

NATIONAL CHILDREN'S SCIENCE CONGRESS

Theme: Understanding weather and climate.

Sub themes:

- Weather and climate around you.
- Impact of human activities on weather and climate.
- Weather, climate and ecosystems.
- Weather, Climate, Society and Culture.
- Weather, Climate and Agriculture.
- Weather, Climate and health.

Focal theme: Understanding Weather and Climate

Weather is the instantaneous state of the atmosphere, or sequence of states of the atmosphere with time, which can be defined as the condition of the atmosphere at any given time and place. Climate, on other hand, is the average as well as variability of weather conditions prevailing in an area over a long period of time, known as the Statistics of Weather.

Precipitation, temperature, humidity, atmospheric pressure, and wind are the important elements of weather and climate. It is the result of the interaction of four basic physical elements- the Sun, the Earth's atmosphere, the Earth itself, and natural landforms on the Earth's surface.

The geographical situation of any locality/area/region in relation to its latitudinal and longitudinal position, altitude, distribution of land and water, relative location from water bodies, surface cover (viz. vegetation/snow/rocks etc.) are some of the natural factors that influence the weather and climatic condition of that particular location.

Moreover, weather and climate are among the key factors that determine the nature, condition, and pattern of natural resources (e.g. water, soil, flora, and fauna). State of temperature, humidity, and precipitation in temporal context in a year determine season and climatic condition in long temporal context. These are responsible for determining the forms of water, soil-forming processes and creating support systems for floral growth; which again determine the faunal composition. These natural resource bases along with weather and climate determine our way of life (viz. occupation, housing, food habits, dress style, transportation, etc.). In totality, weather and climate form the base of the economy and culture of that area. In this perspective, any significant change in weather and climatic condition creates serious impact not only on natural resources but also on the biosphere as a whole, including human life.

Sub-themes

I: Weather around You

Weather is the immediate physical environmental spur and situation we face in our day-to-day life and it influences our decisions, like what to eat, what to wear, where to live, etc.

However, rarely do we make a systematic effort to understand it better. Therefore, systematic approach for understanding weather of a locality/area will be the main concern of this sub-theme, which can help the children to make their decisions more precise and pragmatic, particularly adjusting with the weather conditions.

II: Impact of Human Activities on Weather and Climate

Human population has been growing in geometrical proportion in the last two centuries. Growing population and increasing consumption of goods and services per head after the industrial revolution requires in increasing manner environmental resources (life support systems like air, water, and soil and other natural resources) for its survival and sustenance. The pressure on these has also influenced the weather conditions and climate locally and globally. The growth in agriculture, animal husbandry, fisheries, urbanization, transportation, deforestation, and industrialization caused changes in land use and bio-geo-chemical cycles. Exploration and utilization of energy sources for the increasing demands of the growing society pumped in large quantities of green house gases to the atmosphere causing global warming.

III: Weather, Climate and Ecosystems

Weather and climate have various significant elements such as Rain, Temperature, Wind and Humidity that impact the occurrence, abundance, seasonality and behaviour of living organisms as well as quality of air, water and soil. They have direct or indirect effect on the various components of ecosystems. With the variation of temperature, humidity and precipitation the quality of water, soil forming process, floral growth, and faunal composition may undergo change.

India's weather and climatic conditions change from region to region on their geographical locations and conditions; hence the parameters of weather vary from place to place. Due to such variations, the distribution of life forms, soil quality and water quality also vary from place to place.

IV: Weather, Climate - Society and Culture

Weather and climate determine the physical environmental condition of an area through their impact on abiotic and biotic elements and that condition in turn influences human way of life in the forms of belief, livelihood, and social, institutional, as well as cultural practices. These together reflect the social and cultural system of a locality/area/region. The social and cultural systems have an adaptation mechanism to local weather and climatic situation through their practices fulfilling basic needs of food, shelter, and clothing through designed livelihood activities, food system, settlement and housing, management of natural resources etc. However, there are many practices associated with social and cultural system, which have negative impact on natural resources and in turn responsible for anomalies of weather and climate, such as human induced climate change. On the other hand there are many examples that human beings face up to extreme weather situations through their social and cultural practices based on Indigenous Knowledge and try to cope up with such weather conditions and disasters.

