

Exemplar: Turtles

Home of Species and its existence is in Trouble

Sea turtles have existed for over 100 million years. Sea turtles are the only reptiles which travel extensively across oceans between feeding and nesting grounds. As sea turtles can hold breath only for 4 to 7 hours underwater, they swim up to the surface of air. Male turtles usually never leave the ocean, while female turtles come to the shore to lay eggs, which is usually the same beach/ocean where they were born. For over 100 million years, sea turtles have travelled across oceans and have played a vital role in maintaining the balance of the marine ecosystem. However, due to increased human activities like poaching and over-exploitation of sea turtles for their skin, meat, shells and eggs, almost all species of sea turtles are endangered. Plastic pollution in oceans and climate change has also caused an imbalance in the survival of sea turtles.

*All tortoises are turtles, but not all turtles are tortoises.
All terrapins are turtles, but not all turtles are terrapins.
Some turtles are just turtles.
~The World of Turtles and Crocodiles*

Linkages to SDGs

This exemplar on Turtles is connected to aquatic life found in sea which is directly linked to Goal 14 focused on “*Conserve and sustainably use the oceans, seas and marine resources for sustainable development*”. This directly links to protection of oceans and sea turtles. It looks into marine pollution of all kinds and protection, managing of marine ecosystems.

There are 6 other SDGs which connect with issues related to marine ecosystems:

- Goal 4 on Quality education
- Goal 6 on clean water and sanitation
- Goal 11 on Sustainable cities and communities
- Goal 12 on Responsible consumption and production
- Goal 13 on Climate action
- Goal 15 Life on land.



Handprint CARE Pedagogy

There are many ways through which issues related to sea turtles can be introduced in classrooms. This exemplar looks into four ways through which a teacher could transact the theme taking students from exploring issues to find solutions and to take action.



Quadrant 1

Start up Stories & Sharing Experiences

Story 1: A walk to remember

On a starry Friday night, many young volunteers of the Students' Sea Turtle Conservation Network (SSTCN) begin their walk along the Marina beach, Chennai (world's second longest beach). The shore of Chennai welcomes different species of turtles but mostly Olive ridley which is locally called Panguni aamai (after the Tamil month Panguni which is mid-March and mid-April and aamai is turtle in Tamil). Green turtles have also been observed in the past.

As volunteers walk along the length of the beach under moonlight, they share their experiences of turtle walks. With wielding slender sticks, and torch pouches many youngsters patiently walk along the beach every day starting from February looking for turtle eggs. As they walked through the night, they found their first dead turtle at around 2:30 am, lying on its shell along the shoreline. After 20 minutes, the volunteers spot another dead turtle stuck in between nets. Volunteers tie a rope around their neck to indicate that they are not fresh corpses to be added to the mortality count. The city corporation usually buries them in popular beaches and in smaller beaches they are left as such. SSTCN mentions that they do not tag live turtles as they believe in non-invasive conservation research and focusing on one species is pointless as we then forget the suffering of the sea at large.

One of the volunteers mentions that live nesting is a rare site but during peak season, one can find nearly five nesting a week but it's sheer luck. Turtles usually come in the night and up to early morning. Turtles throw sand on them before settling to nest, as camouflage added another volunteer. Walking nearly 7km on the beach in relatively cold weather, treading where the shoreline slopes towards the sea is quite exhausting, says Arun who runs SSTCN.



As they walk further, they find another dead turtle which had one of its flippers covered with plastics. The death of all these three turtles has been a tragic sight to volunteers. Arun mentions that the aim of these public walks is to create ecological awareness among people.

As they have covered quite some distance, they finally spot one nest. Each nest has an average of 100 to 120 eggs. Now the volunteers gently pick up the eggs and put them in a cloth bag. After they have collected the eggs, they measure the nest and try to replicate the same in their hatchery.

The hatchery is usually very close to the beach where temporary fences are made to protect it from dogs or any other invaders. One of the volunteers sat down after the long walk and he mentions that on an average an egg takes nearly 45 to 70 days to hatch.

