JUNGLE SAFARI

Grade: 8 and above
Time: 60 mins

Jungle Safari attempts to intertwine seemingly disparate fields like wildlife and mathematics and offers children an opportunity to engage with nature in a meaningful and intellectually stimulating way. In this lesson plan, children explore wildlife activities by integrating mathematics, geography, and ecology concepts. This unit is designed to give students a fun way to practice their mathematics and mapping skills through the context of wildlife and ecology.

LEARNING OBJECTIVES

Students will be able to:

- recognise cardinal directions (North, South, East, West) and apply them to navigate on a 2D physical map.
- review the concept of scale and its application in map-making and modelling.
- apply coordinate plotting skills to locate specific points or regions on interest on a given map.
- explain briefly on how wild animals have territories and how they may be distributed in an ecosystem.
- compute approximate areas of wildlife territories on the map.
- modify scaling on maps and deduce the proportional relationships between areas.

MATERIAL REQUIRED

- Forest map (download file from the given link and print on A3 Paper- https://bit.ly/junglesafarimap)
- Use an appropriate printer software to ensure accurate map dimensions, as Google Chrome or other applications may alter the size.
- Coloured pens, geometrical compass ruler.

Sample of map
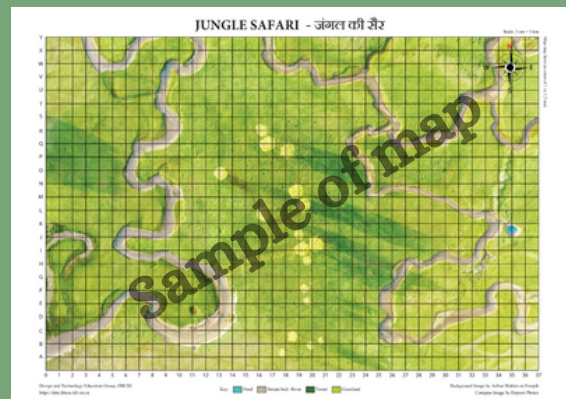
HOW TO CONDUCT

1. To prepare for this activity, teachers are encouraged to stimulate curiosity among students by asking them the following jungle-related questions and experiences:
   - Have you ever been to the jungle and seen any animals there?
   - What are the ways to identify animals in the jungle? (Pug marks, scat, hair, smell etc.)
   - Do you know how animals establish their territories?

2. Then the teacher follows the following steps, to conduct the activity:
   - Distribute the forest map to students (groups of two/ three). This activity can also be done as a solo venture but we suggest group work.
   - Direct students' attention to the forest map and ask them to communicate what they observe in the map.
   - The forest map has a 1cm x 1cm square grid superimposed on it. This grid helps in measuring the forest area dimensions and the animal territories.
   - The teacher asks the following question: The map has a scale of 1cm = 1km, then what is the actual area of the forest?
   - There are seven tasks which students have to solve one by one. Provide the tasks sequentially to students, that is, when task 1 is complete, give students task 2 and so on.

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There is a forest named Kangha, which spans approximately 925 square kilometres. Scientists have determined that three tigers reside in this forest based on camera-trapping studies. They have named the male tiger as *Bamera*, and the two (female) tigress as *Machhli* and *Collarwali*. Based on the latest survey, the following are the locations of *Bamera* (29L), *Machhli* (19S) & *Collarwali* (10G). Did you know that research studies indicate that male tigers may roam up to 8km and female tigers up to 4km at a time, searching for prey and marking their territory!

TIGER

- *Mark the current locations of the three tigers on the given map.*

- *How would you mark their territories?*

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Scientists have also been monitoring tiger-prey populations in the same forest. These comprise of herbivores like spotted deer, gaurs, nilgai. A large herd of gaurs can be seen in the large grassy fields exactly between *Bamera* & *Collarwali*. Did you know that gaurs can walk up to 6km at a time?

- *Mark the location of the gaur herd on the Forest map.*

- *Do the territories of gaurs and tigers overlap?*

GAUR

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From the herd of Gaurs, towards the northwest, there is a habitat of Nilgai near the river, where there are 2 separate (small) herds. Nilgais can walk up to 1.5km. The two Nilgai territories do not overlap.

NILGAI

- *Mark out the approximate locations of both Nilgai herds.*

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To the east of the forest, is a small pond near the river. The eastern bank of the pond is frequented by a sloth bear. Did you know sloth bears can walk 1km to 15km at a time? However, a group of scientists fit a telemetry collar on this particular bear and followed it around for a few months. They suggest that this bear walks around 3km a day.

