water for recreational use. Chemical contamination of air, water, or soil may also affect locally grown and consumed food produce. Therefore, a landfill site may be a health risk for local residents and their children.

Landfill sites have to be chosen carefully. In some countries land is scarce and it is difficult to find suitable areas. The danger of pollution to groundwater supplies, caused by the leaching of toxic liquids from the rotting mess, is a serious problem.

An industrial country with the population the size of the UK creates around 350 million tonnes of waste per year, of which 9% or 30 million tones is household waste. The collection and disposal of household waste costs £720 million (US$ 1.15 billion) a year.

About 85% of it goes into landfills, 10% into the sea, and 5% into incineration, deep burial and chemical solidification.

7.7 million tonnes of paper from 130 million trees are consumed in Britain each year, yet only 27% are recycled. The daily circulation of one popular newspaper alone consumes 4000 trees. 700 million aerosol cans are produced in the world every year; even though they are wasteful, dangerous if burned or punctured and cannot be recycled.

Australians use 7kg of steel cans a year and only 30% of these are recycled. They use over one billion milk and juice cartons every year, and only 10% of these are currently recycled.

An average Western dustbin contains 10% Glass, 30% Paper/Cardboard, 9% Metals, 3% Textiles, 4% Plastics, 23% Vegetables, 21% Dust, Cinders and others. Some of this waste also contains poisonous substances, such as mercury and cadmium from batteries, old medicines, household cleaning and decorating chemicals and garden chemicals. Less than 10% of household waste is recycled.

We create too much waste and in particular too much unnecessary packaging and we do not adequately recycle the waste we create. Many of the resources we use in our everyday lives are disposed of quickly. Food is wrapped in paper or plastic bags, drinks are in throw-away bottles or cans, batteries are disposed of after a short life.

Too many cans are needlessly ending up in landfill when they could be recycled into cars, bridges, freezers or more steel cans.

In many countries collection authorities have set up a system for householders to separate their rubbish into paper, glass and metal, and this makes recycling easier. Recycling facilities operate all over Europe, USA, Canada, Australia and New Zealand. Beteen 1990 and 2005

the amount of waste recycled, doubled in the United States, from fifteen percent to thirty percent. In some countries however, and particularly in the developing world, massive quantities of waste is still dumped in landfills.

What you can do

Avoid over packaged products. Buy things made to last. Take a bag when you shop. Take direct action outside your supermarket to get the retailer to reduce packaging. Write to retailers and ask them to reduce production at source.

Write a letter or email to the editor of your local newspaper; urge him or her to publish your concerns about landfill sites and recycling.

Report anyone who actively dumps waste to the appropriate authorities.

Ring talk back radio expressing concern with increased noisy traffic, dust and smells, wind blown litter, pests and fly's around your local landfill sites.

Write a letter or email to the politicians listed under the heading for your country on our automated lobbying service and ask for more to be done to protect our environment from the harm caused by landfill sites.

Separate collections do cost in the short term but save resources, disposal costs and immeasurable environmental damage. If you don't have separate recycling, press your local council to set one up.

Reduce, re-use and recycle. We can cut down on waste in our dustbins with a little thought and effort. We can separate household waste at home for recycling. More than half of our domestic waste could be recycled or reused but once it is mixed up it becomes more difficult to separate different components for recycling. Some materials can be removed from waste at disposal sites - steel cans, for instance, can be remove magnetically but home separation is preferable. The organic component of waste can also be separated and recycled by composting.

Use the following guide for each product:

Glass: Bottles or jars can be reused or taken to a bottle bank for recycling. Broken glass can be repeatedly recycled with no reduction in quality, saving energy and raw materials. Returnable containers such as milk bottles can be used many times over. Unfortunately now a lot of glass has plastic in its composition making these containers non re-usable and harder to recycle.

Metals: Used aluminium and steel cans can be collected as scrap and smelted for re-use. Avoid batteries. They contain a range of metals but are difficult to recycle. Many developed countries have a system for collecting and recycling used batteries. Rechargeable batteries are now widely available and economical to use. Mobile phones can now have the metals removed for recycling.

Textiles: Old clothes may be given to charity shops or jumble sales or used as rags. Some textiles can be re-used for blankets and cloths.

Plastics: These are derived from a finite supply of fossil fuels. As there are many types of plastics with different chemical properties, it is not easy to recycle them. Many drink bottles are made from a plastic called PET, which can be re-used. Few recycling schemes have been set up as yet for plastics. Most plastics do not degrade and remain a nuisance in the environment for many years. Biodegradable plastics have been developed but these are not suitable for recycling.