The hatchlings are released from outside the beach. The volunteers carefully watch them walk from the hatchery and finally swim to the sea. They stay there for some time to make sure that crabs or birds don't prey on them. However, only one among thousand turtles survives. They are either eaten by bigger fish, or get caught in nets or plastic bags. When asked how they spot nests, a volunteer mentions that they use three techniques- in track, down track and clearing. In track is the path of the turtles from the sea to the sand. Down track is its path from the sand back to the sea. In between I track and down track is a smooth area called clearing.

They use sticks through these areas and wherever the stick goes in smoothly is where you find the nests. For first timers, it might take time to spot these tracks. Turtles always nest beyond high tide lines, added a volunteer. The only mercy for the volunteers after a long walk with tragic sights of three dead turtles, was finding one nest.

Source: When they walk the talk, for turtles. Published on 26th March, 2019. Times of India and on a midnight walk: What Chennai means to the turtles. Published on 26th March, 2017. Hindustan Times



Did you know?

Facts about sea turtles

- Sea turtles are one of the oldest creatures on the planet. They have existed for over 100 years, which means their ancestors have been around since the time of dinosaurs.
- There are seven recognised sea turtles in the world: Olive ridley, Green, Hawksbill, Loggerhead, Leatherback, Black and Flatback.
- While each species looks and behaves differently, they have some common characteristics.
- All sea turtles begin their life on land as hatchlings.
- More than 90% of sea turtles' life is spent in water feeding, mating and migration
- Sea turtles remain submerged for most of the time but they rise up to the surface and breathe in air.
- Loggerhead turtles migrate over 12,000km across the Pacific Ocean.
- Leatherback and Hawksbill turtles feed on jellyfish and keep their population in check. The reason why many turtles die of plastic ingestions is because plastic looks a lot like jellyfish when floating.
- Leatherback turtles are also the largest living turtles and can weigh as much as 900kg. Olive ridley is the smallest among all marine turtles.
- The ability of sea turtles to migrate thousands of miles from their feeding ground to their natal (birth) beach for nesting is one the most unique and remarkable acts in the animal kingdom.
- A hatchling's gender depends on the temperature of the nest. Warmer temperatures produce more females while cooler temperatures produce male.
- Male sea turtles often never leave the ocean, unlike female sea turtles who lay eggs on the shore.
- Female sea turtles return to the same nesting grounds where they were born to lay their own eggs.
- Hatchlings emerge from the nest together at night. They immediately start to scramble for the sea which they locate by its brighter horizon.
- Only one in every thousand turtle hatchlings make it till adulthood.
- Since they don't have to protect themselves from predators for most of their life on water, sea turtles cannot retract their flippers and head into their shells. Their anatomy makes them more agile when under the sea but highly vulnerable when nesting and hatching.
- Even though they're marine animals, some of their natural predators include dogs who dig up their eggs buried in the sand.
- Turtles do cry but not because they are sad but when there is excess salt in their eyes. Glands present in their eyes help them secrete excess salt.
- Satellite tracking studies have shown that the turtles can navigate with exceptional accuracy.
- They live to around 100 years, which is also roughly the number of eggs female sea turtles lay when they nest.



Cultural and symbolic importance of sea turtles

Travelling around the world, as ancient and as iconic as they are, sea turtles hold a prestigious place in many traditions and cultures around the world. Sea turtles are also a symbol of longevity and fertility in many cultures. In Hinduism, Akurpura is a tortoise who carries the world on his back, upholding the Earth and the sea. One of the 10 incarnations of Hindu deity Vishnu is the giant turtle 'Kurma'.

Native American, Chinese and Hindu mythology believe that the continuance of the world relies on the existence of sea turtles. This is depicted in Hindu belief where the image of the world is placed on top of three elephants, standing on the back of a sea turtle. In recent times, sea turtles have become the mascot for conservation movements, appealing to human emotions. Such conservation movements of a familiar and charismatic species like sea turtles can be extended into habitat protection for the entire ecosystem and open doors for appreciation and respect for nature.

If an iconic fauna like sea turtle goes extinct, then is there hope for its lesser known yet indefinitely significant counterparts? Human beings are capable of preventing actions like poaching and over-exploitation and can uphold the spirit of cooperation and oneness. The downfall of the turtle community would certainly symbolize the failure of humanity and the conservation movement. So maybe the Indian mythology is right, if sea turtles disappear from the planet, with them humanity disappears.

