EXPLORING LIFE IN WATER

Learning Module on Aquatic Ecosystems

Nature Classrooms

nature conservation foundation

Team

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Recommended Citation: Learning Module on Aquatic Ecosystems. Nature Classrooms. Nature Conservation Foundation. 2024

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MODULE DEVELOPMENT PROCESS

1 INITIAL FRAMEWORK AND BRAINSTORMING

To arrive at what aspects of the water ecosystem would be addressed, what elements would be included, etc.

2 DESIGN AND DEVELOPMENT

This stage involved the developing and designing of lesson-plans and learning-teaching resources, and creation of complimenting illustrations. The current template in use was arrived at after multiple trials and revisions.

3 STRUCTURING THE LESSON PLANS

Nature Classroom's Nature Learning framework was central to the development of the lessons keeping in mind age appropriate nature goals and approach. Lesson Plans were designed keeping in mind that educators / teachers / facilitators may use it as a basic guide for any given activity, bringing their own unique pedagogy and creativity to the classroom during engagement with the children.

4 RESOURCE TRIAL

The lessons and resources were then tried out at a learning centre as part of a nature-study class. Following the trials, few minor changes were made based on the response of the children and the experience of delivering the lesson by the educator.

5 DESIGNING THE MODULE LAYOUT

The final step included the designing and layout for how the module would be made accessible and easy-to-use for teachers / educators / facilitators.

INTRODUCTION

Most often, water is introduced in a learning environment with a focus on 'uses of water'- how is water useful to humans, why is water important for humans, what does scarcity of water imply for humankind, and so on. **Water as an ecosystem,** however, is so much more beyond the interaction of humans with it. **As land is to us, water is home to a multitude of life.** Over millennia, water on earth has changed in the many forms it takes, the space it occupies on the surface of the planet. And with this, so has life in water. Creatures have adapted in unique and wondrous ways to **not just survive, but thrive in water.** Water then, is a field of study holding much to be in awe and wonder of.

This learning module is an invitation to nurture that wonderment for water as an ecosystem. It is by no means an exhaustive resource and is surely a stepping stone to the vast world of **water-bodies, aquatic and semi-aquatic life-forms**. The focus of this module at the current stage has been largely on the fauna in and around water-bodies. It has been designed to supplement and further what is offered in the **EVS text-books** for children within the grades of I to V. The module uses a mixed medium to engage with it, including read-aloud stories, observation charts, picture-cards, audio-visual resources, group-activities, discussions, etc. The aim and attempt of the module has been to awaken a sense of **curiosity and wonder**, and indulge in it by the medium of **scientific tools, activities and discussion prompts.**

WHO CAN ENGAGE?

Educators

Teachers

Parents

Schools

Alternative or varied education systems

Home schooling

FORMAT OF THE GUIDE

The guide has been divided into three levels. Each level has been designed for children belonging to specific grades and age groups. In each level, there are two major topics with relevant sub-topics covered under each of them. Each level has been designed with an aim to achieve a series of nature learning goals.

Levels | Grades | Age Group | No. of Sessions

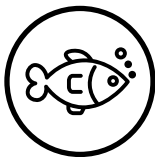
Where can we find water?


Monsoon Water


Homes in Water

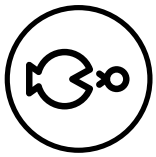

Water in the Ocean

Life in Water


Breathing in Water


Movement in Water


Communicating in Water


Feeding in Water


Defence in Water


Resting in Water

Nature Learning Goals

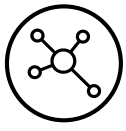

Wonder


Curiosity


Observations


Fun


Reasoning


Making Connections


Asking Why?


Interconnections


Building Micro-


Documentation

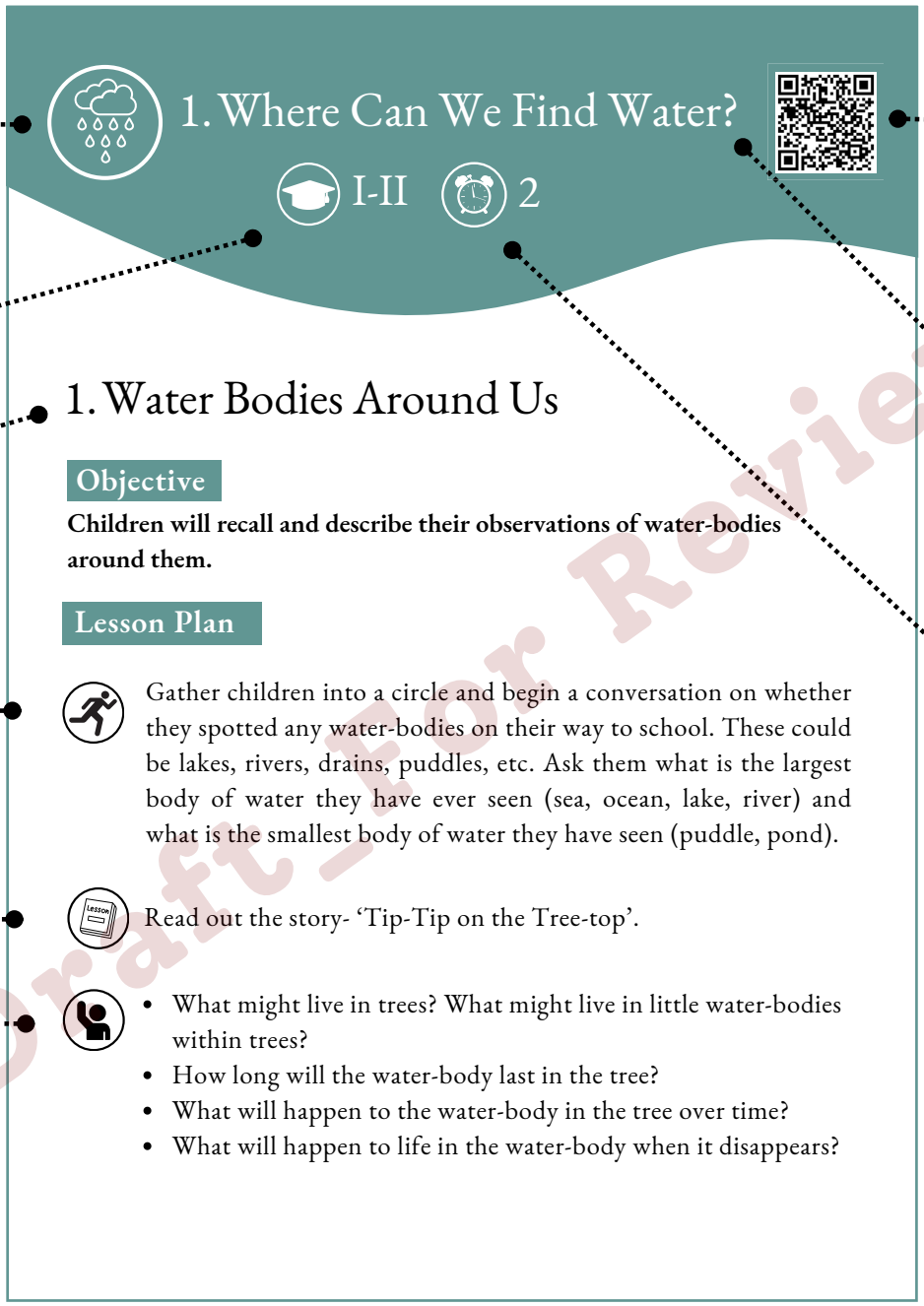

Community Learning

TOPICS COVERED IN EACH LEVEL

Each level has two large sections - **Where can we find Water** and **Life in Water** - under which age-specific themes have been included. Each theme has an adjoining activity designed keeping in mind the nature-learning goals for that particular age-group/level.

Level	Grade	Age-range	Topics included
Level 1	I , II	6 - 8 yrs	**Where can we find Water** • Monsoon Water - 2 lessons • Homes in Water - 3 lessons **Life in Water** • Movement in Water - 1 lesson • Breathing in Water - 1 lesson • Resting in Water - 1 lesson • Feeding in Water - 1 lesson
Level 2	III, IV	8 - 10 yrs	**Where can we find Water** • Monsoon Water - 2 lessons • Homes in Water - 2 lessons • Water in the Ocean - 1 lesson **Life in Water** • Breathing in Water - 2 lessons • Movement in Water - 1 lesson • Feeding in Water - 2 lessons • Communicating in Water- 1 lesson • Staying Safe in Water - 1 lesson
Level 3	V	10 - 11 yrs	**Where can we find Water** • Monsoon Water - 2 lessons • Homes in Water - 3 lessons • Water in the ocean - 1 lesson **Life in Water** • Breathing in Water - 1 lesson • Movement in Water - 2 lessons • Communicating in Water - 1 lesson • Feeding in Water - 3 lessons • Defense in Water - 2 lessons

HOW TO USE THE GUIDE



Indicates the sub-topic for the lessons in this section

Grades

This indicates the lesson no.

Warm-up exercise

Main Lesson

Things to discuss

The QR Code links to the resources that are to be used in every lesson. This can be accessed either by clicking or scanning.

Indicates the main theme / topic for the lessons in the section.

No. of classes / sessions required

The complimenting resources have been linked to the QR Code.

Level I

Water on earth is many things. It is an ecosystem, it is a home to many flora and fauna, it is a source of livelihood for human-communities, it is an energy resource and more. In this level, students will learn that water-bodies are a habitat for several creatures and how different species live in water.

I-II

Nature Learning Goals

Wonder

Curiosity

Observations

Fun

OBJECTIVES

- Reflect and recall what they already know of water-bodies and set context for further learning and lessons.
- Observe their surroundings carefully and learn of unlikely places that water collects and forms micro-ecosystems.
- Learn that water-bodies are a habitat for several creatures and how different species live in water.
- Think about and identify how different creatures have different adaptations to aid their survival in and around water; with a focus on breathing, moving, resting and feeding.

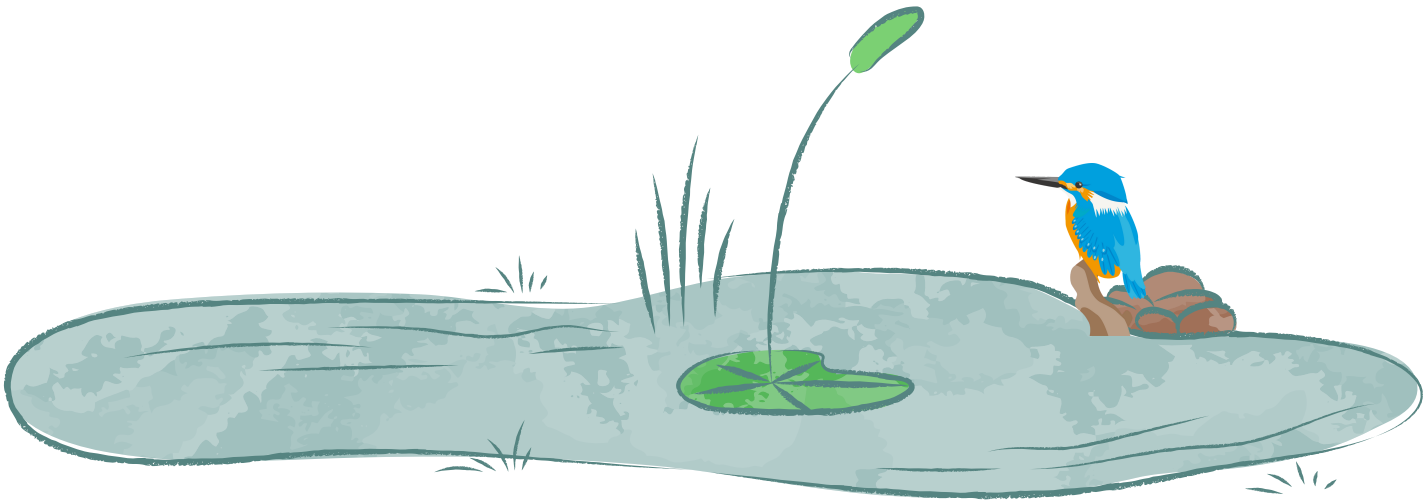
THIS LEVEL INCLUDES:

THEME: WHERE CAN WE FIND WATER?

- MONSOON WATER (2)
- HOMES IN WATER (3)

THEME: LIFE IN WATER

- MOVEMENT IN WATER (1)
- BREATHING IN WATER (1)
- FEEDING IN WATER (1)
- RESTING IN WATER (1)



LINKING IT WITH THE EVS CHAPTERS

This module has been designed to supplement and further what is offered in the EVS text-books for children within the grades of I to V. The linkages between some of the lessons in each of the levels and the chapters in the EVS textbooks for Grade 3-5 have been indicated in the table below.

LEVEL 1

Lesson No.	Lesson Title	EVS Textbook (Grade / Chapter No.)	EVS Chapter Title
L1	Water Bodies Around Us	Gr. III / Ch. 9	**It's Raining**
L3	Where does Water Collect	Gr. III / Ch. 1	**Poonam's Day Out**
L4	Breeding in Water	Gr. III / Ch. 19	**A House Like This!**
L9	What are the Fish Eating	Gr. III / Ch. 24	**Web of Life**

Note for teachers / educators: The EVS lessons for students in grades three to five are connected across these levels. This categorization is suggestive and not restrictive. Lessons from level 3 can be suitable for younger children, taking into consideration their ability to grasp complex concepts and their motor skills. Similarly, older children can be encouraged to explore resources designed for younger students if they have a strong interest.

1. Water Bodies Around Us

Objective

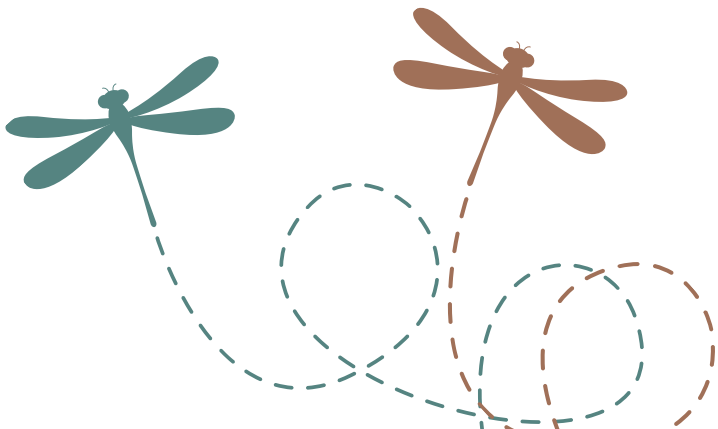
Children will recall and describe their observations of water-bodies around them.

Lesson Plan

Gather children into a circle and begin a conversation on whether they spotted any water-bodies on their way to school. These could be lakes, rivers, drains, puddles, etc. Ask them what is the largest body of water they have ever seen (sea, ocean, lake, river) and what is the smallest body of water they have seen (puddle, pond).

Read out the story- **'Tip-Tip on the Tree-top'.**

- What might live in trees? What might live in little water-bodies within trees?
- How long will the water-body last in the tree?
- What will happen to the water-body in the tree over time?
- What will happen to life in the water-body when it disappears?

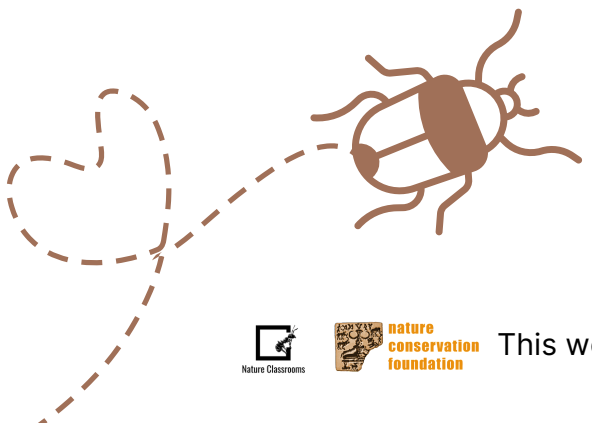


TIP-TIP ON THE TREE-TOP

Anvika is sitting outside her home, biting into a juicy mango. These are going to be some of the last mangoes of the season. Summer has given way to the monsoon and all patches of soil around her home are bursting in shades of green. The brick walls have moss growing in their cracks, the ground around trees is a maze of wild weeds and flowers. Tomorrow is a Sunday and Anvika hopes it won't be a rainy one! As if the skies were listening to her, they respond in loud thunder and a sudden downpour envelopes all that Anvika can see! She frowns up at the sky and goes in. All night, it continues to pour. She tries to trace the different sounds- rain-drops on the roof, rain-drops in the puddles in her rose pots, rain-drops on the leaves of the mango tree right outside her home and rain-drops on her steel plate that she forgot in the verandah! Anvika can't help but enjoy falling asleep to the sound of rain falling on her roof.

Next morning, as the Sunday sun shines through gently, Anvika wakes up. She looks out the window and is glad to see that it is not raining anymore. But wait...what is that sound? There is no rain, but Anvika can hear a tip...tip...tip...tip... She runs out the door to make sure there is no rain. And there it is again! A little louder near the door. She steps out and goes left, the tip...tip...tip... gets softer. She turns back and goes right this time. Tip... tip....TIP....TIP....TIP....! It is getting louder, louder until she finds herself standing beneath her beloved mango tree. She looks up the large trunk with the little knobs that she uses to climb up. Careful not to slip on the still wet trunk, Anvika climbs up into her mango-tree and makes her way to her favourite branch that curves just right for her to cosy in like she is in a chair. Oh! But, there is a surprise for her there! The base of her favourite branch is holding a little puddle of water! As she peers into it...TIP...a drop of water plonks onto her head from the leaves above. Anvika's eyes widen as she realises that last night's rain has created a little pool in her tree! The water is not very clear, and has pieces of small twigs and dust. Among them is something else that is definitely not a twig! It looks like a beetle! Anvika has never seen one of these. Anvika wonders what other creatures might come by to enjoy this special pool in the tree-top. Just then, her father calls out to her, holding out a plate of hot dosa. Anvika can smell the melting ghee right up in the tree-top! She quickly scrambles down, settles down on the steps near her door and dives into her dosa. One eye on her mango tree, as she takes in big bites of crispy dosa. Just as she is getting up to go in for a second one, she sees a little flutter in the tree-top. An oriole has swooped in to make a quick snack of the floating beetle. She can't wait to see what else visits this monsoon-special pool!! But for now, steamy dosas are calling her!

What other creatures do you think Anvika is going to see visiting this temporary pool of water in her tree-top?



2. Colour and Creatures in Water-bodies

Objective

Children will explore and identify different forms of water-bodies around school or where they live.

Lesson Plan

Gather the children and begin a discussion on their assignment from the previous session- looking for different places water collects. Ask them to describe what they observed. Invite them to conduct the same exploration in and around the school premises.

- Distribute and explain the **'Colour-grade Scale'.**
- Ask children to carry note-books and stationary on this exploration.
- Take them on a walk around the school grounds and building looking for different places that water collects.
- They will be observing the colour of water in each water-body, observing what life-forms, if any, exist in and around the water-body and noting them down in the form of drawings.

Things to talk about and observe:

- Size of water-bodies (puddles, lake, crevices in rocks, ditches, cracks in the road, abandoned containers, tree-tops, some types of leaves, freshly watered tree-peripheries)
- Life-forms in the water-body (tadpoles, fish, water-striders, water-scorpions, mosquito larvae) and around the water-body (grassy, flowers, moss)

Notes/Reading Tips for the Teacher:

- Identify some spots before the class where water has collected before taking the children out on the exploration.

- If no naturally formed water-bodies exist near school, create temporary muddy-puddles in empty containers or pots. This will need to be done a few days in advance so the water-body may begin to attract small life-forms.

Water Shade Card

CLEAR | MURKY | MUDDY | BROWN | SHADES OF GREEN | SHADES OF BLUE | GREY | BLACK

Water Shade Card

CLEAR | MURKY | MUDDY | BROWN | SHADES OF GREEN | SHADES OF BLUE | GREY | BLACK

3. Where does Water Collect?

Objective

Using a picture children will point-out places that water collects and identify which creatures live in the different water-bodies.

Lesson Plan

Gather the children together and recall the previous lesson of finding water collecting in unlikely places. Ask if they have observed any more such unlikely spots where water has collected in significant quantities and what life-forms they saw in them, if any.

Distribute the '**Places of Water**' illustration. Ask that the children colour out different places in that outline where water could gather when it rained, if there is a leak, or any other reason they imagine will allow for water to collect.

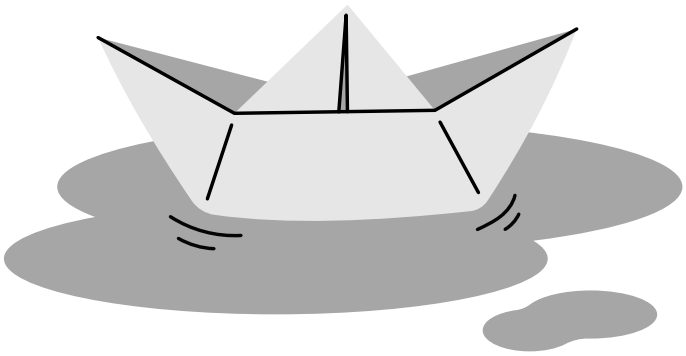
Things to discuss:

- Where does the water come from in the places that they marked? Is it monsoon water? Drains? Streams? Tap-leakage?
- Can life-forms live in these water-bodies? Will these water-bodies last long periods of time?

Use the **anchor chart** and observe the different life-forms within and around the water-body. Point out and identify how many species depend on the water-body to survive.

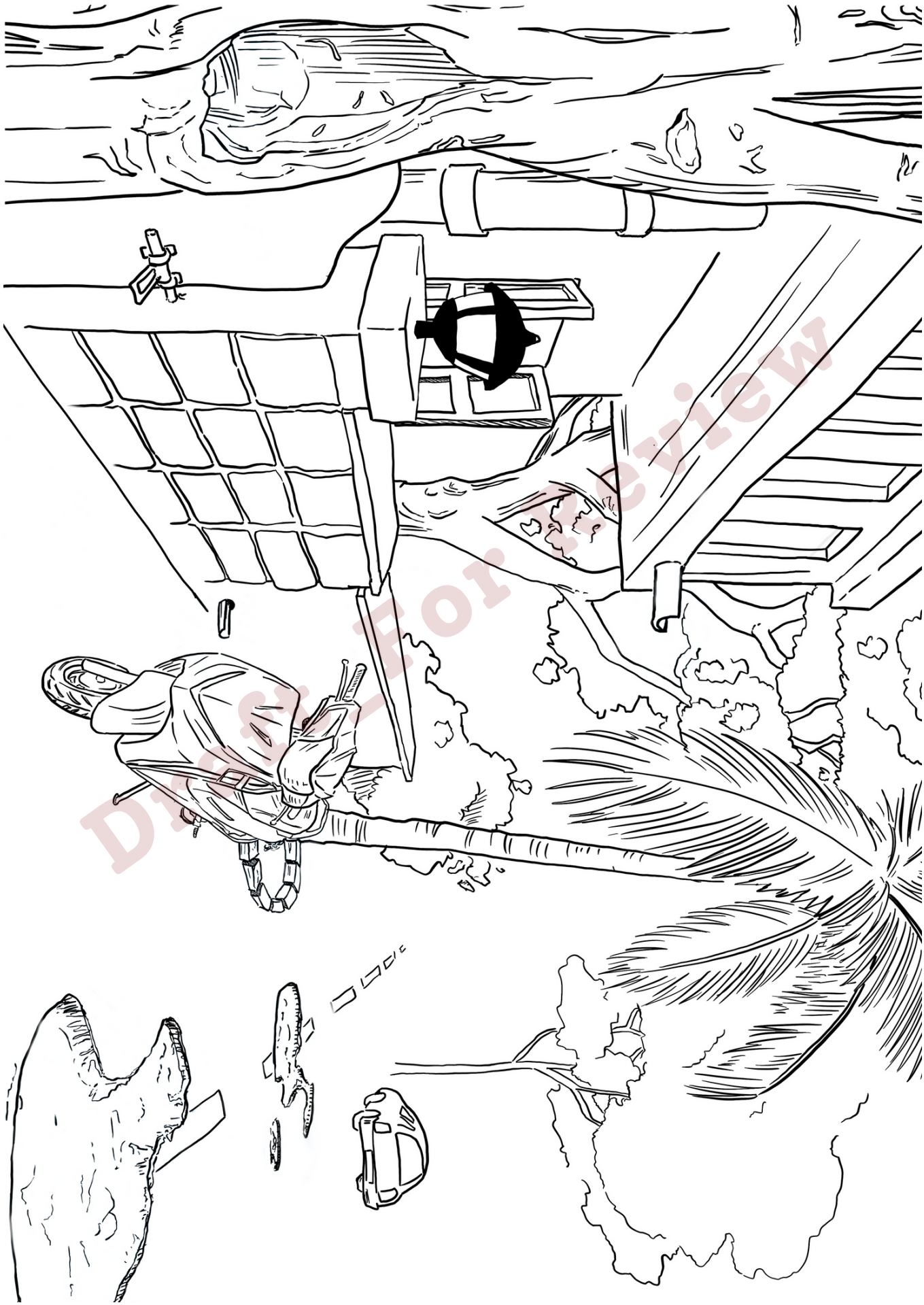
Things to discuss:

- How many of these species live inside the water?
- How many species can live outside the water but are dependent on the water-body still?
- How does water enable survival of the different species in the chart? Is it a source of food, is it a habitat, is it a breeding ground?