V: Weather, Climate and Agriculture

Agriculture is the backbone of our country. Weather and climatic condition determine all the aspects of agricultural practices, which is very much vivid in all agro-climatic regions of the country. In present day context, agriculture is most vulnerable to weather and climate changes because of its seasonality and narrow range of weather conditions influencing crop

and livestock production. Last several decades people across the globe witnessed above normal temperatures and more rapid warming that occurred during the last half of the 20th century. Climate change presents a profound challenge to food security vis-a-vis livelihood and development all around as well.

VI: Weather, Climate and Health

Weather and climate influence environmental and social determinants and also affect health of the living beings. Health - as defined by World Health Organization is a state of complete physical, mental, and social well being and not merely absence of disease. Health, whether of human or animal, mainly depends on safe drinking water, nutrition, sanitation or hygiene and the likes.

Likewise, any variation in weather or climatic conditions adversely affects the health of living beings. Outcome of these changes; heat or cold waves, drought or flood, storms etc., takes its toll on the health, manifested by occurrence of diseases, or even sometimes an outbreak of epidemics.

मुख्य थीम – “अपने मौसम को जानो”

मौसम, वायुमंडल में किसी एक स्थान विशेष की लघु अवधि की परिस्थिती होती है। उदाहरण स्वरूप आज दिन का मौसम गर्म रहेगा जबकि रात ठंडी होगी शाम को बूदाबंदी हो सकती है। अर्थात सुबह, दोपहर शाम एवं रात में मौसम परिवर्तित हो सकता है। जबकि जलवायु दीर्घ अवधि के मौसम को प्रदर्शित करती है यह मौसम के औसत के आधार पर निर्धारित होता है। जो 30 वर्ष या ज्यादा पर निर्भर रहती है। उदाहरण भोपाल में जुलाई में बारिश होती है यह जलवायु को प्रदर्शित करती है।

मौसम एवं जलवायु के कारक

तापक्रम, वायुमंडल कितना गर्म या ठंडा है, तापक्रम कितने डिग्री सेलिसयस है। तापक्रम अत्यंत महत्वपूर्ण कारक है इसके अतिरिक्त आद्रता, बादल, वायुमंडल दबाव आदि भी महत्वपूर्ण कारक हैं।

इस विषय के अंतर्गत कुछ उपविषय निर्धारित किए गये हैं जिन पर आप अपना शोध कार्य कर सकते हैं जहाँ तक संभव हो शोध हेतु अपने आसपास का ही चयन करें एवं संक्षिप्त कार्य करें जो वास्तव में निर्धारित समय में पूरा हो सके।

उपविषय

1. आपके चारों ओर का मौसम एवं जलवायु

इसके अंतर्गत आप प्रतिदिन परिवर्तित होने वाले मौसम के बारे में अध्ययन कर सकते हैं एवं उससे वनस्पति, मानव जीवन, वन्य प्राणियों एवं जानवरों पर पड़ने वाले प्रभाव का अध्ययन कर सकते हैं। साथ ही यदि कोई विपरीत प्रभाव दृष्टिगोचर होता है तो उसे कैसे दूर किया जाये उसे भी शोध में समाहित किया जा सकता है।

2. मानव गतिविधियों का मौसम एवं जलवायु पर प्रभाव

मौसम एवं जलवायु परिवर्तन में लगातार परिवर्तन हो रहा है जिसका मुख्य कारण मानव गतिविधियाँ हैं। मानसून का कम होना, गर्मी का बढ़ना (तापमान में वृद्धि)

आदि। इस पर भी शोध कार्य किया जा सकता है। यह बहुत महत्वपूर्ण एवं संवेदनशील विषय है।

3. मौसम जलवायु एवं पारिस्थितिक तंत्र

पारिस्थितिक तंत्र एक क्षेत्र विशेष के समस्त प्राकृतिक जीवों तथा तत्वों का कुलयोग है और इसे भौतिक भूगोल में एक दृष्टिगत आधारभूत उदाहरण के रूप में देखा जा सकता है। पारिस्थितिक तंत्र के दो घटक होते हैं

जैविक घटक एवं अजैविक घटक

जैविक घटक को पुनः स्वपोजी घटक एवं परजीवी घटक में विभक्त किया जा सकता है।

यदि मौसम एवं जलवायु में परिवर्तन होता है तो पारिस्थितिक तंत्र भी प्रभावित होता है। इस विषय के अंतर्गत इसी का अध्ययन किया जायेगा कि किस तरह पारिस्थितिक तंत्र मौसम एवं जलवायु से प्रभावित होता है।

