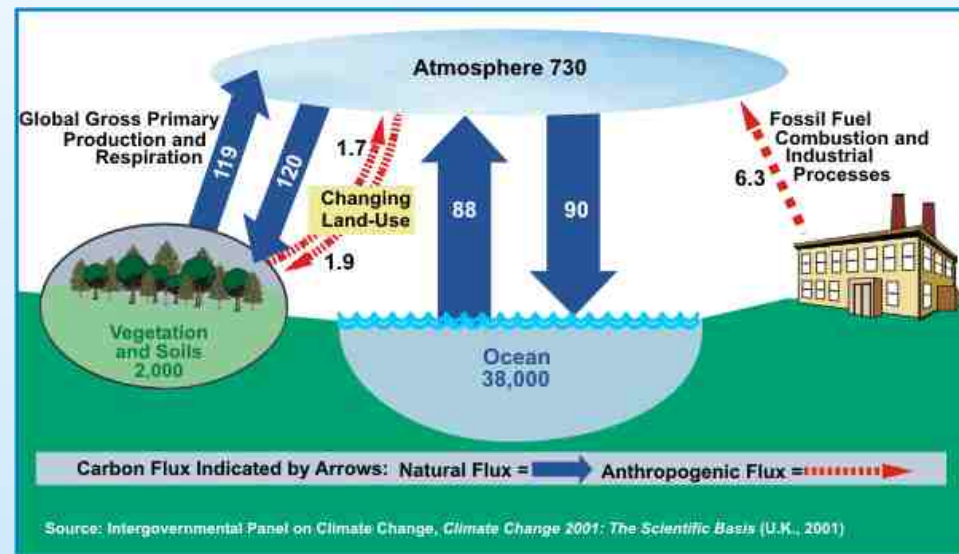


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### Greenhouse Gases:

Human activities have altered the chemical composition of the atmosphere through the buildup of greenhouse gases primarily carbon dioxide (petroleum and natural gas), methane (landfills, coal mines, oil and gas operations, and agriculture), and nitrous oxide (fossil fuels, fertilizers and industrial processes). These gases allow sunlight to enter the atmosphere freely. When sunlight strikes the Earth's surface, some of it is reflected back towards space as infrared radiation (heat). Greenhouse gases absorb this infrared radiation and trap the heat in the atmosphere. Rising temperatures may, in turn, produce changes in weather, sea levels, and land use patterns, commonly referred to as "climate change."



### FORECASTING OF WEATHER

Weather forecasts are classified into following three types on the basis of the period covered by the forecasts, namely

**Short range forecasts**, covering the next 24 hours or upto 3 days at the most

**Medium range forecasts**, covering from 3 days to 3 weeks

**Long range forecasts**, covering periods of a month or longer

The methods of weather forecasting are grouped into four types, namely

**Synoptic Method:** A system of forecasting based on careful studies of synoptic weather charts, aids the forecaster in estimating the and direction of weather system movements and their intensity.

**Statistical Method:** Methods in which past date are used from a long series of observations to show the probability of certain weather events, particularly rain fall.

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**Numerical Method:** A system of computing expected values of selected isobaric surface. In operational terms, this is used for up to 48 hours ahead, as beyond that time differences between observed and computed values become unacceptable. This is because future pressure fields will be influenced by many factors, not all of which are included within the modeling system.

Super computer and satellites are important tools for weather forecasting.

### WEATHER HAZARDS IN NCR

1. TORNADO
2. SQUALLS
3. DUST STROMS
4. HAILLIGHTING
5. FOG
6. COLD WAVES
7. HEAT WAVES
8. FLOODING

### SAFETY MEASURES FOR SOME DISASTERS

#### 1. TORNADO

- (i) Go to a basement. If you do not have a basement, go to an interior room without windows on the lowest floor such as bath room.
- (ii) If possible, get under a sturdy piece of furniture, like a table.
- (iii) Get out of automobiles. Leave your car immediately.
- (iv) If you are out side, go to a ditch or low lying area and lie flat in it.
- (v) Stay away from fallen power lines and stay out of damaged areas.
- (vi) Never use lift in tall buildings.
- (vii) If in water on a boat leave it immediately and go to land area.

