



Tracking Seasons

A Nature Diary

Thejaswi Shivanand

Tracking seasons involves observing various cycles, both living and non-living. The sun seasonally shifts the position where it rises with respect to the horizon, the night skies change with the season and rains are indicative of season. In addition, various plants and animals have seasonal cycles of activity and breeding. This simple worksheet helps us track some aspects of seasonal change.

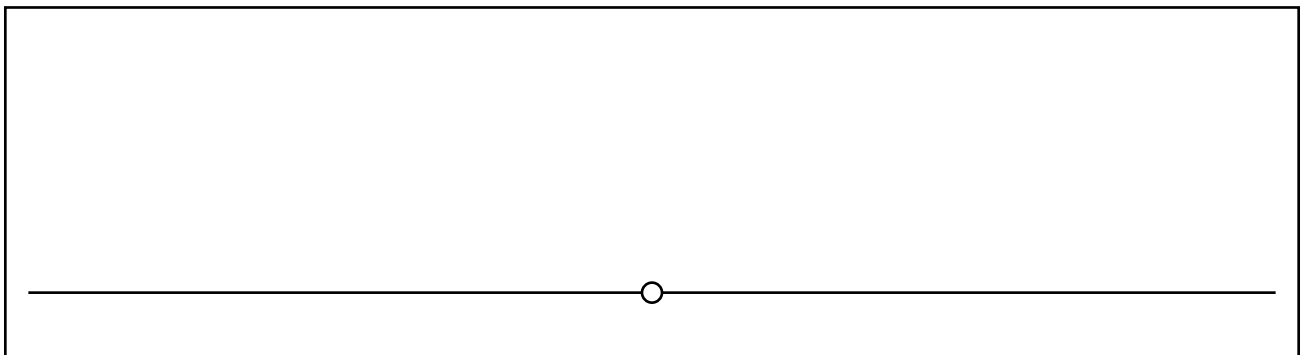
Activity 1: Observing the sun

Choose a pole that is fixed on the ground in your school campus or at home. Any tall pole, such as a flag pole or something permanent will do. Mark a straight line passing through the base of the pole on the ground on either side of it. We will call this the base line for convenience. The position of the base line should be fixed through the year. The poles and lines on a volleyball/handball/outdoor tennis or badminton courts would do well since the lines and poles are fixed through the year. A flag pole is also fine but create the position of the line carefully each time it may be lost for some reason.

Observe the shadow the pole makes with respect to the line at the base of the pole. You will see that the angle that the pole shadow makes with the base line changes with the position of the sun through the day as the sun moves across the sky. Now instead of observing the shadow through the day, choose a fixed time of the day, say 10 AM, and observe the angle that the shadow makes with the base line every day across all months of the year at that particular time that you have chosen. If you can't observe it every day for whatever reason, do observe it once a week at least on the same day (say every Thursday or Wednesday) for all 52 weeks or as many weeks as you can make the observation. Use a protractor to measure the angle between the shadow of the pole and the base line, at the base of the pole. Note your angles in a table with two columns, one for the date and another for the angle.

Date of observation	Angle between the pole shadow and base line

In the diagram below, the dot in the centre of the line represents the pole that is at right angles to the line on the ground. The pole will appear as a dot if you directly look at it from above. Now, using the dot as the start point, draw the line of the shadow using the angle that you measured before for any one date. Repeat this process for each day or week for which you have measurements. You can write the date of the measurement on the line or at the end of the line. What do you observe?



Activity 2: Observing the rain

Making a Rain Gauge



Obtain an empty 2 litre plastic bottle for your rain gauge



Cut the top off the bottle where the walls are straight



Fill the bottom of the bottle evenly with sand or gravel up to where the walls are straight. Pour enough water into the can to cover the sand



Cut out and tape the gauge ruler to the outside of the bottle such that the bottom of the ruler (zero) is on the top of the sand. Cover the ruler completely with clear cello tape



Turn the top of the bottle upside down and insert it in the cut bottom half to act as a funnel, and to keep the rain from evaporating



Adapted from source: Kalamazoo Valley Museum

Place the completed rain gauge in an open space where there is nothing that can block the rain from filling the bottle. Note any rainfall in the table on the next page. Empty the water from the rain gauge after each measurement and set it up again as before.

