

EXPLORING LIFE IN WATER

Learning Module on Aquatic Ecosystems



Team

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MODULE DEVELOPMENT PROCESS

INITIAL FRAMEWORK AND BRAINSTORMING



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

1

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.



RESOURCE TRIAL

5



4

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.



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

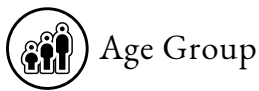
The guide has been divided into three levels. Each level has been designed for children belonging to specific grades and age groups. In each level, there are two major topics with relevant sub-topics covered under each of them. Each level has been designed with an aim to achieve a series of nature learning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



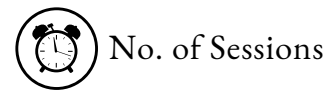
Levels



Grades



Age Group



No. of Sessions

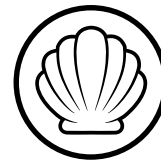
Where can we find water?



Monsoon Water

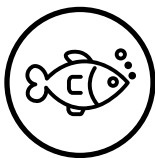


Homes in Water

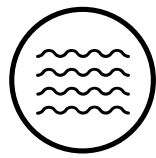


Water in the Ocean

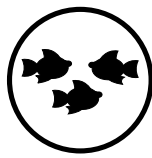
Life in Water



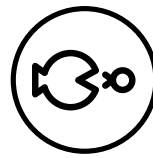
Breathing in Water



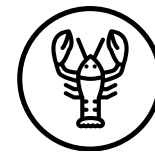
Movement in
Water



Communicating
in Water



Feeding in
Water



Defence in
Water



Resting in
Water

Nature Learning Goals



Wonder



Curiosity



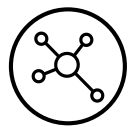
Observations



Fun



Reasoning



Making
Connections



Asking Why?



Interconnections



Building
Micro-



Documentation



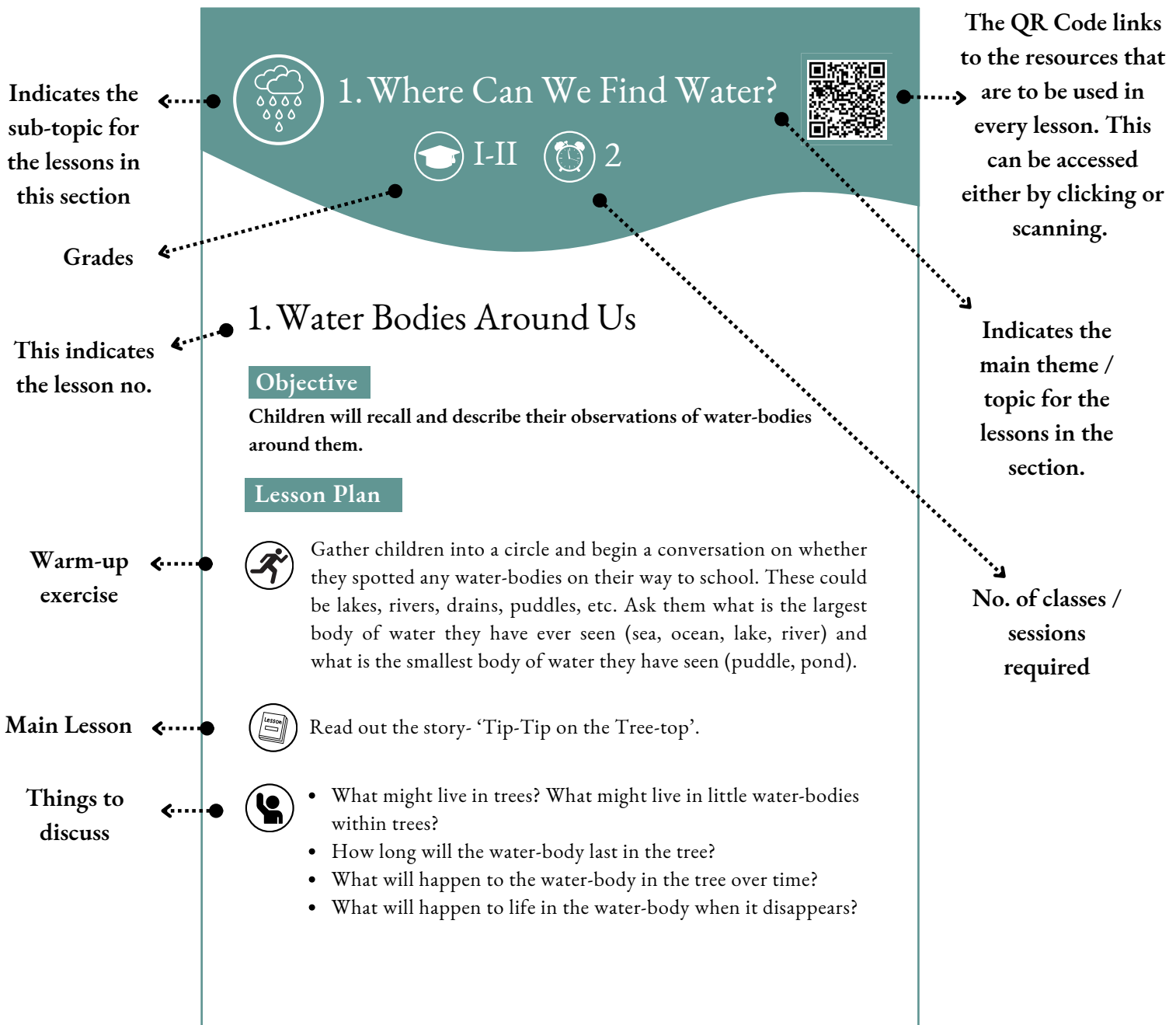
Community
Learning

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	<p>Where can we find Water</p> <ul style="list-style-type: none"> • Monsoon Water - 2 lessons • Homes in Water - 3 lessons <p>Life in Water</p> <ul style="list-style-type: none"> • 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	<p>Where can we find Water</p> <ul style="list-style-type: none"> • Monsoon Water - 2 lessons • Homes in Water - 2 lessons • Water in the Ocean - 1 lesson <p>Life in Water</p> <ul style="list-style-type: none"> • 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	<p>Where can we find Water</p> <ul style="list-style-type: none"> • Monsoon Water - 2 lessons • Homes in Water - 3 lessons • Water in the ocean - 1 lesson <p>Life in Water</p> <ul style="list-style-type: none"> • 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



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)