#### If you're at school during a tornado

- (i) Every school should have a disaster plan and have frequent drills.
- (ii) Basements offer the best protection.
- (iii) Schools without basements should use interior rooms on the lowest floor away from windows.
- (iv) Crouch down on your knees and protect your head with your arms.

#### 2. LIGHTING

- (i) Stay away from doors and windows, metal sinks and faucet, radiators and the phone unless you're making an emergency call.
- (ii) Take off headsets and turn off computers, TVs, and appliances.

#### 3. DUST STROMS

Dust stroms cause strong winds which can uproot tree, poles and fly

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away thatches and weak roofs. They may cause accidents to air crafts and other transport systems due to rapid reduction of visibility. Electricity is often cut off.

### Safety

- (i) Never go out during dust stroms.
- (ii) If in open area, try to rush to some shelter and stand there till the weather becomes clear. Keep your eyes closed in shelter.

### 4. FLOODS

#### During a flood

- (i) Move a safe area quickly. Move to higher ground, like the highest floor of your home. Avoid areas subject to sudden flooding like low spots and canyons. Avoid already flooded areas.
- (ii) If a flowing stream of water is above your ankles stop, turn around and go to the other way.
- (iii) Do not attempt to drive through a flooded road. Kids should never play around high water or storm drains. Be cautious at night.
- (iv) Always drink boiled water.
- (v) Electrical equipments should be checked and dried before use.

### 5. HEAT STROKE

- (i) Lower the body temperature by removing/loosing the clothing or fanning the person.
- (ii) Put ice pack or cold compresses to the neck, under the armpits and to the groin area.
- (iii) Drink lots of fluid and those who perspire should drink more as much as fluid as possible.
- (iv) Stay away from places that are hot.

### ABOUT RDC

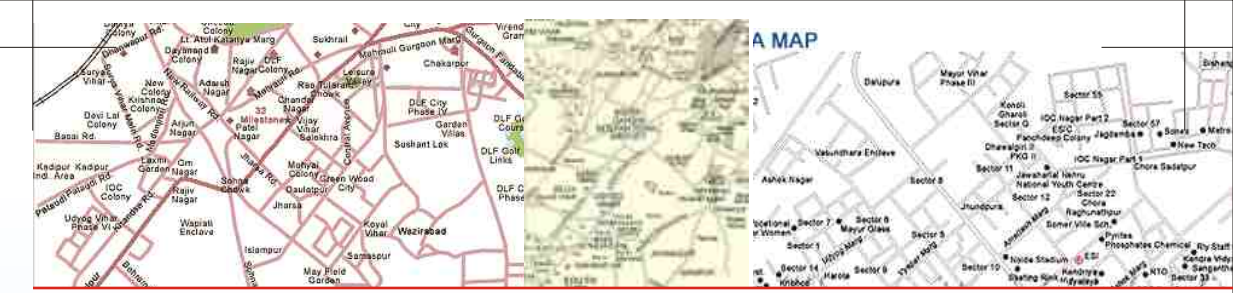
Resource Development Centre (RDC) is a nonprofit professional institution registered under the Societies Registration Act XXI of 1860, and 80G of the Income Tax Act, 1961. It aims to strive for appropriate tools and technologies for effective utilization and management of resources for sustainable development.

RDC aims to conserve, foster and develop resources for sustainability, productivity, equity, empowerment, effective utilization and management, capacity building, human capability formation and enrichment of information resource base for enterprise and community development.