- *Mark the approximate area the sloth bear might cover on the forest map, assuming it is currently on the eastern bank of the pond now.*

- *Do the territories of any of the tigers overlap with that of the sloth bear? If so, with whom?*

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SLOTH BEAR

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Just today, at 28U, a leopard has been spotted. The leopard has hunted a spotted deer very close to the river located to the west of it. Assume this to be the shortest distance between the eastern bank of the (west) river with respect to the leopard.

LEOPARD

Image by Adithi Muralidhar/ CC BY-NC
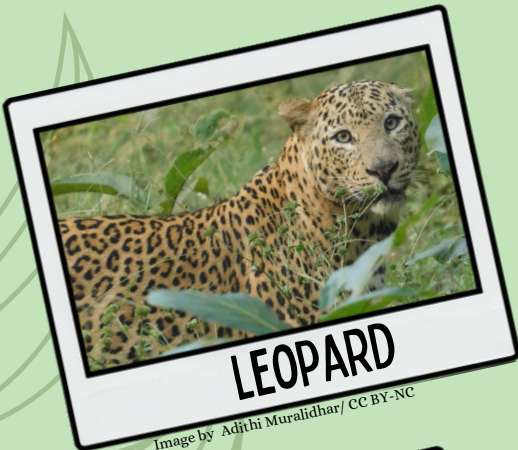
- *Mark the location of the leopard and the approximate location of the spotted deer.*

SPOTTED DEER

- *Calculate the approximate distance the Leopard walked to reach the spotted deer.*

JACKAL

Image by soumyajit nandy on Flickr/ CC BY-SA 2.0

- *A pair of jackals were seen on the same river bank feasting on another spotted deer carcass which was killed over a week ago. Now, the leopard was not present in this area for the last 2 weeks, who is likely to be the predator of this other spotted deer?*

Discuss with teacher: What is a carcass? What do you call animals that feed on carcasses? Can you think of more such examples?

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- *Whose territory is the largest?*

- *What percentage of the total forest is occupied by gaur and nilgai territory?*

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JUNGLE SAFARI

- *In this map, we had taken 1 centimetre on the map to be equivalent to 1 kilometre in the forest. If you take 1 centimetre on the map to be equivalent to 3 kilometres in the forest, then how will the territories of the animals look in this forest? Mark this on the map.*

- *Similarly, student can also explore scaling changed to*
  1. *1cm = 3km*
  2. *1cm = 0.5km*
  3. *1cm = 5km*

TIPS FOR TEACHERS

- The activity may be done by students alone or in groups.
- Provide the tasks sequentially to students, that is, when task 1 is successfully completed by students, give them task 2 and so on.
- Note that there is a tendency for students to mark answers on grid intersections. However, encourage them to be as precise as possible, even if the "answers" are located midway between intersections (for eg., between I and J or between 15 and 16).
- In Task 1, guide students in marking animal territories as circular shapes. As animals can walk in all directions from their location, the most appropriate way to mathematically indicate that would be a circle, with the centre of the circle being the current location of the animal. However, do mention to students that animal territories are typically irregular, and we are considering a circle for the ease of approximation.
- In Task 2, while marking the gaur's territory, students approach the solution with alternate conceptions which may lead to the wrong answer. However, you may encourage them to make a (slant) line from *Bamera's* location (29L) to *Collarwali's* location (10G), and then find the mid-point of that line (between I and J at 19.5). Teacher may encourage student to describe the nature of the overlap of gaur and tiger territories.
- In Task 3, there is no one correct answer. The students are expected to give an approximate location of possible areas where the nilgai herd can be located. They only need to adhere to the descriptions given in the clue. Acceptable answers will fall within the range of O to W on the vertical axis and 5 to 13 on the horizontal axis.
- In Task 4, ensure students mark the sloth bear location on the eastern bank (border) of the pond not inside the pond.
- In Task 5, students can use a ruler to find the shortest distance between the leopard and spotted deer (approx 2.7km). Alternatively, they may also mark the point on the river which seems shortest and calculate the distance by using Pythagoras theorem.
- In Task 6, students have to add the territories of gaur and the two herds of nilgai and express it as a percentage of the total forest area. Teacher can also ask to student How did you find it out?
- In Task 7, the territories will now appear proportionally smaller, on the same A3 map given to students, when the scale is changed from: 1cm= 1km to 1cm= 3km.

SUPPLEMENTAL INFORMATION

The term "jungle" typically refers to dense forest in tropical areas but is also often used synonymouly for forests which are rich flora and fauna.