Source: Hoorn, Roxanne (2016). Humanity balancing on a turtle's back: perceptions and values of sea turtle conservation among different demographics at four sites in the Bocas del Toro Archipelago Bocas del Toro, Panama. Independent Study Project (ISP) Collection. 2487.



Story 2: Between the Tides (South Africa)

(Title taken from Dr G.H. Hughes' book of the same name)

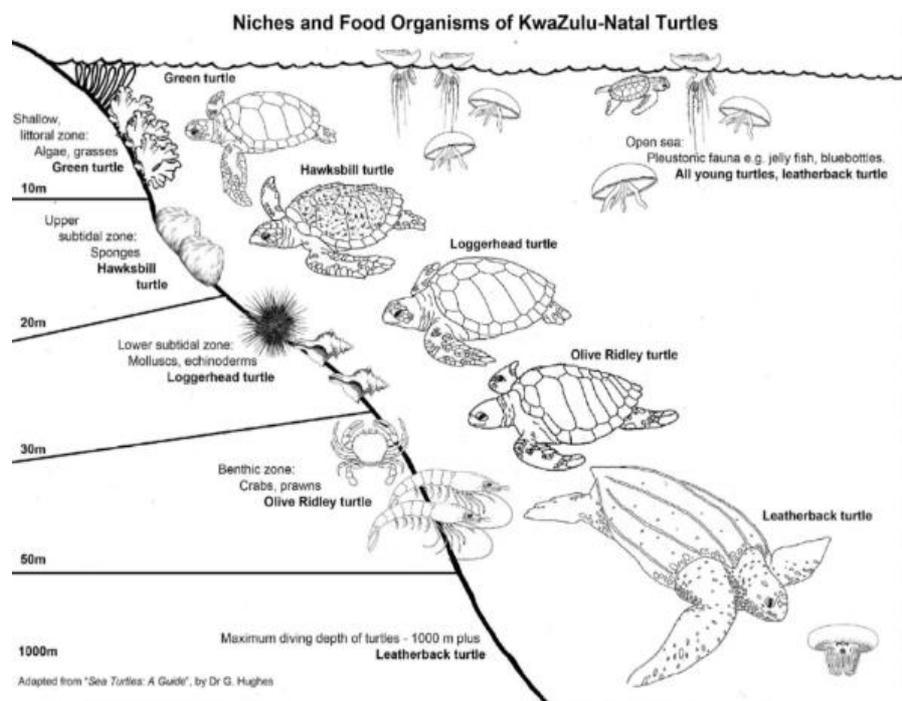
It's a hot, humid, summer night on the Maputaland coast in northern KwaZulu-Natal. It is high tide and the moon is shining down on a deserted beach. A female loggerhead turtle emerges out of the surf and moves slowly up the beach to get her bearings. Yup, this is the right beach - her instincts tell her this is where she hatched 12 years ago and she recognises the smell.

Clearly the female loggerhead has not evolved to move quickly on land, but the high tide has helped her get as far up the beach as possible. Her movements are cumbersome but she makes her way up the sand dune to above the high tide mark.

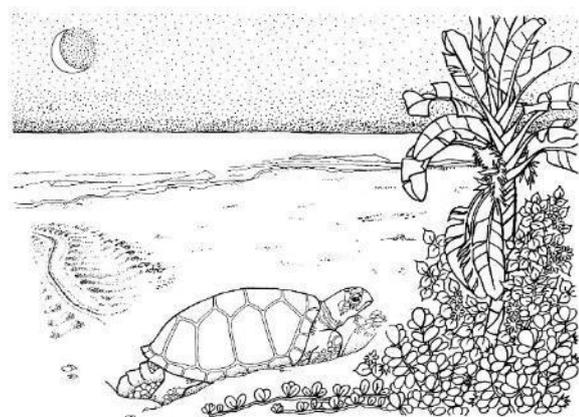
She pauses to catch her breath, then starts digging a body pit with her fore flippers so she can lie with the top of her shell level with the sand dune. Using first the right, then the left back flipper she starts digging an egg cavity, scooping sand out of the hole and flinging it left and right.