### RESOURCE DEVELOPMENT CENTRE

122, Katwaria Sarai, Saheed Jit Singh Marg, New Delhi - 16  
Ph: 011 - 26525702, 26601460; Fax: 011 - 26962019  
E-mail: info@rdcindia.org; Website: www.rdcindia.org



## NCR - PROBE Programme:

# METEOROLOGICAL AND ENVIRONMENT EDUCATION FOR SCHOOLS



Supported by:

STAC Division  
Department of Science and Technology  
Ministry of Science and Technology  
Government of India  
Technology Bhawan, New Delhi

## PROBE OVERVIEW

Department of Science and Technology (DST) under its Inter-Sectoral Science and Technology Advisory Committee (IS-STAC) has taken an initiative to launch a scheme on participation of youth in schools in acquisition, generation, use and dissemination of field data. Under the scheme, a programme entitled **Participation of youth in Real-time / field Observation to Benefit Education (PROBE)** has been conceived for the **National Capital Region (NCR)** and the programme is named as **NCR-PROBE**.

Science and Technology Policy 2003 enunciates that better laboratory facilities at senior secondary schools level need to be created for reaching higher level of achievements in science. It is envisaged that expansion of these efforts would require support from State Education Departments and Central Government agencies. Along these policy guidelines PROBE is therefore, aiming to strengthen laboratory and computing facilities in schools. NCR-PROBE being launched in 50 Higher Secondary Schools in the National Capital Region of Delhi, aims to introduce meteorology & environment education in schools.

## WEATHER AND CLIMATE

**Weather** is an indication of atmospheric conditions at a certain place at a certain time.

**Climate** means the average atmospheric conditions of an area over a considerable time. For climatic averages, a period of 30 years is desirable. This involves the systematic observation, recording and processing of the various elements of climate such as rainfall, temperature, humidity, air pressure, winds, clouds and sunshine.

## ATMOSPHERE

The atmosphere is composed of gases (Nitrogen, oxygen, argon, carbon dioxide, neon, helium, ozone, hydrogen, xenon, methane etc.), water vapour and particulates (dust and salt particulates, pollen, smoke and shoot, volcanic ashes etc.) and on the basis of characteristics. It also filters the incoming solar radiation and prevents the ultraviolet radiation waves to reach the earth's surface and thus protects the earth from becoming too hot, is called ozone layer, at a height 15-50 km from above the earth's surface. The atmosphere is divided into four layers: Troposphere, Stratosphere, Mesosphere, and Thermosphere.

## ELEMENTS OF WEATHER AND CLIMATE

### Air Pressure:

Air is made up of a number of mixed gases and has weight. It therefore exerts a pressure on the earth's surface which varies from place to place and from time to time. The instrument for measuring the atmospheric pressure is called barometer.

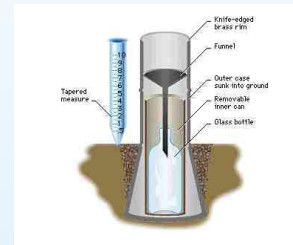


### Humidity:

Water in the atmosphere is referred to as humidity. It is measured in a variety of ways. The actual amount of water vapour in grams per cubic meter of air is called absolute humidity. It is the instrument for measuring relative humidity is the hygrometer, which comprises of wet-and dry-bulb thermometers placed side by side in the Stevenson Screen.

### Rainfall:

Rainfall includes different forms of precipitation like drizzle showers, snow and sleet is always measured by an instrument called rain gauge.



### Winds:

Air in motion is called wind in both direction and speed. Wind consists of a series of gusts and eddies that can only be felt but not seen. The instrument widely used for measuring wind direction is wind vane. The speed of wind is usually measured by an anemometer.

### Temperature:

Temperature is a very important element of climate and weather. The instrument for measuring is the thermometer which is a narrow glass tube filled with mercury or alcohol.



### Clouds:

When air rises, it is cooled by expansion. After dew-point has been reached cooling leads to condensation of water vapour in the atmosphere. Tiny droplets of water vapour which are too small to fall as rain or snow, will be suspended in the air and float as clouds. The classification of clouds is based on its types of height and appearance. For meteorological purposes, the amount of cloud-cover in the sky is expressed in eighths or oktas (e.g. 2/8 is quarter cover of sky with colours).