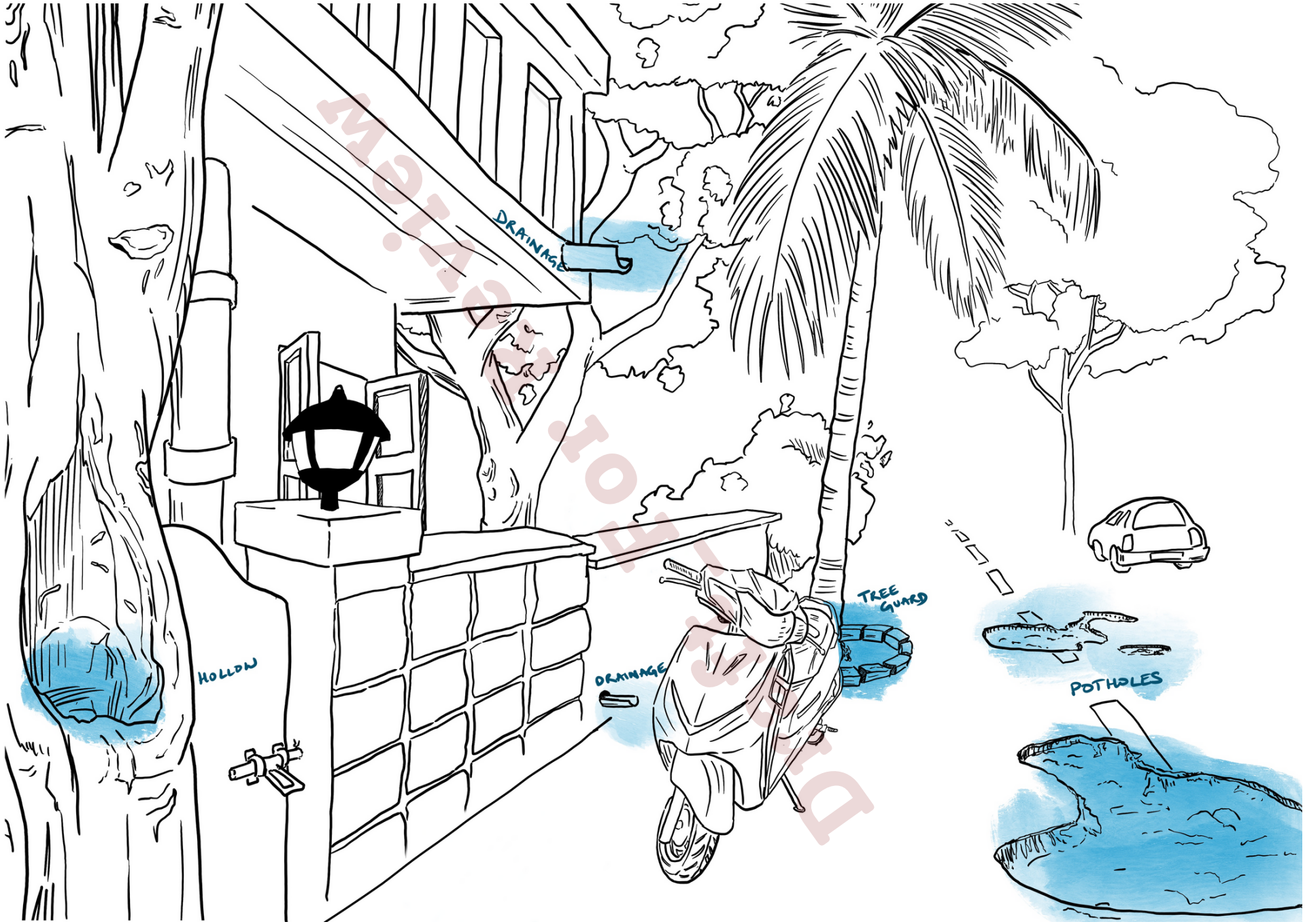


ACTIVITY: PLACES OF WATER

Colour / mark the places where you think water collects.



KEY: PLACES OF WATER



WATER ANCHOR CHART

4. Breeding in Water

Objective

Children will analyse what it takes to be able to call a water-body your home.

Lesson Plan

Gather the children and inform them that they are going to be listening to the story of a very special creature. Before that, ask about their observations from the previous class assignment. Spend some time discussing whether species that they saw in the water live their entire lives in water.

Narrate the story of the Malabar Gliding Frog and how it breeds in water collected during the monsoon.

Things to discuss:

- Are there other animals that need specific habitats like the gliding frog to breed? What other insects or animals do they know of that breed/lay eggs in water?
- What might happen if there is no rain in one season?

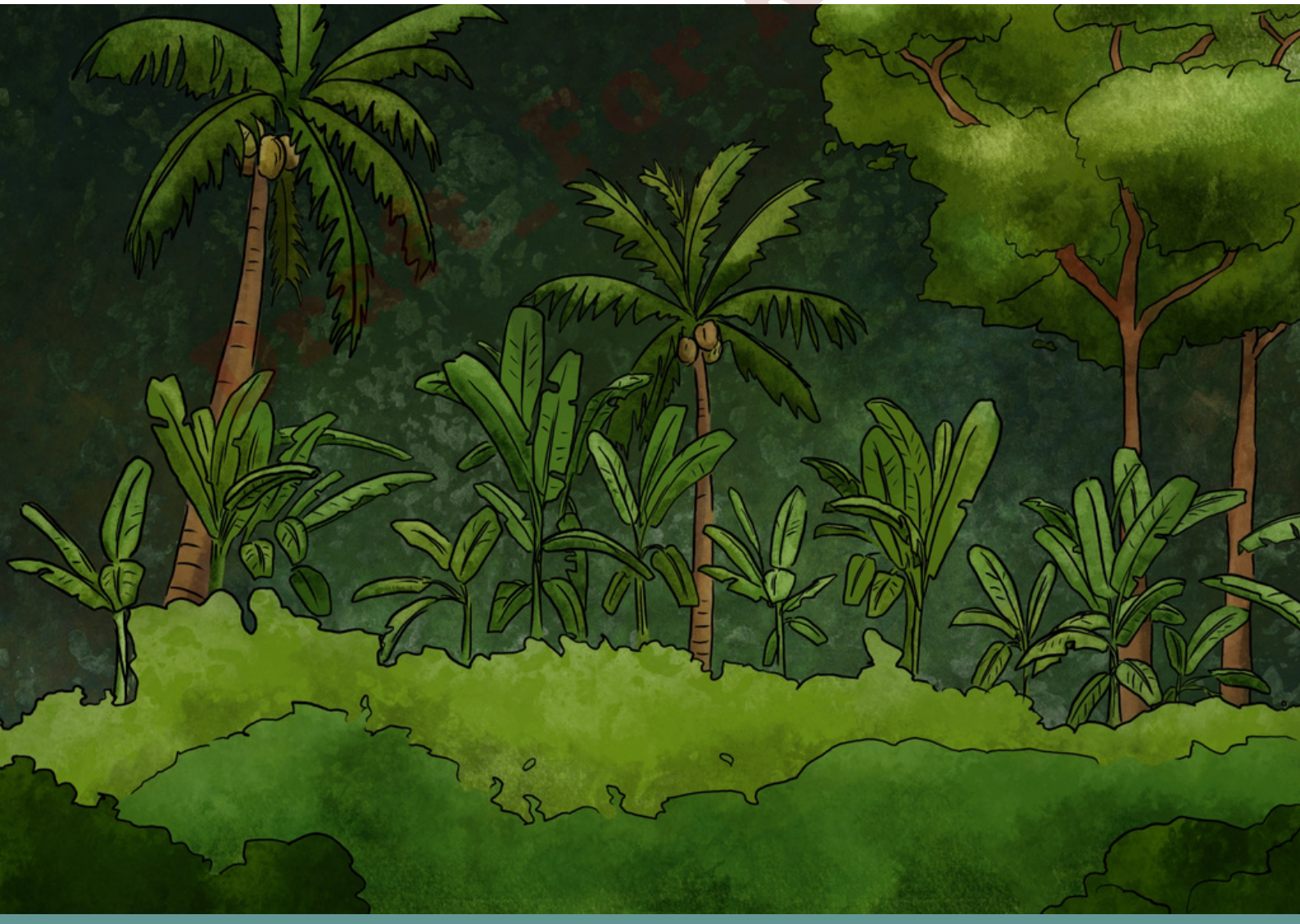
Ask the children if we can say that water is a home to the Malabar Gliding Frog?

Things to discuss:

- Can water be called a home if it is a temporary but necessary habitat in the life-time of a species?
- Which other animals live part of their lives in water?
- Which animals live their entire lives in water?

Independent Learning/HW:

Ask the children to draw a picture of a water-body with different animals that live in water and also animals that live in water only part of their life-time.



MALABAR GLIDING FROG

"Tuck-tuck-tuck". Amidst the lush greens of the Western Ghats, the monsoon is in full force. "Tuck-tuck-tuck". All the creatures of the forests are soaked in the rain- some shivering, some playful. "Tuck-tuck-tuck". Little pools of water have collected in the most unlikely places! Rivers and lakes are full.

Hollows in tree-tops have little private pools of water. Large leaves hold baby-pools of rain water. "Tuck-tuck-tuck". Among the bird-song, langur-chatter and cricket-chirps, there it is again.."tuck-tuck-tuck".

In the dark of the night, the Malabar Gliding Frogs have woken up from their hibernation with the coming of the monsoon. "Tuck-tuck-tuck", there it is again! A male Malabar Gliding Frog is calling out, hoping a female will respond. And indeed, there is a female around here. She has seen him and is interested. They jump up amidst the folds of a banana leaf, bent down by the weight of the rain, over a large puddle of water.

MALABAR GLIDING FROG

The male releases a foamy fluid and whips it up with his padded feet to create a thick fluff of white foam. The female lays her eggs into this foam. Together, they have built a foamy nest to hold their eggs until they hatch. Yes, frogs too make nests although different from bird nests.

The female makes sure the nest is secure, covering it with a few leaf debris if needed and leaves.

In about a week's time, the eggs hatch. All this while, as it rained, little and little of the binding material in the foam nest has been washed off. And so, when the eggs hatch, the tadpoles fall into the puddle of water below. Over the next few weeks, the tadpoles will grow in size. And then the tails will begin to disappear as they grow limbs. Soon, the tadpole will have transformed into a young frog! "Tuck-tuck-tuck", again in the forests of the Western Ghats.

5. Building a Terrarium

Objective

Children will create and maintain a water-terrarium with the help of the teacher.

Lesson Plan

Gather the children and inform them that they are going to be creating an artificial water-ecosystem within their school premises. Ask what they hope will happen with this water-body. Will it survive for a long period of time? Will it support any life-forms? What will they need to keep in mind while building it?

Use the instruction sheet and guide the children on building a Water-Terrarium.

Things to discuss:

- What plants can they put into the terrarium?
- Can there be animals or insects in the terrarium?

Notes/Reading Tips for the Teacher:

Make sure to gather all necessary items/material to build the Water-Terrarium prior to the session. It might be useful to create one as a model to show the children before they begin building one for the class.

BUILDING A SEMI-AQUATIC TERRARIUM

A terrarium is a micro-ecosystem. It is usually a closed glass container containing soil and plants. The glass container helps trap heat and maintain humidity within the container. Terrarium can also be open to the atmosphere.

Things you will need:

- A glass container (a bottle, a fish-bowl, a large bowl with a small mouth)
- Small stones, pebbles or gravel. Children can collect these from near the school if available.
- Soil - A layer of mud or sand from the school surroundings.
- A few water-plants. If there is a water-body close by, pick a few plants with roots. If not, some options are- money plant, ferns, moss, water-hyacinth.
- Plain forceps.

Building the Terrarium:

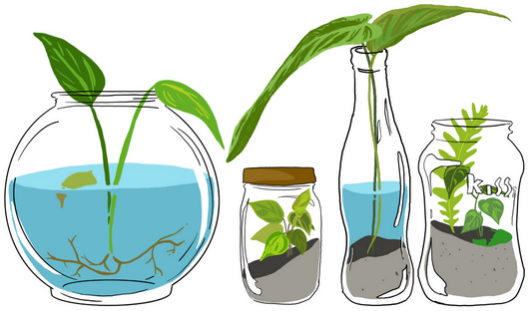
- Clean out the glass-container with a dry-cloth so the surface is clear. Add a first layer of gravel/pebbles/small stones. You can add it as a uniform layer or a sloping layer.
- Add a thin layer of soil. You can choose to leave some parts with the gravel layer exposed if your container is large.
- Carefully place the moss, if available. Then add the plants. You can use the forceps to place them as the mouth of your container may be small.
- At this step, you may choose to add any aesthetic element such as shells if found nearby.
- Add water to the container. Depending on which plants you have picked for your terrarium, you can either fully submerge the plants in water or fill it just below the leaf surface so the roots and stems are submerged leaving the leaves floating.

Maintaining the Terrarium:

- If you have built a closed terrarium, keep it away from direct sunlight. Not all plants survive in a closed terrarium atmosphere. Observe your terrarium closely and remove the lid if you see that the plants are wilting or yellowing.
- If you have built an open terrarium, check for mosquito larvae occasionally. You may need to add water as and when the desired level of water reduces owing to evaporation.

Extra Resources:

Small Terrarium with Aquatic Plants - Video Tutorial



6. Animal Appendages in Water

Objective

Children will identify and match appendages to animals to understand how creatures move in water.

Lesson Plan

- Gather the children in a large circle. Ask them to walk five steps outward. Now, hop three steps inwards. Jump up and down on the spot. Jiggle your body on the spot. Move two steps to the right, three to the left.
- Now ask them to imagine they are surrounded by water and are knee deep in water. Repeat the movement tasks.
- Now ask them to imagine they are submerged in water. Repeat the movement tasks.
- Was it easy to do all the movements when knee-deep in water, when submerged in water? How are creatures that live in water moving about?

- Place the **Water Anchor Chart** up and identify the different animals living in and around water. Identify how each of them moves in the water, towards the water and away from the water. (Dragonflies fly towards the water, snakes glide in the water, goats walk near the water, fish swim in the water)
- Talk about how different creatures have different types of appendages to aid their movement. Lay out the **Animal and Appendages cards** and ask the children to match which animal owns which appendage. As you match the right pairs, name the animal and the appendage.

WATER ANCHOR CHART

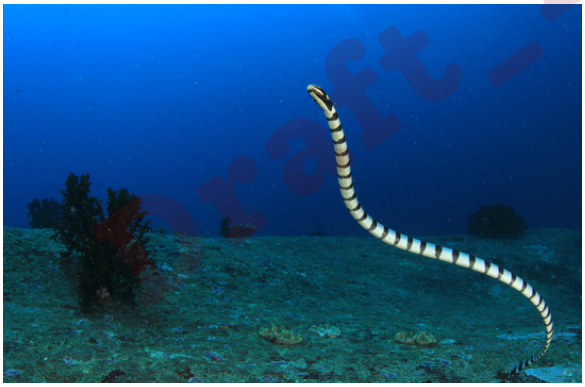
ANIMAL APPENDAGES

Fish

Fins

Frog

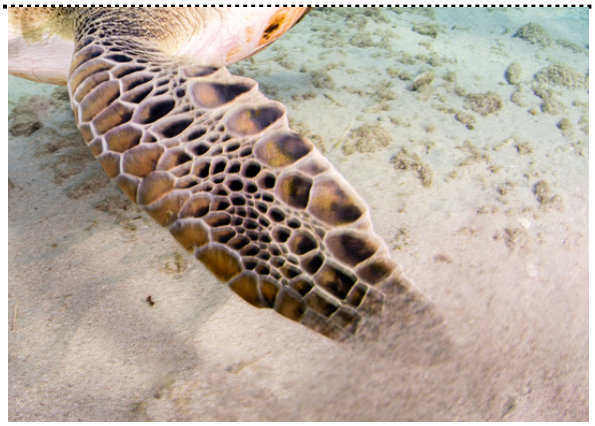
Webbed Feet



Sea Snake

Paddle Tail

Turtle



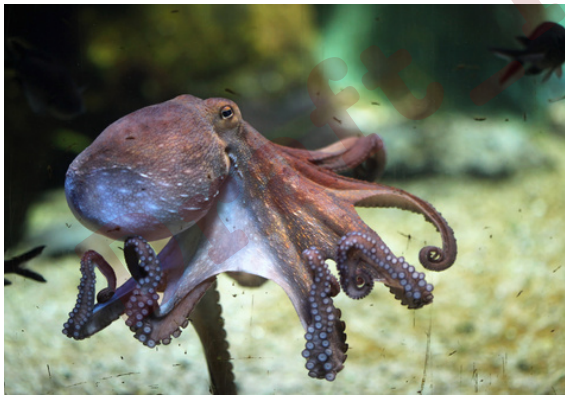
Flippers

Duck

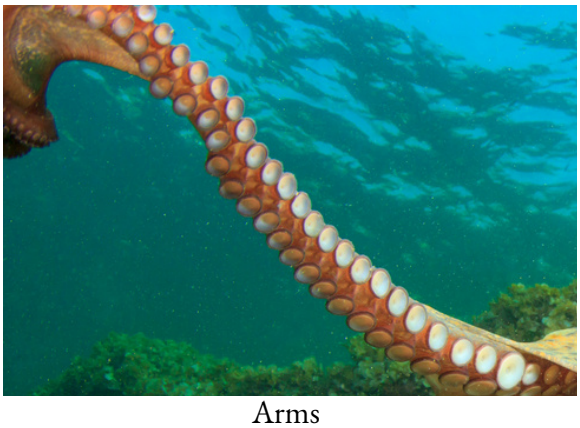
Webbed Feet

Starfish

Tube Feet



Octopus



Arms

Sea Snail

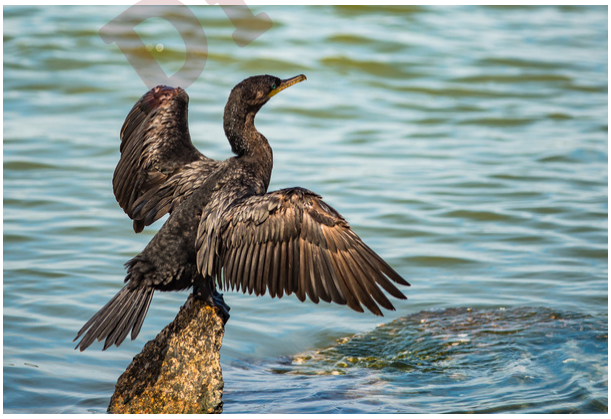
Muscular Foot

Crab

Legs

Water Scorpion

Legs



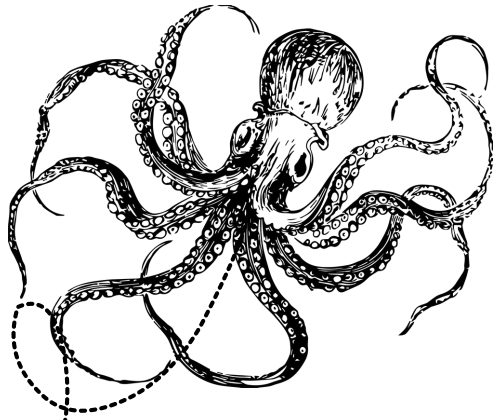
Cormorant

Wings

Webbed Feet

Key - Animal Appendages

- Fish - Fins
- Frog - Webbed Feet
- Sea snake - Paddle Tail
- Turtle - Flippers
- Duck - Webbed Feet
- Starfish - Tube feet
- Octopus - Arms
- Sea Snails - Muscular foot
- Crab - Legs
- Water Scorpion - Legs
- Cormorant - Wings and Webbed Feet



7. How do Creatures Breathe Underwater?

Objective

Children will predict how long they can hold their breath in comparison to water-creatures and identify the organ that these creatures use to enable breathing in water.

Lesson Plan

Ask the children to think about the different ways air and gases enter and leave their bodies. Talk about the nose and mouth as the primary source of air supply to the body. Our skins also absorb small amounts of oxygen directly from the air. We let out air and gases from our body when we exhale and fart.

Use a picture card from the **Fish and Gills** set and observe the different body parts of the fish. Which of these might aid breathing? Do they have a nose like humans? Talk about the gills as an important respiratory organ for aquatic animals and point it out in the picture.

- Distribute the **Creatures with Gills chart** to the children and ask them to circle the gills in each of the creatures.

Talk to the children about how whales and other fish can hold their breath when underwater and come to the surface to exhale and inhale. How long can you hold your breath? Try it out and time the children.

- Look through the **'How long can you hold your Breath'** chart and identify where you stand on the scale. Talk about the creatures that can hold their breath for very long durations and those that can do so for very short duration.

Notes/Reading Tips for the Teacher:

Take necessary precautions while experimenting with the children while holding their breath.

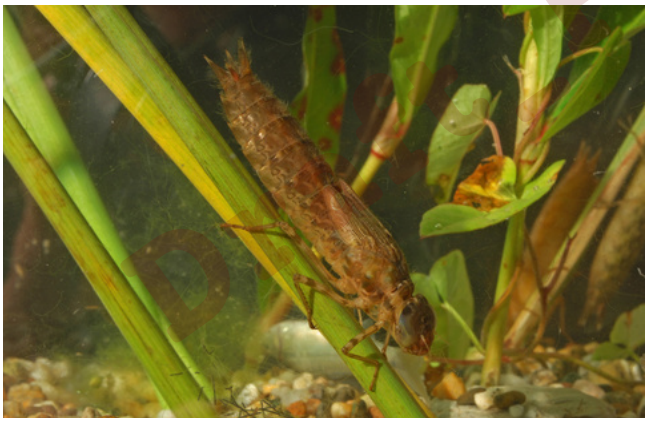
CREATURE WITH GILLS

Shark

Sea slug

Bony Fish - Rainbow Trout

Tadpole



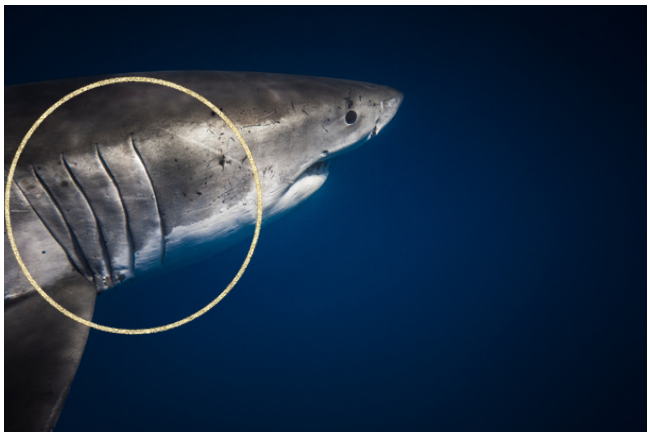
Dragonfly Larva

Crab

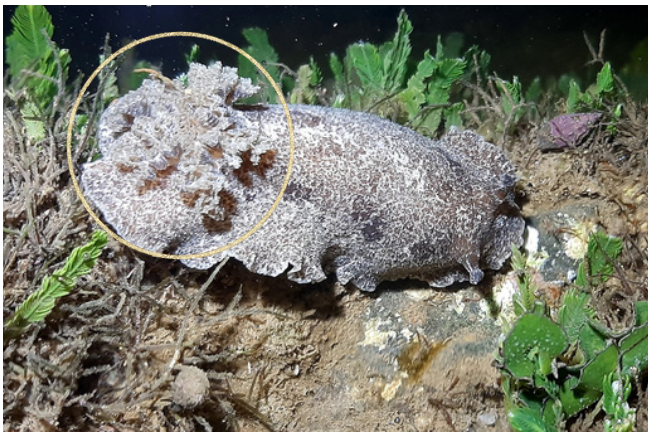
Seahorse

Octopus

KEY- CREATURE WITH GILLS



Shark



Sea slug

Bony Fish - Rainbow Trout

Tadpole

Dragonfly Larva

Crab

Seahorse

Octopus

FOR HOW LONG CAN YOU HOLD YOUR BREATH UNDERWATER?

8. Are the Fish Sleeping?

Objective

Children will interpret visuals and interpret if the creature in the image is resting or in motion.