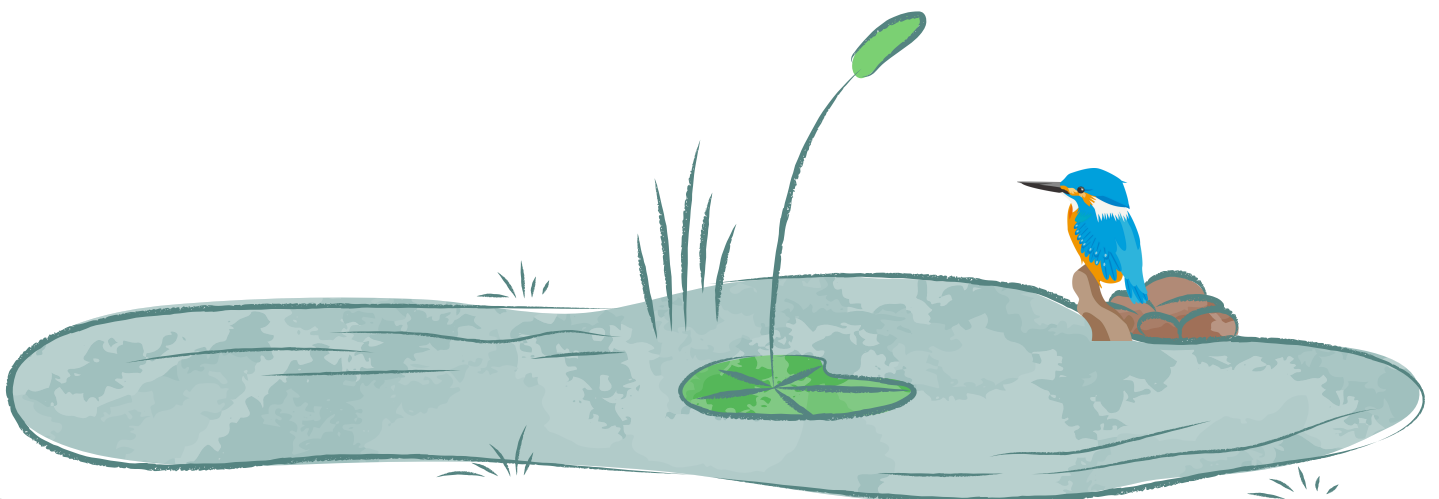
BREATHING IN WATER (1)



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. Where Can We Find Water?



I-II



2

1. Water Bodies Around Us

Objective

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

Lesson Plan



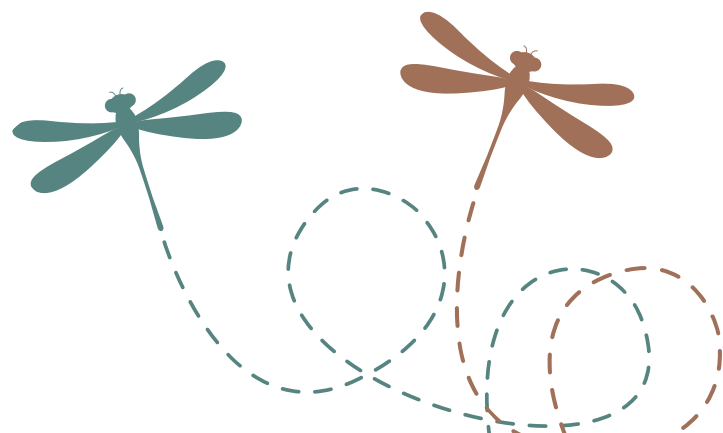
Gather children into a circle and begin a conversation on whether they spotted any water-bodies on their way to school. These could be lakes, rivers, drains, puddles, etc. Ask them what is the largest body of water they have ever seen (sea, ocean, lake, river) and what is the smallest body of water they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





1. Where Can We Find Water?



I-II



2

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.





1. Where Can We Find Water?



I-II



3

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:

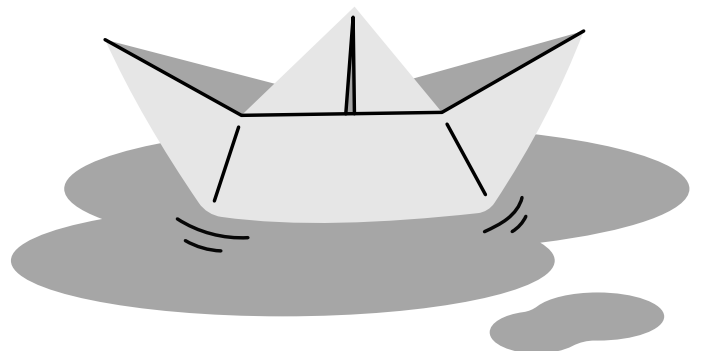
- Where does the water come from in the places that they marked? Is it monsoon water? Drains? Streams? Tap-leakage?
- Can life-forms live in these water-bodies? Will these water-bodies last long periods of time?



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?





1. Where Can We Find Water?



I-II



3

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.





1. Where Can We Find Water?



I-II



3

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.





2. Life in Water



I-II



1

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.



2. Life in Water



I-II



1

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.





2. Life in Water



I-II



1

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.

