

ECONOMICS and MANAGEMENT OF NATURAL RESOURCES

Lecture 1

1) Natural resources :-

Natural resources are the resources available in a nature like air, water, sunlight, soil, minerals, forests, wild life etc.

Natural resources are of two main types. They are renewable and non renewable natural resources.

i) Renewable natural resources :-

Are the resources which can be replenished in a short period of time like air, water, sunlight, forests etc.

ii) Non renewable natural resources :-

Are the resources which cannot be replenished in a short period of time like minerals (coal, petroleum, natural gas, metals etc.) because they take millions of years to be formed.

Human activities produce a lot of waste materials which are thrown away into the environment. These wastes cause pollution of natural resources like air, water and soil.

NATURAL RESOURCES



Natural resources are often classified :

- **Renewable resources** are generally living resources (fish, and forests, for example), which can restock (renew) themselves if they are not overharvested.
- **Non-renewable resources** is a natural resource that cannot be re-made or re-grown. Often fossil fuels, such as coal, petroleum and natural gas are considered non-renewable resources.

The maximum rate at which a renewable resource can be used without impairing or damaging its ability to be renewed is called its **maximum sustained yield**. If this yield is exceeded a potentially renewable resource is then converted to a nonrenewable resource.

Recycling involves collecting and remelting or reprocessing a resource, whereas **reuse** involves using a resource over and over again in the same form.

On the basis of their stages of developments, resources can be classified into both **Actual** and **Potential** resources:

The resources pass through various stages of development before they are actually available. The resources held actually in stock are called **Actual** resources. Even the actual source of resources may not be possible to be used to their full. The portion that can be used profitably with the help of available technology is termed as **Potential** resources. The size and quantity of a potential resource may change with changes in technology and time.

Resources can also be classified on biotic and abiotic:

- **Biotic resources** are derived from animals and plants (livingworld).
- **Abiotic resources** are derived from the non-living world e.g. land, water, and air. Mineral and power resources are also abiotic resources some are derived from nature.

Natural capital

- Natural resources are **natural capital** converted to commodity inputs to infrastructural capital processes. *They include* soil, timber, oil, minerals, and other goods taken more or less as they are from the Earth.



Nations status

A nation's natural resources often determine its wealth and status in the world economic system, by determining its political influence. Developed nations are those which are less dependent on natural resources for wealth, due to their greater reliance on infrastructural capital.

For example, the United States used coal as an export in the early 1900s, and also as a main resource fuel in key industries for production. Eventually, as transportation costs went down with time, minerals used as resources became commodities and were traded at world prices.