Tigers are solitary animals and highly territorial. They use vocalisations and scent marks to mark their area. They hunt animals like spotted deer, sambars, barking deer, nilgai and even larger animals like gaur. The names of the tigers in this lesson plan are inspired from some of the most famous tigers in India. For example, did you know that *Machhli* was known as the Queen of Ranthambore? She was famous for her strength and her role in raising several litters of cubs which contributed to the tiger population in Ranthambhore! *Bamera* was one of the most famous tigers of Bandhavgarh National Park. He was the dominant male tiger for several years, was renowned for his immense size. *Collarwali* was one of the most famous tigress of Pench National Park. Known as the mother of Pench, she gave birth to 29 cubs in 8 liters which contributed to increasing the population of tigers in Central India. Scientists had fitted her with a radio collar and that is how she got her name.

SUPPLEMENTAL INFORMATION

Image by soumyajit nandy on Flickr/ CC BY-SA 2.0

Jackals are omnivores, eating small mammals, birds, and fruits, and scavenging carrion. They are highly adaptable and can live in grasslands, deserts, forests, and mountains.

Gaurs are the largest wild cattle species, with dark brown or black coats, and massive, curved horns. Gaurs are herbivores, grazing on grasses, leaves, and fruit. They are generally shy and avoid humans. They are a herd animal, and the dominant female leads the herd. Adult males may be solitary.


The largest Asian antelope is the nilgai, sometimes referred to as the blue bull. They are herbivores, feeding on grasses, leaves, and crops. Males are usually solitary or form small groups, while females and young form larger herds.

SUPPLEMENTAL INFORMATION

Sloth bears are omnivorous but primarily feed on insects like termites and ants. They also eat fruits, honey, and flowers. They have long, curved claws used for digging and good sense of smell which helps them find their food.

Leopards are large cats, solitary and are identified by their spotted coats, which provide excellent camouflage. They are carnivores and opportunistic hunters, preying on deer, wild boar, monkeys and even dogs! They are known for their strength and ability to climb trees, often dragging their prey up into the branches.
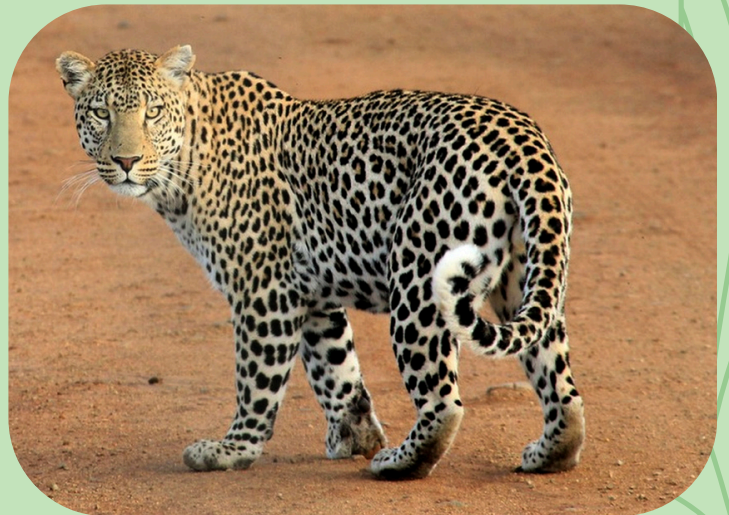

Spotted deer are herbivores, eating grasses, fruits, and leaves. They are social animals, living in large herds. They are active during the day and rely on their keen senses of hearing and smell to detect predators.

SUPPLEMENTAL INFORMATION

Wild animals establish territories in their habitat to secure food (prey), shelter, and breeding grounds. Often, territories are defended against intruders (even of the same species) to reduce competition and ensure survival. For example, two male tigers can engage in a fierce battle over territory or mating rights. In such encounters, they roar and display aggressive behaviors. Many times, such fights can lead to injuries.

Wildlife territories vary in size, for each species. These depend on nature of the animal, social structure of the species and the resources available.
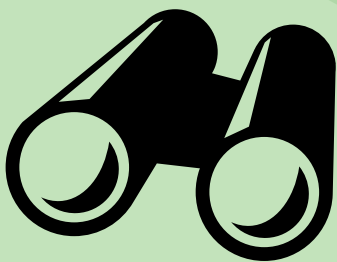
Scientists studying wildlife employ several methods and tools to make their study more effective. Sometimes, they use "camera traps" which essentially involves setting up motion-sensor cameras in specific locations to capture photos /videos of wildlife in their natural habitat. Camera traps help scientists to study animal behavior, population dynamics, and distribution. Another method to study wild animals is radio collaring. This involves fitting an animal with a collar which has a radio transmitter. Using this, scientists can track an animal's movements and study its behavior.