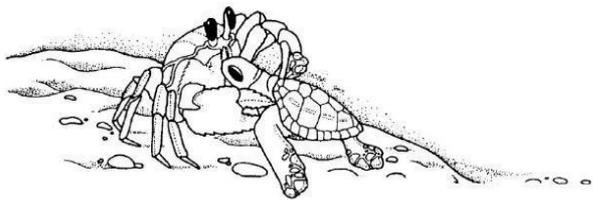
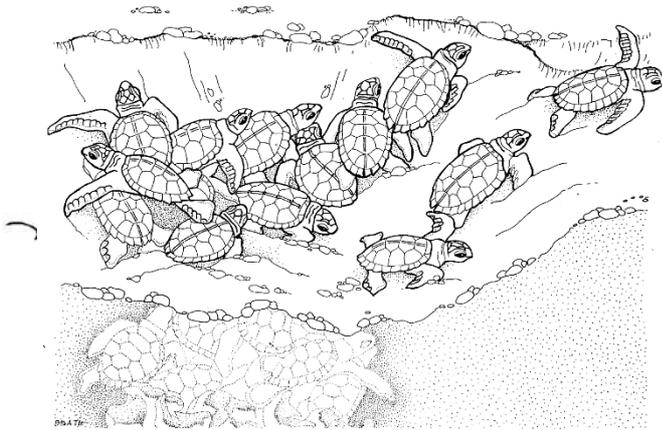
Satisfied the hole is deep enough the female turtle begins to lay her eggs. One hundred beautiful, soft, white, round eggs drop into the cavity, one by one.

She is exhausted! Once the female turtle has laid all her eggs she fills the hole with sand, pressing the surface down hard with her flippers. Turtle eggs are a rich source of protein for many predators, so to prevent animals from finding her nest she throws sand over the whole area with her fore flippers to disguise the nest.



In human time the loggerhead female laid her eggs at the beginning of December. It is now February, 60 days later, and the baby turtles are ready to hatch. The temperature of the sand while the eggs are developing will determine whether the turtle hatchlings are female or male. Eggs developing in warm temperatures produce females, cooler temperatures produce males.





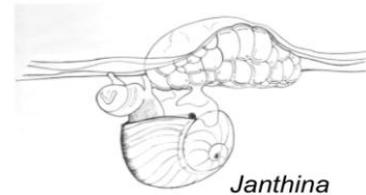
The hatchlings cut their way out of the egg with a special egg tooth on the end of their beaks. Once all the hatchlings have hatched, they start digging at the sides of the nest chamber causing it to collapse. The sand fills the hole allowing the hatchlings to push and climb their way to the surface. It is the middle of the day, so the hatchlings wait until nightfall when the temperature of the sand drops before emerging onto the beach.

Slowly they climb out of the nest and, guided by the lighter horizon of the sea they sprint, as fast as they can to the water. There are many perils along the 50-meter route, many are caught and eaten by ghost crabs, not many will make it to the relative safety of the water.

The sea too has many predators waiting for this feast of baby turtles. Once in the sea, the hatchlings swim steadily for days to get to the

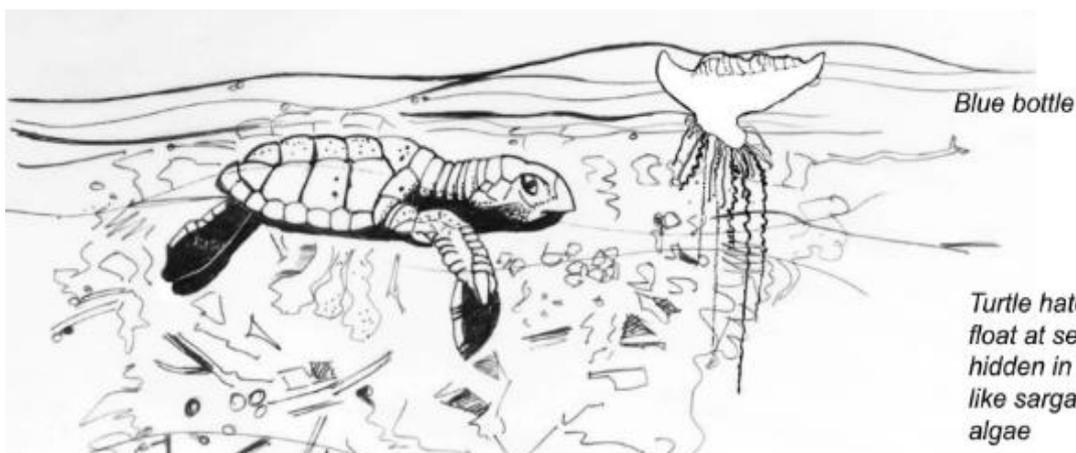
Agulhas Current. This fast flowing, warm current sweeps the hatchlings down the east and south coast of South Africa as far as Cape Agulhas, some even get swept into the Atlantic Ocean!