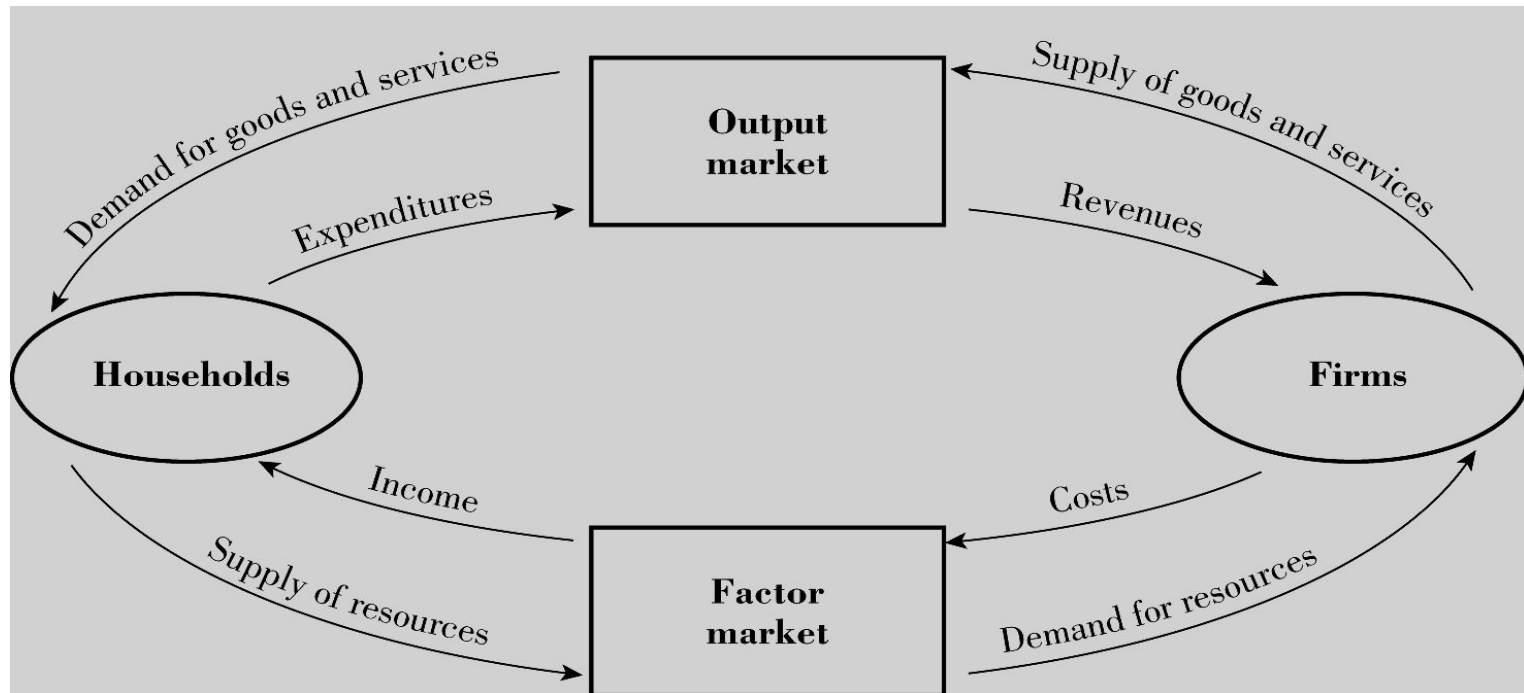
Economics and the Environment

- Economic theory explains what we observe in reality, including environmental problems
- Recognize the link between economic activity and the environment using models
 - Circular Flow Model
 - Materials Balance Model

Circular Flow Model

- Shows the real and monetary flows of economic activity through the output and factor markets (see next slide)
 - Forms the basis for modeling the relationship between economic activity and the environment
 - But does not explicitly show the linkage between economic activity and the environment

