

Episode 39: Major Marine Eco-system of the world and challenges

<Sounds of gurgling water from a flooded river>

Narrator: It moved at tremendous speeds. It got tossed along so fast, it's a wonder it didn't drown. This went on for a long time, it drifted from stream to coast to open ocean. It was hours before it awoke only to realise that it had no idea where it was. *<Sounds of light waves and distant calls of a sea gull>* All it could see was blue expanses of water all around it. It felt despair and fear.

PB: Hello! Help me! Can somebody tell me where I am?

Narrator: There was a long pause, a long silence before it heard a voice.

Ocean (haughtily): I am the ocean.

PB (nervously): I'm sorry, but who is speaking?

Ocean (sternly): Are you mocking me? I am the ocean! How can you not know who I am?

Narrator: The Ocean held an air of authority. The world knew who the Ocean was. How could anybody not know? Its presence was felt on the shores of every continent and on the lands they contained. It gave the forests rain and the planet oxygen. It gave its inhabitants diverse habitats to live in and provided humans with a constant source of food.

PB (meekly): I'm sorry. I have only heard stories of you, of your great might and of your giving nature but I have never seen you or your inhabitants before. Please don't be angry.

Narrator: While the Ocean was proud, it felt sorry for its naive new guest.

Ocean (annoyed): I'm not angry, but I am amazed at your ignorance. I'd understand if you didn't know of the ways in which I contributed to life on Earth but how do you not know of all the plants and the animals that call me home? Life was first created in my depths and now it's all around me! I host organisms so small that you can't see them, and that I will excuse but what about the larger creatures? Have not heard of sharks, turtles and crabs? What about the largest organism on Earth that calls me home, the blue whale?

Narrator: The visitor looked around, but it had come far from shore, unaware of how it had travelled and it saw nothing but blue.

<Sounds of light waves >

PB (meekly): I apologise again, but I see nothing! Where is this life that you speak of?

Ocean (angrily): How dare you! I have life even in my deepest depths!

Narrator: The Ocean was angry again. The visitor perplexed it and it realised the only way to solve this problem was to take it on an unforgettable journey through its deepest depths and its shallowest seas.

Ocean (in a fatherly voice): Don't look so scared. I think it's time for us to head out on an adventure. My promise is to keep you safe and show you sights that you could never have imagined. Keep your eyes, ears and mind open.

Narrator: The Ocean decided to begin their journey in its depths. Where life was supported differently from anywhere else, and every exploration of these regions brought to light more life than was previously known. The exploring duo went in to the middle of the Atlantic Ocean and began to slowly descend. As they went deeper, light decreased and as the water got darker, it also got colder.

<Sounds of bubbles ascending>

PB (annoyingly): It doesn't look like there'd be anything that lives here. It's so dark and cold. Why would anything want to live here? And even if it did, how would we ever see it? I'm pretty sure you were joking. Can we please go back?

Ocean (sternly): Hush! If you didn't talk so much perhaps you'd be able to pay a little more attention. Like I said earlier, keep your eyes wide open and tell me what you see.

Narrator: It's hard to imagine life in the icy cold and pitch dark and crushing environment of the deep oceans of the world. But there is life – life that looks very alien to us. The deep dark brings together organisms that are very different from what we are used to seeing – they saw small fish with large mouths filled with sharp teeth, fishes with light bulbs hanging over their heads, bright-red shrimp-like animals, transparent jellyfish, blind sharks and so much more! Wherever they looked, there were flashes of red and green from organisms that were best left to one's imagination. As they continued to descend, slowly and steadily, a fast moving creature of giant proportions appeared before them. The visitor, still nervous from all the darkness, got the start of its life.

<Sounds of a swoosh>

PB (in a loud, scared voice): Don't hurt me!

Ocean (fatherly): Stay calm, little one. I promised to keep you safe and will make sure no harm is done to you.

Narrator: At the length of a bus with 8 long arms and 2 tentacles that were even longer, the giant squid came to a screeching halt right before the visitor. She peered at it with an eye the size of a dinner plate. She was more curious than the visitor was scared.

PB (stuttering): What are you? Please don't eat me. The Ocean has promised to keep me safe.

Giant Squid (giggling): I'm not going to eat you, but my question is, what are you? I've never seen you around here before!

PB: I've come from the land and the Ocean is showing me around. He's taking me down to the ocean floor. But it's so dark and all these flashing creatures are scaring me. Which one do you eat to make you so big?