Lesson Plan

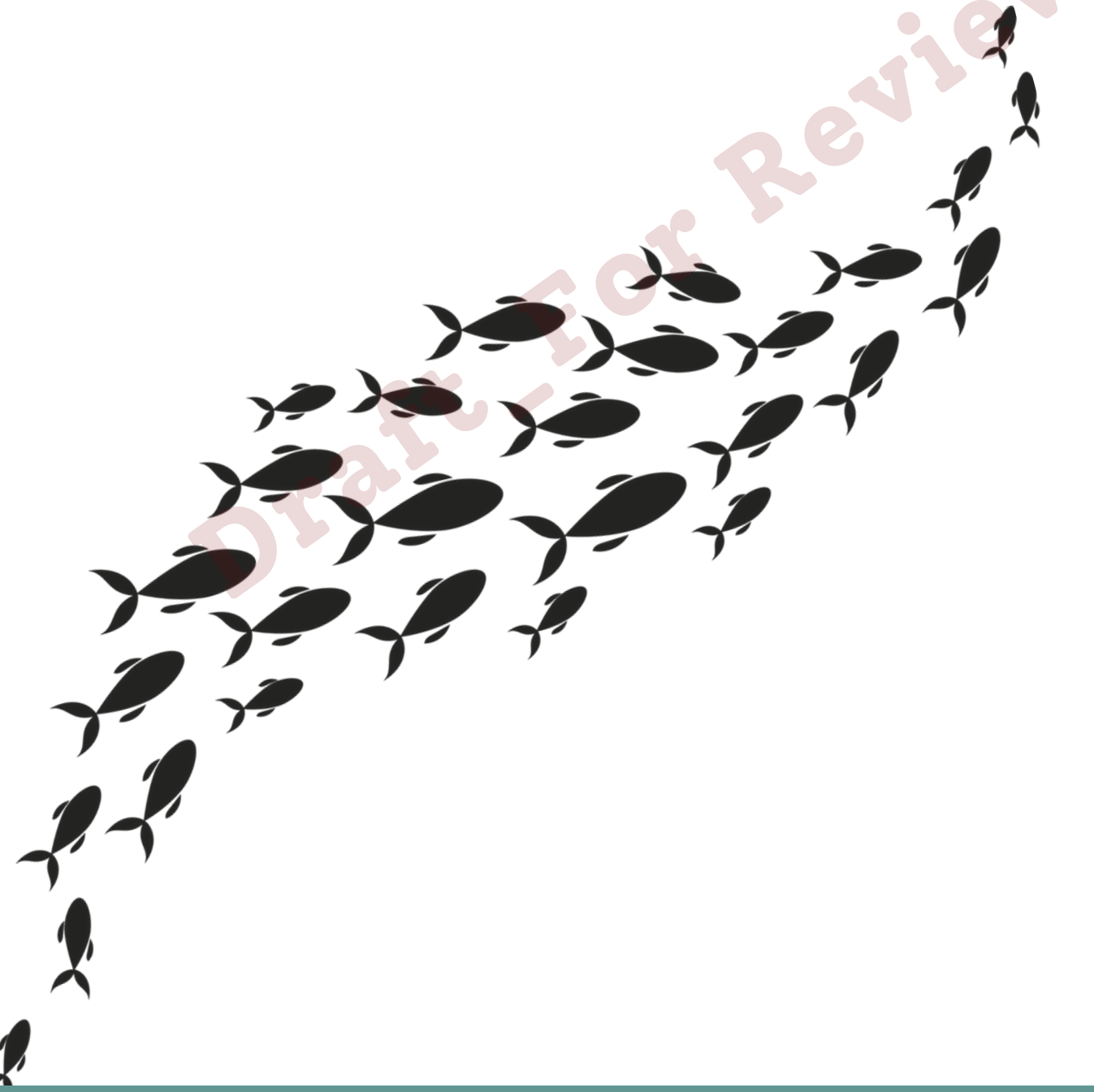
Ask the children to make space for themselves so they can stretch out and lie down on the floor. Instruct the children to close their eyes, stretch their limbs out and relax. Give them a minute or two to lay like this in silence.

When the children are up, ask them if they were asleep. Did they feel relaxed however, and rested? What functions of their body were still active in this state of rest (breathing, internal functions- digestion, circulation, etc.)? What functions of their body were restricted (movement, speech, vision, etc.)?

- Ask them, how do they imagine creatures in the water sleep or rest? Do they sleep at all? Where would they sleep?
- Use the **Sleepy Fish card** to guess if the creature in the image is sleeping/resting or awake.
- Discuss briefly about how marine creatures rest in water (refer to the link below for information). Watch the 'Sleeping with the Fish' and How do dolphins sleep? **video** alongside this discussion.

Notes/Reading Tips for the Teacher:

1. Video Link: Sleeping with the Fish
2. Video Link: How do Dolphins Sleep?
3. Reading: The Extraordinary ways that Animals Sleep: BBC



SLEEPY FISH

Cut out the images and play a guessing game of whether the creature in the picture is asleep/resting or awake/active.

Sperm Whale - sleeping

Sea Anemone - active

Parrot Fish - sleeping in a mucous shield

Sea Anemone - closed and resting

Sea Turtle - resting

Dolphin - resting

All images taken from Wiki Commons and/or Nat-Geo website. No copyright infringement intended.

9. What are the fish Eating?

Objective

Children will study about and connect the links in the aquatic food-web.

Lesson Plan

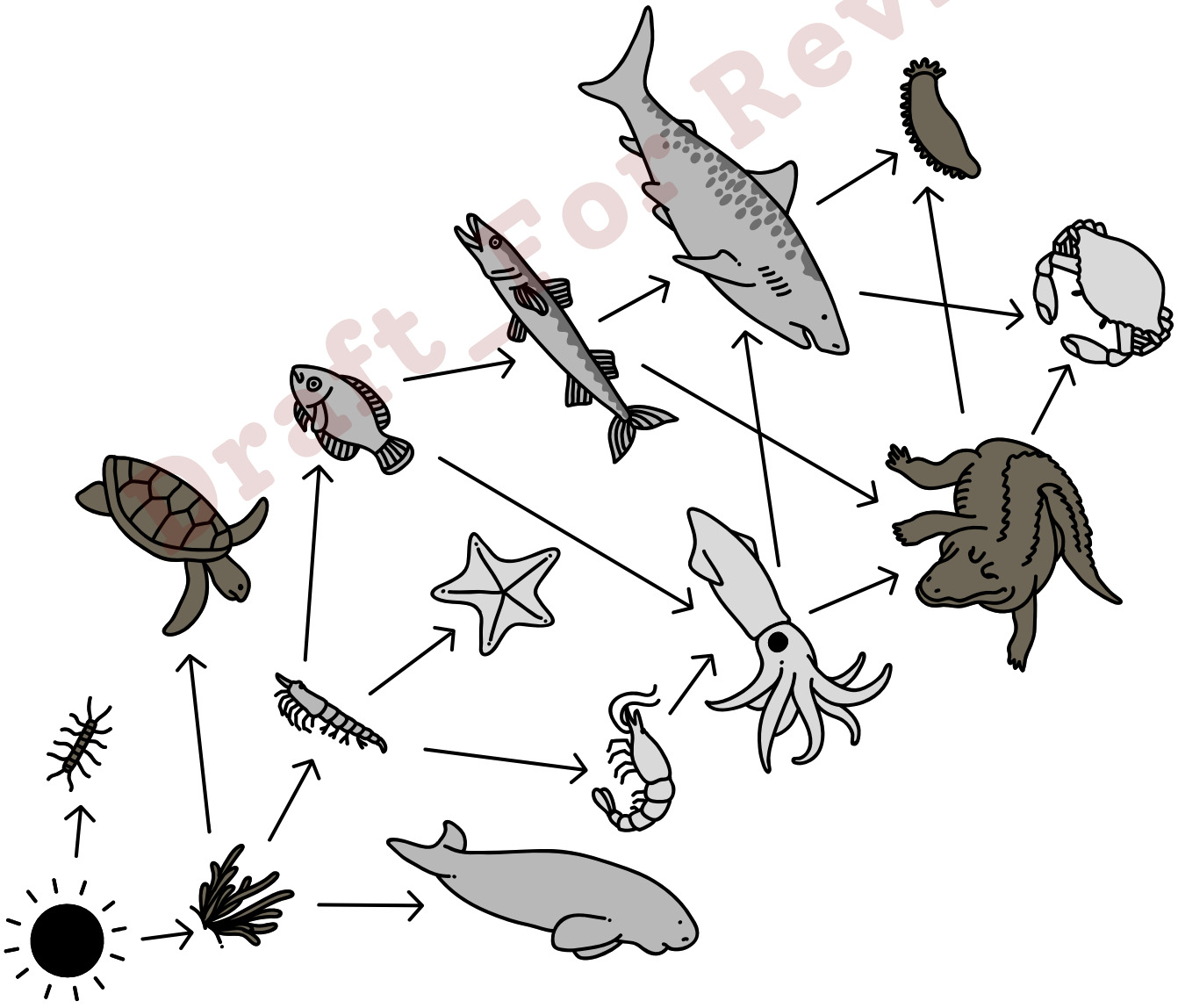
Begin a conversation on what the children ate for their last meal. Where did they procure the raw material from (vegetables/fruits from trees, meat and eggs from poultry/fish, rice from plants, etc.). Further speak about what do these raw materials eat for their nutrition (plants need sunlight, water, etc, hens eat grains,)

Introduce the idea of a food-chain, using the warm-up conversation to illustrate it. How might this food-chain play out in an ocean, river or lake? What are the different things fish can eat in the water? Are there other animals, in addition to fish in water?

- Lay out the '**Who eats Whom' cards** and match the prey to predator. Name the creatures as the children make the prey.
- Discuss how the children are guessing who eats whom. Is it by size, or any other clues? Type of creature, shape of the mouth, etc.

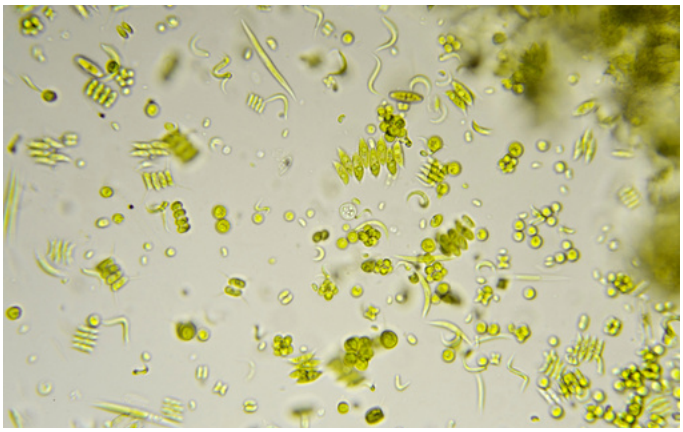
Notes/Reading Tips for the Teacher:

Resource: Marine Food Chain : National Geographic



WHO EATS WHOM?

Zooplankton



Phytoplankton

Turtle

Seagrass

Frog

Insects

Whale

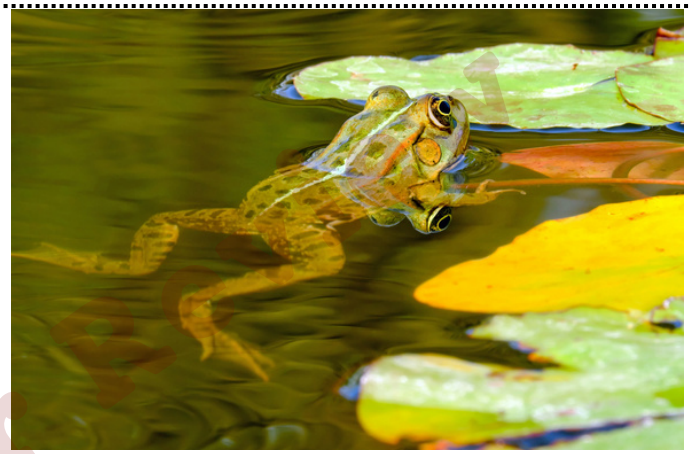
Krill

WHO EATS WHOM?

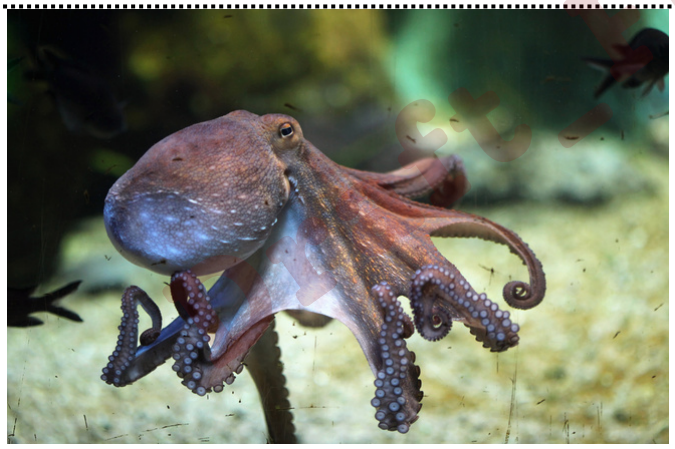
Water Scorpion

Mosquito Larvae

Water Snake



Frog



Octopus

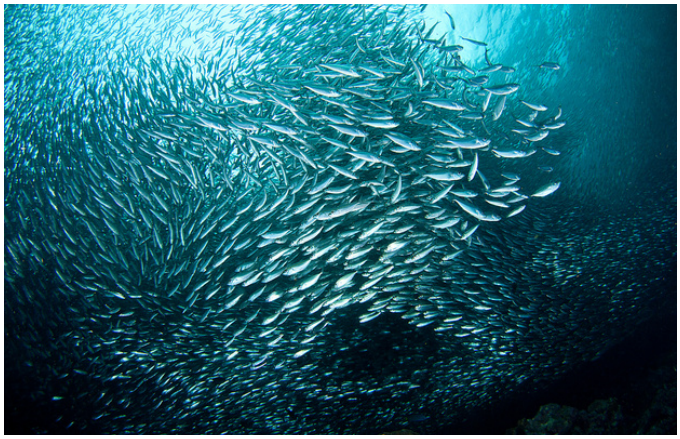
Crab

Crab

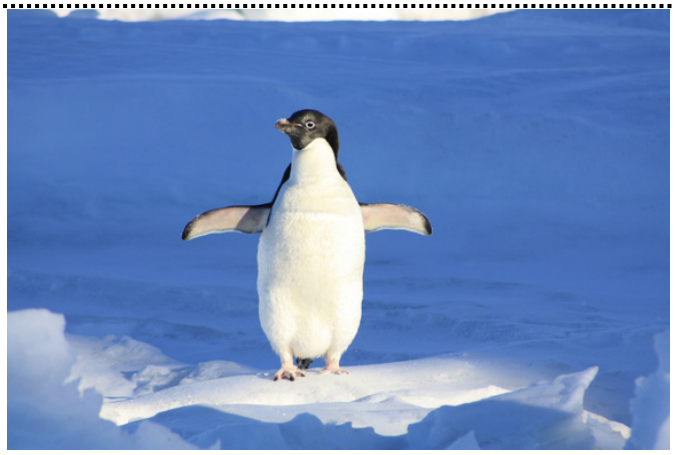
Algae

WHO EATS WHOM?

Dolphins

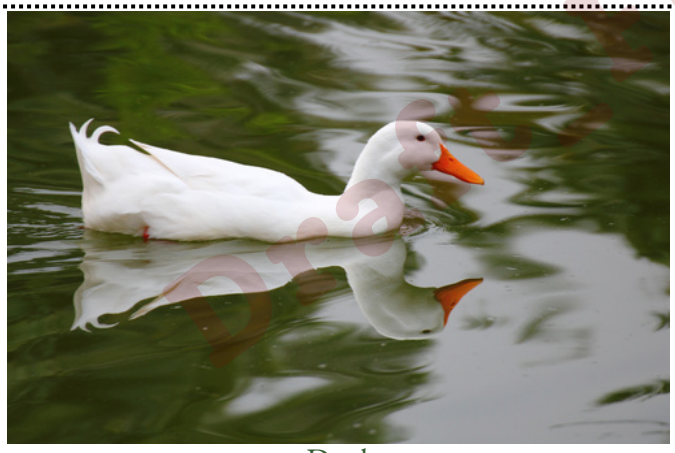


Small fish (Sardines)

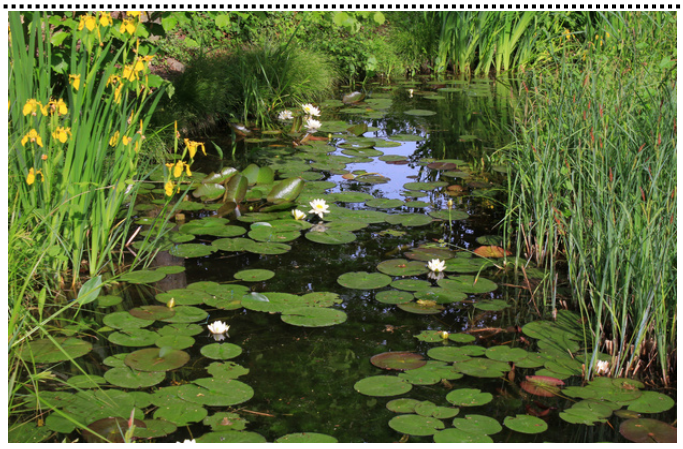


Penguin

Fish



Duck



Aquatic Plants (pond weed)

Cormorant

Fish

Key - Who eats Whom?

- Zooplankton - Phytoplankton
- Turtle - Seagrass
- Frog - Insects
- Whale - Krill - Zooplankton - Phytoplankton
- Water Scorpion - Mosquito Larvae
- Water Snake - Frog - Insects
- Octopus - Crab - Algae
- Crab - Algae
- Dolphins - Fish (sardines) - Zooplankton - Phytoplankton
- Penguin - Fish - Zooplankton - Phytoplankton
- Duck - Aquatic plants (pond weed)
- Cormorant - Fish

Level II

Water on earth is many things. It is an ecosystem, it is a home to many flora and fauna, it is a source of livelihood for human-communities, it is an energy resource and more.

III-IV

Nature Learning Goals

Wonder

Observations

Reasoning

Asking Why?

Making Connections

OBJECTIVES

- Explore and observe the vicinity of their school premises and locate different places water collects forming small and large water-bodies.
- Use scientific tools to observe and study things in nature.
- Learn about animals that are dependent on water ecosystems for their living and identify water ecosystems as a habitat.
- Reflect on and learn of what is threatening nearby water-bodies and its impact on other species.
- Think about and explore through discussions and audio-visual aids, how aquatic animals live underwater; with a focus on breathing, movement, feeding, excretion and communication.

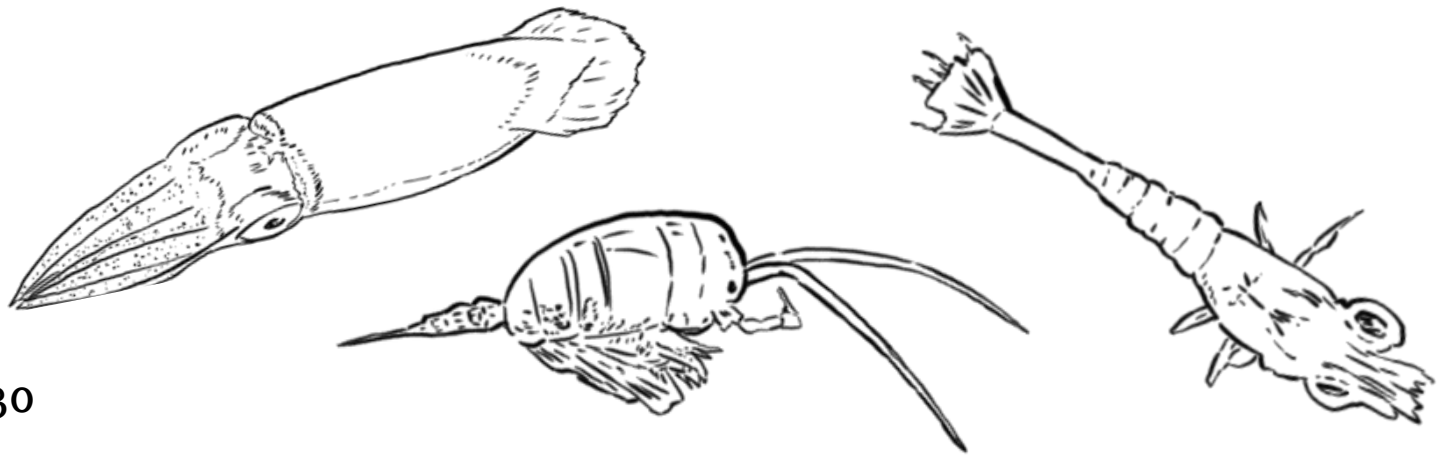
THIS LEVEL INCLUDES:

THEME: WHERE CAN WE FIND WATER?

- MONSOON WATER (2)
- HOMES IN WATER (2)
- WATER IN THE OCEAN (1)

THEME: LIFE IN WATER

- MOVEMENT IN WATER (2)
- BREATHING IN WATER (1)
- FEEDING IN WATER (2)
- COMMUNICATING IN WATER (1)
- DEFENCE IN WATER (2)



LINKING IT WITH THE EVS CHAPTERS

This module has been designed to supplement and further what is offered in the NCERT EVS text-books for children within the grades of I to V. The linkages between some of the lessons in each of the levels and the chapters in the EVS textbooks for Grade 3-5 has been indicated in the table below.

LEVEL 2

Lesson No.	Lesson Title	EVS Textbook (Grade / Chapter No.)	EVS Chapter Title
L1	Places Where Water Collects	Gr. III / Ch. 3	**Water oh Water**
L2	Looking at and into Puddles	Gr. III / Ch. 1; Gr. IV / Ch. 13	**Poonam's Day Out; A River's Tale**
L4	Are the Water Bodies Around us Changing	Gr. III / Ch. 20; Gr. IV / Ch. 13; Gr. IV / Ch. 18	**Drop by Drop; A River's Tale ; Too much Water, Too Little Water**
L5	Understanding Properties of Water	Gr. V / Ch. 7	**Experiments in Water**
L9	Food-Web in Aquatic Ecosystems	Gr. III / Ch. 24	**Web of Life**
L11	Communication among Aquatic Creatures	Gr. V / Ch. 1	**Super Senses**

Note for teachers / educators: The EVS lessons for students in grades three to five are connected across these levels. This categorization is suggestive and not restrictive. Lessons from level 3 can be suitable for younger children, taking into consideration their ability to grasp complex concepts and their motor skills. Similarly, older children can be encouraged to explore resources designed for younger students if they have a strong interest.

1. Places where Water Collects

Objective

Children will explore and identify different places water can collect.

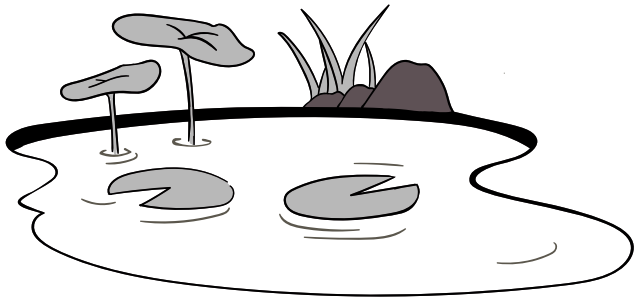
Lesson Plan

Gather the children together. Share the **'Places of Water'** illustration. Ask the children to mark/colour the different places water could collect in the event of rain.

Step out and take a walk within and in the vicinity of the school premises. Take note of the different spots where water has collected- a puddle, a lake, an empty container, roof-tiles, cupped leaves, hollow poles or bark.

Things to discuss:

- Where did the water come from in these collection spots?
- How long might the water-body last without any human intervention?
- Are there any life-forms within or surrounding the water-body?



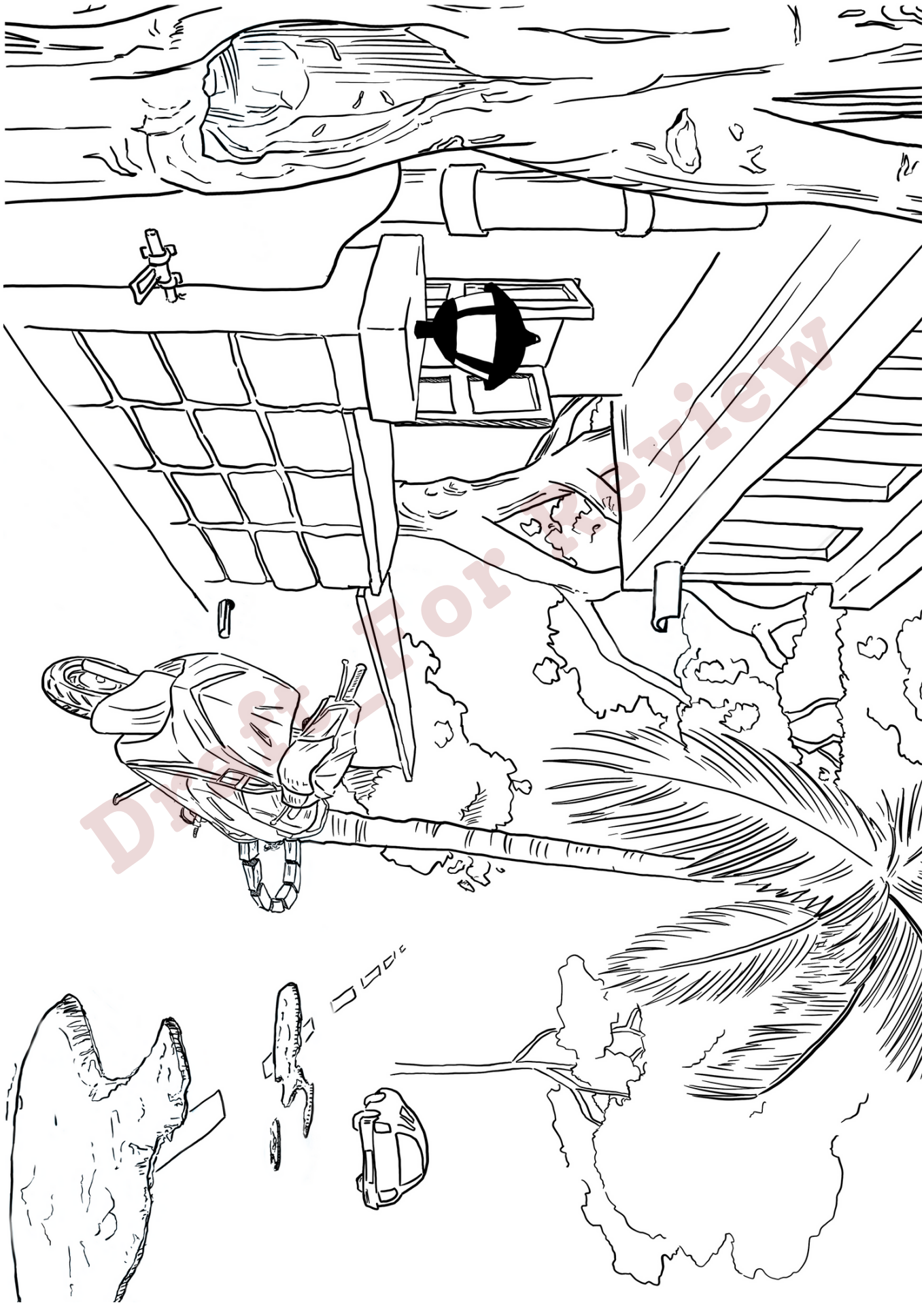
Notes/Reading Tips for the Teacher:

- Identify some spots before the class where water has collected before taking the children out on the exploration.