4. मौसम, जलवायु समाज एवं संस्कृति

भारतीय समाज एवं संस्कृति को देखा जाय तो वह पूर्णतः वैज्ञानिक पद्धति पर आधारित हमारा खानपान, रहन सहन सभी मौसम एवं जलवायु के अनुसार निहित होता है। किस मौसम में क्या निषेध एवं किस के सेवन से ज्यादा फायदा होता है। उनका सत्यापन हम वैज्ञानिक पद्धति से कर सकते हैं।

5. मौसम, जलवायु एवं कृषि

भारत कृषि प्रधान देश है यहाँ आर्थिक व्यवस्था कृषि पर आधारित है। कृषि पूर्णतः मौसम पर निर्भर करती है एवं शोध का विषय है कि कम बारिश में कौन सी फसल अच्छी होगी या ज्यादा बारिश किस फसल के लिए उपयुक्त है।

6. मौसम, जलवायु एवं स्वास्थ्य

कहा गया है कि पहला सुख निरोगी काया अर्थात् स्वस्थ रहना पहली प्राथमिकता है। मौसम एवं जलवायु का स्वास्थ्य से सीधा संबंध है। अतः किस मौसम में किस तरह स्वस्थ रह सकते हैं। क्षेत्र में किस मौसम में कौन से रोग होते हैं उनके बचाव कैसे किया जाय यह सभी शोध के विषय हैं।

वर्ष 2014 एवं 2015 हेतु राष्ट्रीय बाल विज्ञान कांग्रेस हेतु चयनित विषय हमारे दैनिक जीवन से सीधे जुड़े हुये हैं। अतः हमारा शोध कार्य भी इसी लक्ष्य को ध्यान में रखकर किया जाना उचित होगा।

Some Possible Topics

(Take these topics as guideline, much more topics can be think)

Sub Theme 1 : Weather Around You

Making simple measuring devices and using and validating them

- Calendar - onset of major events such as monsoons
- Making a Rain Gauge ; Human hair hygrometer

Making a Rain gauge

Human Hair Hygrometer

Property used : Length of a human hair is dependent on the relative humidity and it is close to linear

Process: Obtain a reasonably long human hair [or horse hair]. Fix one end to a split cork or some such fixating device. Wind

the other end over a wheel that can spin freely. Weigh the wheel with a small weight on the other side so that the wheel is in

equilibrium between the tension in the hair and the string. Affix a light pointer to the wheel and place a dial.

Calibration : Put the apparatus in a “dry” environment –dry environment obtained by passing air over desiccators.

Mark “0” for the pointer’s position. Put near a boiling kettle so that saturated environment is available. Mark “100” for the pointer’s position. You have the human hair hygrometer

Measuring wind speed and direction

- How to measure speed?
- Why is direction important?
- Wind rose

Procedure:

Construct a fan from paper fan-wheel which can rotate freely. Hold the fan against the wind and measure its speed of

rotation. [This can be done either by a commercial speedometer or by constructing a strobe light arrangement]. Orient the fan

so that the speed is maximum. Note the direction.

Measuring temperatures

- Maximum, minimum and average temperature
- Shade or open?
- What is the “hottest month”?

Use a thermometer to measure the temperature every hour in a shaded place. Note it. From the data decide what the

maximum and minimum temperature are in a day. Do this for every day for a year to get monthly maximum, minimum and

average temperature.

Impact of any one parameter measured on something of importance to us

- E.g. Correlate (i.e. draw a graph) on temperature and electricity bills
- Rain and flower prices; seasons & illnesses; rain & mosquitoes
- Ants & prediction of rain

Sub Theme 2: Impact of Human Activities on climate and weather

Suggested projects

1. Loss of forest/wilderness areas in the locality
2. Loss of water bodies with time
3. Changes in cropping pattern in the locality
4. loss of mangrove forest in coastal area and possible impact in terms of coastal erosion
5. The effect of mangrove loss on the impact of cyclone in the coastal area.
6. Food wastage and carbon footprint
7. Life style and carbon foot print
8. Afforestation and carbon footprint
9. Use of fuel in industry and impact on weather and climate.
10. Artificial fish culture, fertilizing water and GHG emission
11. Use of biowaste as compost and reduction in carbon footprint
12. Replacement of non biodegradable plates, cups etc with biodegradable to reduce carbon footprint
13. Use of bicycle in the place of motorised vehicle and reduction in carbon footprint
14. Energy saving devices to reduce GHG emission
15. Use of natural light in place of artificial light.