Paper and Board: Most of this can be recycled or reused. Recycled paper products are becoming widely available. You can help by buying recycled paper products. Recycled tissues and toilet rolls should be greyish in colour rather than brilliant white. Do not waste paper!

Vegetable Waste: A bucket with a lid makes a good container for vegetable waste that can be regularly added to the compost heap for use in the garden.

CHAPTER 6

Remedial Action

REMEDIAL ACTION

1. Introduction

Soil, together with water and air comprises an essential part of the environment for human beings and other organisms, and plays the vital role of the mother's womb of the ecological chain. Compared to water and air, however, soil has diverse compositions which give rise to complicated reactions with other substances. Once polluted by harmful substances, soil remains polluted for an extended period of time. That is an important factor of its innate nature is its accumulative properties.

Our company provides an integrated solution to soil pollution ranging from soil surveys to remedies for chlorine-based organic solvent, heavy metal, and PCB pollution.

2. From survey to remedial action and follow-up assessments

As the diagram (Fig. 2) shows, our operation is divided primarily in-to two steps: surveys and remedial action.

Fig.1 Purification technique

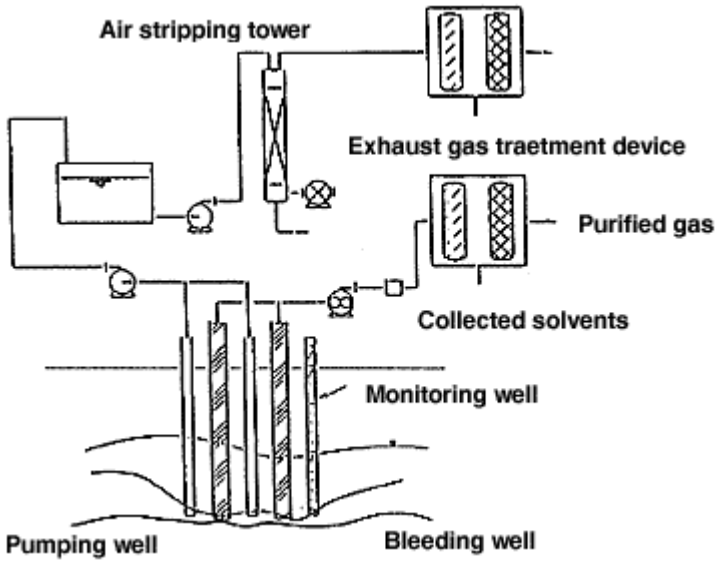
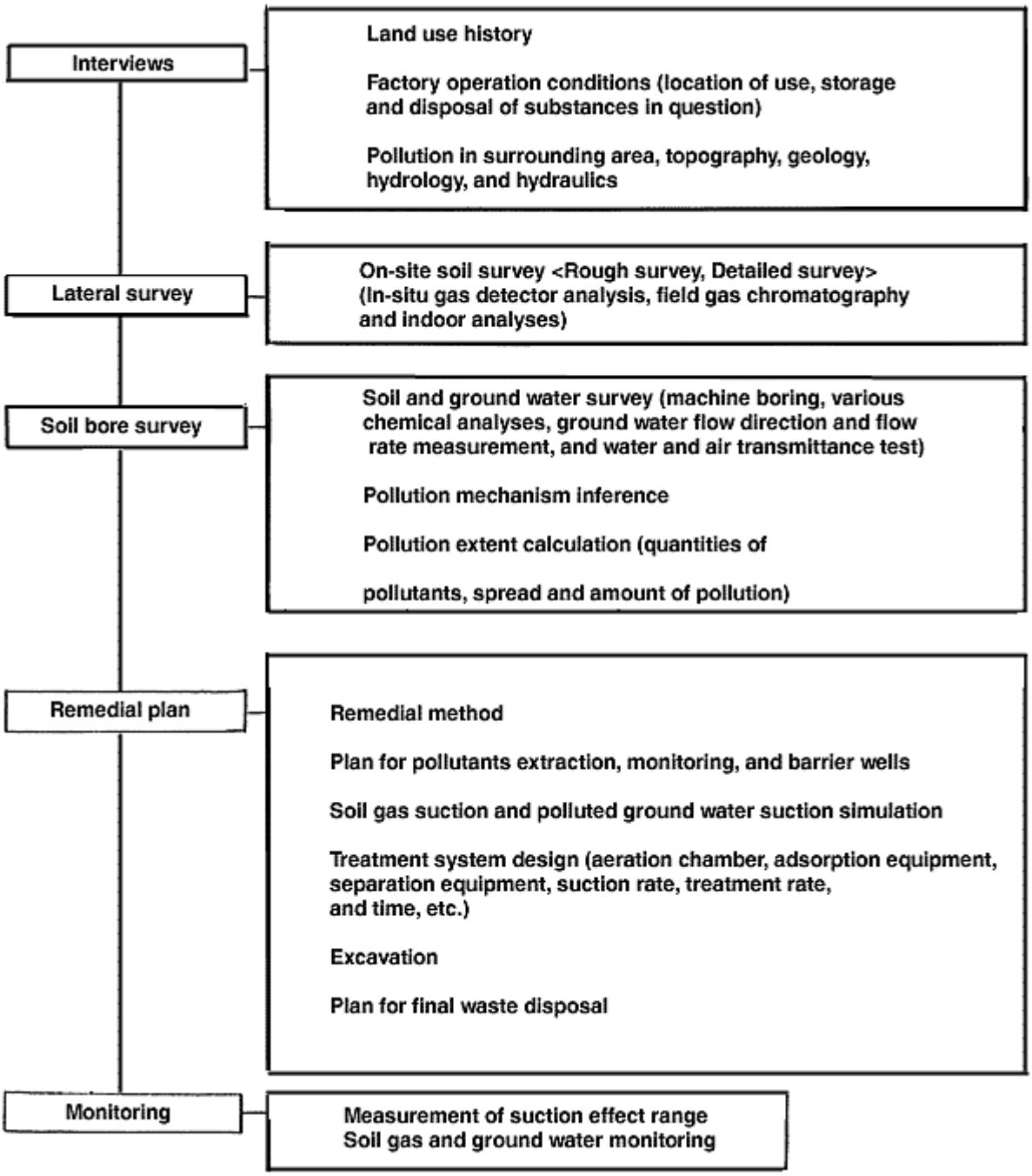