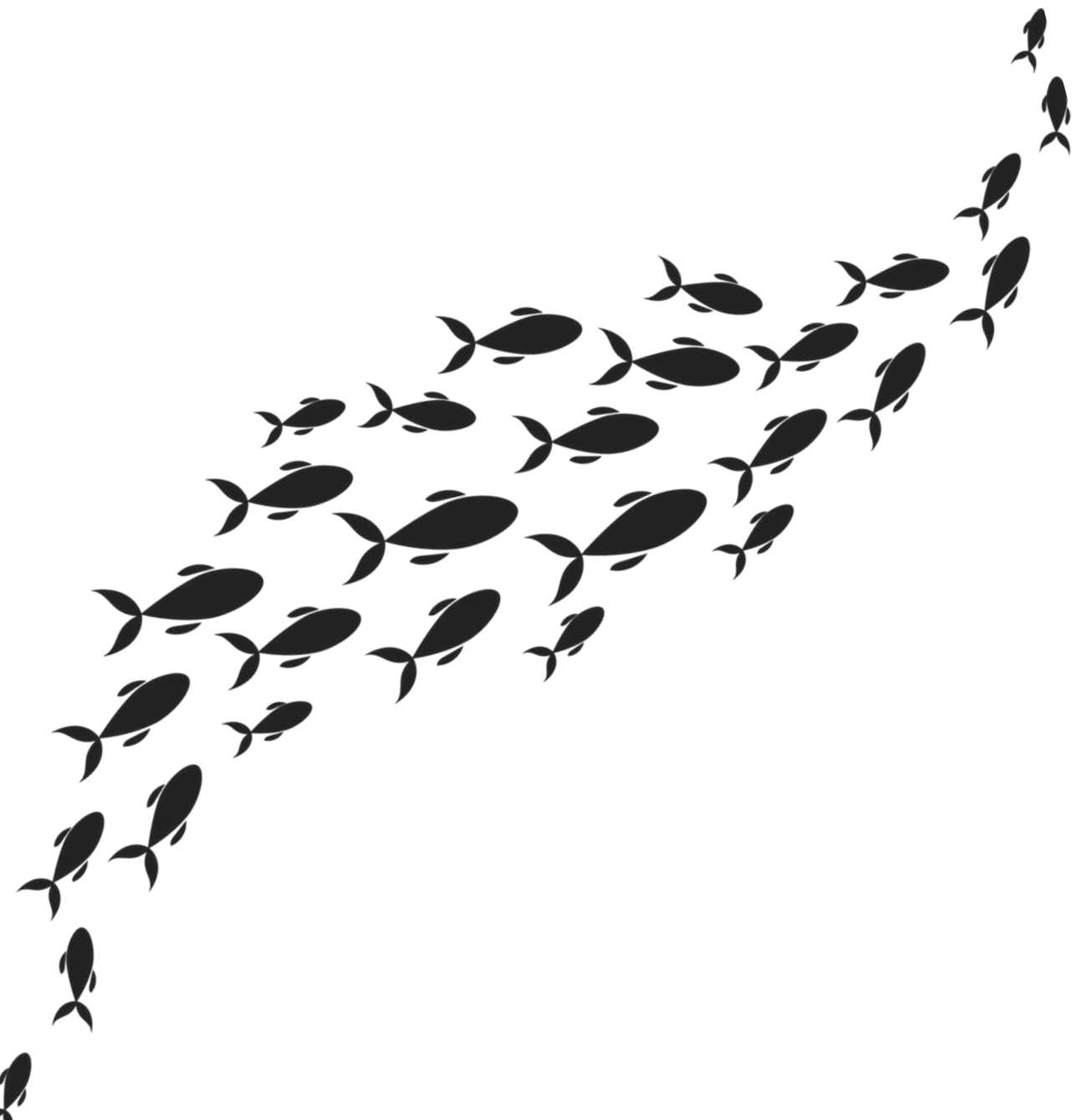


When the children are up, ask them if they were asleep. Did they feel relaxed however, and rested? What functions of their body were still active in this state of rest (breathing, internal functions- digestion, circulation, etc.)? What functions of their body were restricted (movement, speech, vision,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





2. Life in Water



I-II



1

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,)



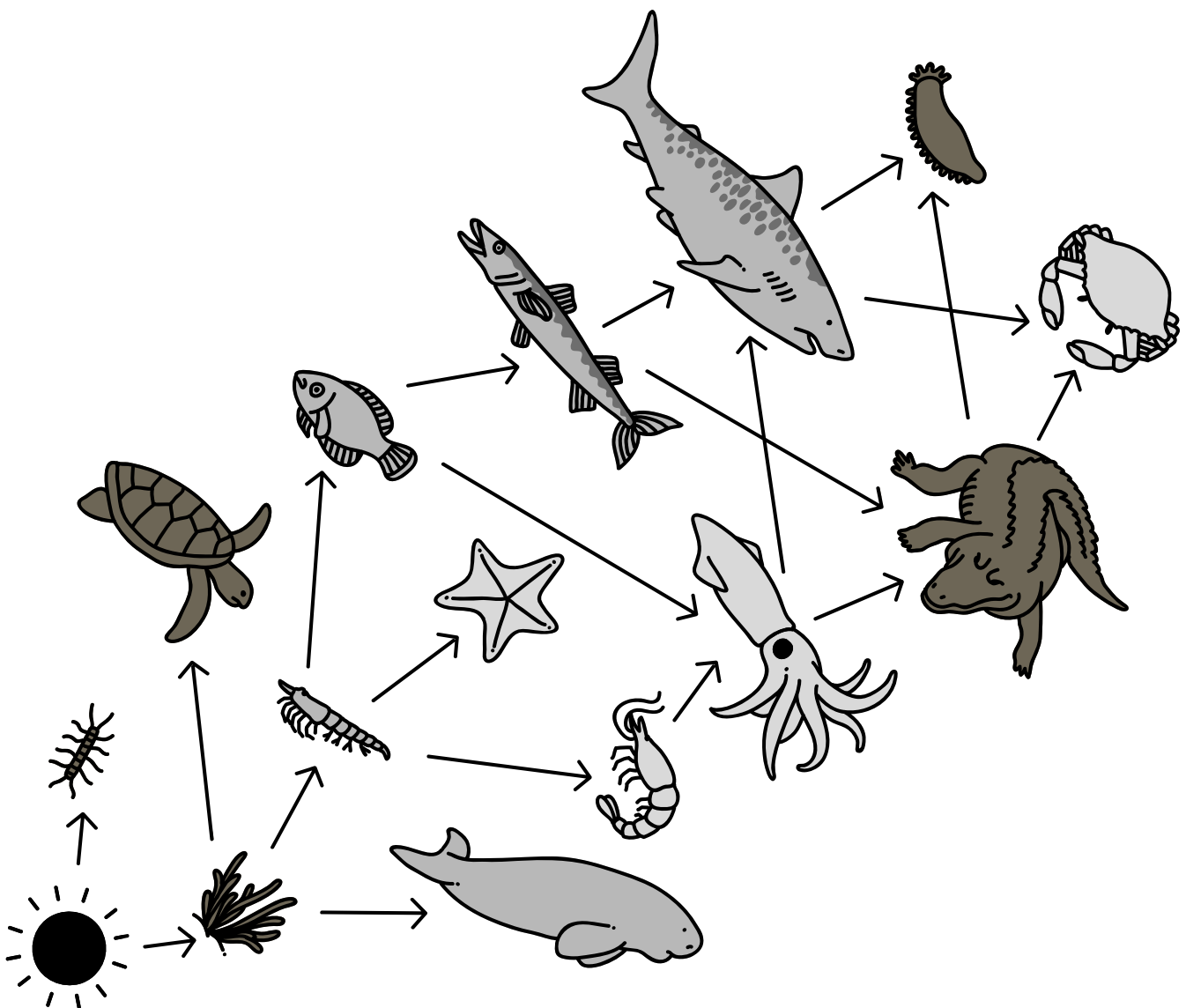
Introduce the idea of a food-chain, using the warm-up conversation to illustrate it. How might this food-chain play out in an ocean, river or lake? What are the different things fish can eat in the water? Are there other animals, in addition to fish in water?