Circular Flow Model

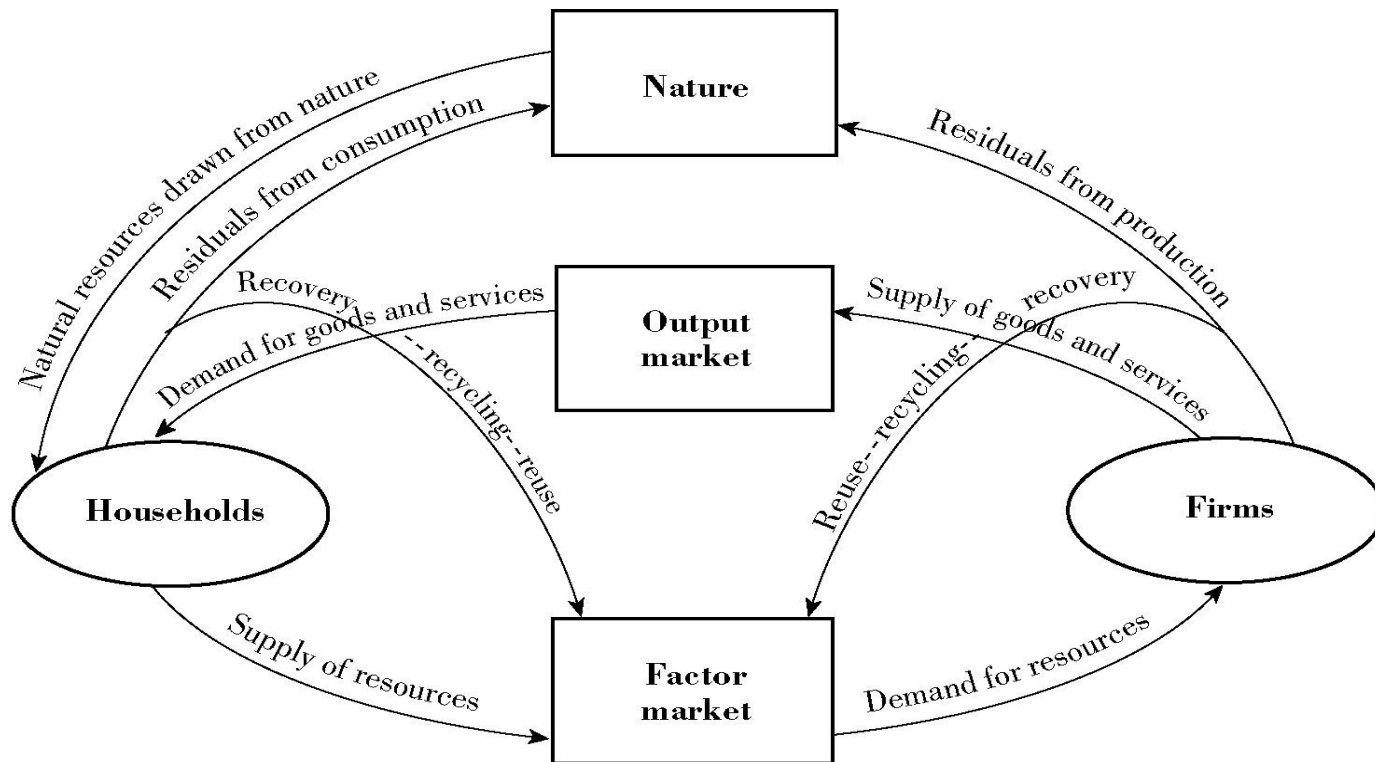


Materials Balance Model

- Places the circular flow within a larger schematic to show links between economic activity and the natural environment via two sets of flows
 - Flow of resources *from* the environment *to* the economy
 - The focus of **Natural Resource Economics**
 - Flow of residuals *from* the economy *to* the environment
 - The focus of **Environmental Economics**
- Residuals are pollution remaining in the environment after some process has occurred
 - Residuals can be delayed, but not prevented, through **recovery, recycling, and reuse**
 - Shown as inner flows in the model

Materials Balance Model

The Interdependence of Economic Activity and Nature



Source: Adapted from Kneese, Ayres, and D'Arge (1970).

2) The Three R's to save the environment :-

The three R's to save the environment are Reduce, Recycle and Reuse.

- i) Reduce :- means using less of natural resources and avoiding wastage of natural resources.
- ii) Recycle :- means the materials like paper, plastic, glass, metals etc. used for making things can again be used for making new things instead of synthesising or extracting new paper, plastic, glass or metals.
- iii) Reuse :- means using things again and again like the plastic bottles in which we buy jams, pickles etc can be again used for storing things in the kitchen.

RECYLED PAPER ARTICLES



3) Need for management of natural resources :-

All the things we use and consume are obtained from natural resources. Due to increase in population, industrialisation and urbanisation the demand for natural resources is increasing and their availability is limited . So there is a need for proper management of natural resources.

The proper management of natural resources consists of :-

- i) Judicious use of natural resources and avoiding wastage of natural resources.**
- ii) Long term planning for the use of natural resources so that it last not only for the present but also for future generations.**
- iii) The exploitation of natural resources should not be for the benefit of a few people but should be distributed equally for all.**
- iv) While extracting and using natural resources we should also plan for the safe disposal of wastes so that no damage is caused to the environment.**

4) Forests :-

a) Importance of forests :-

- i) Forests help to preserve biodiversity.
- ii) Forests are natural habitats of plants and animals.
- iii) Forests provide timber, wood, fuel, medicines, fodder, etc.
- iv) Forests help to maintain ecological balance.
- v) Forests help to control climate and rainfall.
- vi) Forests help to prevent soil erosion and controls floods.
- vii) Forests help to maintain the oxygen – carbon dioxide balance in nature.