Date	Rainfall (in millimeters)

What do you observe? Are some weeks or months 'rainier' than others? Which is the most rainy month in the year in your place? Which is the driest?

EXTENSION: You can make similar tables to take daily measurements of the air temperature using a thermometer (mid-day and night). Do you notice any variation in temperatures across the year? Which is the coldest month, week, day? Which is the hottest month, week, day?

Activity 3: Observing the monsoon

Germinating Wild Seeds

Months: June/July-September

Collect seeds from wild plants and trees that you may come across in your school or neighbourhood during the summer (March-May or June, depending on where you are in India). Take used milk packets, rinse them and cut off their tops. Make a small hole at the bottom of the packet to let excess water drain out. Mix equal amounts of red soil and compost and fill this mixture into the packets. If your soil is sandy, double the amount of compost with respect to soil. Plant one seed in each packet and leave it in the open. **Do not water the packets.** Keep the packets with soil and seed close to each other for support. Look out for signs of germination after rains have fallen on the packets.

Date of observed germination:

Number of days between first rains and germination (Find this out from the rain gauge measurements):
Complete the following chart for each packet. In the boxes below, make sketches of the germinating seed as you observe them grow over the days. In the notes section, measure the length of the seedling and then the plant as it grows over time. You can do this measurement by holding a length of string from the tip of the plant to the base and measuring this string against a ruler. Make copies if you are observing multiple packets.

Day 01	Day 02	Notes:
		Day 01:
		Day 02:
Day 03	Day 04	Day 03:
		Day 04:
Day 05	Day 06	Day 05:
		Day 06:

Do seeds from different plants look different during the germination process? How? EXTENSION: Make a similar table for trees and observe the first day of new leaves emerging from trees in the spring, typically before the rains, and sketch the changes in the shape and colour of new leaves as they grow over the days.