- 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





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)



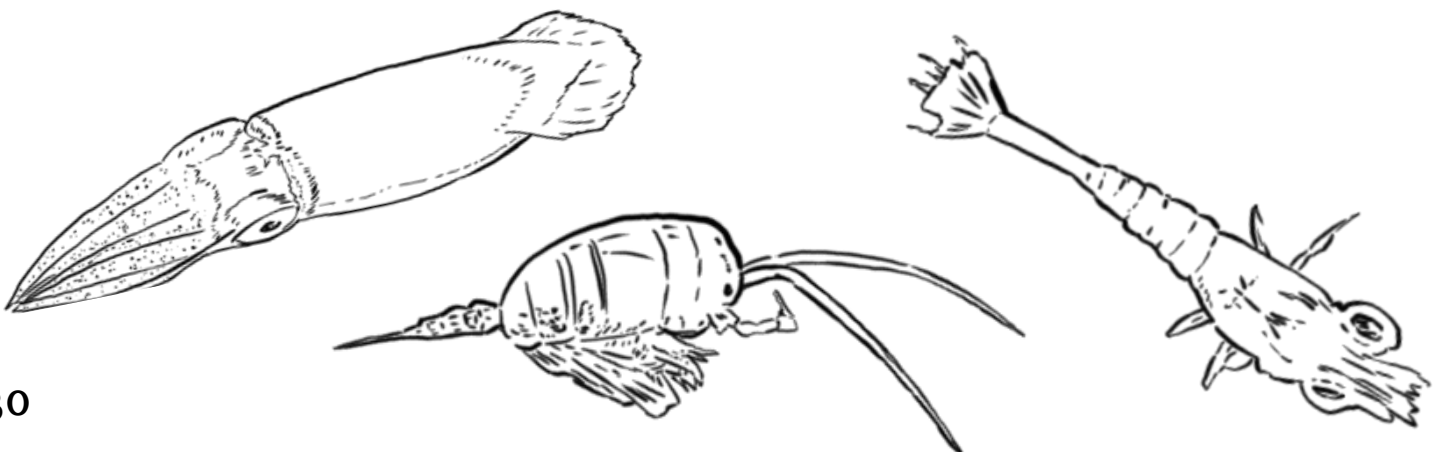
FEEDING IN WATER (2)



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 textbooks 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. Where Can We Find Water?



III-IV



2

1. Places where Water Collects

Objective

Children will explore and identify different places water can collect.

Lesson Plan



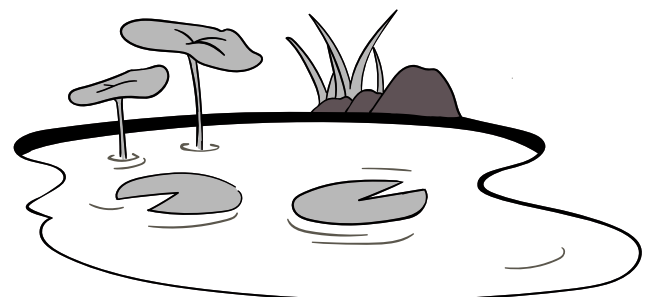
Gather the children together. Share the 'Places of Water' illustration. Ask the children to mark/colour the different places water could collect in the event of rain.



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.





1. Where Can We Find Water?



III-IV



2

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 data for scientific study



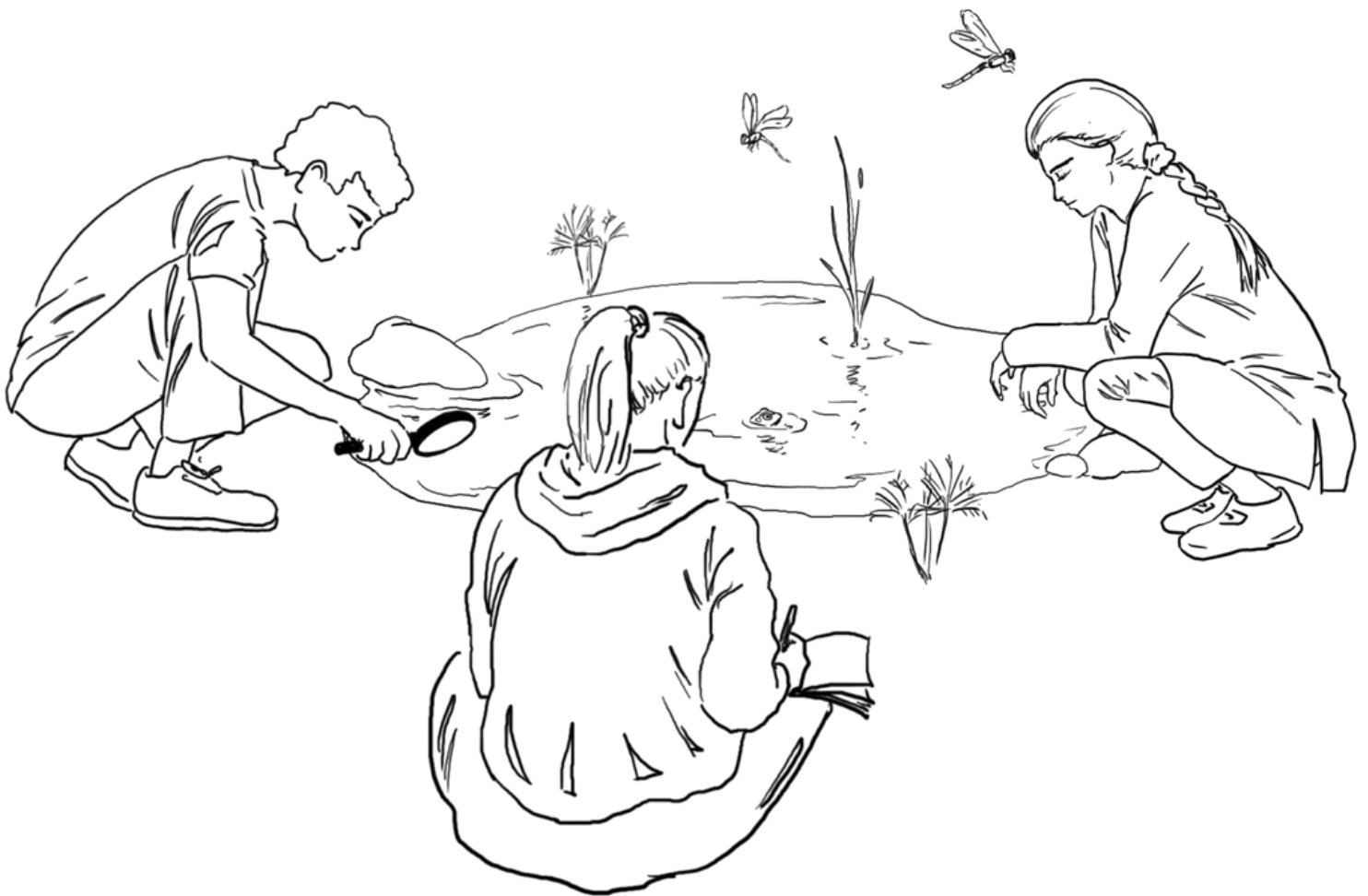
Distribute and explain the use of both **Colour-grade Scale** and **Puddle-Watching Worksheet**. Step out and gather by a pre-identified muddy puddle. Using the help of the worksheets, record observations of the puddle.