b) Stake holders of forests :-

People who are associated with forests directly or indirectly are :-

- i) People living in and around forests depend on forests for their livelihood.
- ii) Industrialists who use the raw materials from forests for manufacturing paper, medicines, furniture etc.
- iii) Forest Department of the Government who owns the forests and controls the resources from the forests.
- iv) Nature and wild life organisations who want to conserve and preserve forests.

c) Conservation of forests :-

Forests can be conserved by :-

- i) Afforestation – planting of more trees.
- ii) Preventing or reducing deforestation.
- iii) Preventing over grazing by cattle.
- iv) By setting up wildlife sanctuaries, national parks, biosphere reserves etc.
- v) Undertaking social forestry programs like Van Mahotsav, Chipko movement for planting and protecting trees on a large scale.



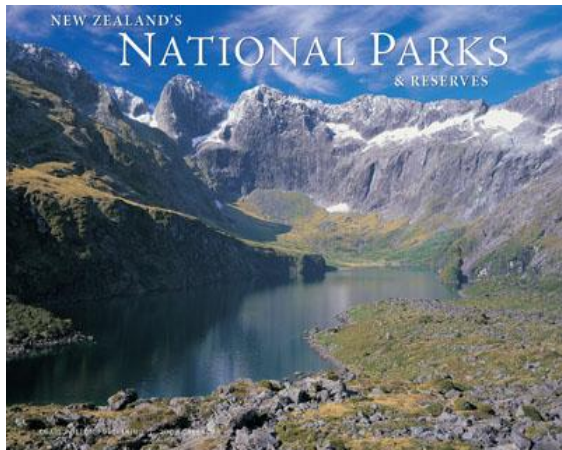
5) Wildlife :-

a) Importance of wildlife :-

- i) Wildlife helps to preserve biodiversity.**
- ii) Wild life helps to maintain food chains and food web.**
- iii) We get useful products from wild life like food, medicines, leather, bones, honey, lac etc.**

b) Conservation of wildlife :-

- i) Preserving the natural habitats of animals.**
- ii) Banning poaching of animals.**
- iii) Protecting endangered species of animals.**
- iv) Setting up of wildlife sanctuaries, national parks, biosphere reserves etc.**



6) Water :-

a) Uses of water :-

Water is a basic necessity for all living things. We use water for our daily needs, for agriculture, transportation, construction of buildings, roads, dams etc. Water is a natural habitat for aquatic organisms.

Human activities are affecting the availability of water and causing pollution of water bodies.

b) Dams :-

Advantages of dams :-

- i) Irrigation of crops.
- ii) Producing electricity.
- iii) Supplying water to towns and cities.
- iv) To control floods.

Disadvantages of dams :-

- i) **Social problems** :- It displaces a large number of people who have to be rehabilitated.
- ii) **Economic problems** :- It is expensive and uses a huge amount of public money.
- iii) **Environmental problems** :- It causes deforestation and loss of biodiversity.

DAMS



c) Water harvesting (Rain water harvesting) :-

Water harvesting is collecting and storing rain water for future use.

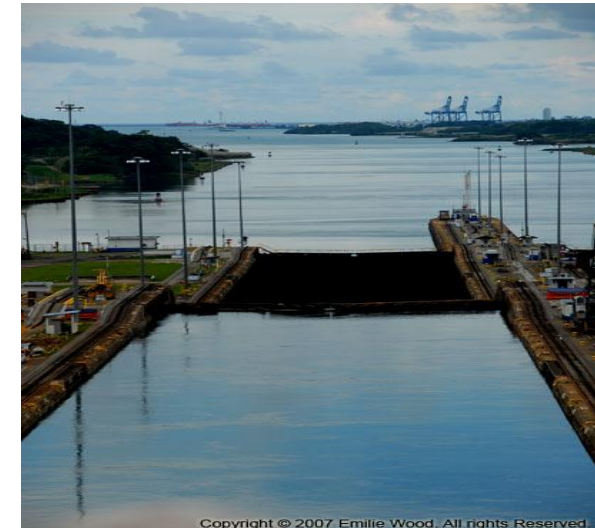
The common methods of water harvesting are :-