Sub Theme 3 :Effects of weather and climate on Biotic Components

- Effect of the pattern of weather parameters such as Rain, Temperature, Wind and Humidity on
- Abundance of various Insects
- Changes of Behaviour of insects with respect to weather parameters
- Relationship between Dragon fly population changes and rainfall
- Relationship of movement of social insects and weather parameters
- Behaviour of birds in relation to the weather parameters
- Behavior and movement of spider in relation to the weather parameters
- Abundance and breeding of frogs in relation to the weather parameters
- Variation in weather and climate Vs presence and absence/ abundance of plants such as weeds

- Behavior of domestic animals in relation to the weather parameters
- Seasonality of occurrence of plants
- Weather pattern and flowering of plants
- Soil Organisms and weather pattern
- Fish migration and weather pattern/ tide pattern
- Fish catch and weather pattern
- Seasonality in fish catch
- Seasonality of behavior of costal animals / tide pattern
- Weather parameters and abundance of mushroom

Effects of weather and climate on Abiotic Components

- Variable weather conditions can affect quality of air, water and soil. Some of the changes are measurable such as measuring pH amount of dissolved salts in water, organic matter in soil etc.
- Quality of air in terms of air pollutants such as Carbon dioxide, methane, NOX content in different seasons
- Soil pH in different places/ different time.
- Water pH in different places/ different time / rain water
- Determination of dissolved minerals in different water samples in your locality
- Comparing water quality before and after rain
- Determination of organic matter present in soil in different periods of time.
- Weather and soil erosion
- Effect of light period, light intensity, atm. temperature, humidity and soil moisture on growth of plants
- Stomatal count for as surrogate for the production of Oxygen – comparison of different plants
- Calculation of Carbon sequestration in different urban and rural gardens
- Relation between Wind pattern and seed production in wind dispersed seeds.
- Relation between wind pattern and flowering of anemophilic plants.

Sub Theme 4 : Weather, Climate- Society and Culture

- Identify a locality where traditional houses are there;
- Observe and identify different traditional houses in terms of design and material used;
- At the same time identify some modern houses with different designs and materials used;
- Observe, identify and assess the building materials used in the building, its facing and ventilation, etc for both categories of houses;
- Measures the room temperature using suitable thermometer, at different period of time both in day and night. For this purpose fixed two or three room (if available) in each of the

houses considered for observation. These measurement need to be taken both in traditional and modern houses. Keep the records separately for each of the houses of observation.

- Assess the humidity level in each of the houses (in each room of observation separately). For this purpose use wet bulb thermometer or design/adopt a separate way of alternative measurement.
- Now, compare the temperature of traditional houses with modern ones and find out the differences and also find out where it is lowest and where it is highest. Try to correlate humidity level with the temperature.
- Now find out best housing design and material use for thermal comfort in particular area.
- Study the relationship between traditional/indigenous pest management practices and weather condition;
- Study the practices of traditional land use and land cover management and impact on weather and climate;
- Assess the impact of traditional water harvesting and management practices (like Johad, Vap, Kul, Longsor,Dong, etc) in developing sustainability of water resources in climate stress period and developing resilience system;
- Study the traditional practices of animal rearing and their health management, their relationship with weather condition and seasonality; identify components of adaptation and resilience;
- Study cultural priority on selection of food crop for cultivation in the locality and its relationship with local weather and climate induced disaster;
- Study on the efficiency of traditional utensil used for cooking and their contribution in reduction of energy and carbon emission;
- Comparative study of distribution of rainy days against month in traditional calendar system and English calendar system and find out the reliability aspects for agricultural planning;
- Study on fuel wood based cremation practices, assessment of carbon emission and developing alternative system for cremation;
- Assessment of energy requirement in traditional cooking and modern way of cooking, identify carbon emission factors and impact on weather and climate;
- Study on the alternative food sources of different cultural groups in disaster prone situation (like flood, drought, etc) and assessing its potentiality for building resilience and adaptation to climate change;
- Assess the energy consumption and pollution of air, water, noise during festival (like Diwali, Pongal, Magh Bihu, Durga Puja, etc) and impact on developing resilience and adaptation to climate change;
- Study on the traditional food storage practices among the community and its relation to weather and climate;
- Prepare community based culturally adaptable Disaster Management Plan with proper assessment of risk and vulnerability for climate induced disaster of your locality.