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, footprints).

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.





1. Where Can We Find Water?



III-IV



2

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.





1. Where Can We Find Water?



III-IV



2

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.



1. Where Can We Find Water?



III-IV



1

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?



2. Life in Water



III-IV



2

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.

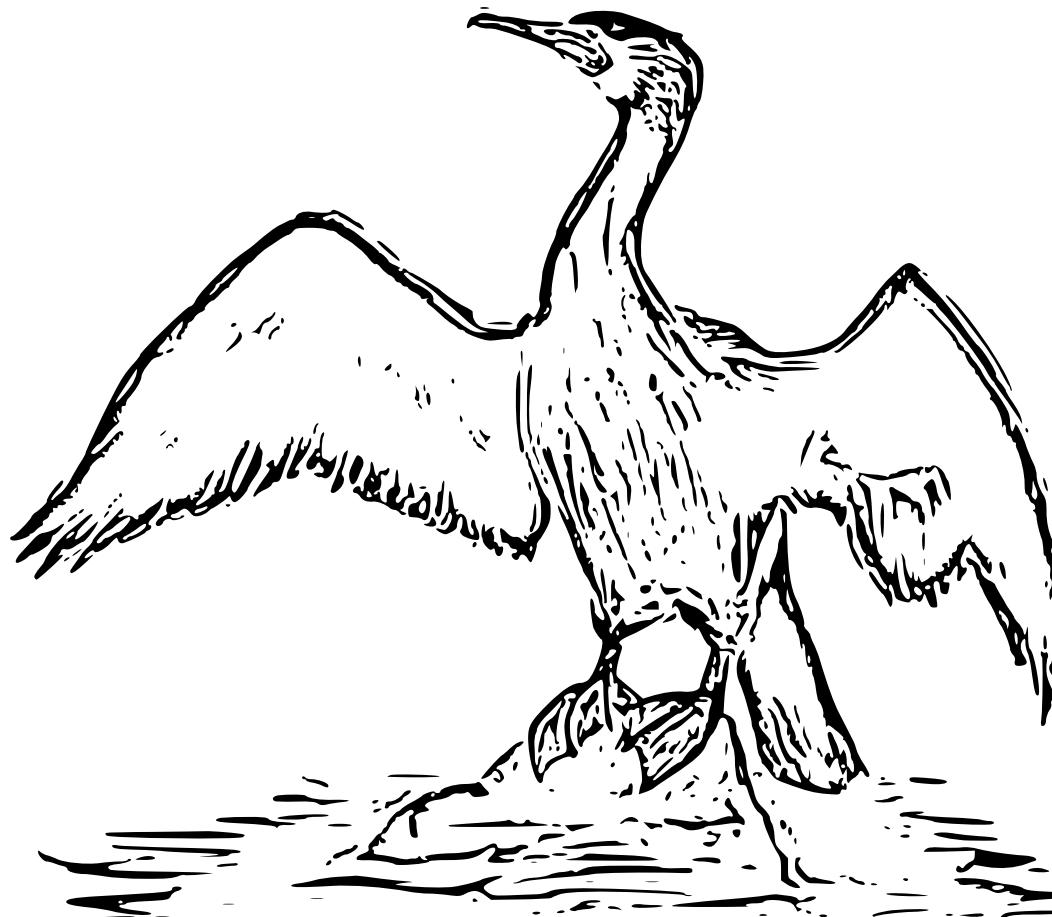
- Talk about creatures that breathe underwater (fish - gills), creatures that hold their breath underwater (birds - nostrils) and creatures that can breathe under and outside water (frogs - skin when underwater, mouth and nostrils when outside)
- What about humans? How do we breathe when under water? 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.





2. Life in Water



III-IV



2

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](#)



2. Life in Water



III-IV



1

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.



2. Life in Water



III-IV



2

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.



2. Life in Water



III-IV



2

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.



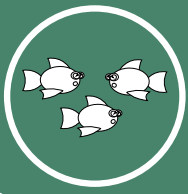
Ask the children if they have ever paid attention to and observed excreta of other creatures- bird, cat, dog, cow, hens, goat, etc. What do the different types of poop look like? Where do each of these creatures go to poop? What about aquatic animals then? Where do they go to poop? Do fish and whales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



2. Life in Water



III-IV



1

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](#)