Fig.2 Flow Diagram of Surveys and Remedial Actions for Soil and Ground Water Pollution
Caused by Volatile Organic Chlorine Compounds



Soil and Groundwater Contamination Survey and Countermeasure Technologies:

For the preservation of the environment of soil and groundwater, improvement of contaminated soil and groundwater is required as well as prevention of contamination from chemical substances such as heavy metal and trichloroethylene.

Consequently, in January, 1999, the Environment Agency, which is currently called the Ministry of the Environment, announced the "Survey and Countermeasure Guidelines for Soil and Groundwater Contamination" along with "Operating Standards" which describes the guidelines in detail.

These operating standards include specific technical examples of surveys and countermeasures for soil and groundwater contamination as reference materials. The Global Environment Centre Foundation constructed a database on technical examples of surveys and countermeasures for soil and groundwater contamination with the permission of the Ministry of the Environment in order to provide developing countries which are facilitating industrialization with worldwide access to the information.

Upon the receipt of a voluntary application for the monitoring of a remedial action plan for land pollution pursuant to section 81-15, 184, the Department of Environmental Quality shall evaluate and investigate all aspects of the proposed project, the proposed schedule for completion, and the proposed reimbursement schedule and shall determine if the remedial action plan is eligible for department monitoring. If the department determines that an application is unsatisfactory or does not contain adequate information, the department shall return the application to the applicant and may make recommendations to the applicant which the department considers necessary to make the plan, the reimbursement schedule, or the application satisfactory. If the department approves the application, the department shall execute an agreement with the applicant for department monitoring and payments by the applicant.

Any entity which voluntarily chooses to make application for monitoring of remedial action plans for land pollution:

1. Submit a remedial action plan on a form approved by the Department of Environmental Quality which conforms with procedures approved by the department;

2. Provide the department with documentation regarding the land pollution or water pollution site, including, when appropriate, information indicating that the applicant holds or can acquire title to all lands or has the necessary easements and rights-of-way for the project and related lands;

3. Provide a plan for the proposed project, including project monitoring reports, appropriate engineering, scientific, and financial feasibility data, and other data and information as may be required by the department;

4. Provide a payment plan and schedule for the reimbursement of all department expenses related to monitoring the progress of the remedial action plan, including expenses to review and evaluate the proposed plan;

5. Demonstrate that the remedial action plan conforms with federal Environmental Protection Agency standards. However, nothing in this subdivision shall be construed to require that the department make any determination that such plan conforms with such standards; and

6. Provide the department with an application fee of five thousand dollars and a participation fee of five thousand dollars. The application fee shall be used by the department to offset the expenses referred to in subdivision (4) of this section. The participation fee shall be used by the department to reimburse the General Fund as such fund is impacted by activities conducted pursuant to the Remedial Action Plan Monitoring Act.