- i) Digging pits, ponds, lakes etc.
- ii) Building small earthen dams or concrete check dams.
- iii) Construction of dykes.
- iv) Construction of reservoirs.
- v) Construction of rooftop collecting units in houses.

d) Advantages of underground water :-

- i) It does not evaporate easily.
- ii) It spreads out and recharges wells.
- iii) It provides moisture for irrigation of crops.
- iv) It does not get polluted easily.
- v) It does not provide breeding ground for mosquitoes and houseflies.

Different methods of water harvesting



RAINWATER HARVESTING

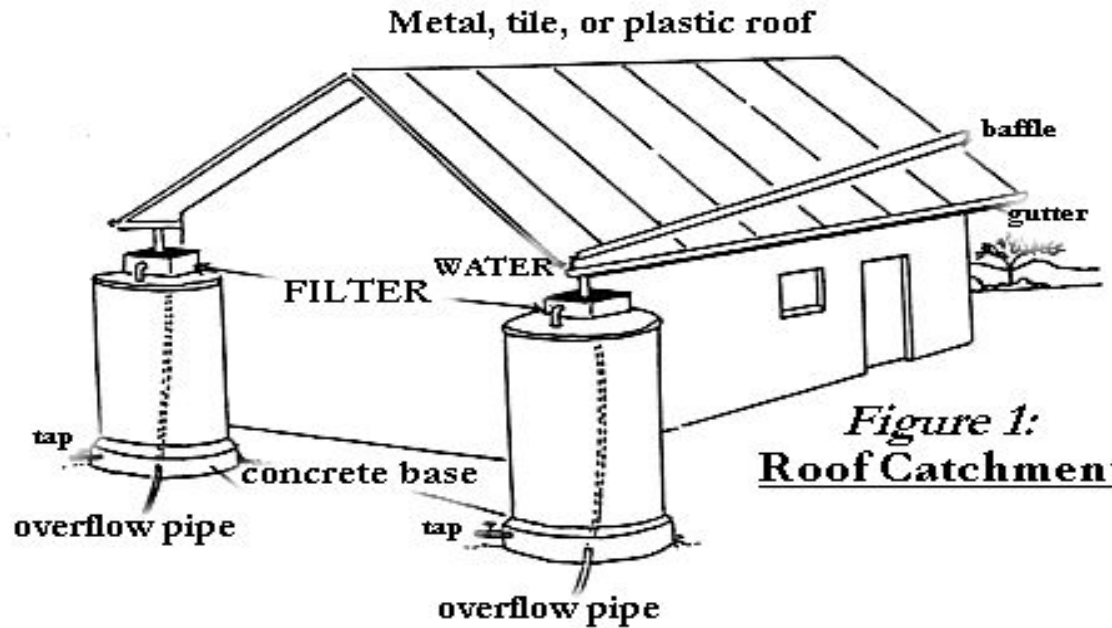
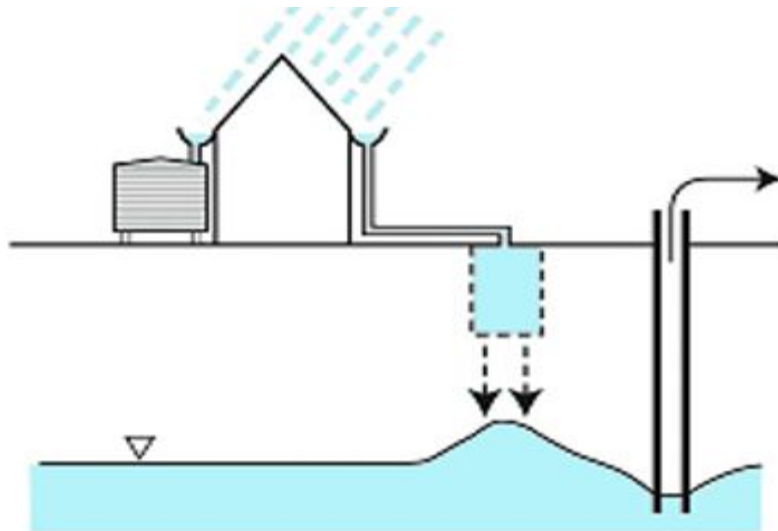
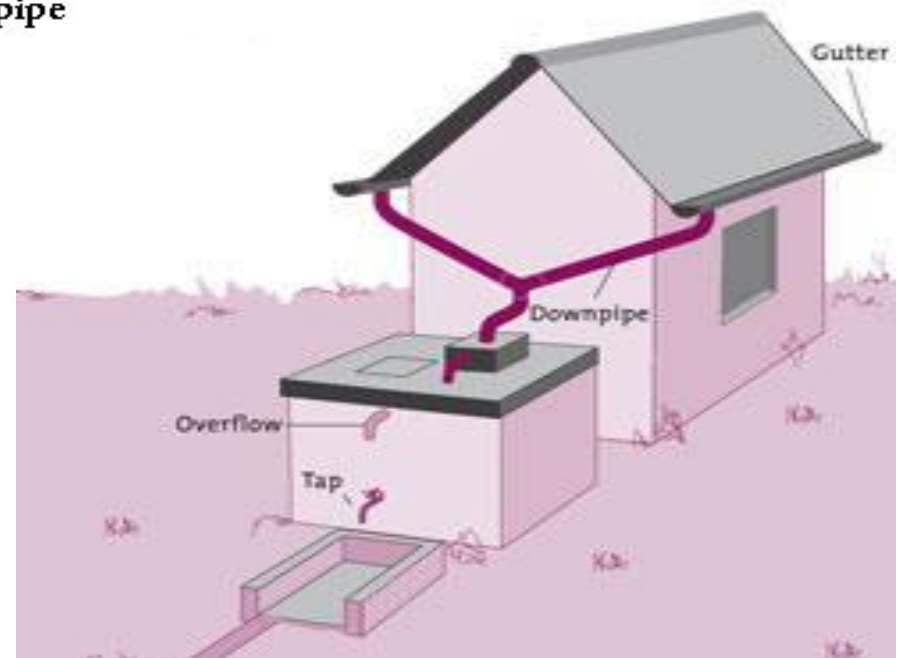