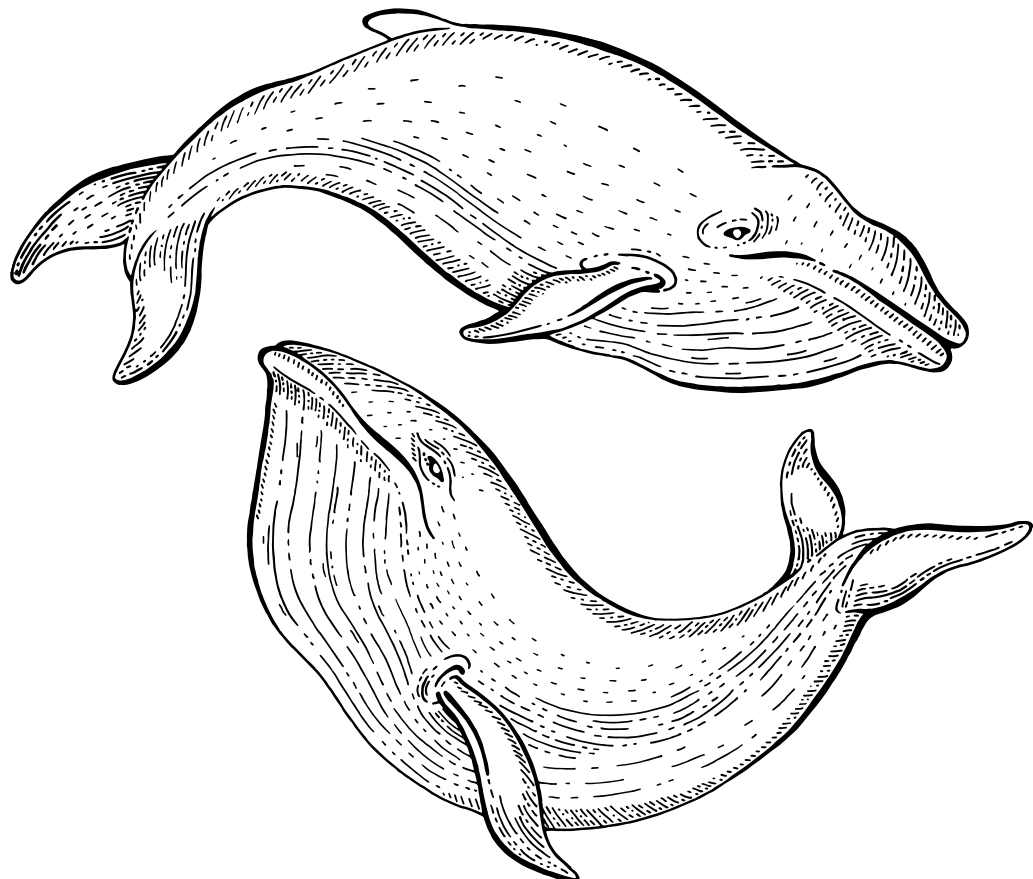
Talk about:

- 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](#)





2. Life in Water



III-IV



2

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 its 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.



2. Life in Water



III-IV



2

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.

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.



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)



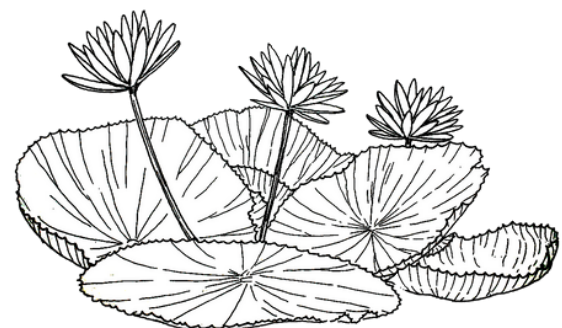
BREATHING IN WATER (3)



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. Where Can We Find Water?



V



2

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'.





1. Where Can We Find Water?



V



2

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.





1. Where Can We Find Water?



V



3

3. Understanding our Role in Water-habitats

Objective

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

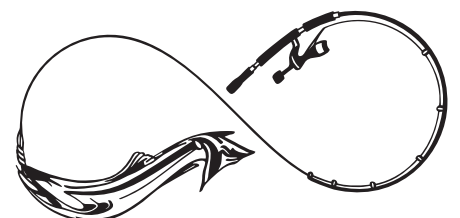
Lesson Plan



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.





1. Where Can We Find Water?



V



3

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.



1. Where Can We Find Water?



V



3

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-Terrarium 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.





1. Where Can We Find Water?



V



1

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.

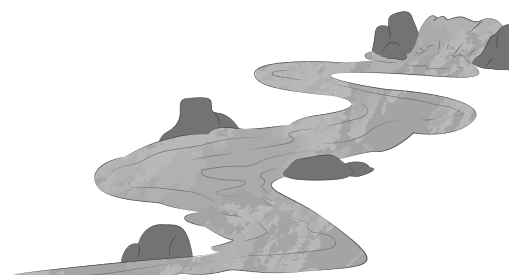


Experiment: Have two glasses of water, half-filled. In one glass, had a table-spoon of salt and mix in turmeric powder to give it a bright yellow colour. Now, slowly pour in this glass of water into the un-coloured glass of water.

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.





2. Life in Water



V



1

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)

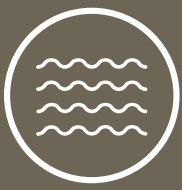


Introduce the working of the gill in fish. Use the 'How do Gills Work' instruction sheet and conduct the experiment in class.

- 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 now 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?](#)



2. Life in Water



V



3

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.