Most hatchlings are swept back into the southern Indian Ocean where they drift in the open sea for up to 3 years. At sea the hatchlings feed on blue bottles, purple storm snails, Janthina, and other floating organisms.



Janthina

Eventually the ocean currents sweep the immature turtles back to the coast line where they start feeding on mussels and molluscs found in the subtidal zone.



Quadrant 2

Inquiry & Deepening Knowledge

Did you know?

Threats to Turtles

Habitat loss

Sea turtles are totally dependent on beaches for nesting. Due to extensive and uncontrolled coastal development, vehicle traffic on beaches and other human activities, sea turtle nesting has been greatly affected. Lights from roads and construction buildings disorient hatchlings away from the shore and vehicles on beach compacts sand making it difficult for turtles to dig nests. Clearing land, nutrient runoff from agriculture, and other onshore activities, damage seagrass beds and coral reefs.

Illegal trading and over harvesting

Sea turtles have been unsustainably and illegally harvested for many years. Turtle meat and eggs have been a source of food and income for many countries across the globe. Turtles are also killed for medicine and religious purposes. Thousands of turtles are killed this way every year which has led to devastating populations of endangered hawksbill and green turtles. Even though the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES) prohibits the international trading of sea turtles and their parts, illegal trading continues.

Ocean pollution

Sea turtles usually mistake floating plastics in the ocean for jellyfish and can choke while trying to feed on them. Discarded fishing gear can entangle around turtles and cause them to drown. Hatchlings can get trapped in waste discarded on beaches. Oil spills pollute the ocean and poison turtles.

Climate change

Environmental conditions have an impact on almost all aspects of sea turtle's development. Even the sex of the hatchlings is dependent on temperatures. Increasing sea level rise, storms can wash away /damage nests.

Migration

Most sea turtles migrate between foraging and nesting grounds, and seasonally to warmer waters. Adult sea turtle migration occurs on average 2-4 years. While many reptiles migrate, sea turtles are unique because they migrate hundreds and even thousands of miles. Sea turtles' nest in tropical and subtropical regions. Mostly they migrate to nesting areas where they were born. While it is not exactly known how adult turtles navigate to their natal (birth) beaches, some researchers suggest they might use few clues like ocean currents, water chemistry and even earth's magnetic field.

News Update

Finding my way!

A study by researchers in 2020 show evidence that turtle pull off their exceptional feats of navigation only with a crude map to guide them and sometimes they go well off their way before correcting their direction. Six of their tracked turtles travelled more than 4000 kilometres to the east coast of Africa, from Mozambique in the south, to as far north as Somalia.

So, these turtles complete round-trip migrations of more than 8,000 kilometres to and from their nesting beaches in the Chagos Archipelago. These findings have implications for turtle conservation. As turtles broadly travel across open ocean once nesting season has finished, conservation measures must be taken across these spatial scales and across many countries.

Eco Puzzle Activity 1: How Many Types of Sea Turtles?

Teachers must make sure that they explain the activity to the students. For lower primary grades, teachers can introduce them to words like scutes, clutches, etc. Students can find out what they mean by themselves or as a group.

