

# Deep Sea Design Challenge

## **Objective:**

- To recognize how much we do not know about the ocean, and to encourage to students to recognize the teamwork needed for ocean exploration.
- To engage student's creativity in thinking about what animals need to survive and how they interact with their environment.
- This activity is adaptable to other ecosystems as well, not just deep sea. Students could also explore the arctic, coastal or intertidal habitats or coral reefs.

## **Materials:**

- Drawing/colouring materials + paper.
- Can also include 3D additions like pom-poms, felt, cut-outs etc.
- They can use one large piece of paper and continuously add to it throughout the exercise, to have a full complete picture at the end.

## **Background:**

95% of the ocean is still unexplored, most of it too deep for technology to reach yet. The better we understand the ocean, the more equipped we are to help sustain the ocean that we need to survive. Exploration is a team effort, and no scientist ever works alone. There are the junior and senior scientists that collect and analysis the data, even every day people who contribute to the data by being citizen scientists. There are the crew and captains that operate underwater vehicles, ships and equipment necessary for underwater travel. There are the bodies of government that give scientists permission and even funding for their research. Through respect and teamwork, we are able to dive deeper into the ocean and explore a world that is still a mystery to us.

## **Activity:**

**Instruction:** Read through the narrative with the students. Allow appropriate pauses so that they may discuss either with the class or with a partner, and to draw throughout the discussion.

Today you are going to be researchers preparing for your very first research expedition. It is your goal to discover an underwater animal that has never been seen before.

Before you begin, it is important to review what you already know about the ocean. With a partner, make a list of what you already know about the deep ocean. Be sure to include things like animals and plants that live down there, what the temperature is like, and how much light is there. These are all conditions that may influence your expedition.

Now the first thing you need to do is design the equipment that will allow you to explore the bottom of the ocean. Is this a submarine that will hold people, or a camera that will go down on its own? Which is the safer option, which is the more expensive option? What sort of challenges might your technology face while under water? Keep these things in mind as you design your underwater exploration machine.

The next thing you will need is some team-mates to help you on your expedition. Will you be on a boat for this research, or standing on shore? What kind of team-mates will you need with you, and what skills must they have for the expedition to be a success?

Finally, you are ready to start your exploration!

You launch your underwater exploration machine into the water and watch as it descends deeper and deeper into the depths of the ocean. Did you remember to add lights? Better turn those on now. You see lots of different sized fish swimming by, along with – WOAHH was that a shark?! You see several pieces of plastic float past. It is like you have entered a completely different world.

Oh no! A plastic bag has gotten stuck in one of your propellers. You cannot steer while the plastic is clogging up your machine. What do you do?

Congratulations, you have successfully removed the plastic from your propeller and removed it from the marine environment! Great job. Just as the plastic got stuck in your propeller, it could also be a risk to those animals who live in the ocean. You may continue on your journey.

Finally, after a very long descent you finally land on the ocean floor. Is your underwater exploration machine movable, or does it sit and wait? As you are scanning the ocean floor, your equipment detects some movement up ahead. You move your lights towards the shape, and see a living organism that you have never even heard of before. You've done it! You have discovered a brand-new specimen. Did you bring a camera to take a photo or video of it? Or did you bring an artist who can draw your creature?

What does your new discovery look like? Design the creature that is going to make you, and your team, famous scientists.

Ask yourself these questions as you are designing your creature:

- Is it a plant or an animal?
- Is it an invertebrate (no spine) or a vertebrate (has a spine)?
- What does your creature eat? What does your creature use/do to catch and eat its food?
- What eats your creature? What does your creature use/do to defend itself?
- How has your creature adapted to living in an environment that is very cold and has very little light?
- What other threats might your creature face in the ocean?

Congratulations! You and your team have discovered an extraordinary creature! Your scientific contribution has helped us better understand what is needed to explore the ocean and the kinds of amazing things we might find. You are almost done your expedition, but before you finish there is one more important task you must accomplish. What is the name of your newly discovered creature?

**Reflection:**

Here are some possible follow-up questions for the students:

1. What was the biggest challenge in designing your underwater exploration machine?
2. Was there anything you did not have on your expedition that you think would have needed?
3. Where would you get the funding for your expedition?
4. Was it difficult to think of what your creature eats or is eaten by? Why was it difficult? Lead them to the conclusion that because we do not know a lot about the ocean it is hard to guess how our creatures live if we know nothing about where they live.
5. What could we do as students to help scientists who are out doing research right now? Such examples could include: volunteer work, shoreline cleanups, donations, citizen science projects, learning more about what we do know and what we need to know.