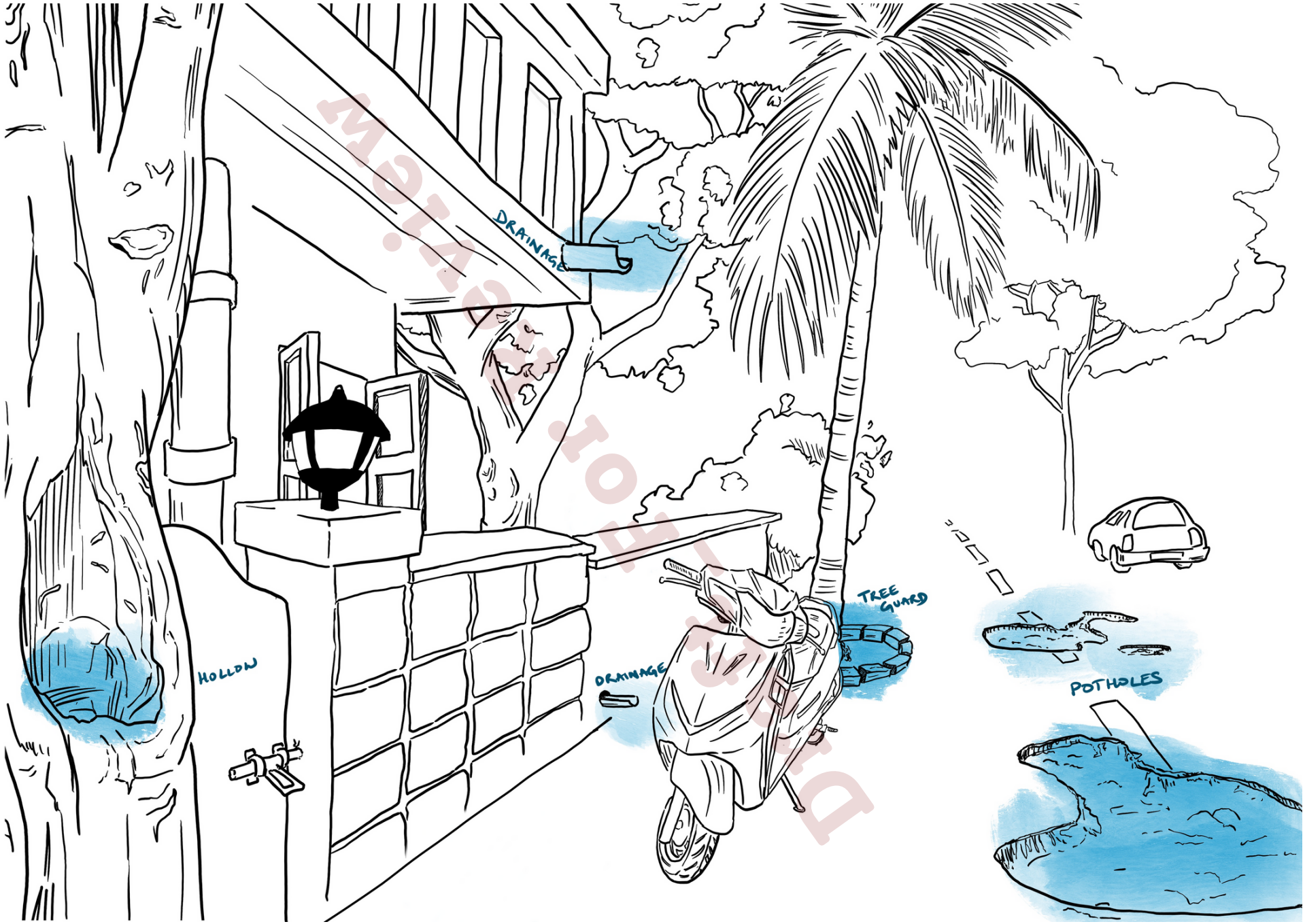
- If no naturally formed water-bodies exist near school, create temporary muddy-puddles in empty containers or pots. This will need to be done a few days in advance so the water-body may begin to attract small life-forms.

ACTIVITY: PLACES OF WATER

Colour / mark the places where you think water collects.



KEY: PLACES OF WATER



2. Looking at and into Puddles

Objective

Children will observe and study a water-puddle closely with the aid of a worksheet.

Lesson Plan

Gather the children and inform them that they are going to be nature-scientists in today's session. Inform them that they will be collecting data by using scientific tools such as magnifying lens, observation sheet, rulers, etc. Discuss the importance of careful observation and accurate documentation of date for scientific study

Distribute and explain the use of both **Colour-grade Scale** and **Puddle-Watching Worksheet.** Step out and gather by a pre-identified muddy puddle. Using the help of the worksheets, record observations of the puddle.

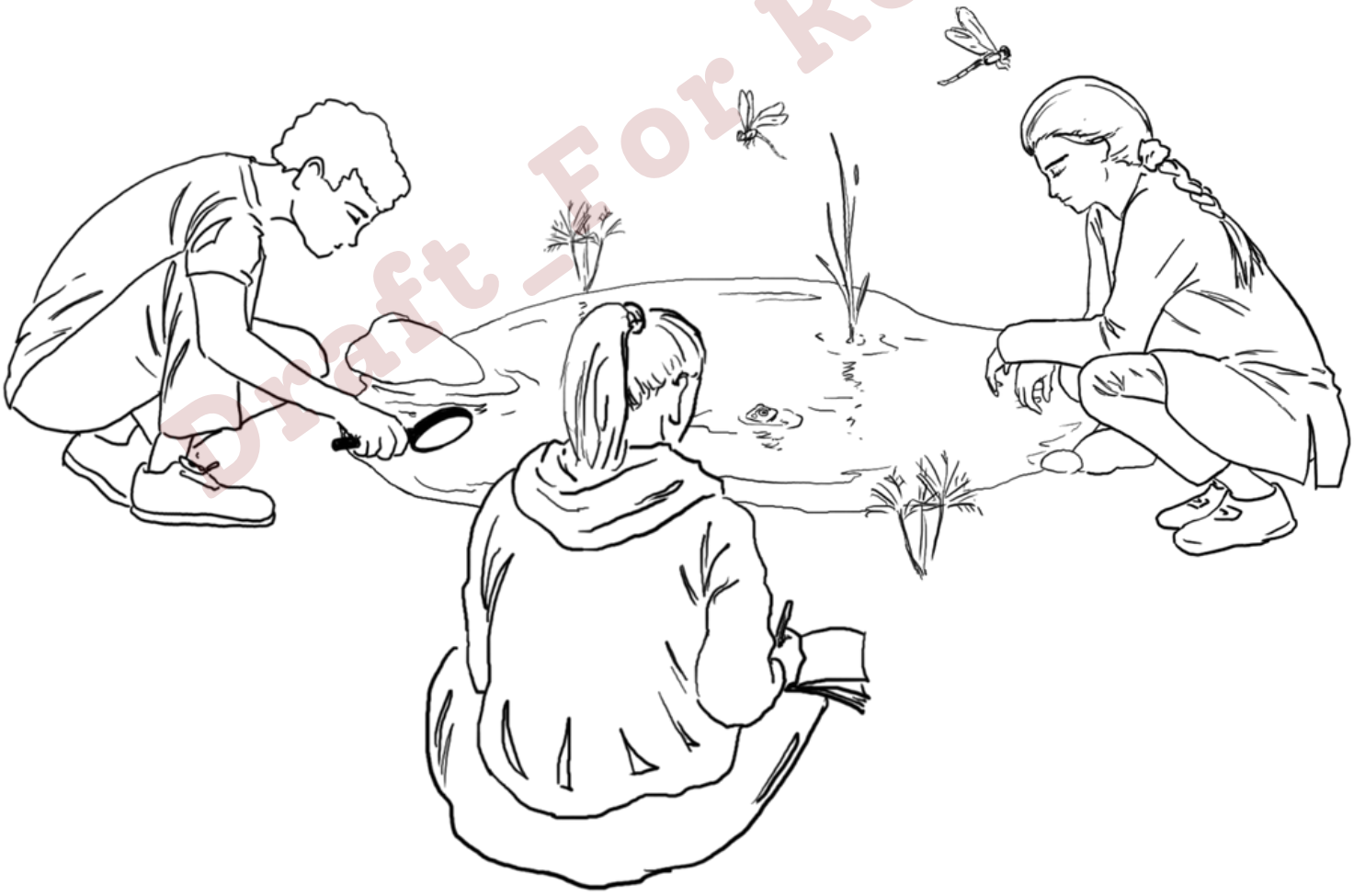
Things to discuss:

- Measuring the size of the puddle (circumference by counting steps walking around it), depth of the water (using a ruler).
- Recording the colour of the puddle (using the colour-grade scale)
- What life-forms can be observed inside the puddle and around the puddle. Encourage use of magnifying lenses to look closely for tiny creatures that are hard to spot with the naked eye.
- What can they observe around the puddle and if there are signs of other creatures that visit the puddle (bird feathers, excreta of animals, foot-prints).

Notes/Reading Tips for the Teacher:

- Identify some spots before the class where water has collected before taking the children out on the exploration.

- If no naturally formed puddles exist, create a muddy-puddle in a basin layered with mud, placed in a shallow pit outdoors. This will need to be done several days prior to the class to ensure life-forms begin to use the puddle.



PUDDLE - WATCHING

What is a puddle?

A naturally forming puddle is a small pool of water that collects after a rain-fall. Puddles can form anywhere that there is a depression in the surface. Look for them on road-sides, mud-paths, roof- tops!

Once you have found a puddle, go ahead and study it! Observe carefully and make notes here. Things to carry: ruler, magnifying lens, pen/pencil, note-pad.

What is a puddle called in your language?

_____

What colour is the water? Use the colour-grade sheet to find out.	
How big is the puddle? Measure the circumference by walking along the boundary and counting your steps. You could also use a thread to trace the circumference of the puddle and use a scale to measure the length of the thread.	
How deep is the puddle? Use your ruler and place it in the centre of the puddle where the water is the deepest. Mark where the water's surface is.	
What is the shape of the puddle? Draw it out.	

What do you see in the puddle? Are there any life-forms? Any animal, insect, or bird? Are there any plants in the water?	
What do you see around the puddle? Look near the edges of the puddle? Are there any plants or creatures there?	
Do you see anything of special interest?	

Make a drawing of your puddle with all the things you see inside and around it.

Water Shade Card

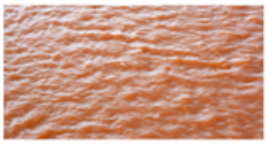
What colour is the water?

Clear Water

Can you see what's inside the water? Leaves, stones, tiny creatures... If yes, then it's clear water. Can you see your own reflection in the water?

Murky Water

Why do you think the water is murky? Is there soil, sand, or dust dissolved in the water, making it a bit hazy? Can you see any dissolved particles? Can you see any creatures or plants inside the water body?



Muddy Water

Is there loose mud around the water body? Do you think the colour of the water body is orangish-brown because there's mud dissolved in it?

Brown

What colour is the soil around the water body? Is the colour of the water similar to the colour of the soil? Is it darker or lighter than the soil? As the soil mixes with water due to rain or soil erosion, the colour of water becomes brown.

Shades of Green

Do you see anything green floating in the water body? If the soil around the water body is brown, then why does the water appear green? Thats because this water has microscopic green algae floating in the water which gives it a green colour. The more algae there is in the water, the more green the water looks.

Shades of Blue

A ray of light is made of 7 colours (VIBGYOR), same colours as the rainbow. When sunlight hits the surface of water, red, yellow and orange light gets absorbed by the water but the violet and blue light are reflected back. That's why water appears blue in colour. We also see different shades of blue in the ocean depending on how deep or shallow the water is. Shallow waters appear brighter blue while deeper waters are dark blue.

Grey

What do you see around the water body? Are there more buildings/houses or construction work happening nearby? Water appears grey when there are impurities like cement dissolved in it.

Black

Do you think it's the natural colour of water? Can you look around to see why the water in this water body is black? Most often, water bodies appear black when pollutants and impurities like waste from factories or sewage get mixed with water. Water bodies also appear black at night because there's no sunlight entering the water.

3. Who Lives in the Water?

Objective

Children will study about species that live in water and identify interesting facts about their life in water.

Lesson Plan

Gather the children and review the assignment from the previous session. If they have observations of life-forms in puddles that they have noticed, it will be a good starting point to the following session. Inform them that they are going to be learning about species living not just in puddles but even larger water-bodies like rivers and oceans.

Lay out the **Creature-Feature cards** on the floor, with the image facing up. Ask the children if they can identify any of them, what they know about them, etc.

- Ask the children to group the cards into what kind of water-body they think the creature lives in (puddle, river, pond, ocean, well). Check the information behind and see how accurate the classification is.
- Now, group the cards into creatures they think breed by laying eggs vs giving birth to young. Check the information behind and see how accurate the classification is.

Distribute one card per child. Or one card to a pair of 2 children. Ask them to carefully read the information on the card. Each child/pair comes ahead and shares what they know about their creature.

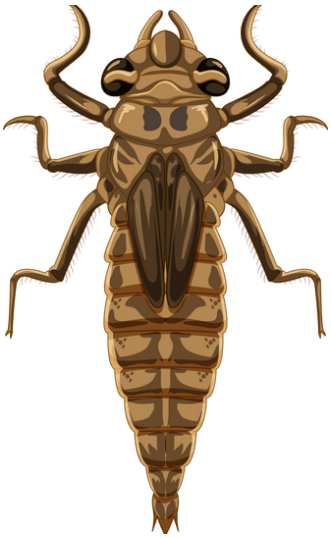
Guess the Creature Game:

To make it more challenging, ask them to hide the card and describe the creature to the larger group. The group has to guess which creature they are talking about.

Independent Learning/HW:

Children can be encouraged to make their own version of Creature-Feature cards based on the creatures they observe near water-bodies.

Creature Feature Cards



Creature Feature Cards

Who is it? - Mosquito Larvae
The life-cycle of a Mosquito is similar to the life-cycle of a butterfly ; Egg - larva - Pupa - adult
A female Mosquito lays eggs on the surface of water or around water-bodies. When the eggs hatch in about 2 days tiny, wriggling larvae come out.

Where is it found? - In stagnant water bodies like puddles, ponds, rainwater collected in containers.

What do they eat? - The larvae feed on microorganisms in the water. When the larva turns into pupa, it does not eat at all but stays just below the surface of the water to breathe. After a few days an adult mosquito emerges from the pupa.

Who is it? - Dragonfly Larvae (Nymph)
A female dragonfly lays eggs in or around water bodies.
When the eggs hatch larvae, also known as Nymphs, crawl out. As the nymphs grow in size they undergo molting. In their last larval stage the nymph crawls out of water and breaks out of it's final molt to become an adult dragonfly.

Where is it found? - In freshwater bodies like ponds and lakes.

What do they eat? - The nymphs feed on mosquito larvae, small fish and larvae of other aquatic insects in the water. They have a specialized mouth part - a jaw that shoots out and grabs its prey!

Who is it? - Tadpoles
The young ones of frogs and toads are called Tadpoles.
When the eggs laid by a female frog hatch into larvae, they look nothing like a frog. The larvae have gills for breathing underwater and a flattened tail for swimming.

Where are they found? - In streams, shallow parts of ponds and lakes, pools formed in tree hollows and puddles formed by rains.

What do they eat? - Tadpoles feed on algae and other aquatic plants. As they grow they also eat insect larvae and dead animals in the water.

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Who is it? - Water strider (Pond skater)
Have you seen this cool insect that calmly stand on the surface of the water? Water striders can not only stand on water but also skate and hop on it!

Where is it found? - In freshwater bodies like ponds and lakes, mud puddles. There's also one kind that lives in the sea and is called Sea skater!

What do they eat? - Water striders are carnivorous. They eat aquatic insects like mosquito larvae and dead insects that fall in the water.

Creature Feature Cards

Creature Feature Cards

Who is it? - Marsh Crocodile (Mugger)
These crocodiles are identified by their broad snout. The females dig a hole on land and lays eggs in it. When the eggs hatch, the adult crocodile carries the hatchlings into the water, in it's mouth.

Where are they found? - In fresh water bodies like lakes and rivers as well as in brackish water of the mangroves.

What do they eat? -
Their diet includes fish, amphibians, waterbirds, reptiles and even mammals.

Who is it? - Skittering Frog
Greenish brown in colour, the skittering frogs get their names from skipping on water when disturbed or threatened.

Where is it found? - They are found in all kinds of waterbodies including wells, rock pools, ponds and paddy fields.

What do they eat? - Their diet is very varied. They eat insects, other amphibians, fish, worms, etc.

Who is it? - Fiddler Crab
Male Fiddler crabs are easy to identify due to a distinctive feature - Their one claw larger than the other. They use their dominant claw to attract females and fight with males.

Where are they found? - They are found in the mangroves and mudflats. They live in burrows made in sand and seal their burrows with sand/mud during high tide leaving just tiny pocket of air to breathe.

What do they eat? - Fiddler crabs feed on algae and also scavenge on detritus.

Who is it? - Sand Bubbler crab
Have you ever been to the beach and noticed patterns in sand? Tiny round balls of sand arranaged in patterns around a tiny hole? Meet the Sand Bubbler Crab!

Where is it found? - The are found on sandy beaches.

What do they eat? - These crabs have an interesting way of eating. They eat microscopic organisms in the sand by taking in morsels of sand into their mouth and filtering out the organisms from it. The filtered sand is brought out the mouth in the form of balls.

Creature Feature Cards

Creature Feature Cards

Who is it? - Common Kingfisher
The common Kingfisher is a small bird with bright plumage. Their head is greenish blue, back is pale blue and the front is orange coloured.

Where are they found? - Near freshwater bodies like rivers and lakes. They are also found near wetlands and mangroves and even found near canals and ponds.

What do they eat? -
They feed on fish and aquatic insects.

Who is it? - Asiatic Water snake (Checkered Keelback)
It is a non-venomous snake with yellow and black pattern on its scales, hence the name Checkered Keelback. The female comes out of water to lay eggs.

Where are they found? - In fresh water ponds, lakes, rivers, paddy fields, etc.

What do they eat? -
It is very well adapted for life in water and eats frogs, fish and crabs. The young ones eat tadpoles and water insects.

Who is it? - Mudskippers
Have you heard of fish that walk on land? Meet the Mudskipper. They are amphibious fish, adapted to living on land as well as in water. They have gills to breathe in water and when on land they breathe through the lining in their skin and mouth.

Where is it found? - In the mangroves and mudflats. During high tide they hide in their burrows.

What do they eat? - They eat algae, insects, worms, crabs and fish.

Who is it? - Indian Cormorant
The Indian cormorant is a water bird with a slender, hooked bill and blue eyes. It's black and brown in colour. They build their nests on trees near a waterbody.

Where is it found? - Near freshwater bodies like rivers and lakes. They are also found near wetlands and mangroves

What do they eat? -
Their webbed feet and their slender body make them expert swimmers and dive. Their meals mainly consist of fish and eels.

Creature Feature Cards

Creature Feature Cards

Who is it? - Olive Ridley Sea Turtles
These are the most abundantly found sea turtles. They get their name from the olive colour of their shell.

Where are they found? - In the warm waters of Pacific, Atlantic and Indian Ocean.

What do they eat? - They eat jellyfish, shrimps and crabs, sea snails. They occasionally eat algae and seaweed.

Who is it? - Mangroves
These are unique plants that are well adapted to growing in salty conditions with marshy soil. Different species of mangroves have different root systems that help them survive the tough soil conditions.

Where are they found? -
In the inter-tidal zone - the area where land and water meet. They grow in estuaries, creeks and bays where there is a mixture of salt and freshwater.

Who is it? - Common Octopus
The octopus is considered as one of the most intelligent animals. They have 8 arms with suckers on them. They act as fingers, nose and tongue and are used for touch, smell and taste!

Where is it found? - In the coastal marine waters. They prefer the rocky crevices of tidepools and coral reefs.

What do they eat? - They eat crabs and other crustaceans.

Who is it? - Seaweed
While Seaweed looks like a plant, it's not a plant. It is a kind of algae that is found floating in the ocean waters. However, just like plants they also prepare their own food using photosynthesis. Different kinds of animals like crabs, shrimps, sea slugs and fish use seaweed as shelter.

Where are they found? -
In the inter-tidal regions, shallow and deep waters of the oceans, estuaries and backwaters.

Creature Feature Cards

Creature Feature Cards

Who is it? - Water Lily
This is a freshwater, flowering plant.
Even though it looks like the plant is floating on water, it's roots are buried at the bottom of the pond or lake. The leaves of Water Lily, also known as lily pads have a waxy coating on them. And their flowers attract bees for pollination.

Where are they found? - In ponds and lakes.

Who is it? - Duckweed
Duckweeds are tiny, free-floating aquatic plants. They provide shelter for animals like frogs, fish and insects. Ducks like to eat this plant and that's where it gets its name from.

Where are they found? -
They are found in freshwater ponds, lakes and wetlands.

Who is it? -

Where are they found? -

What do they eat?

Who is it? -

Where are they found? -

What do they eat?

Creature Feature Cards

Who is it? -

Where are they found? -

What do they eat?

Who is it? -

Where are they found? -

What do they eat?

Who is it? -

Where are they found? -

What do they eat?

Who is it? -

Where are they found? -

What do they eat?

Creature Feature
Did You Know Cards

Mosquito Larvae

Did you Know?
The larvae swim just under the surface of the water and breathe though a tube-like (snorkel-like) organ called a siphon, located at the end of their abdomen.

Dragonfly Larvae (Nymph)

Did you Know?
The nymphs breathe underwater with the help of gills that are located in their butt!

Tadpoles

Did you Know?
Tadpoles undergo a process called metamorphosis. As they grow bigger they start developing limbs. Their hind legs develop before their front legs. They loose their gills and develop lungs to breathe on land. Almost all their organs undergo a change to prepare them for life on land .

Water strider (Pond skater)

Did you Know? Their legs have tiny hair on them that helps them stay afloat. Their legs can also sense ripples in the water caused by other insects, and that's how they catch their prey.

Marsh Crocodile (Mugger)

Did you Know?
A crocodile cannot stick it's tongue out! It's tongue is held in place by a membrane. We also often see the crocodile basking in the sun with it's jaw open, it does so to release heat and cool down.

Skittering Frog

Did you Know?
These frogs are seen floating in water and can do everything including catching a flying insect to finding a mate while floating in water.

Creature Feature
Did You Know Cards

Fiddler Crab

Did you Know? During a fight between 2 male fiddler crabs if one looses it's dominant claw, it's small claw will grow into a dominant claw. And a small claw grows in place of the broken claw.

Sand Bubbler crab

Did you Know? - They live in burrows in the sand and during high tide, they cover their holes with burrows to prevent water from going it.

Common Kingfisher

Did you Know? They dive into the water to catch their prey and bring it back to their perch. Holding the prey in their beak they beat it a few times on the perch and then swallow it.

Mudskippers

Did you Know? Mudskippers move on land and can also climb trees using their specially adapted fins.

Asiatic Water snake (Checkered Keelback)

Did you Know? When threatened these snakes flatten the skin of their neck and raise their head like cobras to frighten their predators.

Indian Cormorant

Did you Know? A common sight we come across is finding a cormorant perched on a rock or a branch half submerged in water, with it's wings open. They do this to dry their wings after a swim.

Creature Feature
Did You Know Cards

Olive Ridley Sea Turtles

Did you Know? In an annual event called *arribada,* thousands of adult female Olive Ridley turtles travel large distances to return to the same beach they were born in, to lay eggs.

Common Octopus

Did you Know? Octopus have cool ways of hiding or escaping. Their body has special cells that help them camouflage to their surroundings. And when threatened they squirt out black ink to confuse their enemy.

Mangroves

Did you Know? Mangroves are important habitats that act as nurseries for young fish and other marine animals. They are also very important because they guard our coasts against soil erosion and natural disasters like tsunamis.

Seaweed

Did you Know? Seaweed and other algae produces around 70% of the world's oxygen. It also helps reduce pollution by absorbing CO2 from the atmosphere.

Water Lily

Did you Know? The floating leaves, known as lily pads provide shade and hiding places for fish, snakes, and other animals. Frogs and water birds like Jacanas use them for resting and walking on them.

Duckweed

Did you Know? This plant is known to filter contaminants from the water, thus helping in keeping the water clean.

4. Are the Water Bodies Around Us Changing?

Objective

Children will analyse some of the threats to species dependent on water-bodies.

Lesson Plan

Gather the children and ask them to call out all the things they did in the last 24 hours that required the use of water. Now steer the conversation to what other creatures do they think used water in the last 24 hours- either for food, to live, or to lay eggs.

Pick a water-body close to the school premises as the context for the discussion. This could be a well in the school, a near-by lake, or a stream. Note down on the board as the children call out, any changes they have seen in this water-body in the last one year- seasonal changes, human-caused changes, etc. Now, next to it, note down how these changes impacted- humans, insects, birds, frogs, fish.

Things to discuss:

- Are all species impacted the same way by changes to the water-body?
- Are there any positive changes to the water-body?
- What are the most prominent changes and what is the cause behind it?
- Human-caused changes: pollution in the water, construction near the water.
- Seasonal changes: monsoon and dry season influence on the water.

5. Understanding Properties of Water

Objective

Children will experiment and examine some properties of water.

Lesson Plan

Gather the children together and inform them that they are going to be conducting an experiment and watching a video to understand water. But before that, ask if they have observed any large water-bodies such as an ocean, lake or the sea. Ask if they have observed the colour of the water and what they can recall of it.