Divide the class into groups of three or four. Each group can be given one species of sea turtle. The group can trace their turtle species (given below) on a chart. They can colour them as well. As a group, they can include the following information on their chart:

Olive Ridley Turtle	Hawksbill Turtle	Loggerhead Turtle	Green Turtle	Leatherback Turtle
				

- 1) Name of the turtle
- 2) Shape of their shell
- 3) Pairs of scutes
- 4) Shape of their head and beak
- 5) Number of claws in each limb
- 6) Food
- 7) No of clutches in one season
- 8) Clutch size (average)

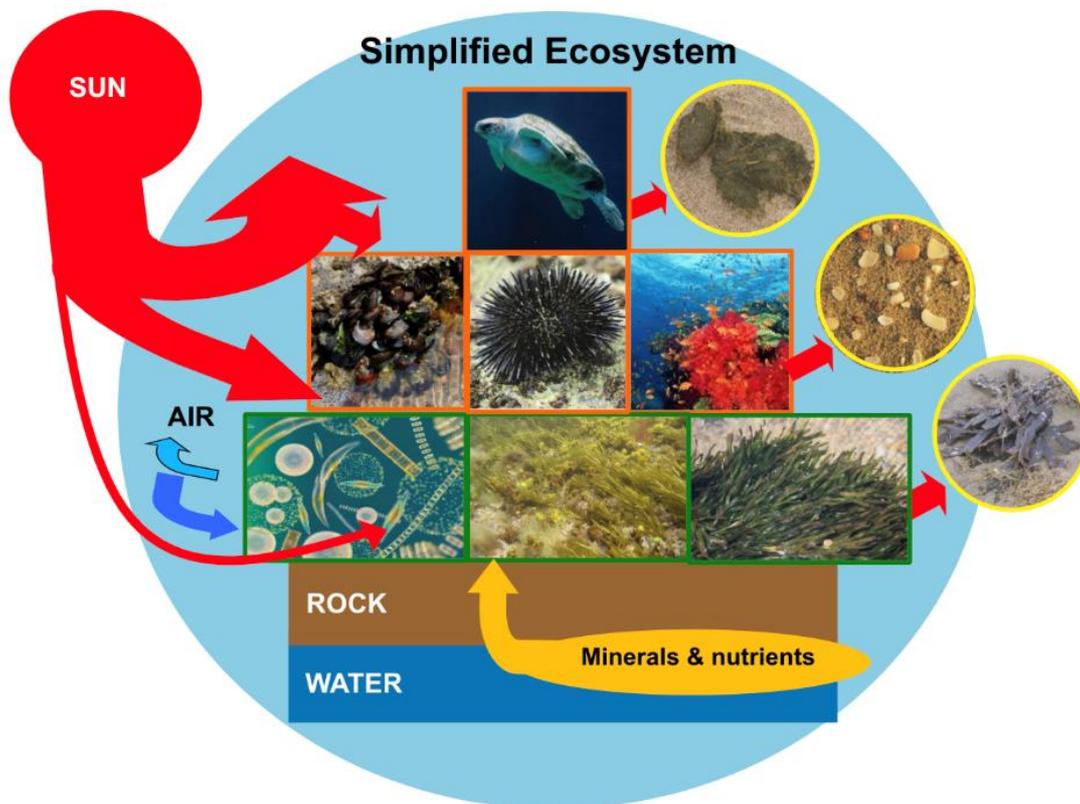
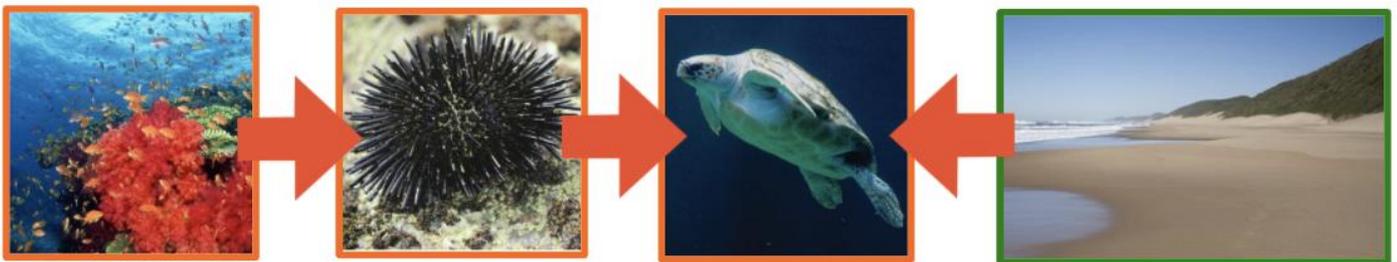
After completion, each group can display their chart in an open space so that other students from their class and in their school can look at them and learn from it.