CHAPTER 7

Analysis & Interpretation

ANALYSIS AND INTERPRETATION OF DATA

The major objective of the present study was the preparation and testing of learning modules in environmental science . The methods selected for the study were survey and experiment.

Data were collected by the administration of appropriate tools based on the hypotheses and objectives of the study as described earlier. The survey method was used to identify the facilities available and activities conducted in the higher secondary schools for enhancing environmental awareness and to understand the awareness level of higher secondary school students with respect to the environmental issues. The experimental method is used to test the effectiveness of the prepared learning modules. The research design adopted for the Experiment was pre-test, post-test, parallel group design. The analysis and interpretation of the results are presented under the following sections. The soil pollution may be the direct effect of waste dumping, use of agro-chemicals, mining operation and urbanization. It also says how soil pollution is controlled.

Sources of soil pollution

1. Waste dumps: Soil becomes polluted by dumping of industrial wastes, municipal wastes and hospital wastes. Industrial solid wastes and sludge are the major sources of soil pollution. The fly ash emitted by the thermal power plants can pollute the land. Radioactive waters from nuclear testing laboratories and nuclear power station also contaminate the soil.

2. Municipal wastes: Municipal wastes include domestic wastes, hospital wastes, market wastes, Livestock and poultry wastes, slaughterhouse wastes, waste metals, glass and ceramic wastes etc. Dumping of domestic sewage and hospital organic wastes contaminate the environment with a variety of pathogens that can affect human health.

3. Agro-Cbemiccls: Excess use of pesticides, weedicides, in organic fertilizers and biocide residues contaminate the soil. They can also adversely affect soil organisms.

4. Mining operations: The process where the surface of the earth is dug open to bring out the under ground mineral deposits is called open cast mining.

- Control of soil pollution
- Safer land use
- Planned urbanization
- Controlled developmental activities
- Safe disposal and management of solid wastes from industries and human habitations.

- Toxic chemicals, metal containing wastes and fly ash are used as bedding material for road construction
- Solid wastes are burned in presence of oxygen (incineration) and combusted in the absence of oxygen (pyrolusis).
- Municipal solid wastes containing biodegradable organic wastes can be transformed in to organic manure for agriculture.
- The undesirable change in the physical, chemical and biological characteristics of the soil that adversely affects its fertility and productivity is called so-l pollution or land pollution

1. Waste dumps:

Land or soil becomes polluted by dumping of industrial wastes, municipal wastes, and hospital wastes.

Industrial solid wastes and sludge are the major sources of soil pollution.

The fly-ash emitted by thermal power plants can pollute surrounding land. Radioactive wastes from

nuclear testing. Laboratories and nuclear power plants, and the radioactive fall out irom nuclear explosions also contaminate the soil.

They include domestic and kitchen wastes, hospital wastes, market wastes, livestock and poultry wastes, slaughter house wastes, waste metals, glass and cei-amic wastes etc.

Hospital wastes contain organic materials, chemicals, metal needles, plastic and glass bottles, vials etc. Non-biodegradable materials like used polyethylene carry bags, waste plastic sheets, pet-bottles, etc. persist in soil for long periods.Excess use of pestic:ides, weedicides in organic fertilizers and biocide residues contaminate the soil surface water and ground water. Nitrate can pollute drinking water. Inorganic nutrients like phosphate and nitrate are washed out to aquatic ecosystems, and accelerate eutrophication.

4. Mining operations

The process where the surface of the earth is dug open to bring out the underground mineral deposits, is called open cast mining.

This process completely relnoves the top soil and contaminates the area with toxic metals and chemicals.