Experiment: Have two glasses of water, half-filled. In one glass, had a table-spoon of salt and mix in turmeric powder to give it a bright yellow colour. Now, slowly pour in this glass of water into the un-coloured glass of water.

Things to discuss:

- Ask the children what they think will happen when the water is poured into the other.
- Why does the yellow water not immediately mix with the clear water?
- Density of salt and freshwater.
- What might happen when river and ocean water meet?

6. How Creatures Breathe Underwater

Objective

Children will categorise different types of breathing techniques among creatures that live in water.

Lesson Plan

Begin the conversation with how do humans and other mammals and birds on land breathe. What are the organs we use to support inhaling and exhaling (nose, mouth, lungs). Where does the gas come from, that we breathe in and out (oxygen in the air). Now, how about animals in water? Is there oxygen in water too?

Take a container filled with water. Use a straw dipped into the water and exhale into it. Observe the bubbles formed and illustrate the connection between the gas exhaled from our bodies taking form in the water. Water then holds oxygen too for the creatures that live in it. How might these creatures breathe it in?

Use a picture of a fish, a water-bird (cormorant or a duck) and a frog. Identify which organs each of these creatures might use to inhale and exhale.

- Talk about creatures that breathe underwater (fish - gills), creatures that hold their breath underwater (birds - nostrils) and creatures that can breathe under and outside water (frogs - skin when underwater, mouth and nostrils when outside)
- What about humans? How do we breathe when under water? Can we breathe enough through our skin like frogs? No, we hold our breath when under water or come up to the surface to inhale and exhale underwater making bubbles.

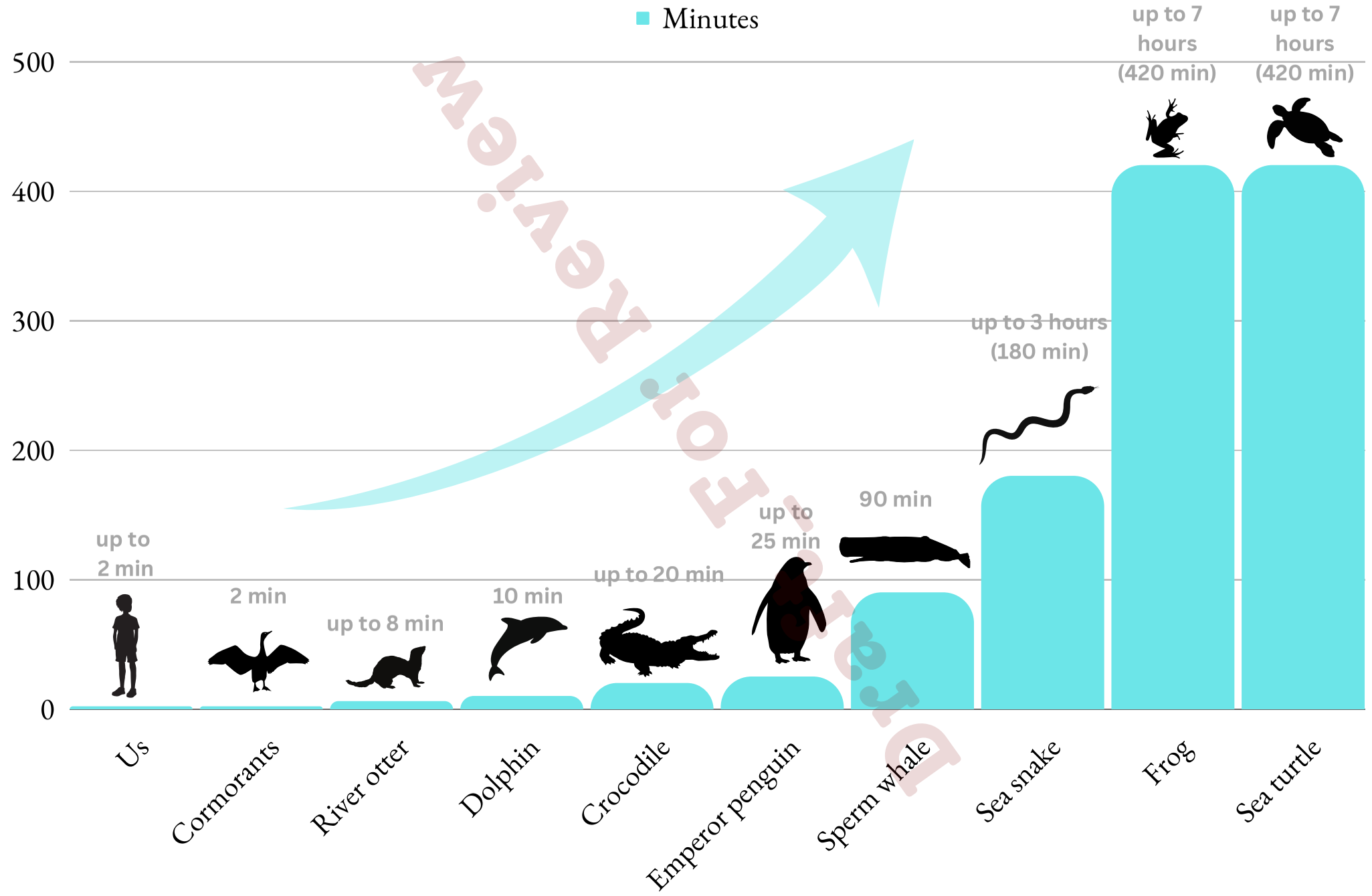
Ask the children to try holding their breath for as long as they can. Time them. Look through the **'How long can you hold your Breath'** chart and identify where you stand on the scale.

Notes/Reading Tips for the Teacher:

- Resource: Frog Respiration
- Take necessary precautions while experimenting with the children while holding their breath.

FOR HOW LONG CAN YOU HOLD YOUR BREATH UNDERWATER?

FOR HOW LONG CAN YOU HOLD YOUR BREATH UNDERWATER?



7. Working of Gills in Fish

Objective

Children will observe with an experiment, how gills in fish work.

Lesson Plan

Do gills function the same way as noses? What will happen if we inhale through our nose when underwater?

Use the **'How do Gills Work'** instruction sheet and conduct the experiment in class.

- Talk about the operculum (gill cover), gills and the absorption of oxygen by the gills and releasing of carbon dioxide.

Distribute the **Creatures with Gills sheet** and let the children circle or colour the gills in the different creatures.

Notes/Reading Tips for the Teacher:

- Resource: Respiration in Fish- video
- Resource: How do Gills Work- experiment video

How do gills work?

(Experiment)

Requirements - 2 glass jars or beakers, a coffee filter, a hair tie, water, a spoon, and some fine mud (or coffee powder)

Process

Step 1 - Fill one glass jar (or a beaker) with some water

Step 2 - Think of the mud or the coffee powder in our experiment as oxygen. Take 2 spoonfuls of the mud and dissolve it in the water. The dissolved mud is like dissolved oxygen in water.

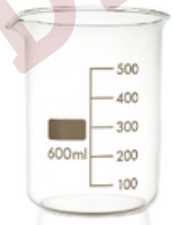
Step 3 - Take the other empty glass jar and place the coffee filter on top of it. Make sure the filter is fitted well at the mouth of the jar with a hair tie so that it doesn't fall inside the jar. The coffee filter represents the fish's gills.

Step 5 - Pour the muddy water over the filter into the empty jar.

Step 6 - Observe the coffee/ mud that's collected by the filter.

Observation

When fish breathe, they take in water through their mouth. Just like the dissolved mud in the water that gets trapped by the filter, dissolved oxygen in the water is gets absorbed by the gills of the fish. This oxygen is then carried by the blood in the gills to different parts of the fish's body.



Beaker

Coffee Filter

Coffee/ Mud dissolved in water

Place the coffee filter on top of the beaker and pour the brown water over it.

The filter acting as gills absorb the dissolved oxygen (coffee) in the water

CREATURE WITH GILLS

Shark

Sea slug

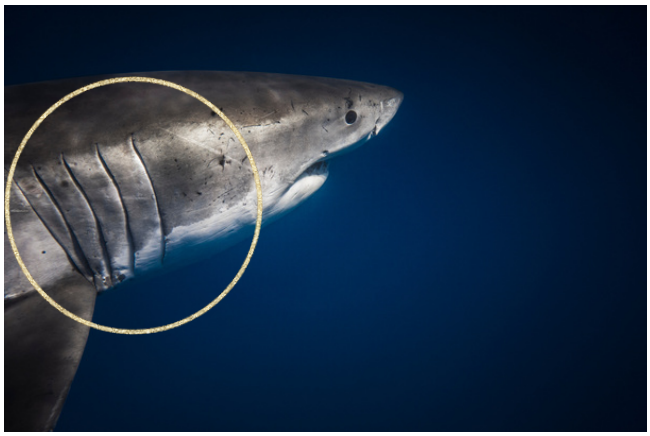
Bony Fish - Rainbow Trout

Tadpole

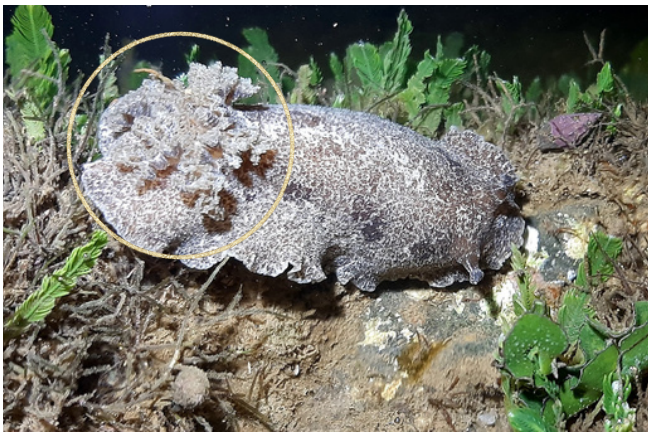
Dragonfly Larva

Crab

KEY- CREATURE WITH GILLS



Shark



Sea slug

Bony Fish - Rainbow Trout

Tadpole

Dragonfly Larva

Crab

Seahorse

Octopus

8. Moving in Water - Animal Appendages

Objective

Children will enact and identify through an activity how aquatic animals move in water.

Lesson Plan

Children enact how different things move- humans, birds, cats, horses, snakes, bees, frogs, trees, fish.

Now, enact how creatures move in water- humans, birds, snakes, fish, crabs.

What helps fish move? The way humans have legs and birds have wings, what appendages do creatures in the water have.

- Fins (fish), flippers (turtles), paddle tail (sea snake), arms (octopus), legs (crustaceans), foot (snail), webbed feet (water birds)
- Use the **Animal and Appendages cards** to match the aquatic animal to its appendage and discuss how each uses them to move in water.

Children can enact the movement of different aquatic animals with their specialised appendages and the class can guess the name of the animal and the appendage.

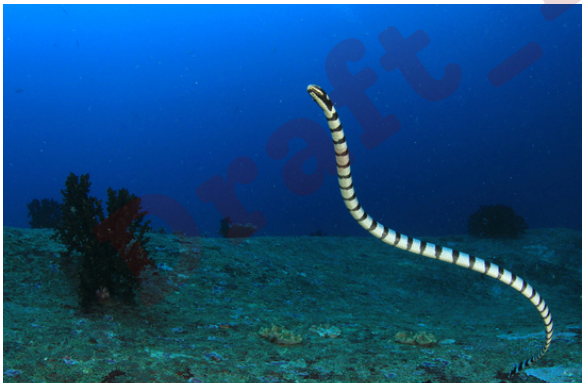
ANIMAL APPENDAGES

Fish

Fins

Frog

Webbed Feet



Sea Snake

Paddle Tail

Turtle

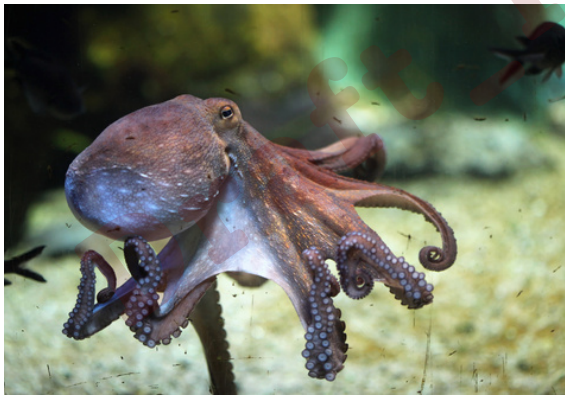
Flippers

Duck

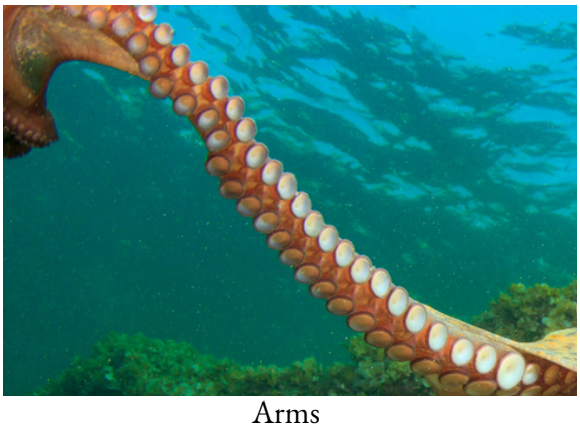
Webbed Feet

Starfish

Tube Feet



Octopus



Arms

Sea Snail

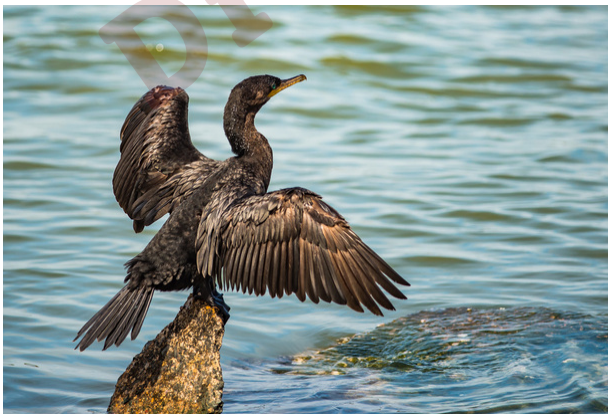
Muscular Foot

Crab

Legs

Water Scorpion

Legs



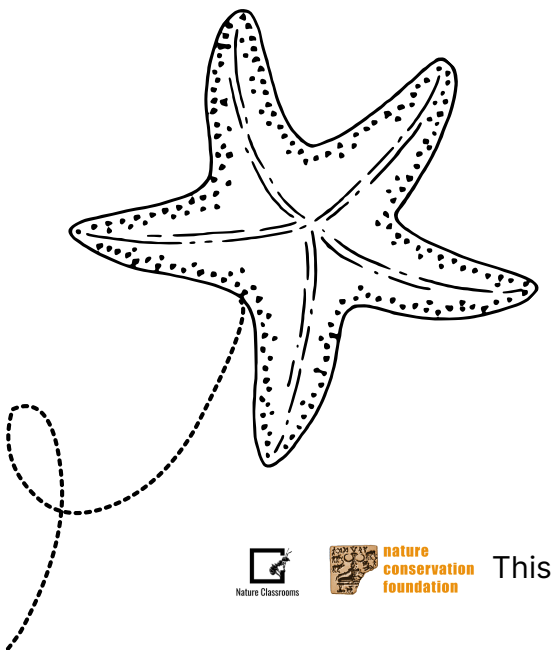
Cormorant

Wings

Webbed Feet

Key - Animal Appendages

- Fish - Fins
- Frog - Webbed Feet
- Sea snake - Paddle Tail
- Turtle - Flippers
- Duck - Webbed Feet
- Starfish - Tube feet
- Octopus - Arms
- Sea Snails - Muscular foot
- Crab - Legs
- Water Scorpion - Legs
- Cormorant - Wings and Webbed Feet



9. Food-web in Aquatic Ecosystems

Objective

Children identify and match predator- prey relationships in aquatic animals.

Lesson Plan

Use the anchor chart and name all the creatures the children can identify on it. Ask questions about what each of those creatures eat, where do they get their food from.

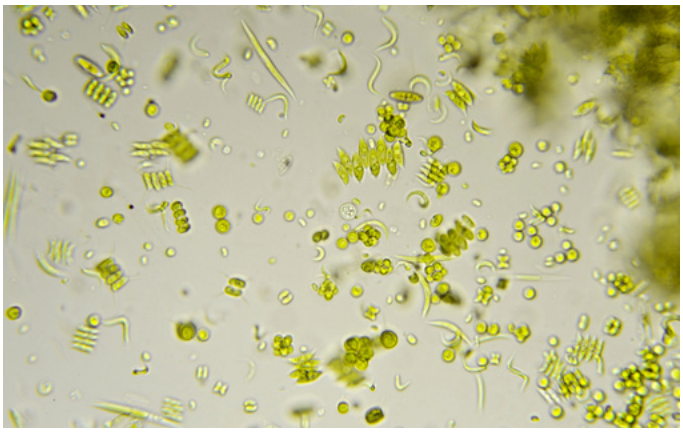
Introduce the concept of the food-chain as the children identify the different creatures that might eat another in the anchor chart (snakes eat frogs, frogs eat damselflies, birds eat fish).

- Talk about the food chain on land and work with the children to build a food chain of animals in water. It can be drawn out on the board with names of the different creatures in the order of who eats whom.
- Distribute the **'Who eats Whom' cards** among the children. Each child gets one card. They have to walk around with their card and find their matching card. If one has a predator card, they need to find who has the matching prey card.
- In small groups, a memory game can be played with the same cards. Lay out the cards face down and children sit in a circle around it. Each child, in their turn, can come and pick up two cards. If they get a correct pair of prey and predator, they keep the pair aside. If not, they lay them back and try again in their next turn. The idea is to remember the position of the different cards and pick the matching pairs.

WATER ANCHOR CHART

WHO EATS WHOM?

Zooplankton



Phytoplankton

Turtle

Seagrass

Frog

Insects

Whale

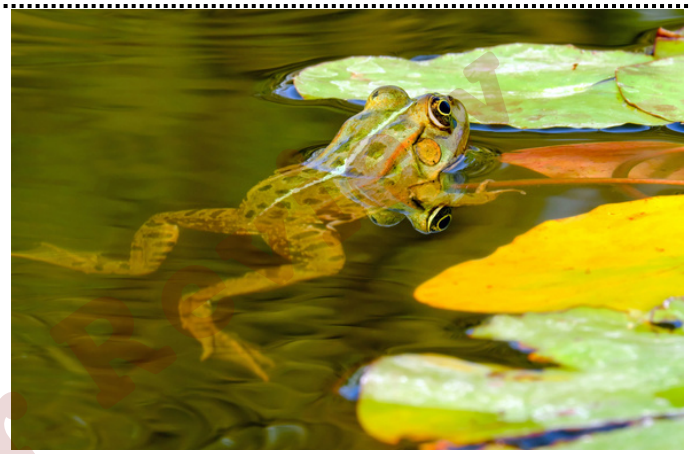
Krill

WHO EATS WHOM?

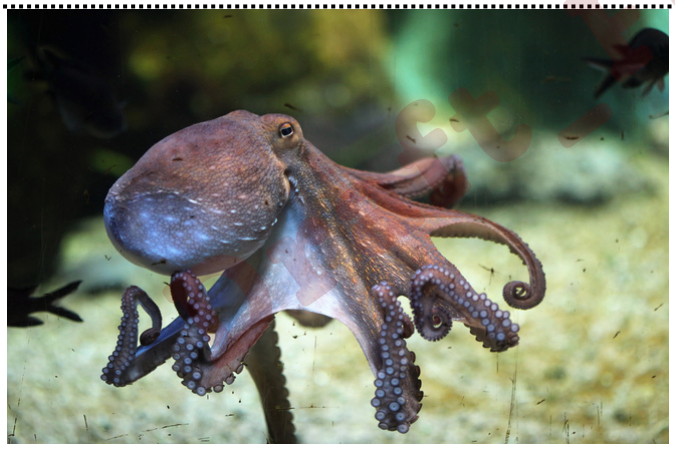
Water Scorpion

Mosquito Larvae

Water Snake



Frog



Octopus

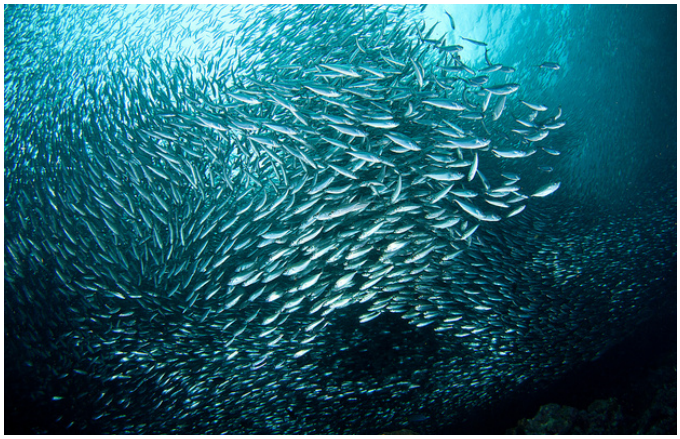
Crab

Crab

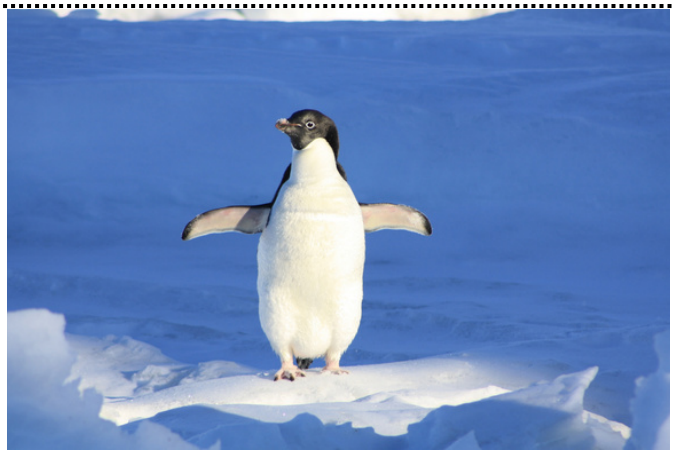
Algae

WHO EATS WHOM?

Dolphins

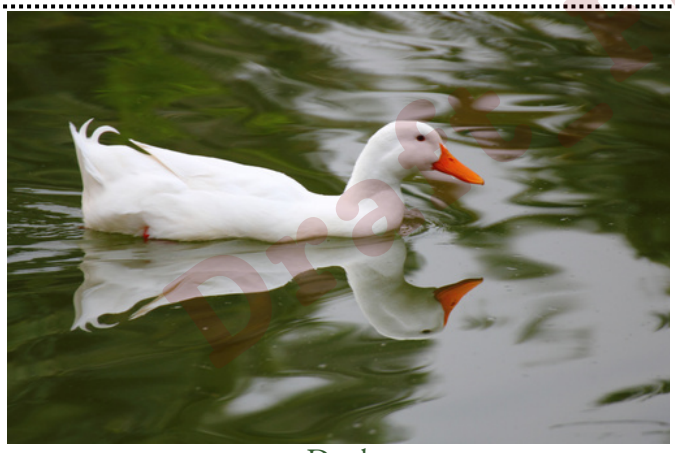


Small fish (Sardines)

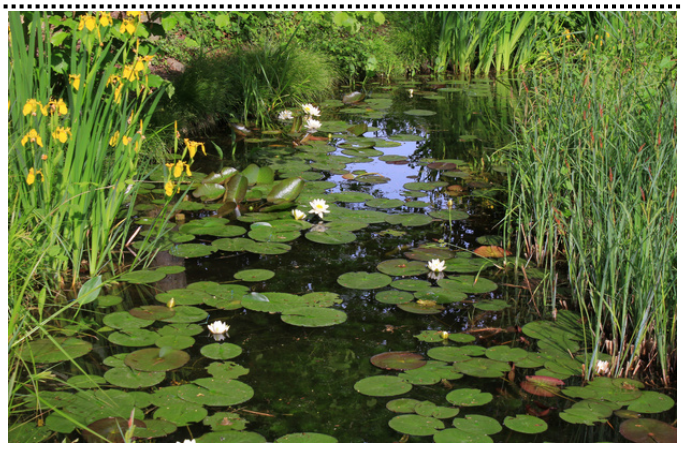


Penguin

Fish



Duck



Aquatic Plants (pond weed)

Cormorant

Fish

Key - Who eats Whom?

- Zooplankton - Phytoplankton
- Turtle - Seagrass
- Frog - Insects
- Whale - Krill - Zooplankton - Phytoplankton
- Water Scorpion - Mosquito Larvae
- Water Snake - Frog - Insects
- Octopus - Crab - Algae
- Crab - Algae
- Dolphins - Fish (sardines) - Zooplankton - Phytoplankton
- Penguin - Fish - Zooplankton - Phytoplankton
- Duck - Aquatic plants (pond weed)
- Cormorant - Fish

10. Do Fish Poop in Water?

Objective

Children will watch a video and discuss how aquatic animals excrete underwater.

Lesson Plan

Take a short walk around the school campus if conditions permit. Look out for animal and/or bird poop when on this walk.

Ask the children if they have ever paid attention to and observed excreta of other creatures- bird, cat, dog, cow, hens, goat, etc. What do the different types of poop look like? Where do each of these creatures go to poop? What about aquatic animals then? Where do they go to poop? Do fish and whales in the oceans poop? How often might they poop?

Watch the video: Where do Creatures Poop in the Ocean?

Things to discuss:

- Fish poop as food for other creatures in the ocean (coral reefs)
- Frequency of excretion (most fish urinate once a day and poop every other day)
- Excretory organs (some fish have anal opening, some fish poop through their mouth like the jellyfish, some fish excrete excess salts and water through their gills)

Reading: Fish Poop: Everything you've ever wanted to Know

11. Communication Among Aquatic Creatures

Objective

Children will listen to an audio of whale-song and discuss how aquatic animals may communicate under water.

