

## Nature our Teacher

### Expedition Summary

In this learning expedition, students will explore and experience nature. They will understand the concept of Biodiversity, and how the coexistence of the different species creates a healthy ecosystem. They will apply this learning to analyse how biodiverse their neighbourhood is. The data collected thus will be presented as a report on birds and trees of Gurgaon, with the aim of increasing awareness on the need for conserving Biodiversity.

Students will explore the interdependence between different parts of the ecosystem, and through field work, study birds closely in their natural habitat. They will focus on the form of the species, and understand how it helps it perform its specific functions. Students will then conduct a research on an allotted bird, following it up with an informative piece.

The concept of adaptation (form and function) will help the students understand the idea of biomimicry. They will learn about the different inventions that have come up from biological entities, and how such innovations continue to solve present day problems of the society. The idea is to understand the importance of nature as our teacher. Having comprehended the concept of Biomimicry, the children will engage in conceptualising an idea of a product, in groups. These will then be presented in a local exhibition.

Grade level	Timeframe	Date of creation or revision
Grade 4	3 to 4 months	August 2018

## Big Ideas behind the Expedition

1. The more biodiverse an ecosystem, the healthier and sustainable it is. (Project 1)
2. Different species in nature are unique and interdependent. (Project 1)
3. Nature has an immense capacity to adapt and survive. To understand this, we can study the diverse species and their habitats. (Project 2)
4. Whenever we are challenged, we can look to nature for ideas and solutions. Nature inspires us to innovate and invent. (Project 3)

## Guiding Questions for the Expedition

1. How do different species in nature adapt and survive? (Adaptation)
2. How do all living things help sustain each other in an ecosystem? (Interdependence)
3. What is the importance of Biodiversity in an ecosystem? (Biodiversity and Ecosystem)
4. How biodiverse is my locality? (Biodiversity and Ecosystem)

## Focus of the Expedition

Subjects	Concepts/Understanding	Skills	Values
Science	<p><b>Biodiversity</b></p> <ol style="list-style-type: none"> <li>1. A larger number of plant species enable higher <b>productivity</b></li> <li>2. Greater species diversity ensures natural sustainability for all life forms</li> <li>3. Healthy ecosystems better withstand and recover from disasters</li> </ol> <p><b>Adaptation</b></p> <ol style="list-style-type: none"> <li>1. The form of a species enables it to perform the functions that are important for it to survive</li> <li>2. We get ideas to solve our day to day problems from nature. Nature inspires inventions and innovations.</li> </ol> <p><b>Interdependence</b></p> <ol style="list-style-type: none"> <li>1. All things in nature are interdependent and they help sustain each other in an ecosystem</li> </ol> <p><b>Biomimicry</b></p> <ol style="list-style-type: none"> <li>1. Whenever we are challenged, we can look to nature for ideas and solutions. Nature inspires us to innovate and invent.</li> </ol>	<ol style="list-style-type: none"> <li>1. Observation</li> <li>2. Recording</li> <li>3. Asking questions &amp; conducting inquiry</li> <li>4. Innovating Skills</li> <li>5. Systems thinking</li> </ol>	Interdependence & interconnectedness
Social Science	<ol style="list-style-type: none"> <li>1. Case study of an invention that was inspired by nature.</li> <li>2. Nature inspired Technology</li> </ol>	<ol style="list-style-type: none"> <li>1. Making connections;</li> <li>2. Creative Skills</li> </ol>	Respect for nature; Creation

Languages	Informative writing	Writing Presentation	
Craftsmanship & character	1. Working in crews 2. Working through multiple drafts	Communication Team Work	Learning together
Process skills	1. Observation and Recording	Making detailed observations, noting structure, functions and relationships	

**Learning Targets** Learning Targets to be addressed in the Expedition are

Subjects	Standards	Learning Targets
<b>Science and Technology</b>	Constructs an evidence based argument on how the external parts of plants and animals are designed to ensure their survival in their natural habitat.  Explains with compelling evidences, the interdependent nature of ecosystems.	<ol style="list-style-type: none"> <li>1. I can describe the functions that a species needs to perform to survive in its habitat.</li> <li>2. I can explain how the form of a living thing helps it to perform a specific function.</li> <li>3. I can explain how plants, animals and non-living parts of an ecosystem are interconnected.</li> <li>4. I can study the given food web to predict how a change in one of its links affects the entire web.</li> </ol>
<b>Reading</b>	RI.4.2. Determine the main idea of a text and explain how it is supported by key details; summarize the text.  Identifies key ideas and details in the text.	I can determine the main idea using key details from the text.