Control measures for soil pollution are the following:

1. Safer land use.

2. Planned urbanization.

3. Controlled developmental activities.

4. Safe disposal and management of solid wastes from industries and human habitations.

5. Sewage sludge and industrial soil wastes are used as land fills.

6. Toxic chemicals, metal containing wastes and fly-ash are used as bedding material for road construction.

7. Solid wastes are burned in presence of oxygen (incineration combusted in the absence of oxygen (pyrolysis).

8. Municipal solid wastes containing biodegradable organic wastes can be transformed into organic manure for agriculture.

CHAPTER 8
Findings

FINDINGS

When giant squid turned up dead off Spain about ten years ago, scientists suspected their cause of death to be due to powerful sound pulses from ships. A new study shows that this might, indeed, be the case. According to Barcelona's Technical University of Catalonia, low-frequency sounds from human activities can affect squid and other cephalopods alike.

The findings show that noise pollution in the ocean is a matter that should not be taken lightly.

"We know that noise pollution in the oceans has a significant impact on dolphins and whales, which use natural sonar to navigate and hunt, but this is the first study indicating a severe impact on invertebrates, an extended group of marine species that are not known to rely on sound for living," study leader Michael Andre stated.

About a decade ago the remains of giant squid were found off Spain's Asturias province not long after ships had used air guns to conduct low-frequency sound-pulse exercises in the region. Affects on the squid included reduced mantles, bruised muscles, and lesions throughout their bodies. These organs, which are located behind the squids' eyes, help it to maintain balance and position.

In the early 2000s, however, marine biologists were unable to prove that these frequencies were causing harm to the squid and surrounding marine life. Now, though, the evidence is in.

"With this study, we now have proof," said marine specialist Angel .

The researchers conducted the study by examining the effects of low-frequency sound exposure in 87 individual cephalopods of four different species. After two hours of constant exposure to various intensities of sound waves, the animals showed signs of damage to their statocyst tissue.

"This is a typical process found in land mammals and birds after acute noise exposure: a massive acoustic trauma followed by peripheral damage, making the lesions worse over time," continued Andre.

The giant squid from the shores of Spain may or may not have suffered the direct impact of the sound waves, however, in either case their statocysts were practically destroyed causing the squid to become disoriented.

"The disoriented animals might wander up from the depths to the surface, where the temperature difference kills them," explained Guerra.

Although the new research points out overwhelming evidence towards the leading cause of death for these giant squid, more research is necessary before a solid case can be made that human-made noise pollution is causing significant damage to marine life.

CHAPTER 9
Suggestions

SUGGESTIONS

Reduce Pollution by taking these actions

A brief recap

We have a uniquely beautiful world, thus surely it would make sense to preserve it for future generations to enjoy as we do. Landfill sites that are used for dumping ever increasing amounts of domestic rubbish cannot last forever...and nobody wants such a site on their backdoor. Nobody likes incinerators either, even though they offer a possible solution to the question 'what do we do with all this household rubbish?' Consider how much rubbish your household produces in one week. Then imagine how much rubbish your street produces...then your city...then your region...then your country. Hopefully then you can begin to imagine the extent of this problem. It's nice that this rubbish is collected and taken away but it doesn't disappear. Our wasteful society pollutes the landscape and environment. Yet pollution is not just about landfill rubbish.

Pollution from the combustion of fossil fuels causes global warming and acid rain. Pollution causes unexpected and sometimes serious and devastating changes in our land, river and sea environments. Pollution can kill animals and plants and it probably kills us too. We know that pollution can causes health problems such as respiratory illnesses. Polluting our world should not even be an option, especially where there are alternatives as there are these days. And where we consider that we have no other choice other than to pollute, we should be investigating as best we can alternatives to the technology that pollutes. We ***should*** be. Please check out the actions listed below which can help to reduce the amount of pollution in our world.

Help to reduce pollution and waste by:

- Recycling everything that you can recycle! This may mean you have to spend an extra five minutes sorting out what is rubbish and what is recyclable. This may mean a different bag to put your recyclables in. This may even mean the occasional trip to a recycling bank. It may feel inconvenient but with routine it becomes second nature and it is an important part of reducing pollution.
- Recyle your unwanted gadgets. There are websites that allow you to recycle your mobile phone and you can even receive money for doing so! Recycling saves natural resources, reduces land pollution and also air pollution as many products require more energy to produce them than to recycle them. This energy is often provided by carbon-emitting fossil fuels so by using less of those there is an indirect benefit in acting to prevent global warming.
- Most of us like computer games and own a computer console. We all like to upgrade sometimes too. If you have an old gaming console and games that you no longer use then why not see if you can recycle your gaming console and games for cash payments, and allow it to be reused and recyled. Receiving a fee or recycling seems a very good incentive to not throw sometihng valuable away.
- You can recyle your used and unwanted printer ink cartridges. So many used/unwanted ink cartridges are disposed of by households and business every day and these are unnecessary additions to landfill waste. They can also leak and cause serious environmental consequences through contamination. So recycle them and buy recycled ink cartridges to encourage other businesses to provide better recycling programmes.
- We can recycle almost everything these days: plastics, glass, aluminium, other metals, clothes, newspapers, magazines, cardboard, even your organic peelings from your vegetables can go on a compost heap. Check out the Ecoants recycling guide for more information on what you can recycle and how exactly you can do it.
- Use online auction sites to sell unwanted items or donate useful items to charity shops and collections.
- Buy recycled products. Recycled paper, products that use recycled packaging and plastics. Recycled electrical goods, clothes from charity shops. All of these are just examples but if the demand for recycled products is there business will recycle more and unnecessary waste and pollution will be reduced.

- Buy organic food. This can sometimes be slightly more expensive but it will reduce the amount of pesticides, herbicides, fungicides, artifical fertilizers, hormones, antibiotics and who knows what else, being used in the agricultural industries. Thus helping to reduce pollution in our rivers and in ourselves.
- Buy organic cotton products, such as clothes, bags and shoes, produced in an eco friendly way (i.e. sustainably and without the use of pollutants - any ethical shop should be able to give you the information you require).
- Buy products with biodegradable packaging (or packaging that you will actively recycle). Look out for this in the shops where you buy from, it should be clearly labelled.
- Re-use your plastic shopping bags until you can use them no more...and then try and recyle them! Many supermarkets have introduced schemes where you can recyle your plastic carrier bags.
- Better still don't use plastic bags, buy a rucksack or other bag to use for your shopping.
- Use refills and products that allow refills. This will reduce packaging and waste.
- Use rechargeable batteries and electronic items. When you are recharging these items do not leave them on indefinitely overnight (especially relevant to mobile phones). Recharge them and then unplug them so as not to waste energy!
- Use public transport, walk or cycle...or car share. The less vehicles that are used the less pollution will be emitted. This means better health for us and our environment.
- Manage your bank, credit card and utility accounts online and use paperless banking. It's a lot easier and it saves paper which saves waste, natural resources and energy.
- Use less harmful detergents in your home. For example the Ecover range of detergents are good quality cleaning products which are very sensitive to the environment. The more people that use these the more we can reduce pollution in our beautiful environments.

Ways to Overcome Land Pollution

Ways to Overcome Land Pollution

The Environmental Protection Agency, or EPA, advocates three ways to avoid land pollution: composting, recycling and source reduction. Of the three, the agency recommends source reduction as the most effective. Recycling and composting support source reduction in overcoming land waste, according to the EPA. The Clean Air Council reports that each American creates 56 tons of trash each year, with only 10 percent of it recycled and the rest accumulating in landfills.

Reduce Product Packaging

Consumer packaging not only increases the price of a product, it also adds to environmental waste. CaRecycle, part of the California Department of Resources Recycling and Recovery, encourages consumers to reduce product packaging in the grocery store by purchasing unwrapped products, as well as larger-size items that use less packaging per ounce. Use of a cloth grocery bag eliminates the need for plastic film bags. Cutting down packaging in student lunches also reduces the amount of packaging that later goes into landfills. Eliminating the use of small packaged condiments, disposable juice packaging, as well as plastic and zippered sandwich bags amount to a savings of more than 540 items per California student each year.

Formeco Solvent Recovery Systems Waste Water Evaporators

Recycle

Recycling reduces the amount of items buried in landfills, as well as providing energy and cost savings. The Container Recycling Institute notes that nearly 100 billion tons of aluminum cans were produced in 2006. In the same year, 80 billion plastic or PET bottles along 20 billion one-way glass bottles were produced. The CRI reports that the number of soft drinks packaged in PET plastic bottles is increasing each year. All of these products, if not recycled, end up as land pollution. Even with current recycling, the Clean Air Council reports that the U.S. produces enough waste each year to "fill 63,000 garbage trucks," equivalent to a line of trucks "that would stretch from the Earth, halfway to the moon," according to the council.