Lesson Plan

Gather the children together and ask them to imitate different creatures by the sounds they make- cat, sparrow, dog, horse, cow, hen, goat, humans, etc. Now, what might a fish sound like? Whale? Dolphin?

Play the audio file and ask the children to guess what creature is making that sound.

Audio File: Whale Sound Sampler

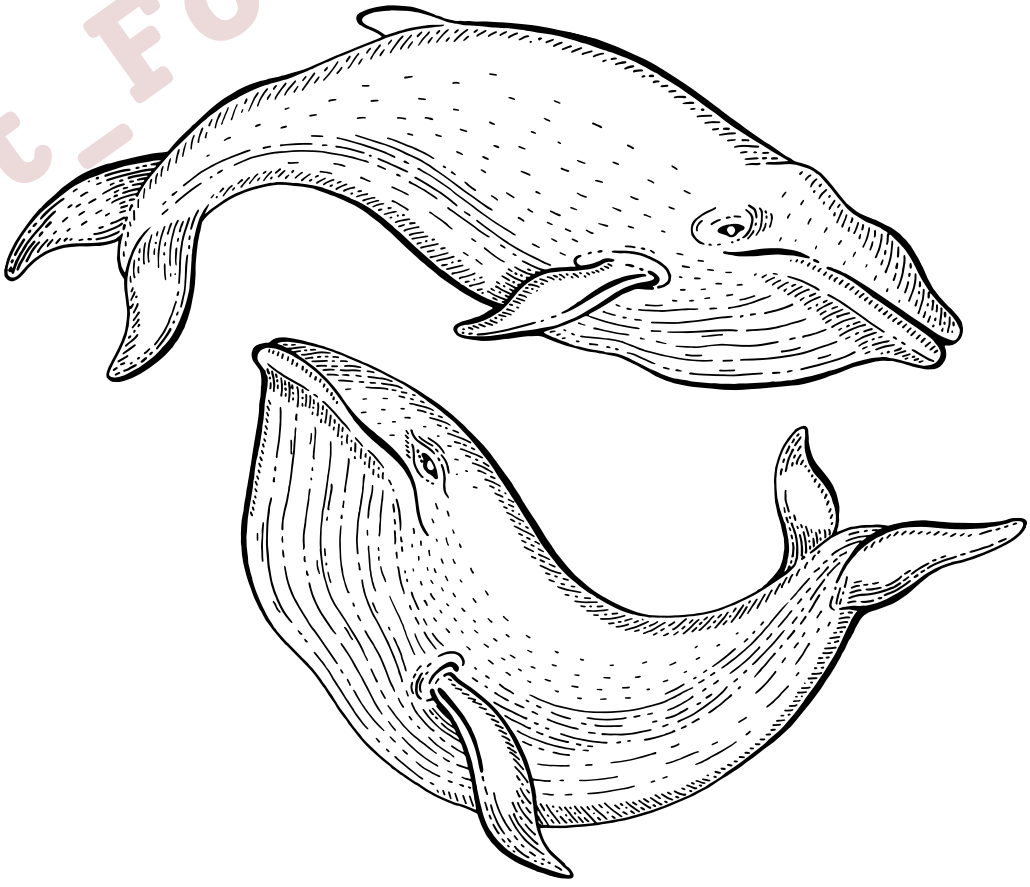
Talk about:

- Whale song and dolphins making specific sounds (signature whistles) to call out to one another.
- Use of fins and flippers to nudge one another.

Ask children to create a unique whistle for themselves. If they had to replace their name with a unique set of sounds, what would that be?

Notes/Reading Tips for the Teacher:

- Resource: The Amazing ways Aquatic Animals Hear
- Resource: Whale Songs in South Pacific : Video
- Resource: How Marine Animals Communicate



12. How do Creatures Stay Safe Underwater?

Objective

Children will use picture cards to match and discuss how creatures in water defend themselves from threats.

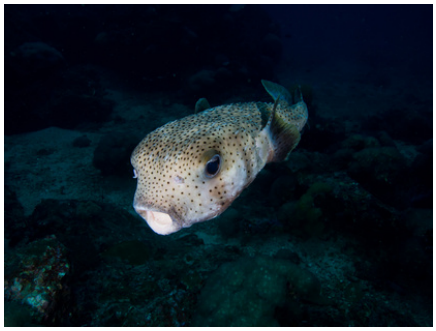
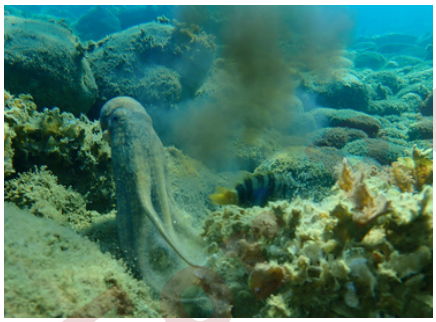
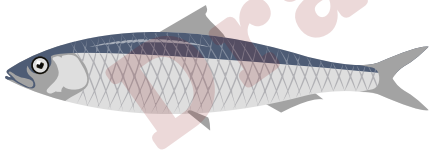
Lesson Plan

Begin a conversation on what could be the possible threats to the creatures in water. What are the dangers they face? (pollution of the water, lack of food, larger predators, etc.)

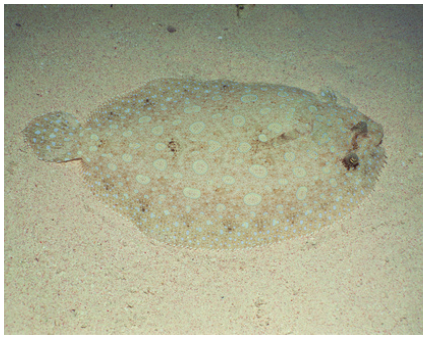
What might different creatures do to defend themselves against predators in particular? Can they always have places to hide? Can they do anything with their bodies to escape from predators?

Use the **Defense or Relax matching cards.** Place the picture of the creature in a relaxed state and ask the children to guess what this creature might be able to do with it's body to keep predators away. Then place the picture of the creature in a state of defense. Do the same for all the cards, pausing for children to guess, imagine and discuss how different creatures have unique adaptations to defend themselves.

STAYING SAFE IN WATER

Animal	When threatened	Description
 Puffer fish		**Puffing up** When they sense danger Puffer fish turn themselves into a big ball and expose their spines. They are also highly poisonous.
 Octopus		**Ink cloud** When threatened an Octopus sprays inky fluid on it's predator to confuse them.
 Sardine		**Staying in schools** Fish like sardines and tunas, swim together in schools to make it difficult for their predator to catch them.
 Hermit crab		**Symbiosis** Some hermits crabs carry sea anemones on their borrowed shells. The stinging cells of anemones protect the crabs and the crab helps the anemone by carrying it to different places to feed.

STAYING SAFE IN WATER

Animal	When threatened	Description
 Frog		**Appearing Big** Some toads and frogs make themselves look bigger when threatened.
 Sea Slug		**Bright colours** Some sea slugs have bright colours to tell their predators that they are poisonous.
 Lionfish		**Venomous Spines** The Lionfish when threatened, spreads its spiny fins to warn the predator. These fins are venomous.
 Flounder fish		**Camouflage** Marine animals like the Flounder fish have a unique ability to merge themselves with their surroundings. Making it difficult for predators to spot them.

13. The Octopus Hero

Objective

Children will listen to a story and discuss to understand how an octopus stays safe in water.

Lesson Plan

Gather the children and open a conversation on any creatures they have observed on land or water, defend themselves. What do cats do when there is a threat around? What do chameleons do? What do birds do when a predatory bird comes close to their nest? What might fish and other aquatic creatures do in water to defend themselves?

Read out the '**The Octopus Hero**' story to the group. Make sure to pause at significant points and ask the children what they think might happen (when the octopus is being chased, for example).

Children may enact the story by taking up roles and adding more characters. Refer to the earlier lesson and encourage children to integrate the defense mechanisms they learnt of other aquatic creatures.

THE OCTOPUS HERO

In the shallow waters of the Indian ocean, there lies a beautiful coral colony. Teeming with life, all kinds of creatures live here in harmony.

It's a regular day on the reef. The beautiful parrot fish are chomping on the coral reefs. They eat the algae that live inside the corals. The vibrant sea slugs are crawling around looking for food, the anemones are feeding with the help of their stinging tentacles, and schools of colourful fish are swimming by. On one side of the colony, a group of young clown fish are playing among the tentacles of the anemones. These anemones are their home.

Suddenly, one of the young clown fish notices a long arm coming out from a dark corner of the reef. She stops swimming and stares at it, awestruck! The others notice it too. They all stand staring at it. The arm grows longer. For a second it looks like it’s coming towards them but in one swift movement it catches a shrimp swimming by and disappears.

Shaken by the whole scene, one of them finally asks, ”What was that?". "Monster!", replies another. They all look at each other and burst out laughing. All except one. The young fish that first saw the arm says, "That's not a monster”. "That's an Octopus! My grandmother told me that they are one of the most intelligent and brave creatures in the ocean. She always talks about the Great Battle that happened on our reef a long time ago. She was there and she saw it!"

Everyone is now listening to the young clown fish with all their attention. "A long, long time ago, a BIG Fish came to this reef. It was a very scary time. Everybody lived in fear of that fish. Nobody ventured out on their own when the Big Fish was around. One day, the Octopus was out hunting for its favourite food, crabs, and the big fish appeared out of nowhere.

It headed straight towards the octopus with its mouth wide open. Everybody was watching, with bated breath, from the windows of their homes. Just as the Big Fish opened its mouth to eat the Octopus, the Octopus disappeared. Everybody including the Big Fish was confused. It turned left and right and swam around in circles to find the octopus. Only a few saw a part of the coral reef move, including my grandmother. They realised the Octopus was using camouflage to hide from the Big Fish. It was changing its colours to resemble the colours of the coral reef. It was very hard to spot the hiding Octopus."

"Woah!", said a wide eyed, tiny looking clown fish who was listening very intently. He was clearly impressed.

"The game of hide and seek went on for a while...", continued the young clown fish. "The Big Fish swam around trying to keep up with the Octopus, but soon it grew tired. And that's when the Octopus decided to use its final trick. It called out to the Big Fish and came out of hiding. The Big Fish turned around, spotted the Octopus, and two things happened at the same time... as the Big Fish headed towards the octopus, it squirted out a big jet of black inky fluid right into the eyes of Big Fish but it was a few seconds too slow. The Big fish caught hold of one of its arms. But the black inky fluid almost turned the Big Fish blind. It swam away from the reef and left the reef forever. All the fish and other marine animals came out of their houses applauding and cheering the Octopus. But the Octopus was tired and had lost one of its arms. It went back into its home quietly. And that's where it is said to be resting now. Waiting for its arm to grow back."

"What?", asked the tiny fish! "Can it regrow its arm? Wow, this Octopus is my hero! Do you think it will give us an autograph once it feels better?" “I think it can give all of us autographs using its 8 arms!” said the young fish. Excited and happy everyone resumed playing among the anemones.

Level III

Water on earth is many things. It is an ecosystem, it is a home to many flora and fauna, it is a source of livelihood for human-communities, it is an energy resource and more.

V

Nature Learning Goals

Observations

Inter-Connections

Building a Micro-ecosystem

Documentation

Community-Learning

OBJECTIVES

- Study and observe interconnections among creatures in water and the water-body.
- Build curiosity and wonder for life-forms living in water and/or dependent on water.
- Think critically about water-ecosystems and possible threats to them.
- Use scientific tools to study and make observations of nearby and accessible water-bodies.
- Use experiments as a medium to understand basic properties of water.
- Discuss and explore life of creatures in large and small water bodies with the help of stories, audio-visual media and worksheets, with a focus on breathing, movement, communication, feeding and defence mechanisms in water.

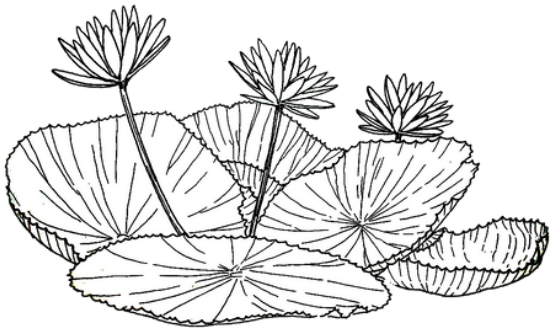
THIS LEVEL INCLUDES:

THEME: WHERE CAN WE FIND WATER?

- MONSOON WATER (2)
- HOMES IN WATER (3)
- WATER IN THE OCEAN (1)

THEME: LIFE IN WATER

- MOVEMENT IN WATER (1)
- BREATHING IN WATER (3)
- FEEDING IN WATER (1)
- COMMUNICATING IN WATER (3)



LINKING IT WITH THE EVS CHAPTERS

This module has been designed to supplement and further what is offered in the NCERT EVS text-books for children within the grades of I to V. The linkages between some of the lessons in each of the levels and the chapters in the EVS textbooks for Grade 3-5 has been indicated in the table below.

LEVEL 3

Lesson No.	**Lesson Title**	**EVS Textbook (Grade / Chapter No.)**	**EVS Chapter Title**
L2	Studying a Rainswater Puddle	Gr. V / Ch. 6	**Every Drop Counts**
L3	Understanding our Roles in Water-Habitats	Gr. V / Ch. 6	**Every Drop Counts**
L6	Understanding Properties of Water	Gr. V / Ch. 7	**Experiments in Water**
L11	Do Creatures Talk to Each Other Underwater?	Gr. V / Ch. 1	**Super Senses**

Note for teachers / educators: The EVS lessons for students in grades three to five are connected across these levels. This categorization is suggestive and not restrictive. Lessons from level 3 can be suitable for younger children, taking into consideration their ability to grasp complex concepts and their motor skills. Similarly, older children can be encouraged to explore resources designed for younger students if they have a strong interest.

1. Knowing Seasonal Water-bodies

Objective

Children will listen to a story and engage in critical questioning and thinking to understand the significance of seasonal water-bodies.

Lesson Plan

Gather the children and recall what they know of natural sources of water. Focus the conversation on where all they have seen large and small collections of water, how many of these last throughout the year/season/month/day, where does the water come from that collects in these different places.

Ask children what is the smallest collection of water they have seen that has lasted for a few days. Ask if they think any creature is dependent on that small water-body. **Narrate the story of the Malabar Gliding Frog using the story card.**

Things to discuss:

- Revisit the question of creatures dependent on small water-collection sites. Can they think of other creatures like the Malabar Gliding Frog? (mosquitoes, dragon-flies, tadpoles).
- What could happen if sites for these water-collections are destroyed? (no rice-fields, no hollows in trees, no soil for mud-puddles, etc.)
- What are the different elements needed to ensure the Malabar Gliding Frog can breed successfully? (dense trees of the western ghats, timely monsoon, undisturbed collections of water in tree-tops, etc.)
- Have they seen any differences in monsoon in the last year or two? Does change in season have any impact on places that water collects?

Independent Learning/HW:

Have conversations with the parents, grandparents and/or community elders near home and find out if there have been significant changes in the monsoon since their younger days. Find out if they know of special creatures that depend on monsoon waters for their survival. Are there any creatures that come into sight more during the monsoon?

Notes/Reading Tips for the Teacher:

- Find out if there are any endemic or local creatures in and around the school's vicinity that are dependent on the monsoons like the Malabar tree-frog.

- You could narrate the practice of a tribe in Agumbe while assigning the home-work assignment: The community elders are known to have counted their age by monsoon. An individual, instead of saying 'I am 10 years old', would say 'I am 10 monsoons old'.

MALABAR GLIDING FROG

"Tuck-tuck-tuck". Amidst the lush greens of the Western Ghats, the monsoon is in full force. "Tuck-tuck-tuck". All the creatures of the forests are soaked in the rain- some shivering, some playful. "Tuck-tuck-tuck". Little pools of water have collected in the most unlikely places! Rivers and lakes are full.

Hollows in tree-tops have little private pools of water. Large leaves hold baby-pools of rain water. "Tuck-tuck-tuck". Among the bird-song, langur-chatter and cricket-chirps, there it is again.."tuck-tuck-tuck".

In the dark of the night, the Malabar Gliding Frogs have woken up from their hibernation with the coming of the monsoon. "Tuck-tuck-tuck", there it is again! A male Malabar Gliding Frog is calling out, hoping a female will respond. And indeed, there is a female around here. She has seen him and is interested. They jump up amidst the folds of a banana leaf, bent down by the weight of the rain, over a large puddle of water.

MALABAR GLIDING FROG

The male releases a foamy fluid and whips it up with his padded feet to create a thick fluff of white foam. The female lays her eggs into this foam. Together, they have built a foamy nest to hold their eggs until they hatch. Yes, frogs too make nests although different from bird nests.

The female makes sure the nest is secure, covering it with a few leaf debris if needed and leaves.

In about a week's time, the eggs hatch. All this while, as it rained, little and little of the binding material in the foam nest has been washed off. And so, when the eggs hatch, the tadpoles fall into the puddle of water below. Over the next few weeks, the tadpoles will grow in size. And then the tails will begin to disappear as they grow limbs. Soon, the tadpole will have transformed into a young frog! "Tuck-tuck-tuck", again in the forests of the Western Ghats.

2. Studying a rain-water Puddle

Objective

Children will conduct scientific observations and document them with the help of a worksheet.

Lesson Plan

Gather the children and begin with sharings from their home-assignment of learning from their community elders of monsoon and creatures of the monsoon.

Inform the children that they are going to make a scientific study of one such small water-habitat. The children could be divided into small groups of 3-4 members each. Each group picks one mud-puddle to observe.

Use the Puddle-watching Worksheet and the **Colour-grade scale** to note observations.

Re-group after taking notes. Each group may present their findings to the rest of the class, highlighting anything interesting they noticed at their puddle.

Things to discuss:

- What life-forms were most prominent at the puddles- inside or around. Were there any that surprised you?
- Did the depth of the puddle impact how many creatures were found in the puddle?
- What will happen to these creatures when the puddle dries up?
- Where did these creatures come from which weren't there before the puddle-formed?

Notes/Reading Tips for the Teacher:

This lesson should ideally be taken up during the monsoon for there to be naturally formed mud-puddles. If that is not the case, convert the lesson to creating a mud-puddle and then observing it over the course of a few days. To create a mud-puddle : Dig out a small pit in the ground, deep enough to fit a wide-mouthed basin. Place the basin in the pit. Add a layer of soil at the bottom and cover the rims too so it blends in with the ground. Add water, mix it up. You may also add some water plants. Observe if it attracts any life-forms over time.

PUDDLE - WATCHING

What is a puddle?

A naturally forming puddle is a small pool of water that collects after a rain-fall. Puddles can form anywhere that there is a depression in the surface. Look for them on road-sides, mud-paths, roof- tops!

Once you have found a puddle, go ahead and study it! Observe carefully and make notes here. Things to carry: ruler, magnifying lens, pen/pencil, note-pad.

What is a puddle called in your language?

_____

What colour is the water? Use the colour-grade sheet to find out.	
How big is the puddle? Measure the circumference by walking along the boundary and counting your steps. You could also use a thread to trace the circumference of the puddle and use a scale to measure the length of the thread.	
How deep is the puddle? Use your ruler and place it in the centre of the puddle where the water is the deepest. Mark where the water's surface is.	
What is the shape of the puddle? Draw it out.	

What do you see in the puddle? Are there any life-forms? Any animal, insect, or bird? Are there any plants in the water?	
What do you see around the puddle? Look near the edges of the puddle? Are there any plants or creatures there?	
Do you see anything of special interest?	

Make a drawing of your puddle with all the things you see inside and around it.

Water Shade Card

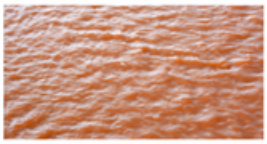
What colour is the water?

Clear Water

Can you see what's inside the water? Leaves, stones, tiny creatures... If yes, then it's clear water. Can you see your own reflection in the water?

Murky Water

Why do you think the water is murky? Is there soil, sand, or dust dissolved in the water, making it a bit hazy? Can you see any dissolved particles? Can you see any creatures or plants inside the water body?



Muddy Water

Is there loose mud around the water body? Do you think the colour of the water body is orangish-brown because there's mud dissolved in it?

Brown

What colour is the soil around the water body? Is the colour of the water similar to the colour of the soil? Is it darker or lighter than the soil? As the soil mixes with water due to rain or soil erosion, the colour of water becomes brown.

Shades of Green

Do you see anything green floating in the water body? If the soil around the water body is brown, then why does the water appear green? Thats because this water has microscopic green algae floating in the water which gives it a green colour. The more algae there is in the water, the more green the water looks.

Shades of Blue

A ray of light is made of 7 colours (VIBGYOR), same colours as the rainbow. When sunlight hits the surface of water, red, yellow and orange light gets absorbed by the water but the violet and blue light are reflected back. That's why water appears blue in colour. We also see different shades of blue in the ocean depending on how deep or shallow the water is. Shallow waters appear brighter blue while deeper waters are dark blue.

Grey

What do you see around the water body? Are there more buildings/houses or construction work happening nearby? Water appears grey when there are impurities like cement dissolved in it.

Black

Do you think it's the natural colour of water? Can you look around to see why the water in this water body is black? Most often, water bodies appear black when pollutants and impurities like waste from factories or sewage get mixed with water. Water bodies also appear black at night because there's no sunlight entering the water.

3. Understanding our Role in Water-habitats

Objective

Children will discuss, debate and defend their responses to specific situations with regard to water-habitats.

Lesson Plan

Gather the children and recall observations and learnings from the previous class on different places that water collects and their characteristics. Distribute the **'Places of Water' illustration** to the group. Ask that they colour out the different places water could collect in this frame post a heavy monsoon rain. Also, illustrate or label each of these places with likely creatures/life-forms that could grow/visit inside and around these collection sites

Divide the class into smaller groups of 3-4 children each. Read out one of the **situation cards** and ask them to discuss the question on the card in their respective groups. After a few minutes for small group discussion, let them share their thoughts in the large group. Repeat with another situation card. After this, each group gets one unique situation card that they have to discuss in depth and present their thoughts on.

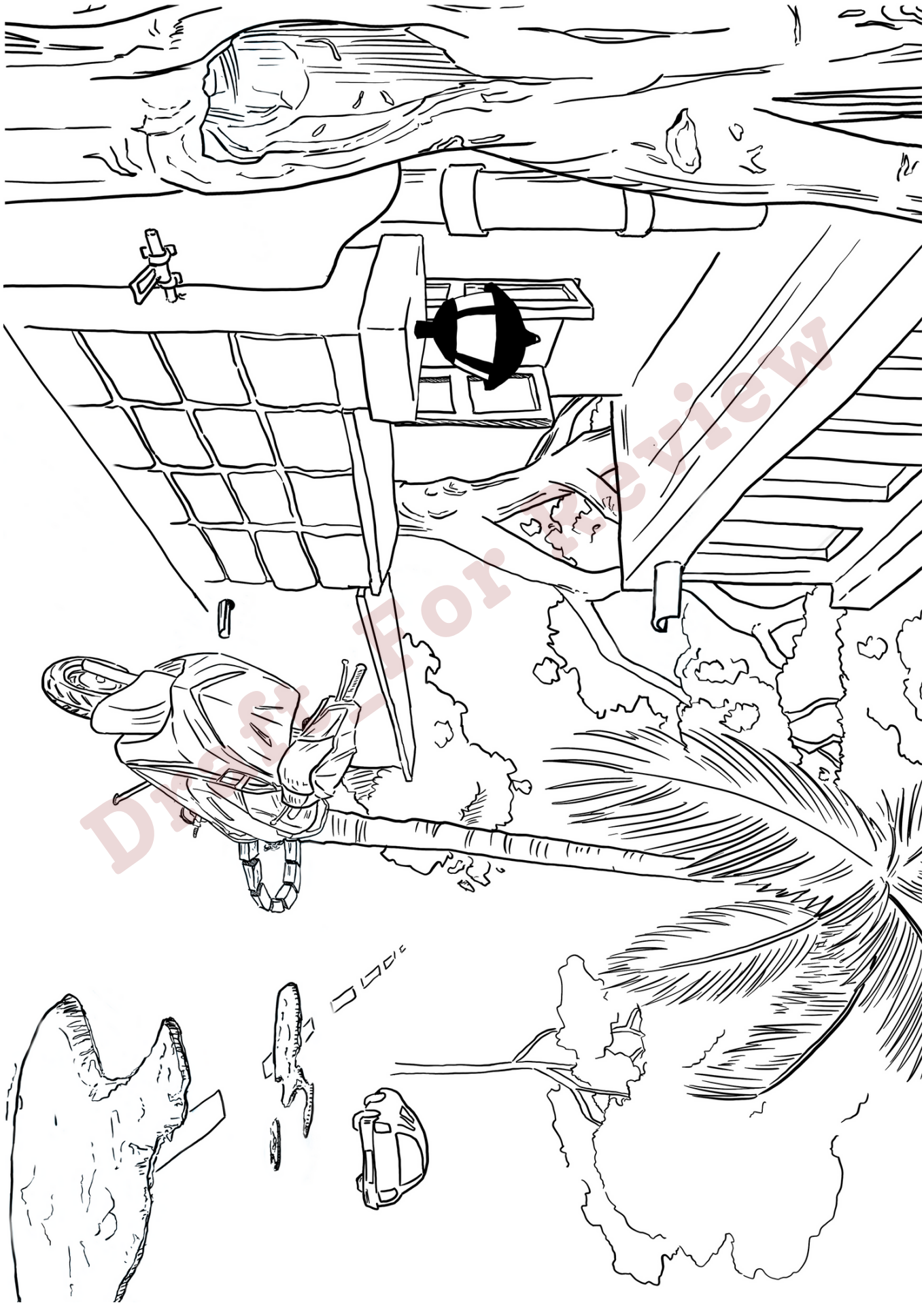
Notes/Reading Tips for the Teacher:

Read through the situation cards in advance and think about possible arguments that may come up in the discussion. You will need to be prepared to challenge the responses of the child to encourage thinking critically and deeply.