Narrator: The giant squid was about to start explaining how it eats a lot of the organisms that they could see around them but a few seconds before she could start speaking, an organism, even larger than her, almost twice the length her and with a square shaped head swooped down from above, and took her into its mouth. It disappeared into the distance almost as fast as it had appeared. The visitor didn't think it could be more afraid but mustered up the courage to speak.

PB (nervously): Did I do that? Did she get eaten because of me?

Ocean (matter of factly): This is the pattern of life. Animals eat and animals get eaten but this was never because of you. All the organisms of the sea know that they constantly have to pay attention. Don't worry. Let's keep going.

Narrator: As nervous as our visitor was, its curiosity never went away. It agreed to go further down to the ocean floor. As they travelled through the darkness they arrived at an oasis in the dark. They came to an area suddenly teeming with life and the Ocean pointed out crabs, eels, snails and octopus but the most striking of them all were giant tubes with red feather-like structures that stuck out of them. In between it all stood a chimney that was sending out clouds of black smoke into the freezing cold water.

PB (curiously): Where are we?

Ocean: It's called a hydrothermal vent. It's a place that a lot of people have not heard of or seen. You are quite lucky. Here really, really hot water, heated by volcanic rocks in the Earth, comes out of cracks in the Earth, similarly to a hot spring on land!

PB (curiously): Is it boiling hot?

Ocean: It's even hotter! But because of all the pressure we are under at this depth, it won't actually boil.

PB: But why is there so much life here if the water is so hot?

Ocean (with slight excitement): There are a couple of things that are happening here. When this really hot water comes out, it brings in minerals with it that bacteria use to grow! These bacteria then get eaten by larger organisms and this continues, creating the thriving community that you see! To throw in some numbers,

compared to the sea floor around these hot spots, hydrothermal vents have a density of organisms that is 10,000 to 100,000 times greater.

PB (slightly irritated): But you didn't say anything about how they survive the heat?

Ocean (calmly): Yes, yes. I was getting there. Think about it, though. Do you realise how cold it is where we are?

PB (irritable): Of course I do! I've been freezing for a long time now.

<Sounds of teeth chattering>

Ocean (calmly): Exactly, so even though we're around this super heated water, it mixes with the extremely cold water pretty fast which is why you're still feeling cold and the organisms close to the vent don't get burned alive! But I want you to remember, there are other ecosystems on the sea floor, in other dark and cold regions. Unfortunately, we don't have time to look at all of them. Instead, I think we should head over to another cold region, but one that isn't so dark.

PB (nervously): I'm ready to head out. The thought of that sperm whale still gives me the shivers.

Narrator: The Ocean and it's visitor headed further South, to the Southern Ocean. The Southern Ocean surrounds Antarctica, Earth's southernmost continent which also contains the South Pole. This continent which is almost completely covered by ice has been historically uninhabited by humans. But the Ocean around it is a whole different story!

<Sounds of a whale spray>

PB: What is that spray of water? There, see, the one at the surface?

Ocean (excitedly): I see it! This is so exciting!

PB (anxiously): Exciting? That's not how I feel at all! What's happening now?

Ocean (excitedly): Remember how I told you that the largest organism on Earth lives in my waters? There it is! That spray is from a blue whale. They've been fished for centuries, so there are very few left and only fewer get to see them. Shall we go say hello?

PB: I'm holding you to your promise of keeping me unharmed!

Ocean (calmly): You have my word.

PB: Does the blue whale, like the sperm whale, eat giant squid too?

Ocean (calmly): Let me stop you right now. We're heading over and I think you should ask him directly.

Narrator: The blue whale is the largest animal that has ever lived on Earth, it's so large that you would need at least 15 people lying head to toe to match its length. You can only imagine how intimidating it was to approach him. But there was no reason to be, for the blue whale ate organisms that are only about as large as your thumbnail. The visitor didn't know yet but mustered up the courage to go ask.

PB (nervously): Sir, sorry to bother you, but would you be able to tell me what you eat? I thought you might eat the giant squid like the one we saw earlier but the Ocean says I'm wrong.

Blue whale (talking fast): Well, hello. You are indeed incorrect. You can't see them right now, they are in the water below us, but if you could you'd see carpet of red made up of thousands of tiny organisms called krill. You could only imagine how much I'd have to eat based on my size. But don't. I'll tell you. I eat 4 crore krill in a day. Do you know how many zeroes there are in a crore? 7! That's a lot. If we were to convert those many krill to a weight, I eat almost 4,000 kilograms in a day.

