

SAMPLE

Nature and Scope of Climatology

Lesson Aim

Demonstrate awareness of the nature and scope of climatology.

INTRODUCTION

The atmosphere is composed of a mixture of moisture, temperature and gases which, in one way or another, control the conditions that are vital for the occurrence of life on earth. These conditions are always somewhat active, and are subject to change at every moment in time. The variations in the atmosphere along with the earth's energy dynamics play a major role on what influences an everyday environmental behaviour. This, along with the movement of the earth and the sun's radiation, produces continuous and aggregate conditions of climate and weather phenomena that affect, positively or negatively, life on earth.

Weather and Climate

Weather may be referred to as the atmospheric conditions of a particular place, and is generally determined by factors such as temperature, wind, air pressure and water vapour at any specific time.

Weather, therefore, can be understood as a constant change of the atmospheric state at a certain time and place whereas climate can be defined as the aggregation of weather patterns throughout a certain amount of time (e.g. years) at a certain place or region. As such, weather is rarely forecast for longer than 10 days whereas the climate of a region is relatively stable and predictable over much longer periods.

Climatology

Climatology as the name suggests is the study of climate, or in other words, the study of the average weather conditions over a given period of time. It is considered to be one of the 'atmospheric sciences' which are often subsumed under 'earth sciences'. Knowledge of climatology can be used to make short-term weather forecasts using various analogue climate models.

Climatology may examine past climates through geological data and other sources, along with current climate data to understand climate patterns and predict future weather and climate. Climatology makes use of statistical data and numerical models to try and understand climate but since there are so many different variables and complex processes involved, climate science is not an exact science because the equations used to apply physical laws are generally approximations.

Meteorology

Meteorology is concerned with short term weather patterns. It is the study of the atmosphere and relies on measures of atmospheric variables such as air pressure, temperature, humidity, and so on. The interactions of these variables and changes to them are used to forecast weather. Like climatology, it is an 'atmospheric science'. The study of meteorology can be traced back to Aristotle in Ancient Greece where in 350BC he wrote a book entitled 'Meteorology' and first described the hydrologic cycle.

UNDERSTANDING HOW CLIMATE AND WEATHER AFFECTS US

No matter whom we are, what we do, or where we live, and regardless of whether we spend most of our days outside relaxing and working or indoors in a controlled environment, we are affected in many ways by weather. The effects may be direct if we work outdoors and largely indirect if we spend most of our time indoors.

What is happening with the weather affects how much water we have to drink from taps, tanks, reservoirs and underground. This amount of water available affects the growing climate that produces our fruits, vegetables and the animals and fish that supply our meat. If there are large amounts of water in the atmosphere, the climate will be very steamy and humid which will, in turn, influence growth and development. The amount of sunshine the plants and animals (including humans) receive affects both growth rate and the ability to process vitamins and nutrients.

The quality of sunshine or light, whether it is filtered through smog or cloud fog, or whether it is direct with high UV levels will also influence how well nutrients and vitamins are used and metabolised.

When temperatures are colder, growth rates are affected and growth generally slows for plants, animals and humans. When temperatures are very high there is also a point where growth slows for plants, animals and man as bodily processes need to change. The shift may now be towards keeping the body or plant cool and preventing overheating, dehydration and exhaustion - and this becomes the primary concern, rather than growth, until conditions are more favourable.

All of these aspects are also of concern to a plant and an animal growing indoors most of the time. Humidity, moisture supply, available nutrients, type of light and its concentration also affect growth, development and function. Even a fully indoor environment relies indirectly on the weather for water to be supplied through some source and the power to be generated from wind, water, or from fuels, to run the whole indoor system. The effects of pollution produced from running the indoor system will also have a direct or indirect effect on the weather and its components and as such the weather is part of the essential life cycle of plants and animals directly and/or indirectly.