Sub Theme 5 : Weather, Climate and Agriculture

Suggested Projects:

1. How does organic component influence different Soil Properties?
2. Determining maximum loading limit for copper in agricultural land
3. Evaluating filtration capacity of soil
4. Influence of vegetation cover on microclimate
5. Influence of mulch on soil physical properties
6. Study of the influence of tillage on soil physical properties
7. Effect of land use options on erosion loss of surface soil
8. Influence of tillage on ground water recharge from rice field.
9. Impact of saline water on soil properties like pH etc.
10. Germination of crop in soil with varying salinity level
11. Organic matter addition and crop growth
12. How pollutants affect soil biota?

SubTheme 6 : Weather, Climate and Health

1. Mapping of weather related diseases in your locality
2. Studies on prevalence of vector-borne diseases (malaria / dengue)
3. Occurrence of communicable diseases due to extreme weather conditions
4. Effect of temperature and humidity changes on incidences of skin diseases
5. Impact of weather on production and/or health of animals
6. Effect of extreme weather on the health of women and children
7. Effect of summer, winter and monsoon on incidence of respiratory diseases
8. Effect of heat on the health of farmers / industrial workers in your area
9. Studies on weather patterns and income loss of workers with daily wages
10. Studies on air-borne infections during variable weather conditions

Some more Topics –

- छोटे मौसम – प्रयोगशाला के द्वारा मौसम का अनुश्रवण
- मौसमी प्राचलों (Parameters) पर ऋतु परिवर्तन का अध्ययन एवं स्थानीय कृषि गतिविधि से इनका संबंध
- मानसूनी वर्षा प्रतिरूप (pattern) का अध्ययन
- अपने विद्यालय परिसर/आवासीय क्षेत्र में घास एवं वनस्पति/पौधों के कार्बन भण्डार का निर्धारण
- वनस्पति के स्थानिक एवं पार्थिव रूपांतरण के ऊपर जलवायु परिवर्तन के प्रभाव का अध्ययन
- पाला के प्रभाव से फसलों की हानि का निर्धारण
- कृषि पर जलवायु परिवर्तन के प्रभाव का आर्थिक विश्लेषण अध्ययन का महत्व
- पारंपरिक कैलेण्डर प्रणाली, कृषि चक्र एवं मौसमी स्थितियों का अध्ययन
- ठनका एवं तूफान का अवलोकन एवं मानवीय गतिविधियों पर इसका प्रभाव
- आपदा से हुई हानि का चित्रण
- मौसमी स्थिति का जानवरों पर प्रभाव
- भूमि जल स्तर पर नदी से बालू उठा लेने का प्रभाव
- विभिन्न जल क्षेत्र में खाद्य-श्रृंखला का तुलनात्मक अध्ययन
- आद्रभूमि में कीट का भोजन करने वाले पौधे (utricularia) का अध्ययन
- जल कृषि (aquaculture) के अर्थतंत्र का निर्धारण
- जलवायु परिवर्तन के कारण सतुद्र जल सतह के ऊपर चढ़ने से असुरक्षित क्षेत्रों का मानचित्रण
- जलवायु परिवर्तन के कारण अतिरिक्त मिट्टी- जल कम होना, क्षरण एवं इसकी क्षमता
- मौसम व जलवायु के साथ मनुष्यों में भोजन की आदतें बदलने का प्रलेखीकरण
- अध्ययन क्षेत्र (जंगल/उसर भूमि/खान क्षेत्र) में पौध-प्रजातियों की विविधता एवं जैव विविधता एवं जैव विविधता पर इसका प्रभाव
- आदिवासी समूह के भोजन की आदतें/भोजन पौधों का प्रलेखीकरण जिससे भोजन एवं स्वास्थ्य के संबंध को बताया जा सके
- मौसम एवं जलवायु प्रभाव मूल्यांकन
- मौसम व जलवायु का जीवनशैली पर प्रभाव
- मौसम व जलवायु पर आधारित पारंपरिक ज्ञान का प्रलेखीकरण
- प्राकृतिक आपदा प्रबंधन
- मौसम व जलवायु पर आधारित स्थानीय पारंपरिक ज्ञान की सूची
- अनाज के भण्डारण पर मौसम का प्रभाव मौसम जलवायु एवं जैव विविधता
- प्राकृतिक विपत्ति तथा इसका जैवविविधता पर प्रभाव
- जैवविविधता के द्वारा मौसम नियमन