Narrator: The blue whale turned out to be quite chatty and didn't give the little explorer a chance to speak at all. He continued..

Blue whale (talking fast): 4,000 kilograms! If you wanted to make sense of it, that's heavier than the weight of an elephant. Am I talking too much? I've been told I sometimes do, but I just basically wanted to help you understand how much I eat, since you can't watch me in action.

Pb: Uhh..

Blue whale: Krill love the Antarctic Ocean and that's really why I'm here. There are so many nutrients that come up here, from the deep ocean, similar to where you just came from, that they collect here to feed on the organisms that directly use those nutrients. It's a food chain. I'm sure you know what that is. Well, I'm part of that food chain but so are many others. You'll find seals, penguins, squid, orcas, even birds like albatrosses and terns, around Antarctica – they all come to feed on the Krill or other organisms that eat them.

Pb (meekly): I've only seen a squ...

Narrator: The blue whale didn't want to listen. He was so thrilled to have an audience to listen to him. As he continued to go on about some of the creatures that lived in the Southern Ocean, the Ocean signalled to the visitor to make a quick exit before the whale gave them a headache with all his chatter. They didn't see another blue whale but as they moved on, before they left the Southern Ocean, they saw penguins jumping in and out of the water, riding the waves, and even got lucky enough to witness a leopard seal chasing an emperor penguin. *<Sounds of waves>* There was a lot more to explore in the Southern Ocean but time was running out and there was a lot more left to see.

Ocean: We're going to head out around the coast of Australia, up the East coast of Asia and down the West coast of America. There's another fascinating ecosystem that you must see.

Pb (excitedly): There's more to see? We've already seen such amazing things! And so different!

Narrator: The two kept going, one taking stock of everything that was happening and the other impatiently awaiting the next destination. They rounded the coast of Australia, busy chatting away. They were beginning to climb up the coast of East Asia when something grazed the visitor. It quickly turned around to see what was going on. It screamed with all the energy it had left!

Pb (loudly and screechingly): What's going on?? Stay away from me! What are you trying to do?

Narrator: The Ocean remained oblivious for it was busy looking out at the Great Pacific Garbage Patch that was found, as you might have guessed, in the Pacific Ocean. A point of convergence from trash all over the world, the Ocean was worried about its growing size and the impacts that it had on itself and all its creatures. It took a few seconds before it snapped out of its thoughts and looked back to inspect the fuss that the visitor was making. Its negligence had caused it to almost break its promise! For in those few seconds, a leatherback turtle had swum up to the explorer and was trying to eat it!

Ocean (threateningly): Go away turtle!

Leatherback turtle (irritated): I'm just trying to eat. Why won't you leave alone?

Ocean (sternly): That's not your food!

Leatherback (puzzled): But it is. Look at it!

Narrator: The Ocean laughed a hearty laugh for it could see where the confusion would have arisen. The visitor looked a lot like a jellyfish, the turtle's favourite food.

Ocean (sternly): I'd recommend you stay away from it. Not only because it's my friend but I'm pretty sure eating it would cause you great harm.

Narrator: The Ocean and the leather back turtle exchanged a few more words before it was convinced to leave the visitor alone. While the Ocean was relieved, the visitor was offended.

Pb (sadly): Thank you for stopping me from being eaten, Ocean, but why would I cause it harm? I'm sure I'd make a tasty meal!

Ocean (while laughing): I have nothing against you, you have been great company, a keen observer and a fast learner. But the truth is that when organisms eat you, they have been known to choke, or die due to starvation once you've entered their stomach. Remember, even though we're traversing the world's oceans, you do

not belong here. In fact, the reason I didn't see the leatherback turtle is because I was busy looking out towards the Great Pacific Garbage Patch on our right.

Pb (confused): I don't see anything.

Ocean: It's hard to see. Most of the trash here has been travelling around the ocean for many years and is broken down into very small pieces. The tiny pieces which are mostly plastic end up in the stomachs of ocean birds, turtles, other organisms and all their young. They are not only bad for the organisms that eat them but also for the organisms that eat the organisms that eat them.

Pb (sad): That sounds awful.