<b>Writing</b>	<b>W.4.2. Write informative/explanatory texts to examine a topic and convey ideas and information clearly.</b> Writes an informative piece to convey ideas and information.	I can write an informative piece with relevant facts and details using appropriate choice of words.
<b>Speaking</b>	Delivers a Presentation	I can use appropriate verbal and non-verbal expressions to make a presentation in front of an audience.
<b>Visual Arts</b>	Illustration  Illustrates in detail the organism assigned during the expedition.	I can create an illustration that closely resembles the real object.
<b>Craftsmanship skill</b>	Improves the quality of his/her work by working through multiple drafts.	I can make several drafts of the same piece of work, incorporating feedback given on my previous draft.  I can critique other's work objectively and offer feedback that is kind, specific and helpful.
<b>Observation and Recording</b>	Makes detailed observations, noting structure, functions and relationships.	I can observe given species and explain its unique features.

## **The Hook**

Each crew is given a set of cards with pictures of animals and plants and ask questions like the ones given below:

*These are the questions in the question card*

1. Which organism runs fastest? Cheetah
2. Which organism uses sunlight to make its own food? Plant
3. Which organism can see in the dark? Owl
4. Which organism is elusive? How does this help it to survive? Chameleon
5. Which organism lives in groups/herds? Deer
6. Which organism can eat both plants and animals? Bear
7. Which organism can walk, swim and fly? Duck

## **Building Background Knowledge (BBK)**

- 1. Fragile Web Documentary with reading of transcript**
- 2. Common Text: Biodiversity and Ecosystem**
- 3. Expert Texts: Uniqueness in different species - Bees, Cactus, Bats**
- 4. Case Study on/visit to Biodiversity Park in Gurgaon (initiative taken by the citizens to promote biodiversity)**

## The Launch of the Expedition

Tasks	How
Launch	Releasing the Overview booklet to all sections
What we need to communicate to children? How?	<ul style="list-style-type: none"> <li>• What the expedition is all about.</li> </ul>
What we need to communicate to parents? How?	<ul style="list-style-type: none"> <li>• This expedition creates the foundation for students to pursue the study of natural sciences.</li> <li>• Why real life experiences are important for a meaningful and an engaging learning?</li> <li>• Role of parents in preparing their children for Khoj.</li> <li>• Role of parents in observation and collecting data from neighbourhood.</li> <li>• Training of students to do the same through work done during khoj.</li> </ul>
Who is responsible for what?	Timeline