Eco puzzle activity 2: Explore patterns of care

The loggerhead turtle plays an important role in maintaining the marine ecosystem. These roles range from maintaining productive coral reef ecosystems to transporting essential nutrients from the oceans to beaches and coastal dunes.

Some of these patterns of interdependence are:

- The loggerhead turtle depends on healthy reefs for food.
- Reefs depend on turtles to help keep the balance of the marine food web and by facilitating nutrient cycling.
- Loggerhead turtles depend on undisturbed dune forests and beaches for nesting and egg laying.



Quadrant 3

Review, Analysis & Critical Thinking

Over the last few hundred years, human activities have caused an imbalance in the survival of sea turtles. Sea turtles suffer from poaching and over-exploitation as they are slaughtered for their skin, shells, meat and eggs. Change in sand temperature due to climate change has an impact on turtle nesting sites. Almost all species of sea turtles are now endangered and three of the seven existing species are critically endangered.

India's long history of sea turtle conservation

1969 marks an important year for sea turtle conservation in India. It was the first time in India when few enthusiasts started conducting turtle walks in the coast of Chennai (then Madras). The sea turtle conservation pioneer, Carr started the Marine Turtle Specialist Group in 1966. Until the 1970s, marine turtles were referred within a fisheries framework in India but later there was a focus on conservation of marine endangered species with research on olive ridley turtles. Five species of sea turtles in India were included in Schedule 1 of the Wildlife Protection Act in the year 1977. Student's Sea Turtle Conservation Network (SSTCN) started in 1988, which is still active.

1990 is considered as the decade of citizen movements of sea turtle conservation. Many organisations, NGOs across India including a fishing village in Kerala called Theeram, Visakha Society for Protection and Care Of Animals (VSPCA) in Visakhapatnam all started work related to conservation of sea turtles. Especially after Orissa's cyclone in 1999 sea turtle conservation became a national priority.

In 2000s, National Conservation Foundation started their work on green turtles in Lakshadweep islands. International Sea Turtle Society's 30th Annual Symposium was conducted in 2010 in Goa. "The World of Sea Turtles" was the theme of the symposium and it drew a lot of attention around the conservation of marine ecosystems. Very recently in 2018 an annual symposium was conducted in Japan.

The Goa Coastal Zone Management Authority (GCZMA) has decided to declare the beaches of Morjim, Mandrem, Agonda and Galjibag- the turtle nesting zones- as "Silence Zone". Centre for Environment Education (CEE) has been asked to prepare Coastal Zone Management Plan (CZMP) to protect turtle-nesting grounds along these beaches. As per Coastal Regulation Zone (CRZ) Notification 2011, Clause 8 (3) (vii) "provides that the beaches of Mandrem, Morjim, Galgibag and Agonda have been designated as turtle nesting sites and protected under the Wildlife Protection Act 1972 and these areas shall be surveyed and management plan prepared for protection of these turtle nesting sites and that no development shall be permitted in the turtle bleeding areas."

While efforts continue to protect marine ecosystems and sea turtles, threats of climate change, and human activities like poaching and over-exploitation continues. Hence, it is important for people/communities to come together to learn more about the role of humans in marine pollution and decline of sea turtle and create awareness and take steps as individuals and as communities to conserve marine ecosystems.

Source: "A half century of sea turtle conservation" by Karthik Shanker. <https://round.glass/sustain/conservation/sea-turtle-conservation/>; Morjim, Mandrem, Agonda and Galjibag to be declared as Silent Zones. Published on 9th December 2020. Herald Publication (<https://www.heraldgoa.in/Goa/Morjim-Mandrem-Agonda->

News Update

Protection Action

The Ministry of Environment, Forest and Climate Change, Government of India in 2021 has issued blueprints for protecting endangered turtles. The documents ‘Marine Mega Fauna Stranding Guidelines’ and ‘National Marine Turtle Action Plan’ promote inter- sectoral action for conservation. It also guides improved coordination amongst the government, civil society and all relevant stakeholders on the response to cases of stranding, entanglement, injury or mortality of marine mammals and also conservation of marine turtles.

Eco puzzle activity 3: Turtles in Trouble

Using the pamphlet template below, include information on

1. different species of sea turtle around the world
2. different species of sea turtles found in your country
3. threats that they face in your country
4. suggest ways to protect sea turtles.