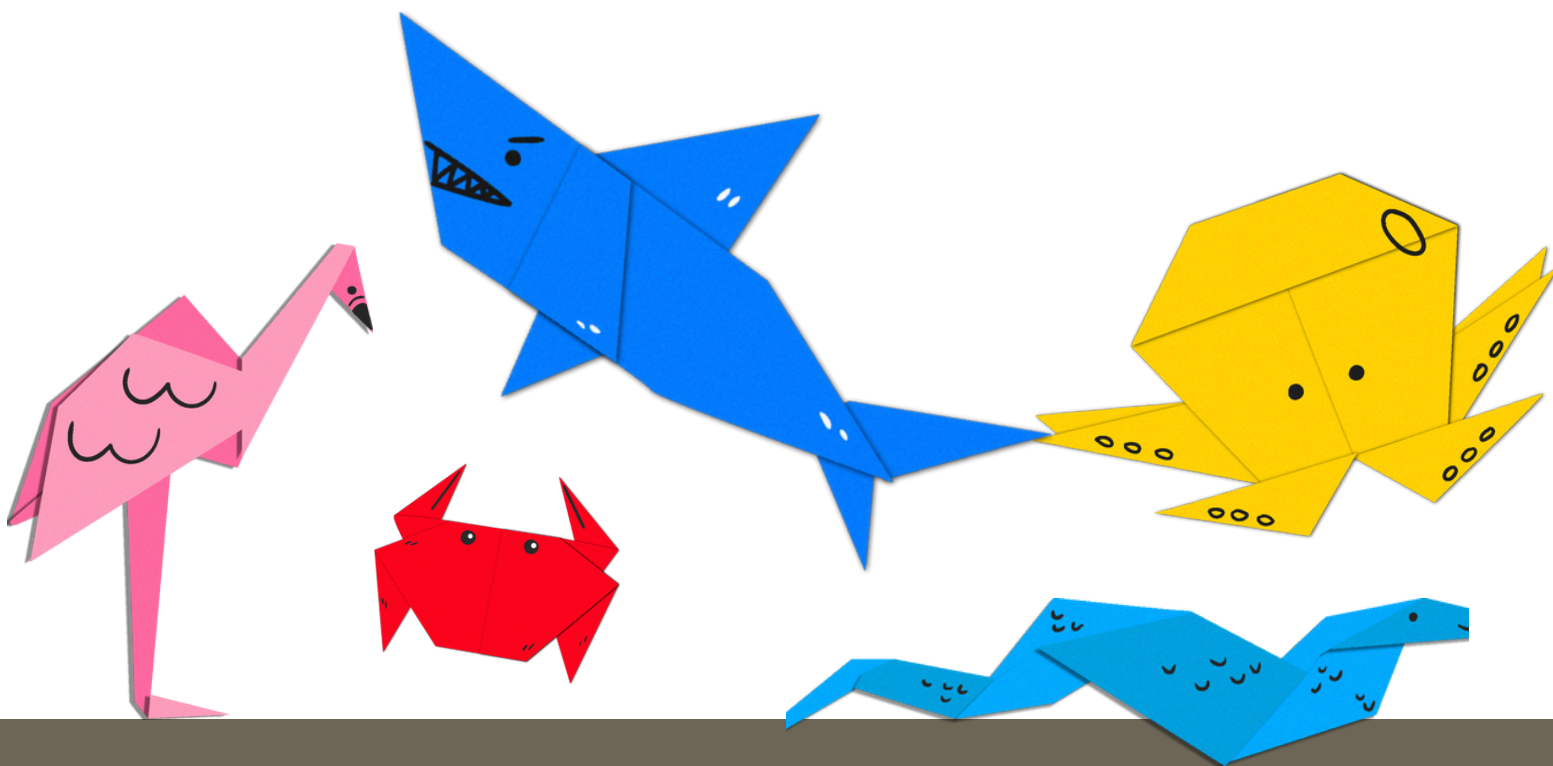
Divide the children into small groups of 2-3 in each. Each group watches the video tutorial and makes one of the origami creatures. If this is difficult to organise, make larger groups and each group makes 2 or 3 of the origami creatures.

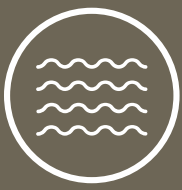
- Once completed, ask the children to identify the organs the creature might use to move in the water. Name the organs as they point it out.
- Links to video tutorials for making different origami sea creatures in the 'Notes' section (next page).

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





2. Life in Water



V



3

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

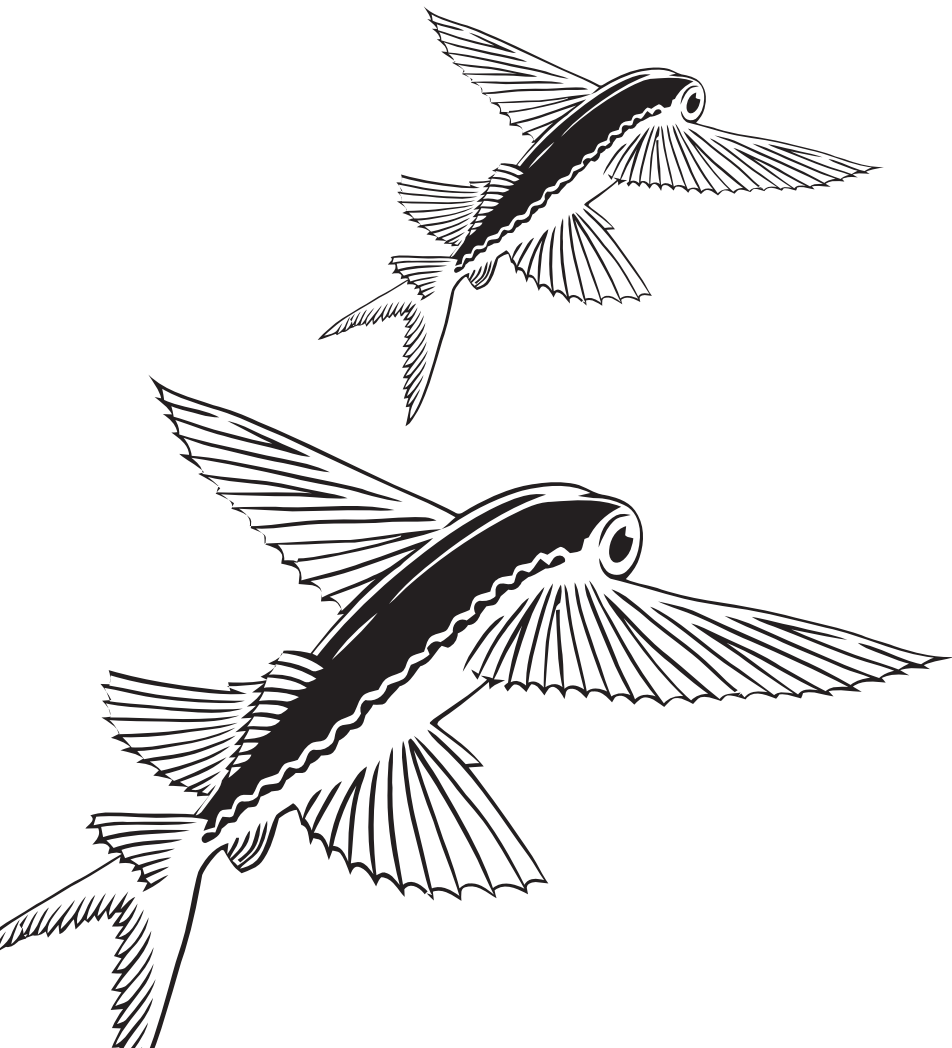
- Puffin Bird Diving and Torpedo Gannet Diving.
- Discuss about how body parts evolved to enable these specific movements (fins of the fish that could become wings, long beaks of the bird that support and deep-dive).

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





2. Life in Water



V



3

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

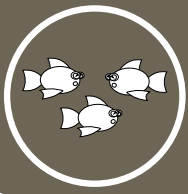


Open a conversation on birds in water- have the children observed how birds move in the water? What colour birds have they seen in the water? How are the birds keeping their feathers clean and dirt free? How come the birds aren't soaking wet when they are in the water all day or even in for just a dive? 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.