## Projects (Discovery & Creation)

### Project 1 - Biodiversity in my Locality (How biodiverse is my neighbourhood ecosystem)

<b>Project Title: Biodiversity and Ecosystem</b>	<b>Big Ideas/Broader concepts</b>  <ol style="list-style-type: none"><li>1. The more biodiverse an ecosystem, the healthier and sustainable it is.</li><li>2. Different species in nature are unique and interdependent.</li></ol>
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<u>Flow</u>	<b>Skills to be developed</b>
<p><b>1. What is an ecosystem?</b></p> <ul style="list-style-type: none"> <li>- Understanding what is a system?</li> <li>- What makes an ecosystem?               <ol style="list-style-type: none"> <li>a. Understanding the components of an ecosystem – abiotic and biotic</li> </ol> </li> <li>- Learning about the importance of a healthy ecosystem</li> </ul> <p><b>2. What are the different kinds of ecosystems?</b></p> <ul style="list-style-type: none"> <li>- Forest</li> <li>- Desert</li> <li>- Aquatic – Marine &amp; Freshwater (Wetland)</li> <li>- Mountain</li> <li>- Grassland</li> </ul> <p>Activity on the different kinds of ecosystems</p> <p><b>3. Introduction to the idea of Biodiversity</b></p> <ul style="list-style-type: none"> <li>- Understanding the concept of diversity.</li> <li>- Learning the importance of a biodiverse ecosystem.</li> </ul> <p><b>4. Mapping Biodiversity at Sultanpur Bird Sanctuary</b></p> <ul style="list-style-type: none"> <li>- Children will experience the wetland ecosystem at Sultanpur Bird Sanctuary. They will chart the various species they locate at Sultanpur in their journals, on the basis of their respective categories (animal, bird, insect etc...)</li> <li>- This data they will then use to map the biodiversity of Sultanpur Bird Sanctuary.</li> </ul> <p><b>5. Module on Interdependence</b></p> <ul style="list-style-type: none"> <li>- Understanding how different species in an ecosystem, with their distinct functions, are dependent on each other for their survival.</li> <li>- Game creation: <b>Web of Life</b></li> <li>- Activity on how <b>energy flows</b> from the sun, to the producers, and then to the different consumers.</li> </ul>	<p>Observation</p> <p>Making Inferences</p> <p>Reading</p> <p>Report writing</p> <p>Asking Questions and Conducting Inquiry</p> <p>Systems thinking</p>

<p><b>6. Field Study of the locality to ascertain Biodiversity Index</b></p> <ul style="list-style-type: none"> <li>- Based on the survey provided, children will create a biodiversity index of their respected localities. This they will do with then help of their parents.</li> <li>- Resources for the same will be provided to the students.</li> </ul> <p><b>7. Report Writing</b></p> <ul style="list-style-type: none"> <li>- Preparing a report on the biodiversity of the neighbourhood</li> <li>- Learning and raising awareness about the need for conserving biodiversity.</li> </ul>	
<p><b>Standard to be addressed</b></p> <p>Constructs an explanation that describes the multiple interactions between various biotic and abiotic components in an ecosystem.</p>	
<p><b>Case study</b> <i>(For setting the conceptual context for the project)</i></p> <ul style="list-style-type: none"> <li>• Biodiversity and Conservation</li> <li>• Basai Wetlands</li> <li>• Interdependence</li> <li>• Hong Kong - Asia's most biodiverse city</li> </ul>	<p><b>Citybound</b></p> <p>KHOJ experience at Sultanpur National Park, Gurgaon</p>
<p><b>Experts</b></p> <ol style="list-style-type: none"> <li>1. Experts from Disha India</li> </ol>	<p><b>Final product/performance and the audience</b> <i>(What skills &amp; knowledge will students need to complete this product/performance?)</i></p> <p>Mapping the Biodiversity Index of the allotted locality, raising awareness on the importance of a biodiverse ecosystem, and the need for conserving different species of plants and animals.</p>
<p><b>Assessment</b></p>	
<p><b>Service:</b></p>	