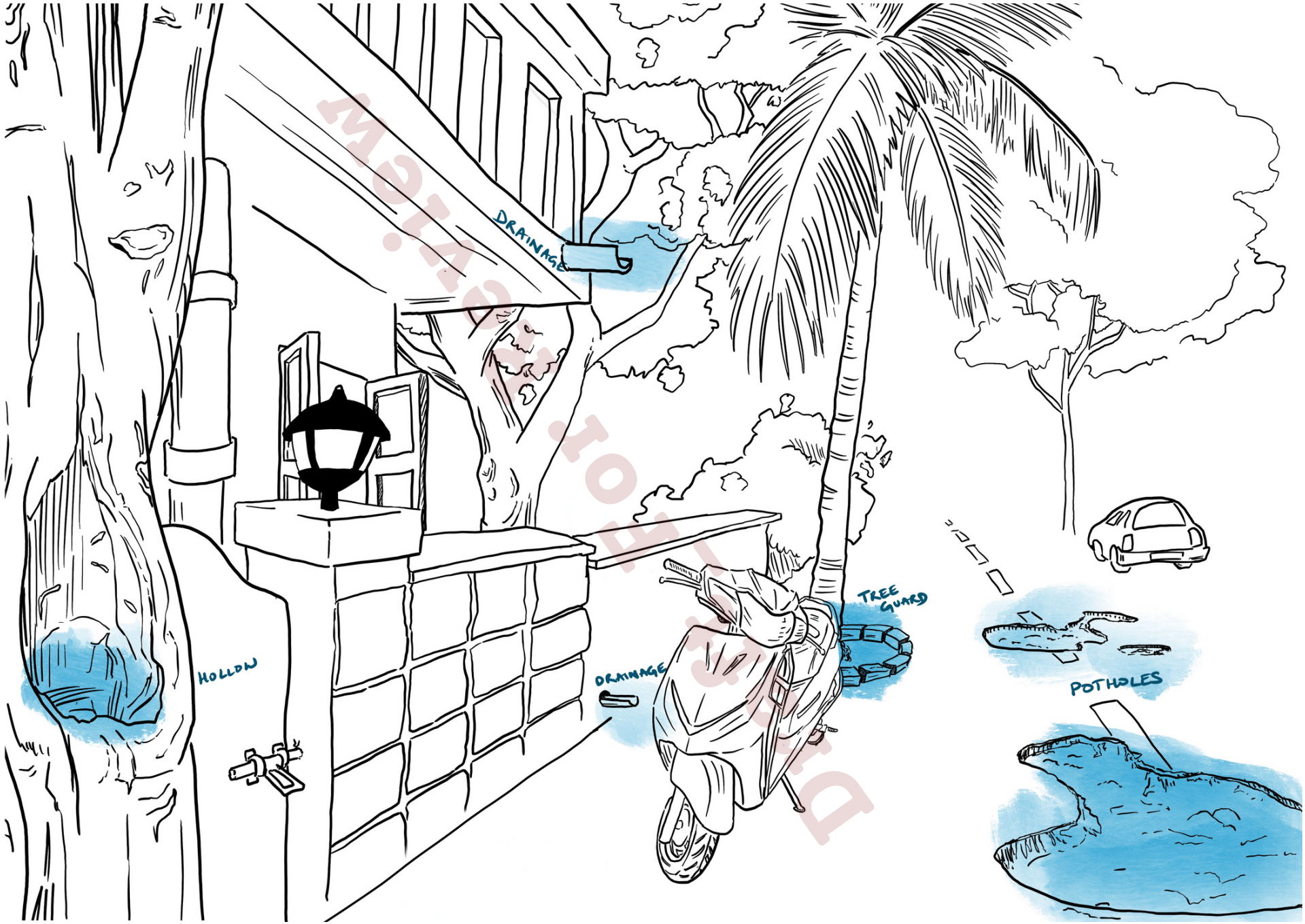
For e.g., one of the cards might read: A puddle has formed under a leaking tap. You notice that a dog comes by and drinks water there regularly. On closer look, you also find a tadpole in the puddle. If you fix the tap, you save the water and the puddle will quickly dry up. How would you decide what to do? Be prepared with arguments both for and against the act of fixing the tap so children may think deeply about the interconnectedness of the issue.

ACTIVITY: PLACES OF WATER

Colour / mark the places where you think water collects.



KEY: PLACES OF WATER



SITUATION CARDS

Cut-out the cards for use in the class. You may choose to hand over the cards to the children individually or in small groups or read it out aloud and discuss them one by one.

A leaky tap has created a puddle. Some tadpoles live there now. If you close the tap, you will save water but the puddle will dry up and the tadpoles will lose their home.
What will you do?

There is an entire world inside a puddle by the side of the road. All the animals living inside a puddle are talking. They are scared. Animals from the neighbouring puddle are screaming for help. They are saying 'it's coming!!' Slowly the shadow of a foot appears above them.
What happens next?

By the lake-side, a damselfly is very busy. She is sitting at the edge of a water-lily leaf and every few seconds, curving her tail onto the underside of the leaf. She is laying her eggs!! An adult nearby is getting ready to throw out their fishing string right about where the damselfly is.
What will you do?

A group of adults is setting out to go fishing! There is a place for just one more little one and they invite you in to join them. As they pull out the fishing net they had cast earlier, they see that several young fish have got caught in the net along with some fully-matured ones.
What do you think they will do?

A small pond by the road to school has a little patch of water-hyacinth. They bloom beautiful flowers. In a few weeks, half the pond will be covered by the water-hyacinth. If it is allowed to spread, all of the pond will be covered by it and several other creatures living in the water will struggle to survive with light and oxygen cut out. If the water-hyacinth is removed, so will the beautiful flowers be gone. What would you do?

4. Know your Ocean Creatures

Objective

Children will compare and distinguish between the different creatures living in varied water-bodies.

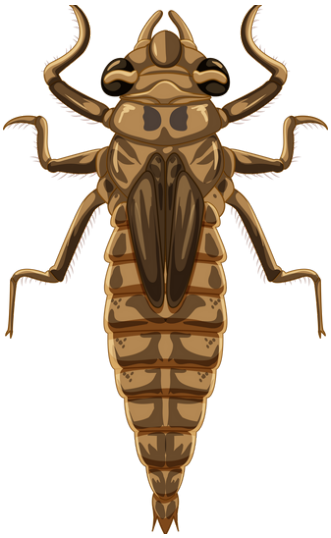
Lesson Plan

Gather the children and inform them that they are going to be learning about different creatures that call water-bodies their homes. Begin a conversation on what makes a place home- shelter from danger/harsh weather, place of safety, place of nourishment and food, family and community, etc.

1. Place all the **Creature-feature cards** on the floor with the picture side facing up. Ask the children how many of these creatures they can recognise. What do they know about these creatures?
2. Discuss in what ways each of these creatures make home in the water- what kind of water-body, do they live part of or their complete lives in water, what do they eat, any interesting features.
3. Divide the class in groups of 5 members each. Hold a quiz where you read out a feature and the groups have to guess the creature.

Independent Learning/HW:
Create your own Creature-feature cards with 5 creatures you have seen in water-bodies near your home. Children can conduct their own quiz with the Creature-feature cards they make and bring.

Creature Feature Cards



Creature Feature Cards

Who is it? - Mosquito Larvae
The life-cycle of a Mosquito is similar to the life-cycle of a butterfly ; Egg - larva - Pupa - adult
A female Mosquito lays eggs on the surface of water or around water-bodies. When the eggs hatch in about 2 days tiny, wriggling larvae come out.

Where is it found? - In stagnant water bodies like puddles, ponds, rainwater collected in containers.

What do they eat? - The larvae feed on microorganisms in the water. When the larva turns into pupa, it does not eat at all but stays just below the surface of the water to breathe. After a few days an adult mosquito emerges from the pupa.

Who is it? - Dragonfly Larvae (Nymph)
A female dragonfly lays eggs in or around water bodies. When the eggs hatch larvae, also known as Nymphs, crawl out. As the nymphs grow in size they undergo molting. In their last larval stage the nymph crawls out of water and breaks out of it's final molt to become an adult dragonfly.

Where is it found? - In freshwater bodies like ponds and lakes.

What do they eat? - The nymphs feed on mosquito larvae, small fish and larvae of other aquatic insects in the water. They have a specialized mouth part - a jaw that shoots out and grabs its prey!

Who is it? - Tadpoles
The young ones of frogs and toads are called Tadpoles.
When the eggs laid by a female frog hatch into larvae, they look nothing like a frog. The larvae have gills for breathing underwater and a flattened tail for swimming.

Where are they found? - In streams, shallow parts of ponds and lakes, pools formed in tree hollows and puddles formed by rains.

What do they eat? - Tadpoles feed on algae and other aquatic plants. As they grow they also eat insect larvae and dead animals in the water.

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Who is it? - Water strider (Pond skater)
Have you seen this cool insect that calmly stand on the surface of the water? Water striders can not only stand on water but also skate and hop on it!

Where is it found? - In freshwater bodies like ponds and lakes, mud puddles. There's also one kind that lives in the sea and is called Sea skater!

What do they eat? - Water striders are carnivorous. They eat aquatic insects like mosquito larvae and dead insects that fall in the water.

Creature Feature Cards

Creature Feature Cards

Who is it? - Marsh Crocodile (Mugger)
These crocodiles are identified by their broad snout. The females dig a hole on land and lays eggs in it. When the eggs hatch, the adult crocodile carries the hatchlings into the water, in it's mouth.

Where are they found? - In fresh water bodies like lakes and rivers as well as in brackish water of the mangroves.

What do they eat? -
Their diet includes fish, amphibians, waterbirds, reptiles and even mammals.

Who is it? - Skittering Frog
Greenish brown in colour, the skittering frogs get their names from skipping on water when disturbed or threatened.

Where is it found? - They are found in all kinds of waterbodies including wells, rock pools, ponds and paddy fields.

What do they eat? - Their diet is very varied. They eat insects, other amphibians, fish, worms, etc.

Who is it? - Fiddler Crab
Male Fiddler crabs are easy to identify due to a distinctive feature - Their one claw larger than the other. They use their dominant claw to attract females and fight with males.

Where are they found? - They are found in the mangroves and mudflats. They live in burrows made in sand and seal their burrows with sand/mud during high tide leaving just tiny pocket of air to breathe.

What do they eat? - Fiddler crabs feed on algae and also scavenge on detritus.

Who is it? - Sand Bubbler crab
Have you ever been to the beach and noticed patterns in sand? Tiny round balls of sand arranaged in patterns around a tiny hole? Meet the Sand Bubbler Crab!

Where is it found? - The are found on sandy beaches.

What do they eat? - These crabs have an interesting way of eating. They eat microscopic organisms in the sand by taking in morsels of sand into their mouth and filtering out the organisms from it. The filtered sand is brought out the mouth in the form of balls.

Creature Feature Cards

Creature Feature Cards

Who is it? - Common Kingfisher
The common Kingfisher is a small bird with bright plumage. Their head is greenish blue, back is pale blue and the front is orange coloured.

Where are they found? - Near freshwater bodies like rivers and lakes. They are also found near wetlands and mangroves and even found near canals and ponds.

What do they eat? -
They feed on fish and aquatic insects.

Who is it? - Asiatic Water snake (Checkered Keelback)
It is a non-venomous snake with yellow and black pattern on its scales, hence the name Checkered Keelback. The female comes out of water to lay eggs.

Where are they found? - In fresh water ponds, lakes, rivers, paddy fields, etc.

What do they eat? -
It is very well adapted for life in water and eats frogs, fish and crabs. The young ones eat tadpoles and water insects.

Who is it? - Mudskippers
Have you heard of fish that walk on land? Meet the Mudskipper. They are amphibious fish, adapted to living on land as well as in water. They have gills to breathe in water and when on land they breathe through the lining in their skin and mouth.

Where is it found? - In the mangroves and mudflats. During high tide they hide in their burrows.

What do they eat? - They eat algae, insects, worms, crabs and fish.

Who is it? - Indian Cormorant
The Indian cormorant is a water bird with a slender, hooked bill and blue eyes. It's black and brown in colour. They build their nests on trees near a waterbody.

Where is it found? - Near freshwater bodies like rivers and lakes. They are also found near wetlands and mangroves

What do they eat? -
Their webbed feet and their slender body make them expert swimmers and dive. Their meals mainly consist of fish and eels.

Creature Feature Cards

Creature Feature Cards

Who is it? - Olive Ridley Sea Turtles
These are the most abundantly found sea turtles. They get their name from the olive colour of their shell.

Where are they found? - In the warm waters of Pacific, Atlantic and Indian Ocean.

What do they eat? - They eat jellyfish, shrimps and crabs, sea snails. They occasionally eat algae and seaweed.

Who is it? - Mangroves
These are unique plants that are well adapted to growing in salty conditions with marshy soil. Different species of mangroves have different root systems that help them survive the tough soil conditions.

Where are they found? -
In the inter-tidal zone - the area where land and water meet. They grow in estuaries, creeks and bays where there is a mixture of salt and freshwater.

Who is it? - Common Octopus
The octopus is considered as one of the most intelligent animals. They have 8 arms with suckers on them. They act as fingers, nose and tongue and are used for touch, smell and taste!

Where is it found? - In the coastal marine waters. They prefer the rocky crevices of tidepools and coral reefs.

What do they eat? - They eat crabs and other crustaceans.

Who is it? - Seaweed
While Seaweed looks like a plant, it's not a plant. It is a kind of algae that is found floating in the ocean waters. However, just like plants they also prepare their own food using photosynthesis. Different kinds of animals like crabs, shrimps, sea slugs and fish use seaweed as shelter.

Where are they found? -
In the inter-tidal regions, shallow and deep waters of the oceans, estuaries and backwaters.

Creature Feature Cards

Creature Feature Cards

Who is it? - Water Lily
This is a freshwater, flowering plant.
Even though it looks like the plant is floating on water, it's roots are buried at the bottom of the pond or lake. The leaves of Water Lily, also known as lily pads have a waxy coating on them. And their flowers attract bees for pollination.

Where are they found? - In ponds and lakes.

Who is it? - Duckweed
Duckweeds are tiny, free-floating aquatic plants. They provide shelter for animals like frogs, fish and insects. Ducks like to eat this plant and that's where it gets its name from.

Where are they found? -
They are found in freshwater ponds, lakes and wetlands.

Who is it? -

Where are they found? -

What do they eat?

Who is it? -

Where are they found? -

What do they eat?

Creature Feature Cards

Who is it? -

Where are they found? -

What do they eat?

Who is it? -

Where are they found? -

What do they eat?

Who is it? -

Where are they found? -

What do they eat?

Who is it? -

Where are they found? -

What do they eat?

Creature Feature
Did You Know Cards

Mosquito Larvae

Did you Know?
The larvae swim just under the surface of the water and breathe though a tube-like (snorkel-like) organ called a siphon, located at the end of their abdomen.

Dragonfly Larvae (Nymph)

Did you Know?
The nymphs breathe underwater with the help of gills that are located in their butt!

Tadpoles

Did you Know?
Tadpoles undergo a process called metamorphosis. As they grow bigger they start developing limbs. Their hind legs develop before their front legs. They loose their gills and develop lungs to breathe on land. Almost all their organs undergo a change to prepare them for life on land .

Water strider (Pond skater)

Did you Know? Their legs have tiny hair on them that helps them stay afloat. Their legs can also sense ripples in the water caused by other insects, and that's how they catch their prey.

Marsh Crocodile (Mugger)

Did you Know?
A crocodile cannot stick it's tongue out! It's tongue is held in place by a membrane. We also often see the crocodile basking in the sun with it's jaw open, it does so to release heat and cool down.

Skittering Frog

Did you Know?
These frogs are seen floating in water and can do everything including catching a flying insect to finding a mate while floating in water.

Creature Feature
Did You Know Cards

Fiddler Crab

Did you Know? During a fight between 2 male fiddler crabs if one looses it's dominant claw, it's small claw will grow into a dominant claw. And a small claw grows in place of the broken claw.

Sand Bubbler crab

Did you Know? - They live in burrows in the sand and during high tide, they cover their holes with burrows to prevent water from going it.

Common Kingfisher

Did you Know? They dive into the water to catch their prey and bring it back to their perch. Holding the prey in their beak they beat it a few times on the perch and then swallow it.

Mudskippers

Did you Know? Mudskippers move on land and can also climb trees using their specially adapted fins.

Asiatic Water snake (Checkered Keelback)

Did you Know? When threatened these snakes flatten the skin of their neck and raise their head like cobras to frighten their predators.

Indian Cormorant

Did you Know? A common sight we come across is finding a cormorant perched on a rock or a branch half submerged in water, with it's wings open. They do this to dry their wings after a swim.

Creature Feature
Did You Know Cards

Olive Ridley Sea Turtles

Did you Know? In an annual event called *arribada,* thousands of adult female Olive Ridley turtles travel large distances to return to the same beach they were born in, to lay eggs.

Common Octopus

Did you Know? Octopus have cool ways of hiding or escaping. Their body has special cells that help them camouflage to their surroundings. And when threatened they squirt out black ink to confuse their enemy.

Mangroves

Did you Know? Mangroves are important habitats that act as nurseries for young fish and other marine animals. They are also very important because they guard our coasts against soil erosion and natural disasters like tsunamis.

Seaweed

Did you Know? Seaweed and other algae produces around 70% of the world's oxygen. It also helps reduce pollution by absorbing CO2 from the atmosphere.

Water Lily

Did you Know? The floating leaves, known as lily pads provide shade and hiding places for fish, snakes, and other animals. Frogs and water birds like Jacanas use them for resting and walking on them.

Duckweed

Did you Know? This plant is known to filter contaminants from the water, thus helping in keeping the water clean.

5. Building a Water-Terrarium

Objective

Children will build, maintain and observe a Water-Terrarium.

Lesson Plan

Gather the children and inform them that they are going to be creating an artificial water-ecosystem within their school premises. Ask what they hope will happen with this water-body. Will it survive for a long period of time? Will it support any life-forms? What will they need to keep in mind while building it?

Use the instruction sheet and guide the children on building a Water-Terrarium. This can be done in small groups of 4-5, with each group making their own terrarium.

Things to discuss:

- What plants can they put into the terrarium?
- Can there be animals or insects in the terrarium?

Assignment/Assessment:

Hand over the responsibility of the safe-keeping and maintenance of the Water-Terrairum to small groups of children (4-5) per week and they could share their observations at the end of the week with the rest of the class.

Notes/Reading Tips for the Teacher:

Make sure to gather all necessary items/material to build the Water-Terrarium prior to the session. It might be useful to create one as a model to show the children before they begin building one for the class.

BUILDING A SEMI-AQUATIC TERRARIUM

A terrarium is a micro-ecosystem. It is usually a closed glass container containing soil and plants. The glass container helps trap heat and maintain humidity within the container. Terrarium can also be open to the atmosphere.

Things you will need:

- A glass container (a bottle, a fish-bowl, a large bowl with a small mouth)
- Small stones, pebbles or gravel. Children can collect these from near the school if available.
- Soil. A layer of mud or sand from the school surroundings.
- A few water-plants. If there is a water-body close by, pick a few plants with roots. If not, some options are- money plant, ferns, moss, water-hyacinth.
- Plain forceps.

Building the Terrarium:

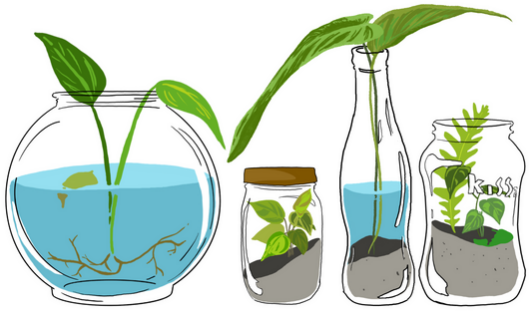
- Clean out the glass-container with a dry-cloth so the surface is clear. Add a first layer of gravel/pebbles/small stones. You can add it as a uniform layer or a sloping layer.
- Add a thin layer of soil. You can choose to leave some parts with the gravel layer exposed if your container is large.
- Carefully place the moss, if available. Then add the plants. You can use the forceps to place them as the mouth of your container may be small.
- At this step, you may choose to add any aesthetic element such as shells if found nearby.
- Add water to the container. Depending on which plants you have picked for your terrarium, you can either fully submerge the plants in water or fill it just below the leaf surface so the roots and stems are submerged leaving the leaves floating.

Maintaining the Terrarium:

- If you have built a closed terrarium, keep it away from direct sunlight. Not all plants survive in a closed terrarium atmosphere. Observe your terrarium closely and remove the lid if you see that the plants are wilting or yellowing.
- If you have built an open terrarium, check for mosquito larvae occasionally. You may need to add water as and when the desired level of water reduces owing to evaporation.

Extra Resources:

Small Terrarium with Aquatic Plants - Video Tutorial



6. Understanding Properties of Water

Objective

Children will experiment and examine some properties of water.

Lesson Plan

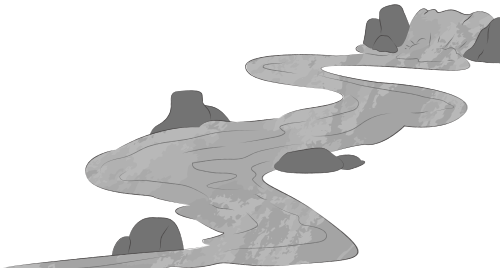
Gather the children together and inform them that they are going to be conducting an experiment and watching a video to understand water. But before that, ask if they have observed any large water-bodies such as an ocean, lake or the sea. Ask if they have observed the colour of the water and what they can recall of it.

Experiment: Have two glasses of water, half-filled. In one glass, had a table-spoon of salt and mix in turmeric powder to give it a bright yellow colour. Now, slowly pour in this glass of water into the un-coloured glass of water.

Things to discuss:

- Ask the children what they think will happen when the water is poured into the other.
- Why does the yellow water not immediately mix with the clear water?
- Density of salt and freshwater.
- What might happen when river and ocean water meet?

Watch the following video to note how this plays out in the meeting of different oceans in the world.



7. How do Aquatic-creatures Breathe?

Objective

Children will watch videos and observe an experiment to learn different ways animals breathe underwater.

Lesson Plan

Use the **Anchor Chart** and ask children to point out the creatures there that breathe underwater and those that breathe above water. What are the organs that each of these creatures are using to breathe? (nostrils vs gills). Is there any creature that is able to breathe both in and outside water? (frog- nostrils above water and skin underwater)

Introduce the working of the gill in fish. Use the 'How do Gills Work' instruction sheet and conduct the experiment in class.

- Talk about the operculum (gill cover), gills and the absorption of oxygen by the gills and releasing of carbon dioxide.
- Talk about how tadpoles have gills, but when they grow into frogs, they lose their gills as they know more live only underwater.

Discuss about creatures holding their breath when diving into water- birds like kingfishers when catching prey underwater, whales and dolphins. Ask the children to guess how long they think some of these creatures can hold their breath underwater- humans, whales, tortoises, kingfishers, etc. Watch the following videos to engage further:

- **Video:** How do whales and dolphins breathe?
- **Video:** How long can animals hold their breath?

WATER ANCHOR CHART

How do gills work?

(Experiment)

Requirements - 2 glass jars or beakers, a coffee filter, a hair tie, water, a spoon, and some fine mud (or coffee powder)

Process

Step 1 - Fill one glass jar (or a beaker) with some water

Step 2 - Think of the mud or the coffee powder in our experiment as oxygen. Take 2 spoonfuls of the mud and dissolve it in the water. The dissolved mud is like dissolved oxygen in water.

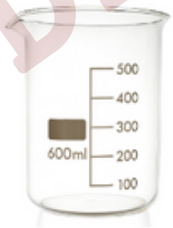
Step 3 - Take the other empty glass jar and place the coffee filter on top of it. Make sure the filter is fitted well at the mouth of the jar with a hair tie so that it doesn't fall inside the jar. The coffee filter represents the fish's gills.

Step 5 - Pour the muddy water over the filter into the empty jar.

Step 6 - Observe the coffee/ mud that's collected by the filter.

Observation

When fish breathe, they take in water through their mouth. Just like the dissolved mud in the water that gets trapped by the filter, dissolved oxygen in the water is gets absorbed by the gills of the fish. This oxygen is then carried by the blood in the gills to different parts of the fish's body.