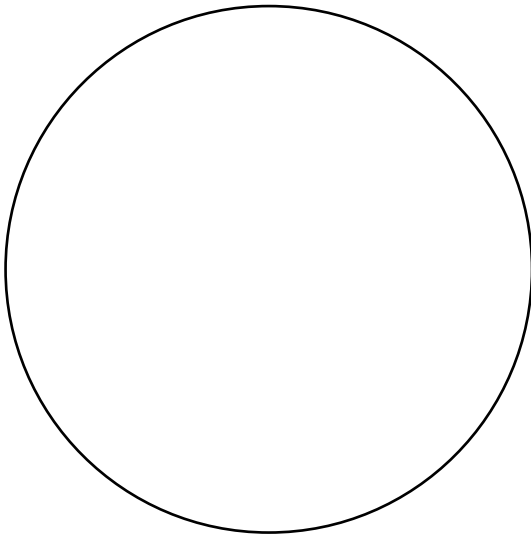
Activity 4: Observing the monsoon



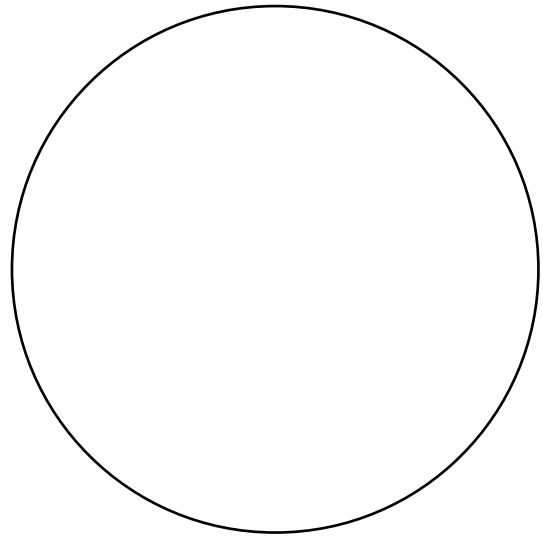
Wild Herb Varieties

Months: June/July-September

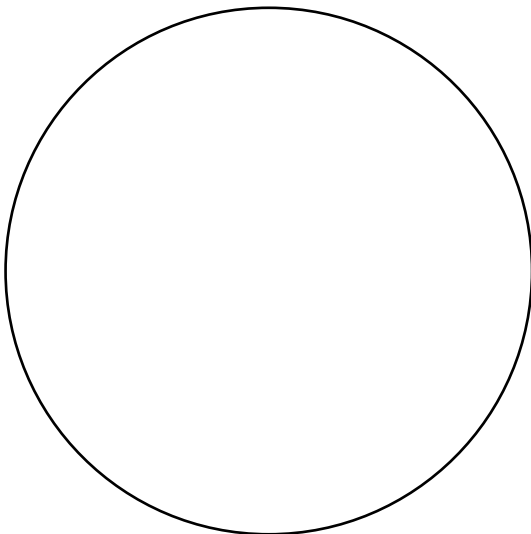
One of the main features of the monsoon is greenery. A lot of plant growth follows rainfall. These activities are for you to observe some changes. Take four 30 cm rulers and tie them up at the short edges to make a square. You can also make such a square with four sticks of equal length, but keep the length of the sticks no longer than 30 cm. Now go out in the open in your neighbourhood or school campus, near a pond or by a quiet roadside, taking the square with you. Also take a small ruler, pencil, eraser, pencil sharpener and colour pencils/crayons and watercolours with you. If you have a hand lens, then carry that with you as well. Find a place where there is wild grass growth (avoid an artificially maintained lawn). You will probably see other small plants growing amidst the grass. Place your square on the grass. Note how many different varieties of plants you observe in the grass. **The features that are often useful in telling different plants apart are the shape and size of the leaf and shape and colour of the flower.** Make a sketch of each variety of plant in the circles below. You may do just leaves, or just flowers or both together. You can colour the flowers and leaves. If you have a hand lens, draw close-ups of leaves or flowers. You can give each plant variety any name you like! Make copies of this sheet to draw and paint more!



Name:



Name:



Name:

Extension: Count the number of varieties you saw in one location. Repeat the same activity for a different location. Does the second location have more or fewer varieties than the first? Does the second location have similar varieties or different?

Activity 5: Observing the monsoon

Creatures above and below the soil

Months: June/July-September

Who are all the creatures that make the growing plants their home? Some of these creatures live below the soil, some of them on the plant. To observe soil creatures, collect moist soil from near plants, or under trees where there are fallen leaves. Sieve the soil using a coarse sieve. Pour whatever is remaining on a white sheet or large piece of paper and look out for creepy crawlies! You can also observe creatures that live on the plant stem and leaves. Once you observe the creatures, make sketches of them in the figure below depending on whether they are found above or below the soil. You can sketch the plant, with roots, stem, branches and leaves, to show where you saw the creatures. If you know the names of these creatures, you can write them as well, or leave them as such, or give them your own names!

Please be careful with some of these creatures, some centipedes and certain spiders can give you a painful bite, but most of them are harmless and go about their own lives without biting anyone.

above ground
below ground

Activity 6: Observing autumn/dry season

Leaf Fall

Months: October-January

If you are living in the drier or colder parts of the country, you will experience a time of the year where trees and big shrubs shed their leaves. You can observe this in different ways. Go about observing these fallen leaves. What shapes do they have? Do they have the same colour when they fall when compared to leaves on a tree?

You will need a pencil and colours for this activity. Place this sheet with a leaf below one of the squares. Press the paper gently against the leaf and holding the tip of the pencil such that it lies flat on the surface of the paper, rub across the leaf in such a manner that the outline of the leaf along with the midrib and veins become visible on the paper. You can repeat the activity with the same leaf on the other square as well but after the pencil rubbing, you can gently erase the excess pencil marks retaining only the outline, veins and midrib. Now observe the leaf closely and fill this box with colours. Make copies of this sheet to do this activity for leaves of different kinds. For large leaves, use a big sheet of paper.

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Extension: Is leaf fall linked to rainfall? Use your rain gauge information to find out what time of the year does leaf fall begin.