### Sunshine:

The amount of sunshine a place receive depends on the seasons, latitude and the position of the earth. It is measured by sunshine refraction.



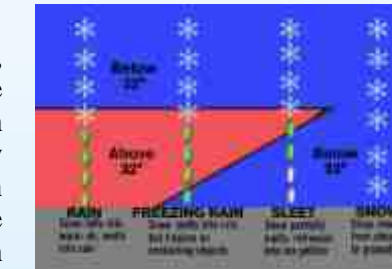
## FACTORS AFFECTING WEATHER

### Temperature:

Heat and temperature are distinct aspects, but they are closely related because gain or loss of heat is necessary to raise or lower the temperature. Difference in temperature decides the direction of heat flow. The following factors are responsible for the uneven distribution of temperature: **Latitude, Altitude and Relief, Continentiality, Ocean Currents and Winds, Natural Vegetation and Soil, Slope.**

### Precipitation:

If air is sufficiently cooled below dew-point, tiny drops of water vapour will condense around dust particles. When condensation occurs at ground level without necessarily resulting in rain, haze, mist or fog is formed. In higher latitudes or altitudes, where condensation of water vapour may take place in the atmosphere at temperatures below freezing-point, snow may fall.



### Rainfall:

There are three major types of rain fall:

**Conventional:** When the earth's surface is heated moisture-laden vapour rises because heated air expands, and becomes lighter. In ascending, its water vapour condenses into clouds.

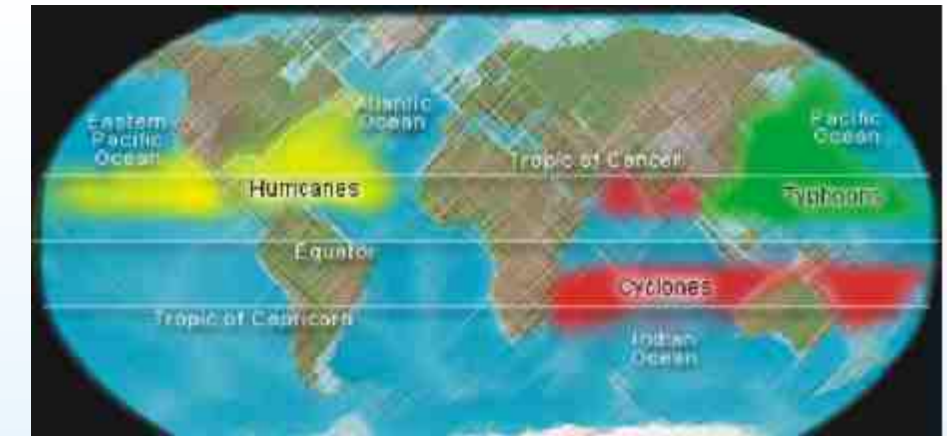
**Orographic or relief:** Orographic rain is formed wherever moist air is forced to ascend a mountain barrier.

**Cyclonic or frontal:** It is purely associated with cyclonic activity whether in the temperate regions (depressions) or tropical regions (cyclones).

### Cyclonic Activity:

In the atmospheric pressures falls further it becomes a depressions causing heavy rain clouds and rain fall occur in association with low pressure areas.

**Tropical cyclones** are intense low pressure areas, usually some 200 to 1000 km in diameter, in which violent winds, with maximum speeds in excess of 63 knots. They are called hurricanes in the Caribbean Sea, Typhoons in the China Sea, Japan and Philipines, Cyclones in the Indian Ocean and Willy-willies occur in north-western Australia. Maximum damage occurs due to storm and strong winds.



Hurricane



Tropical Cyclone



Tornado

### Anticyclones:

These are the opposite of cyclones, with high pressure in the centre and isobars far apart. The pressure gradient is weak and winds are light. Anticyclones normally herald fine weather. Skies are clear and the air is calm.

### Monsoon:

Monsoon is characterized by a reversal of wind direction from summer to winter. The summer monsoon is called south west monsoon is caused by the differential heating of land and Oceans.