2. Life in Water



V



1

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:

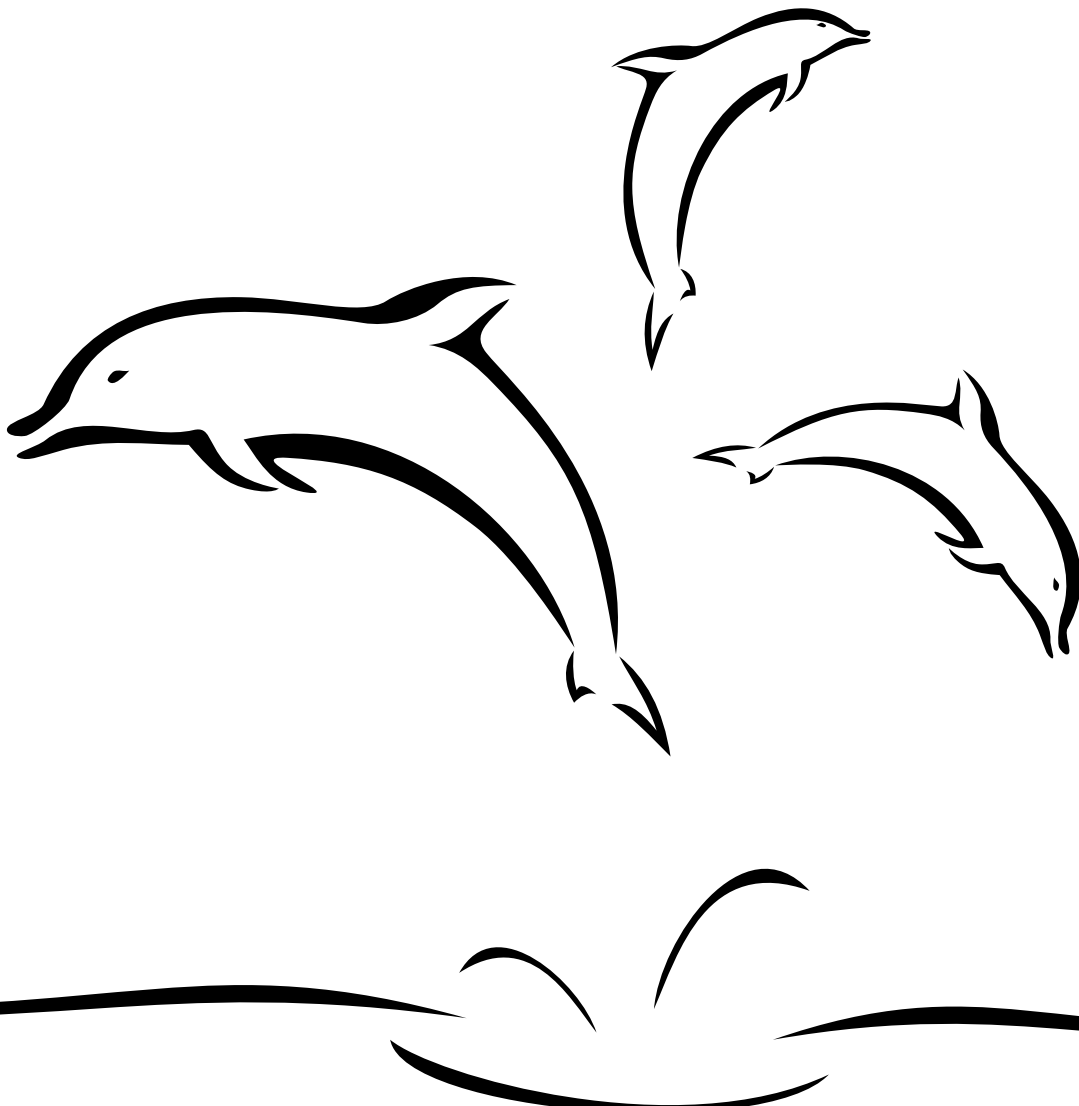
- Dolphin whistle and whale song
- Echolocation
- Chemical signals and info-chemicals (read link below for information)
- Impact of human noise on communication underwater

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?





2. Life in Water



V



2

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?



2. Life in Water



V



2

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](#).

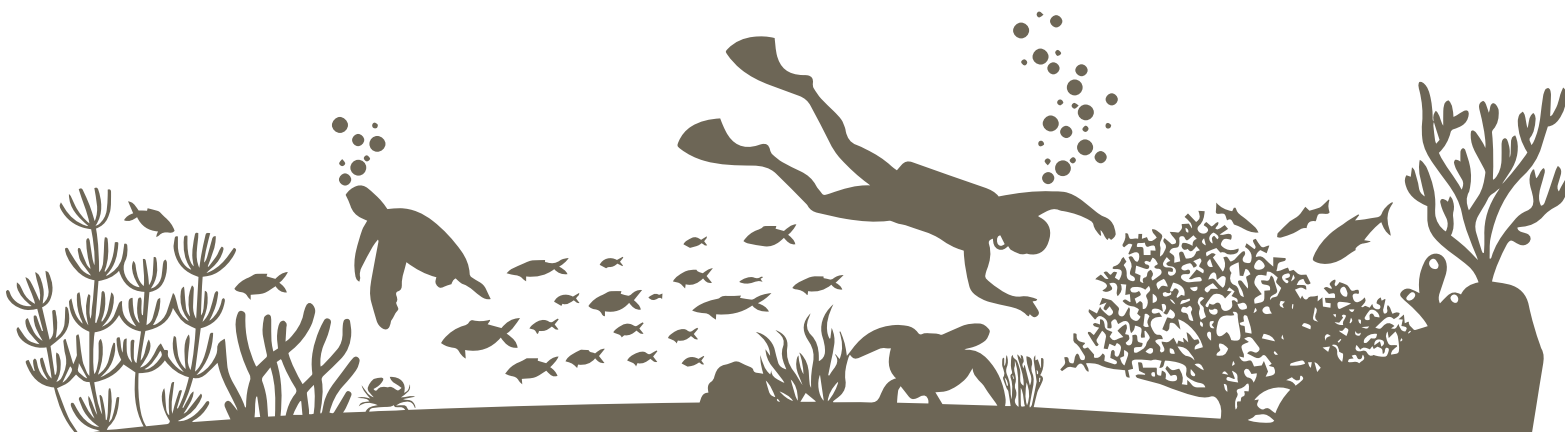
Things to discuss:

- 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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