Weather is always changing but it tends to form cycles or patterns. These are more evident in some areas and climates of the world than others. Some regions of the world are more prone to unusual or more severe weather patterns than others. Vegetation has an effect on weather patterns and the air we breathe. Man and his activity have, in many instances, influenced the type of weather we experience. For example, deforestation of the world has led to more carbon in the atmosphere. It seems that human activity is also largely responsible for the hole in the ozone layer and its effects on climate.

For those who are outdoor workers, whether they work in gardens or on projects producing crops for human and animal use, weather and its patterns are extremely important. Knowing what the weather will do ahead of time and being able to predict the right time for sowing and harvesting crops, can make all the difference to one's livelihood. Additionally, knowing ahead of time what action to take to prevent damage to crops and livestock, such as frost prevention actions or extra irrigation to cope with upcoming heat waves, is extremely important to these growers. For this reason, people who live in rural areas and or who work in the agriculture or horticulture sectors are generally more in tune with the climate and weather than those who live in suburbia.

In urban or suburban situations, often the only concern may be what to wear to work, whether one needs an umbrella, coat or sunscreen. Whether there is water coming out of the tap for a drink or bath, and the price of vegetables, fruits and foods may be the extent of interest for those living in this environment. However, pricing may be due to some unpredictable weather activity somewhere or poor decision making, in terms of floods or famine.

To understand, forecast and predict weather means an individual is much more informed and responsible. They can take action and adjust what they do, and become aware of how their daily activities of energy use, recycling, reusing and conserving affects the climate.

Over the centuries it has become easier to predict weather patterns, events and conditions by using not only the centuries of manmade records and natural signs, but also through techniques which make use of technological and computer advances in collecting, recording and analysing various data. Even without these scientific methods, some native tribes around the world can predict weather reliably from nature and patterns in plant and animal growth and activity, watching the skies, and through observing rainfall.

If you are working outdoors in a horticultural or agricultural role, or in occupations where what is happening outdoors directly affects your income, you can be more productive if you can predict and understand weather

patterns. You can also take preventative action to avoid or reduce damage from a coming flood, drought, cyclone, hurricane, frost or snow storm.

Apart from enhancing safety it can mean preventing costly damage to materials, equipment, homes, animals and humans. A knowledge of weather and climatology in general leads to a richer and much more interesting life. As you become involved, you are better able to observe, predict and understand its effects on your daily life. The broader effects of weather on society are fascinating physically, socially, psychologically, and, of course, economically!

What Makes Up Our Weather?

The following components of weather are among some of the most common weather features. An understanding of each of these is essential to expand your knowledge.

- Rainfall
- Temperature
- Wind
- Hours of Sunshine
- Cloud
- Fog
- Dew
- Mist
- Hail
- Sleet
- Snow
- Frost
- Weather fronts
- Lightning
- Hurricanes
- Dust clouds
- Wildfire
- Volcanic ash
- Aurora

The sun is a vital component to all our weather patterns. As the sun shines over different surfaces such as lakes, forests and hard surfaces, variations of warm air and air patterns immerge. As these try to find or reach equilibrium, various types of weather form. Warm and cool air gusts appear, more moisture is transpired from forests or evaporated from lake areas than other sites, causing sections of air that are extra humid. As these rise (as warm air always does) and are blown about, various other phenomena occur. If the air has to rise over a mountain range blocking its path then clouds can develop, and depending on the type of cloud, rain clouds may form.

How Do We Measure Weather?

Weather may be measured a number of ways and with a range of tools and instruments including:

- Drifting buoys
- Radar
- Satellites
- Automatic weather stations
- Weather balloons

These are some examples of the tools which may be used. Further information on how these tools are used is included in later lessons.

Some instruments are relatively simple and small, and as such may be purchased for private use by the average person. Examples of these are the thermometer, invented by Galileo in 1607, and the barometer, invented by Torricelli in 1643.

SET TASK

Try to find out about as many climatology resources as you can, and begin to get a feel for them. These may include websites, journals, organisations, government or private bodies, or individuals involved in climatology. Make up a list of the resources you discovered which you might use for information later on. If possible, include local resources and contacts/people (if any) in your region who can be of assistance.

Arrange these resources into organised groupings in a file.