Composting

The St. Charles County Division of Environmental Services in Missouri notes that waste deposited into landfills takes decades to decompose, due to a design that involves tight packing and a cover that prevents access to the air. Nearly 12 percent of all food is thrown into the trash each year. Food, along with lawn cuttings and trimming, accounts for over 26 percent of all municipal wastes in the U.S., according to the EPA. Composting food and yard trimmings is a significant way to reduce land pollution.

CHAPTER 10
Bibliography

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CHAPTER 11
CONCLUSION

CONCLUSION

The environmental impacts of mining are particularly severe in Gauteng Province. The effects of water resources and soil quality are possibly the most important. Although many of the mines are no longer operational, the environmental legacy of mining impacts still needs to be addressed. Currently there are smaller mining operations, such as quarries, which can have large negative impacts on the environment and which need to be controlled and managed by the Department f Environmental Planning in the South in co-ordination with other government bodies

- To promote the prevention of waste production.
- To promote waste minimization and recycling.
- To increase recycling.
- Work with communities to formulate acceptable and uniform policy.
- Minimize waste generation pollution at source.
- Public awareness and participation in environmental management.
- Educational programmes
- Business & industry adopt principles of environmental stewardship.
- Composting or digesting 50% of conventional waste that can be treated thus reducing volume of waste requiring disposal and increasing the life span of landfill sites.
- Reducing heavy metals and other toxic pollutants potentially present in sewage sludge.
- Shared treatment plants for detoxification or economic recovery of valuable metals from waste of metals finishing.
- Separation at source of key toxic or recyclable materials.
- Environmentally friendly recovery of organic liquids & other waste materials.
- Destruction of hazardous organic waste materials that persist in the environment and accumulate in food chains.
- Alternatives for the co-disposal of hazardous waste
- Lack of structure to predict change in waste generation patterns and recovery of useful waste.

The purpose of this lesson is to create Land Pollution awareness in order to improve our living conditions.

Throughout this lesson, students will:

Visit nearby dumpsites.

Conduct research activities on the Internet.

List examples of solid wastes and identify their sources.

Identify past and present methods used to dispose of solid wastes.

Identify problems associated with hazardous wastes.

Classify hazardous wastes according to their characteristics.

Survey our homes for examples of materials that are classified as hazardous wastes.

Conduct research on the use of pesticides by the growers who supply our supermarkets with produce.

Identify and explain methods for reducing the volume of wastes.

Discuss the benefits and drawbacks of various forms of waste disposal.

CHAPTER 12

SAMPLE QUESTIONNAIRE

QUESTIONNAIR

1) **Most of the trash your family throws away each day ends up getting..**
   - **A) Recycled.**
   - **B) Burned.**
   - **C) Land filled**
   - **D) Eaten**

2) **About how many pounds of garbage does each one of us create every day in Illinois**
   - **A) Less than 2**
   - **B) 6**
   - **C) 35**
   - **D) 50**

3) **Mercury is a hazardous chemical. Which item does not contain mercury?**
   - **A) Computer disks**
   - **B) Blinking lights in sneakers**
   - **C) Fluorescent light bulbs**
   - **D) Thermometers**

4) **Which items are recyclable?**
   - **A) Plastic milk jugs**
   - **B) Cereal boxes**
   - **C) Aluminum soda cans**
   - **D) All of the above**

5) **What is the environmentally friendly way to dispose of used tires?**
   - **A) Send them to a landfill**
   - **B) Recycle them into a playground matting**
   - **C) Dump them in a ditch along the roadway**
   - **D) Collect them and put them in a big pile**

6) What is groundwater?

- **A) Water that is spilled onto the ground**
- **B) Water beneath the ground surface**
- **C) The bottom part of a lake or river**
- **D) Rainwater that lands on the ground**

7) What material do we throw away the most?

- **A) Glass**
- **B) Paper**
- **C) Aluminum**
- **D) Plastic**

8) How long does it take Styrofoam to break down in a landfill

- **A) 10 years**
- **B) 50 years**
- **C) 100 years**
- **D) 500years**

9) Used oil should be disposed of by..

- **A) Dumping it on your driveway**
- **B) Watering it down and spreading it as a fertilizer**
- **C) Collecting it in a sealed container and taking it to an oil changing business**
- **D) Keeping in the garage for 10 years before throwing it away in the trash**

10) Our waterways are polluted by..

- **A) Dumping used oil on the ground**
- **B) Leaking underground gasoline storage tanks**
- **C) Leaking of old landfills**
- **D) All of the above**