Ocean (matter of fact): It sure is. It's a shame. But between all these beautiful ecosystems that we visit, there is a lot of pollution. Almost all of it is caused by humans but there is nothing that my inhabitants or I can do about it.

Pb: I really want to see what you are talking about. Can we go see all this trash?

Narrator: The Ocean took its guest and cut across the Pacific Ocean, swimming towards the northern coast of California, on the west coast of America. As they swam through the Great Pacific Garbage Patch, they saw tiny pieces of plastic and other materials floating just below the surface. The sight was disheartening, for this patch went on for thousands of kilometres. They travelled in silence. The ocean opened up again and as they got closer to the shore, the water got clearer and they were able to see tall structures, moving gently back and forth in the water.

Pb (excited): Are we here? Is this where you were bringing me?

Narrator: The Ocean only smiled and motioned for the explorer to swim towards the fringes of the ecosystem. It looked like an underwater forest – tall trees with thin barks that swayed with the moving water. The water was cold but it was clear. It was easy to see all the way to the bottom. Together they slowly entered this underwater forest, called a kelp forest, over a 100 feet tall!

The explorer swam through the kelp forest, from the surface all the way to the bottom, exploring its structure and all the organisms that it harboured. The kelp forest was made up of single stalks of kelp that were anchored at the bottom and had large leaf like structures all the way to the top.

Towards the surface, the visitor saw snails munching away on the leaf like structures and sea otters that playfully swam around. As it went lower it saw fish of all shapes, sizes and colours swimming around or hiding behind the kelp. It went down slowly, looking towards the top, staring at the light streaming in through the clear water, looking like sun streaks streaming through between clouds.

Pb (shocked): Ouch!

Ocean (scolding): Be careful! Those things can hurt you pretty bad!

Pb (shocked): Yikes! What is that? Why is it there??

Ocean: That's a sea urchin. You'll find them in lots of different ecosystems. They like to eat the root like structures of the algae that keep it fixed in one spot. But do you remember those sea otters we saw at the top? They like to eat these guys.

Pb: So all of them eat each other?

Ocean: Well, mostly. Kelp however makes its own food.

Pb: Like plants?

Ocean: Exactly.

Narrator: The visitor continued to explore the bottom of the kelp forest. There were lots more sea urchins, sea stars of various types, shrimp and crabs. It swam around for a while but every passing fish cast a dark shadow while swimming through the kelp. What if another turtle came and tried to eat it? From a conversation with the Ocean, it knew that there were sharks here. What if one of those came and attacked it?

Pb (nervously): I'd really like to get out of here, Ocean. I'm scared and also it's still very cold. Everywhere we've gone so far has been so cold! Do you not have any parts of your ocean, other than where you found me, that are warm?

Ocean: Alright, we can go, we still have a little way to travel in cold water but soon we'll get to warmer waters. They will be shallow too, much shallower than anywhere we've been before.

Narrator: The two travellers continued their voyage, down the western coast of America, travelling through more kelp forests before crossing over the fringes of the Great Pacific Garbage Patch and entering what is known as the Coral Triangle. Known as the Amazon of the Sea, it is an almost triangular area on the South East coast of Asia.

Pb (excited): All these colours! We haven't seen anything like this before. What are all those colourful rocks? Who are all these fish? What's going on? Where are we?

Ocean (amused): Slow down, slow down! We'll have some time to swim around and we can explore this area all that you want to. But first, those colourful rocks at the bottom are not really rocks.

Pb: Well, then what are they? They're stuck in place. The only difference I see is that these are coloured, like someone came in with paints and spilled them all over the place.

Ocean: These are corals and together they make up the reef. All those shapes you see, the ones that are branching, the round ones that look like boulders, those that

are flat and look like tables, they are all corals! Each piece, what you call a rock, is made up of hundreds of little organisms. In their tissue, however, they keep even smaller algae and that is what gives the corals their colour.

Pb (curiously): So they are eating the algae?

O: No, no! They have little mouths that they use to eat mostly plankton, smaller than the krill that the blue whale we saw eats. So really tiny! Most of them we can't even see. But they're all around us and that's what they eat.

Pb (puzzled): So then what are the algae doing?

O: The algae live in their tissue for protection and make their own food using photosynthesis, like the kelp in the kelp forest or plants on land. Living in the corals tissue, they get protection from being eaten by other organisms and in exchange they give them some of the food they make.