Activity 7: Observing winter/monsoon



Migrant Birds

Birds migrate from temperate (colder climates) to warmer climates such as India to spend the cold season, or move to India to spend the wet season here when places like Africa are dry at the same time. You can note that their appearance in your neighbourhood is very seasonal. You can track the appearance and disappearance of these birds from your area. Note the first and last dates of the presence of the following birds in your area. You can also make daily observations and the numbers of the birds that you saw each day. What's the difference in arrival and departure of these two species?

Date of first arrival:

Date of first arrival:

Date last seen:

Date last seen:



Barn Swallow (*Hirundo rustica*)

Date Observed	Numbers



Jacobin Cuckoo (*Clamator jacobinus*)

Date Observed	Numbers

Activity 8: Observing spring

Flowering Trees

Months: February-April

Many trees in India flower at a particular time of the year, indicating the arrival of spring. The exact timing of spring can vary across the country, depending on where you live but large scale flowering of trees across the landscape is a good sign in most parts of the country except perhaps deserts and very dry areas where the flowering season may be linked to the monsoon.

One of the activities that you can do is repeat the activity of closely observing, and making coloured sketches of the flowers. In the activity given here, you observe the flowering tree in a very different manner. Choose a tree in your neighbourhood that you know flowers just before summer or in early summer. Observe the tree carefully starting from the end of winter. Then begin to fill in this worksheet as soon as you notice the first flowers fully opened. Go below the tree every day and look for fallen flowers in the evening. In the table below, note the date, count the fallen flowers, remove all the fallen flowers from under the tree and take them away from the area. If you find counting very hard, or the flowers are numerous, you can also think of weighing all the fallen flowers

at the end of each day and keep track of the weights instead of the number of flowers. Repeat the activity over time. Before you begin, give your tree a name, any name you wish.

Name of the tree:

Date of first flowers on the tree:

Date of first fallen flower:

Date of last flower on tree:

Date	Number of fallen flowers

Continue your observations till the tree stops flowering. You can make copies of the table if you find the space insufficient to hold your information. Repeat the activity the next year for the same tree. Ask yourself these questions based on your observations.

1. How many days in total is the length of the flowering season of the tree?
2. Does the tree produce a similar number of flowers each day throughout its flowering season?
YES/NO
3. If your answer is no, does the tree have a peak in the number of flowers that it produces during the flowering season? If yes, then does this date fall early in the flowering season or late in the flowering season?

If you repeat the activity next year, will you see similar dates for the flowering to begin and end? Will the amount of flowers the tree produces be the same? Will the peak of the flowering be the same? Using your shadow and rainfall information, do you see any link between them and timing of the tree's flowering season? You can also do this activity for different varieties of trees. Do they have similar flowering seasons or length of the flowering season?

Activity 9: Making an ecological calendar

An ecological calendar is a simple calendar with notes on daily observations on the natural world from any favourite haunt of yours – the tree near the window, your school yard, a particular patch of garden you pass by every day, a lake, an open field with trees. What did you see? Smell? Hear? Any natural sights, odours and sounds? Did you see any of the following on a particular day of the year?

- Swarms of dragonflies, not solitary ones here and there but fairly large swarms
- Mushrooms – did they pop up overnight after heavy rains?
- Flying termites – when did this event happen? Did you find any particular location where they were coming from the ground?
- Migrating butterflies – moving in a particular direction in loose numbers, not as flocks or groups. When did you see them? What direction were they travelling in?
- Nesting birds – do birds nest through the year? Do particular kinds of birds nest at particular times of the year? Do all bird nests look alike?
- Did you observe frogs and toads croaking in large numbers? Did you see frog eggs or tadpoles? Did the croaking happen before or after you saw the tadpoles?
- Do the positions of stars in the night sky remain the same every day of the year? Can you look up some star charts and find out?

This activity can be performed using a yearly planner with space for each of the 365 days along with illustrations of birds, flowering trees, etc. Detailed notes can be kept separately if needed.

The author is a part of Centre for Learning, Bangalore. He teaches Biology and Statistics in the senior school and is closely involved with the school's nature education and library programmes. He can be reached at <dumaketu@gmail.com>.