Beaker

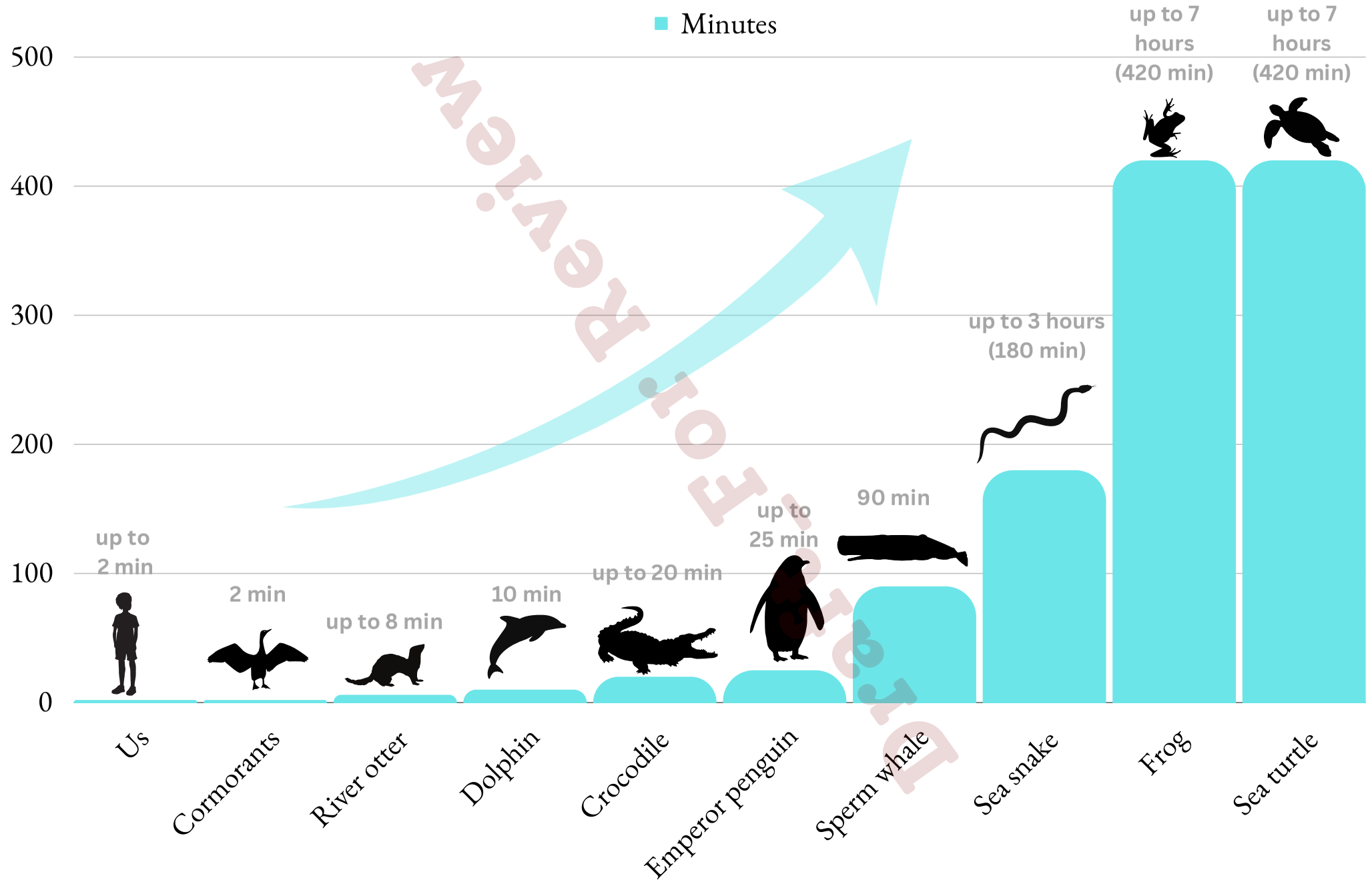
Coffee Filter

Coffee/ Mud dissolved in water

Place the coffee filter on top of the beaker and pour the brown water over it.

The filter acting as gills absorb the dissolved oxygen (coffee) in the water

FOR HOW LONG CAN YOU HOLD YOUR BREATH?



8. Understanding how Creatures move Underwater

Objective

Children will create origami water-creatures and identify the parts of the body used for movement.

Lesson Plan

Children enact how different things move- humans, birds, cats, horses, snakes, bees, frogs, trees, fish. Now, enact how creatures move in water- humans, birds, snakes, fish, crabs.

Divide the children into small groups of 2-3 in each. Each group watches the video tutorial and makes one of the origami creatures. If this is difficult to organise, make larger groups and each group makes 2 or 3 of the origami creatures.

- Once completed, ask the children to identify the organs the creature might use to move in the water. Name the organs as they point it out.
- Links to video tutorials for making different origami sea creatures in the 'Notes' section (next page).

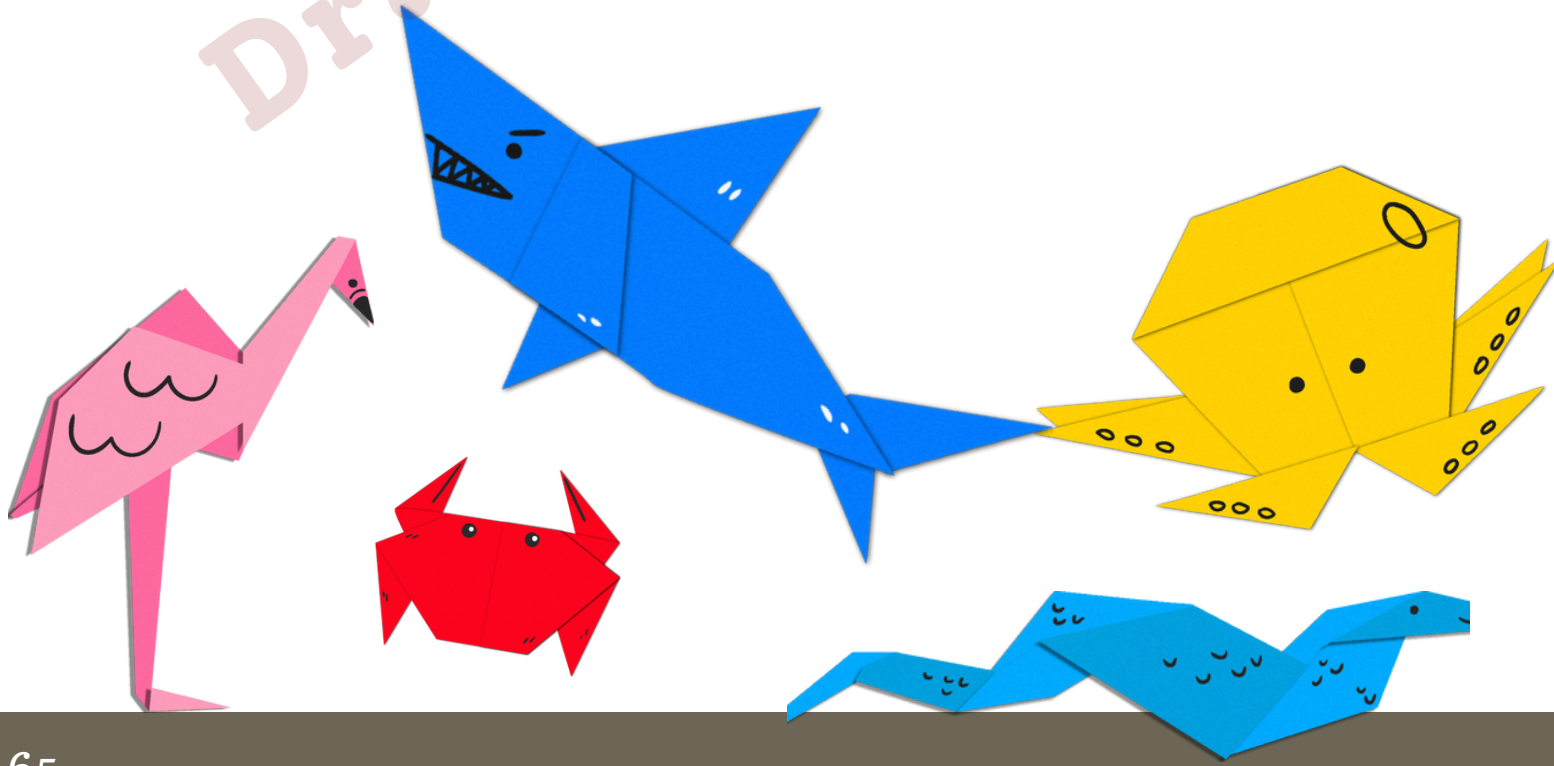
Use the **Animal and Appendages** cards to match the aquatic animal to its appendage and discuss how each uses them to move in water.

Notes/Reading Tips for the Teacher:

- It will be useful to make a few samples of origami creatures to show to the class when they begin.

- Make sure to keep origami paper ready and enough phones/tabs for each group to watch the video tutorial. If this is difficult, use one phone/tab and the entire class follows one tutorial at a time and creates as many origami creatures as possible.

- Origami Sea Creatures (video tutorial links):
  - Stingray
  - Shark
  - Fish
  - Duck
  - Frog
  - Sea Lion
  - Dolphin



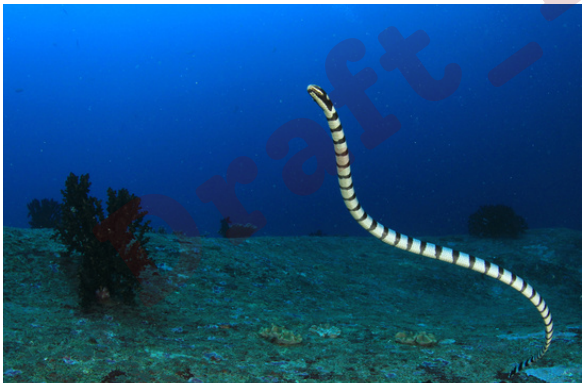
ANIMAL APPENDAGES

Fish

Fins

Frog

Webbed Feet



Sea Snake

Paddle Tail

Turtle

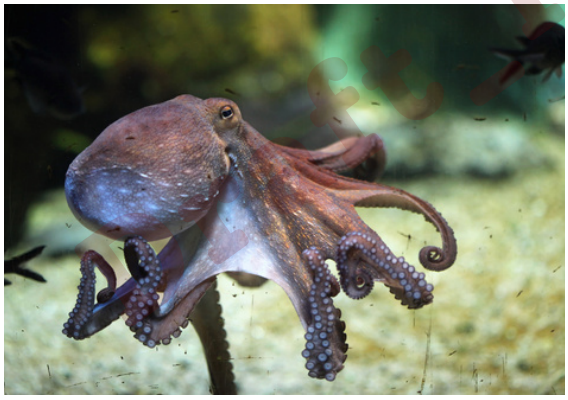
Flippers

Duck

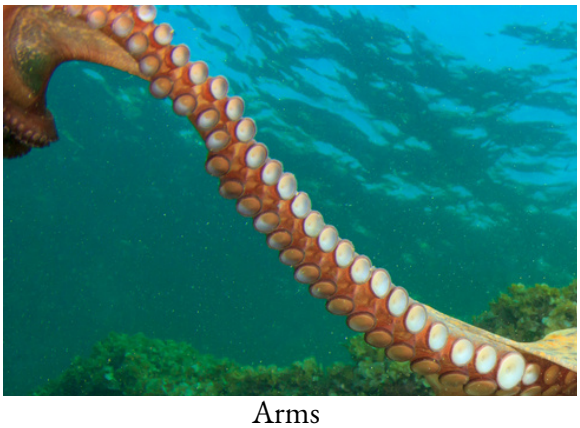
Webbed Feet

Starfish

Tube Feet



Octopus



Arms

Sea Snail

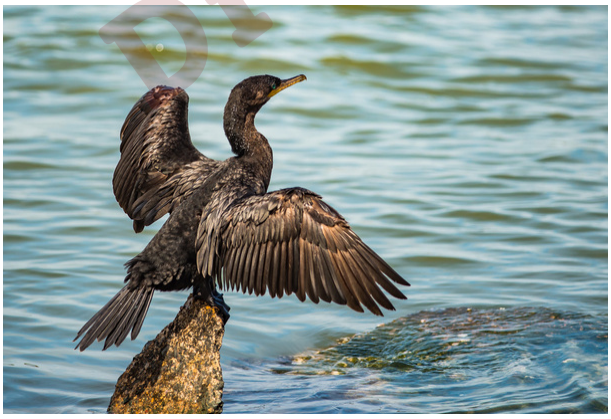
Muscular Foot

Crab

Legs

Water Scorpion

Legs



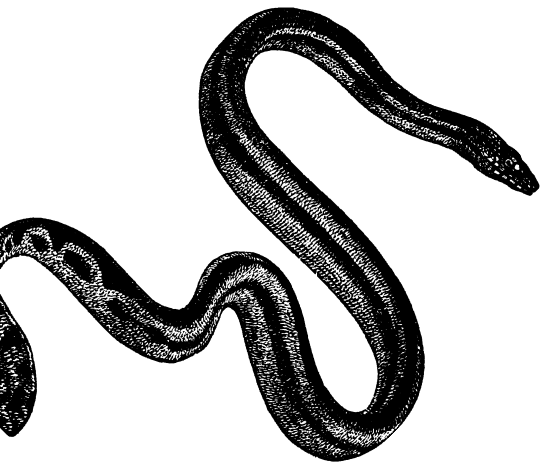
Cormorant

Wings

Webbed Feet

Key - Animal Appendages

- Fish - Fins
- Frog - Webbed Feet
- Sea snake - Paddle Tail
- Turtle - Flippers
- Duck - Webbed Feet
- Starfish - Tube feet
- Octopus - Arms
- Sea Snails - Muscular foot
- Crab - Legs
- Water Scorpion - Legs
- Cormorant - Wings and Webbed Feet



9. Movement in and out of Water

Objective

Children will watch videos and discuss how aquatic animals move in different ways underwater.

Lesson Plan

Ask the children different ways creatures can move and cannot move: Can trees walk? Can humans fly? Can frogs swim? Can birds run? Can ants jump? Can fish fly?

Watch the video on Flying fish and Diving birds

- Puffin Bird Diving and Torpedo Gannet Diving
- Discuss about how body parts evolved to enable these specific movements (fins of the fish that could become wings, long beaks of the bird that support and deep-dive).

Watch the video on Dolphins using echolocation.

- Discuss first about how one would move if they can't see very clearly; for e.g., in the dark (stretching limbs out to feel for obstacles). How might fish that can't see very clearly in water move? How might sound help in locating obstacles?

Notes/Reading Tips for the Teacher:

- Video: Flying Fish
- Video: How do Dolphins use Echolocation
- Video: Puffin Bird Diving
- Video: Torpedo Gannet Diving
- Resource: How do Marine Animals use Sound

10. The Cormorant who was Scared of Water

Objective

Children will listen to a story to learn about the special adaptations of water birds.

Lesson Plan

Open a conversation on birds in water- have the children observed how birds move in the water? What colour birds have they seen in the water? How are the birds keeping their feathers clean and dirt free? How come the birds aren't soaking wet when they are in the water all day or even in for just a dive? What happens to our bodies when we take a dip in the water? Have they ever seen a bird dive into the water, what have they observed about how their bodies are when they dive (how are their feet placed, their wings, etc).

Read aloud the story 'The Cormorant who was scared of Water'. If possible, do so at a lake or water-body close by where cormorants are commonly spotted. Observe their behaviour before reading out the story.

If sitting out, at the end of the story, observe and make a sketch of the cormorant perched with its wing outstretched. If not, encourage the children to draw from imagination what the cormorant or a group of them may look like, all perched with their wings outstretched after a dive.

THE CORMORANT WHO WAS SCARED OF WATER

Have you heard of the cormorant who was scared of water? Cormorants are birds that live near water bodies and are known for their extraordinary diving and swimming abilities. But Kuki, the cormorant, was different.

Kuki was an Indian Cormorant with black and brown feathers, blue eyes, slender, yellow bill and webbed feet. She lived near a beautiful wetland area. These wetlands were home to a lot of different birds, including Kuki's best friend Ruddy. Ruddy was a duck. Kuki loved sitting on her favourite perch, just near the edge of the water body chatting with Ruddy. Unlike other cormorants her age, Kuki was still being fed by her parents. She knew that soon she would have to start catching fish for herself. But she just didn't know how. She was terrified of water!

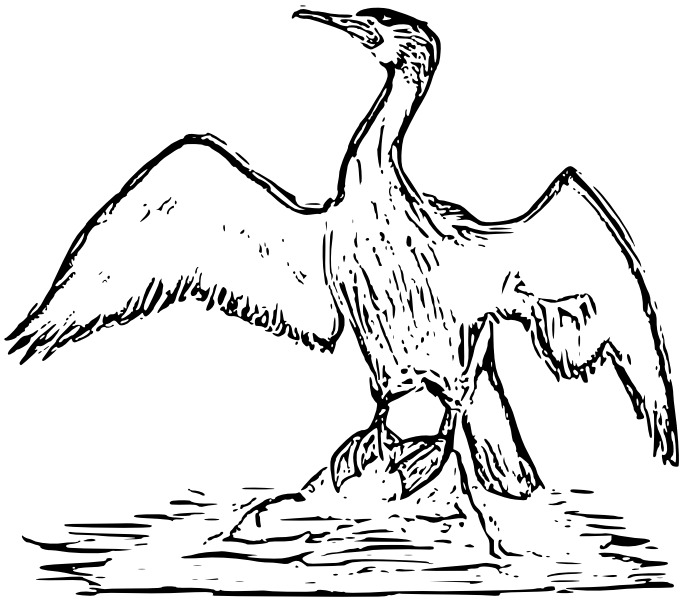
She always admired Ruddy's ability to wade and swim so effortlessly in the water. She adored the water-proof feathers of the duck that helped it stay dry. She had learned from Ruddy that ducks have special oil glands in their body that help to keep their feathers water-proof. Unfortunately, cormorants don't have these oil glands. The thought of having wet feathers made Kuki shiver with fear. Every now and then when she saw other birds enjoying themselves in the water she would be tempted to dive in but her fear always held her back.

One day, while she was resting on her favourite perch, she heard a plop in the water. She looked at the water and saw that a baby crow had fallen in from the nest above her perch. She looked around to call for help but it was a quiet afternoon. Neither her parents nor the baby's parents were in sight. Even Ruddy was nowhere to be seen.

THE CORMORANT WHO WAS SCARED OF WATER

She looked back at the baby crow who was panicking and flapping its wings frantically. She realised she had no choice but to get into the water and save the baby. She took a deep breath and dived into the cool water. As soon as she hit the water, she knew she was home. Her body relaxed, swimming felt as natural to her as breathing. She opened her eyes and saw the baby crow slowly sinking down. Like a fish in water, she swam towards the baby with smooth, elegant moves. Swooping down, she caught the baby in her beak and brought it back to the surface of the water. As soon as they came up to the surface, she heard a commotion. The crow's parents were circling the lake, cawing and asking for help, Kuki's family was cheering for her, and Ruddy was quacking loudly and wading towards them. But Kuki flew out with the baby and put her back in the nest. The crow parents thanked Kuki and held the shivering baby under their dry wings in a warm embrace.

Kuki flew back to her favourite perch, where Ruddy and her parents were waiting for her. They couldn't stop praising Kuki for her bravery. Kuki was embarrassed with all the attention she was getting but she was also secretly proud of herself for getting rid of her fear. The only thing she was unhappy about was her wet wings. Her parents ask her to open her wings wide. She did as she was told and instantly felt the warm sun on her back and a gentle breeze fanning her wings. It felt so good she wondered why she hadn't been doing this all along!



11. Do Creatures talk to each other Underwater?

Objective

Children will use audio-visual means to explore ways in which fish use sounds to communicate underwater.

Lesson Plan

A sound exercise- ask the children to come up with a sound/musical note that they'd give to themselves. If they had to use this sound instead of their name, what'd it be? Can they come up with as many unique sounds as there are children?

Introduce how dolphins have been found to have unique calls for each individual. The adult calls out to the young with a unique combination of sounds.

Things to discuss:

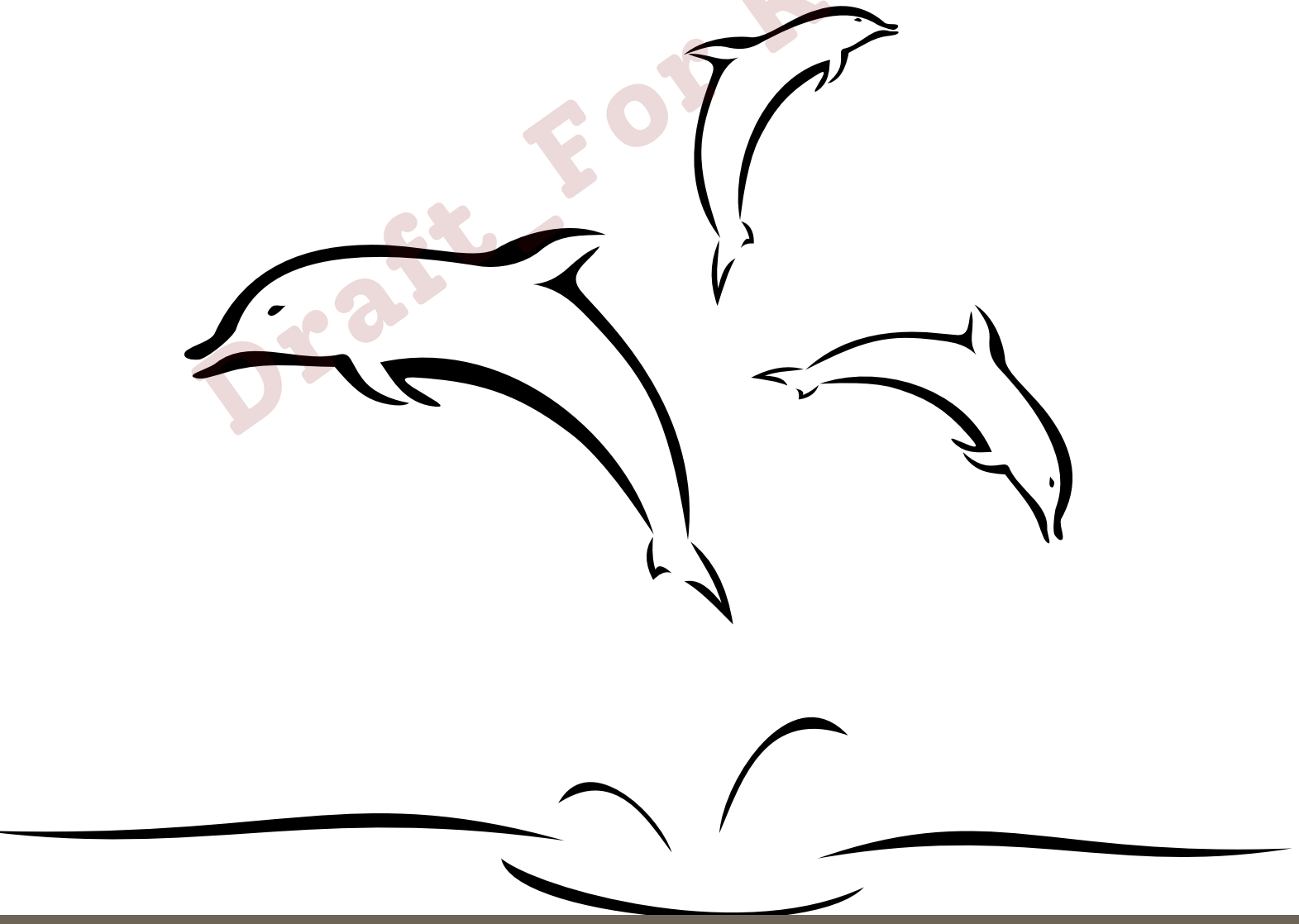
- Dolphin whistle and whale song
- Echolocation
- Chemical signals and info-chemicals (read link below for information)
- Impact of human noise on communication underwater

Notes/Reading Tips for the Teacher:

Resource: How do fish talk to each other?

Notes/Reading Tips for the Teacher:

- Video: Why do Whales Sing
- Video: Encrypted Communication with Dolphins
- Video: Dolphin expresses Emotion through Sounds
- Video: Fish Sounds: Do fish talk to each other?



12. Understanding the Aquatic Food-web

Objective

Children will observe and discuss food-webs with the help of an anchor chart.

Lesson Plan

Begin a discussion on creatures that can be observed in and around the school premises- birds, insects, dogs, cows, humans, frogs, etc. Write down all these names on the board. What do each of these creatures eat? Draw a line connecting two creatures if they have a prey-predator relationship and add others as they come up. E.g., frog to insect, cow to grass, bird to insect, human to bird, bird to frog, etc.

Display the **Forest part of the anchor chart**. Ask the children to call out the food chain within it. And then contrast it with the Coral Reefs chart. Can they see a similar food-chain and food-web here? Point out to the different connections within the chart.

Things to discuss in both charts:

- Who eats whom
- Who gets eaten by many others?
- Which creature is not eaten by any?
- What happens if any creature in the food-chain is missing?
- What are the similarities in forest and coral reefs in the way food chains emerge? Are there differences?

OCEAN AND FOREST ANCHOR CHART

13. Do fish take a bath to keep clean?

Objective

Children will listen to a story and watch videos to understand how fish clean themselves in the ocean.

Lesson Plan

Begin a discussion on observations children have made of how animals keep clean. Do they take a bath? Some prompts could be: Why do cats lick themselves? Why do birds sometimes look like they are pecking themselves (preening) ? Why do horses roll in dust?

Do fish in the ocean need to clean themselves? Since they live in water, do they ever get dirty? Without hands like humans or a tongue like cats, how do they clean themselves?
Watch the two videos: Reef Cleaning Stations and Manta Ray Cleaning Stations.

Things to discuss:

- Do cleaner fish get eaten by the bigger fish they are cleaning?
- What happens if a cleaner fish bites the bigger fish when cleaning?
- What are the different types of creatures that need cleaning in the ocean?
- What is the food-chain here at cleaning stations?

Children could imagine and illustrate what an 'Ocean Parlour' could look like with cleaner fish and big fish coming in as clients.

Notes/Reading Tips for the Teacher:

- Video: Reef Cleaning Stations
- Video: Manta Ray Cleaning Station
- Whale Poop helps keep our Oceans Alive : extra reading that could be weaved into the discussion.

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Recommended Citation: Learning Module on Aquatic Ecosystems. Nature Classrooms. Nature Conservation Foundation. 2024