Pb: That's so cool. I should find a friend like that when I go back on to the land, to keep me safe. I'll just have to figure out what I can give it in return.

Ocean (amused): Haha. Sounds like a good idea! Shall we swim around a little more to see all the life that lives here?

Narrator: The two swam around and saw fish of all kinds. Small, large, red, green, blue, multicoloured, some with spots, other with stripes, some that swam alone, others that swam in groups, some that sat on the ocean floor, some that had big heads, others that looked like snakes - there was so much going on! And there was more than fish. Sea urchins, worms, starfish, lobsters, clams, and other strange looking organisms were to be found all over the corals, and in the crevices that were formed between the corals. It was an overwhelming experience!

Pb (tired): All these colours and all this movement is making me dizzy and tired. Do we have anywhere else to go?

Ocean: We're pretty much done, friend. We've been to 4 of the 5 ocean basins. The only one we skipped is the Arctic Ocean. But did you realise something?

Pb (confused): Hmmm...I don't know. That we saw lots of different ecosystems while we travelled?

Ocean: Let me phrase the differently. Do you think you could travel from the Saharan desert in Africa to the Atacama Desert in Chile without getting in to the water?

Pb (confused): I'm not sure where those are so I can't answer your question.

Ocean: Africa and South America, are two different continents so you would have to travel by ship or by plane to go between them. On the other hand all the

oceans that we visited are connected! It's just one large moving mass of water which allowed us to travel from one place to another so easily.

Narrator: As this conversation continued, the Ocean and his new friend travelled back into the Indian Ocean where they first met. As they swam toward the shore, the visitor had a very pertinent thought.

PB (curiously): You've shown me some amazing sights and it was very interesting to watch and learn, but why is any of this importance?

Ocean: That's a key question and I'm so glad you asked. I'm going to get a little technical here so please bear with me. If you've noticed on our journey, every time we've gotten closer to the shore we've seen lots of large fishing boats on the water. This is because the shallower parts of the ocean contain the most organisms even though they cover only 7% of the world's oceans. About 44% of the Earth's population is concentrated within 150km of the ocean and are dependent on these near shore areas for their livelihood and sustenance. This means this is also where you'll see the most impact of human activity. Runoff, pollution, and overfishing put many of these resources at risk, while sea level rise and storm surges threaten cities and other infrastructure near the ocean. As do natural hazards like tsunamis and cyclones which are increasing in frequency due to global warming and the impacts of sea level rise.

Narrator: The visitor looked like it didn't understand everything but it did understand one thing, humans were dependent on marine ecosystems for their livelihood and needed to be more responsible towards protecting them. As they passed white sandy beaches lined with coconut trees and beaches covered by rocks, the visitor yelled.

Pb (excitedly): Wait! I recognise this place. Those trees, they look very familiar. Maybe this is where I came from?

Ocean: It's quite possible, but you would know better than me. Are you sure you came from this mangrove forest?

PB (slight sadness): I don't know. All I know is that I was thrown into a river, a few days later I reached what you call the mangrove forest and spent a few days entangled in those structures. When that storm came, I got disoriented and the next thing I remember is meeting you.

Ocean: That's quite possible. Those mangled structures are the roots of the mangrove trees. I meet the land wherever there is a coast and these mangroves are one of those coastal ecosystems that I support. They get water from me and also from rivers that flow to the sea. Since you recognise this ecosystem I'm going to send you back in.

PB (scared and sad): But what will I do there? Can't I stay with you?

Narrator: The Ocean had softened up to its visitor through their journey together but at the end of the day it knew that the visitor didn't belong in the ocean or even in the mangroves.

Ocean (softly/apologetically): I'm sorry but you don't belong here with me. I'll send you back to the mangroves but I do hope that someone finds you soon enough.

Narrator: The Ocean sent the visitor back into the mangroves on a gentle wave. <*Sounds of soft, lapping waves*> Once inside, the visitor looked around for a safe place to lodge itself. As it searched, it found juvenile fish and eels that were hiding from predators in between the mangrove roots, crabs and snails spread across the floor of the mangroves and oysters and barnacles attached to mangrove roots. As it looked above to watch a kingfisher fly over, it got picked up, out of the water.

A group of students from a local school were cleaning up litter in the mangroves and this plastic bag went straight into a bin full of other plastic waste to be sent to a recycling centre. The journey of this plastic bag had almost come to an end, but what a memorable one it had been.