**Project 2**

<b>Project Title - Adaptation</b>	<b>Big Ideas/Broader concepts</b>  1. Nature has an immense capacity to adapt and survive. To understand this, we can study the diverse species and their habitats.
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<ol style="list-style-type: none"> <li>1. <b>Beaks and Tools or Camouflage Activity</b> (as a launchpad to study adaptations)</li> <li>2. <b>What is meant by the term species?</b> <ul style="list-style-type: none"> <li>- Understanding Classification - Species, Orders, Families etc</li> </ul> </li> <li>3. <b>Introduction to the concept of adaptation through case studies and documentaries.</b> <ul style="list-style-type: none"> <li>- Understanding how adaptation works: Children comprehend how the form and function of each species, enables it to adapt to its ecosystem.</li> <li>- Learning through case studies how the different organisms adapt.</li> <li>- With focus on the different features of birds, they will further enrich their learning of the concept.           <ol style="list-style-type: none"> <li>a. How do the body of birds help them fly?</li> <li>b. How do birds survive?</li> <li>c. How birds live together?</li> <li>d. Birds' legs and feet</li> <li>e. Birds in search for food</li> <li>f. Coping with the weather</li> </ol> </li> </ul> </li> <li>4. <b>Locating the different birds at Sultanpur Bird Sanctuary, and constructing the idea of how their specific forms allow the species to perform its respective functions...</b></li> <li>5. <b>Research on Species in Focus:</b> <ul style="list-style-type: none"> <li>- Each student in a group will be provided a particular species of birds, on which they will need to conduct a research. This they will do with the help of teachers and facilitators</li> <li>-</li> <li>- When done, children will write a short summary on their respective species along with illustrations.</li> <li>- At the end, these summaries can be compiled into forming a resource book.</li> </ul> </li> </ol>	<p><b>Skills to be developed</b></p> <p>Observation          Making Inferences          Reading          Writing          Asking Questions and Conducting Inquiry</p>
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<p><b>Standards</b></p> <p>Uses evidence to construct an argument on the form of an organism enabling functions necessary for its survival in a specific habitat</p>	
<p><b>Case study</b> <i>(For setting the conceptual context for the project)</i></p> <ol style="list-style-type: none"> <li>1. Understanding Classification</li> <li>2. How adaptation works</li> <li>3. Extraordinary Birds</li> <li>4. Module on Adaptation (all the texts)</li> </ol>	<p><b>Citybound</b></p> <p>KHOJ at Sultanpur National Park, Gurgaon</p>
<p><b>Experts: Naturalist</b></p>	<p><b>Final product/performance and the audience</b> <i>(What skills &amp; knowledge will students need to complete this product/performance?)</i></p> <p>Creating an informative piece on the birds of Sultanpur, focussing on their form and function.</p>
<p><b>Assessment</b></p>	<p>Formative Assessment based on observation of student's work and participation.</p>
<p><b>Service Audience:</b></p>	

**Project 3 - Innovations from Nature**

<b>Project Title - Biomimicry</b>	<b>Big Ideas/Broader Concepts</b>  1. Whenever we are challenged, we can look to nature for ideas and solutions. Nature inspires us to innovate and invent.
<p><b>1. What is Biomimicry?</b></p> <ul style="list-style-type: none"> <li>- Children will be introduced to the term biomimicry.</li> <li>- They will learn about the many innovations that have been taken from nature, and will, through case studies, understand how the diverse species have helped and inspired us in solving present day problems, making our lives easier and better.</li> </ul> <p><b>2. Our Innovations</b></p> <ul style="list-style-type: none"> <li>- Children implying the concept of Biomimicry, will conceptualise an idea for creating a product of use, in groups. They may do this with the help of their understanding of the concept of form and function.</li> <li>- This they can then present in a local exhibition.</li> </ul>	<b>Skills to be developed</b> Invention through innovation
<b>Standard</b>	

<p><b>Case study</b> (For setting the conceptual context for the project)</p> <ul style="list-style-type: none"> <li>- Biomimicry</li> <li>- Velcro (Adaptation inspired invention)</li> <li>- Mosquito Proboscis Inspired Needle</li> <li>- Woodpecker Inspired Helmet</li> <li>- A Beetle's Story</li> </ul> <p><b>Documentaries</b></p> <ul style="list-style-type: none"> <li>- Biomimicry in action - Janine Benyus</li> <li>- The world is poorly designed. But copying nature helps - Vox</li> <li>- Science copies nature's secrets</li> </ul>	<p><b>Citybound</b></p>
<p><b>Experts from Disha India</b></p>	<p><b>Final product/performance and the audience</b> (What skills &amp; knowledge will students need to complete this product/performance?)</p> <p>Students conceptualise an idea for their products of use in groups of 5, which will then be presented in a local exhibition.</p>
<p><b>Assessment</b></p>	<p>Assessment based on student's creative use of nature (based on form and function of the different organisms) in his/her invention.</p>
<p><b>Service Audience:</b></p>	

## The Final Challenge

### Presentation

Students will conduct a biodiversity survey of their locality, by mapping the different birds and trees present. When done, the data collected from the different neighbourhoods will be compiled into forming a report on the biodiversity of Gurgaon.

## The Expedition Culmination

<p><b>Tasks</b></p>	
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How are we planning to culminate the expedition?	
What do we want to communicate to the school, parent community and the society at large?	
Who all will be part of the culmination? (Audience)	
Who all we want to acknowledge and appreciate?	
Who is responsible for what?	
When? (Timeline)	