Figure 1:
Roof Catchment



Rainwater Harvesting



7) Coal and petroleum :-

Coal and petroleum are fossil fuels formed by the decomposition of dead plants and animals inside the earth after several millions of years. They are non renewable sources of energy.

Petroleum reserves may last for about 40 years and coal reserves may last for about 200 years.

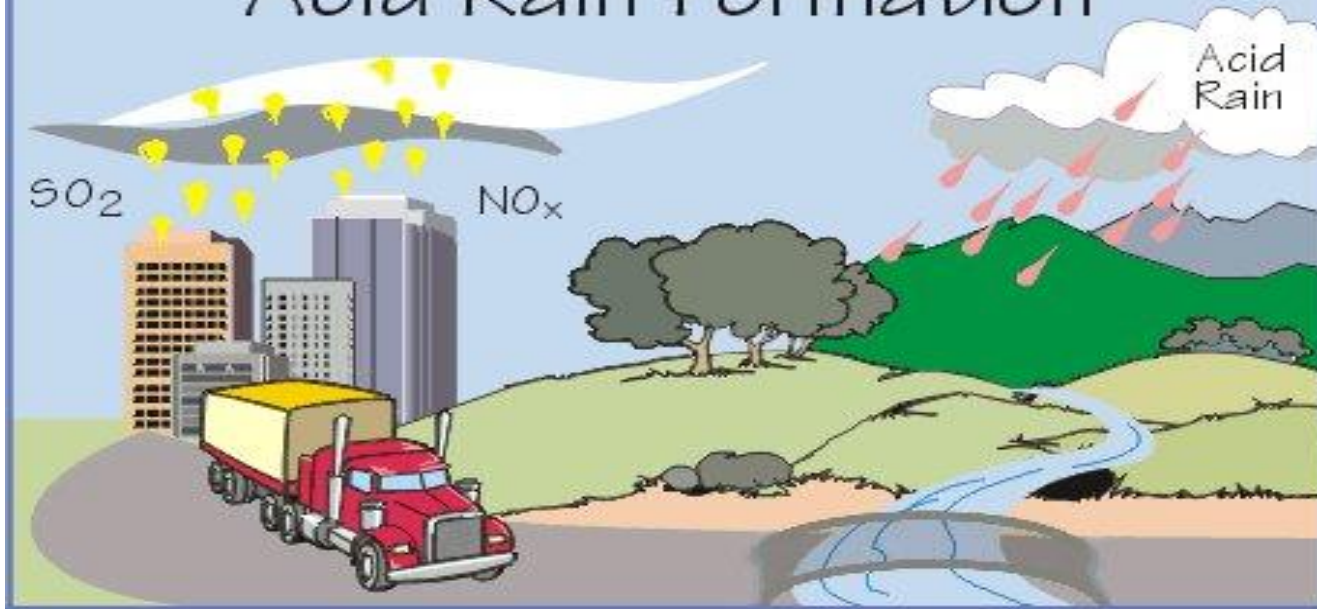
Coal and petroleum contain carbon, hydrogen, nitrogen and sulphur. When they are burnt, they release carbon dioxide and oxides of nitrogen and sulphur.

Carbon dioxide is a green house gas which causes global warming.

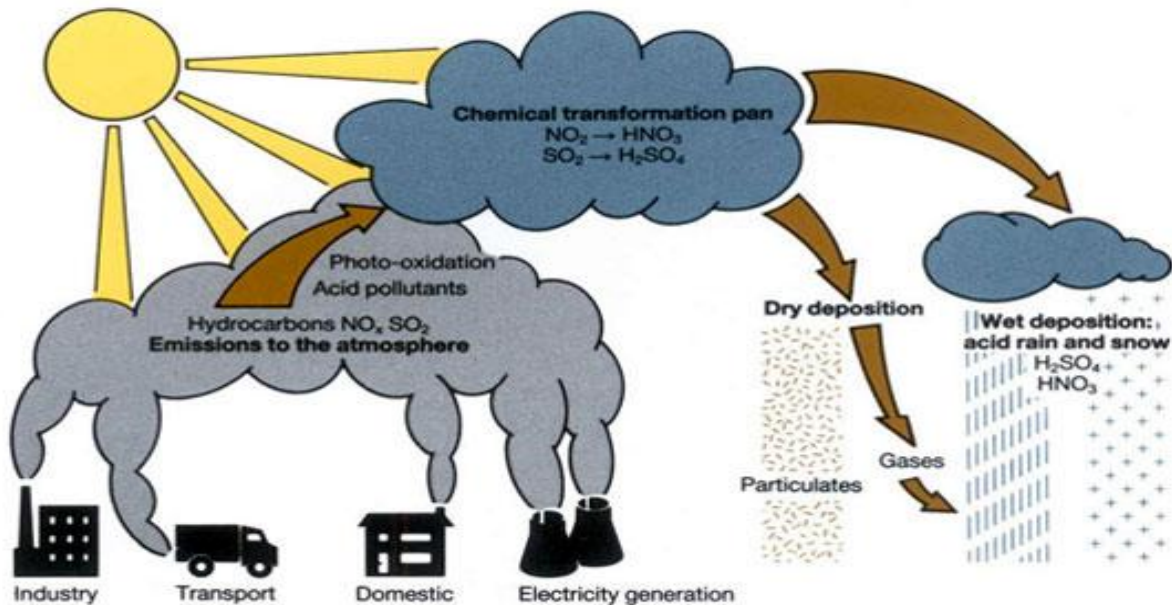
Oxides of nitrogen and sulphur combines with moisture in the air and produces acid rain.



Acid Rain Formation



How acid rain is formed



MELTING OF POLAR ICE



RISE IN SEA LEVELS