You can work together with other students in your class in creating and discussing ideas for this pamphlet. With the help of your teachers and school administration, you can

- a) put up the pamphlets in school corridors/bulletin and
- b) plan a school assembly one day to present the pamphlet to the whole school and raise awareness on the issue. Teachers/school administration can share this pamphlet on Facebook or other social media platforms to spread the word.

Topic: _____

Species around the world



Country name	Species

Country map

Species	Threats

Ways to conserve sea turtles

Quadrant 4 Handprint Actions for Change

Did you know?

How Does Plastic in the Sea Affect Sea Turtles?

- Discarded or lost fishing nets pose a hazard to large marine mammals and reptiles, like sea turtles who can get entangled in these nets and drown.
- Fishing line causes painful entanglement.
- Sea turtles swallow plastic bags by accident because they mistake it for their favourite food, jellyfish.
- Plastics in the ocean break down into small pieces known as microplastics, which can be eaten by many marine animals.

Plastic litter on land is washed into the sea. Litter found on the beach is only a tiny percentage of what is out in the ocean.

The top 15 litter items found on KwaZulu-Natal beaches are:

plastic bottles, plastic bottle lids, polystyrene, carrier bags, chip packets, individual sweet wrappers, plastic straws, plastic ear bud sticks, lollipop sticks, cigarette butts, discarded fishing line, plastic containers like yoghurt tubs, plastic cutlery, plastic pieces bigger than 5 mm and raw plastic nurdles.

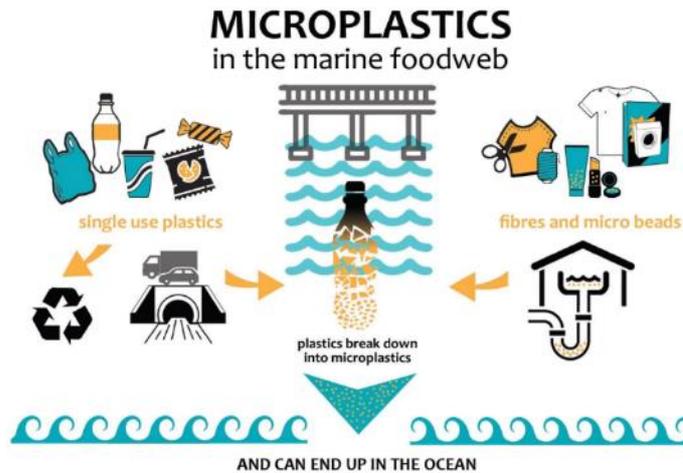
How Can You Help?

- Be responsible with your litter no matter where you live.
- Reduce your use of single use plastic and join the recycling movement.
- Educate others on the dangers of plastic pollution.

TASK: Start a clean-up campaign in your area.

- Making sure your neighbourhood is litter free helps prevent marine litter as it is washed from the streets into rivers, and finally into the sea.
- Find out where you can take plastic to be recycled and educate yourself and others about the different plastic recycling categories.
- Recycling can generate funds for your school or community.
- Make an ocean promise

<p>What is your OCEAN PROMISE?</p> <p>Date: Age:</p> <p>Venue:</p> <p>Occupation: Scholar (still at school) Student</p> <p>Unemployed Employed Other</p> <p>My promise is:</p> <p>.....</p> <p>.....</p> <p>.....</p> <p>.....</p>



Plastic Recycling Categories

COMMONLY RECYCLED

Codes 1, 2 and 4 are recycled across South Africa.



PET

1. Bottles and jars for cool drinks, juice, water, detergents and food.



PET

2. Bottles for milk, juice, shampoo, shopping bags, bottle tops, household containers and crates.



PET

4. Packets for bread, frozen vegetables, milk sachets and toilet paper packs.



NOT EASILY RECYCLED



PVC

Codes 3, 5, 6, 7 are not recycled in South Africa because of FEW SUITABLE recycling facilities.



PP

3. Cling film, clear jars and bottles for toiletries, food and medication.



PS

5. Yoghurt, margarine and ice cream tubs, clear and metallic films for sweets (individual sweet wrappers).



Other

6. Polystyrene take away containers, food trays for meat, fruit and vegetables, seedling trays.

7. Multi-layered plastics for long-life products.

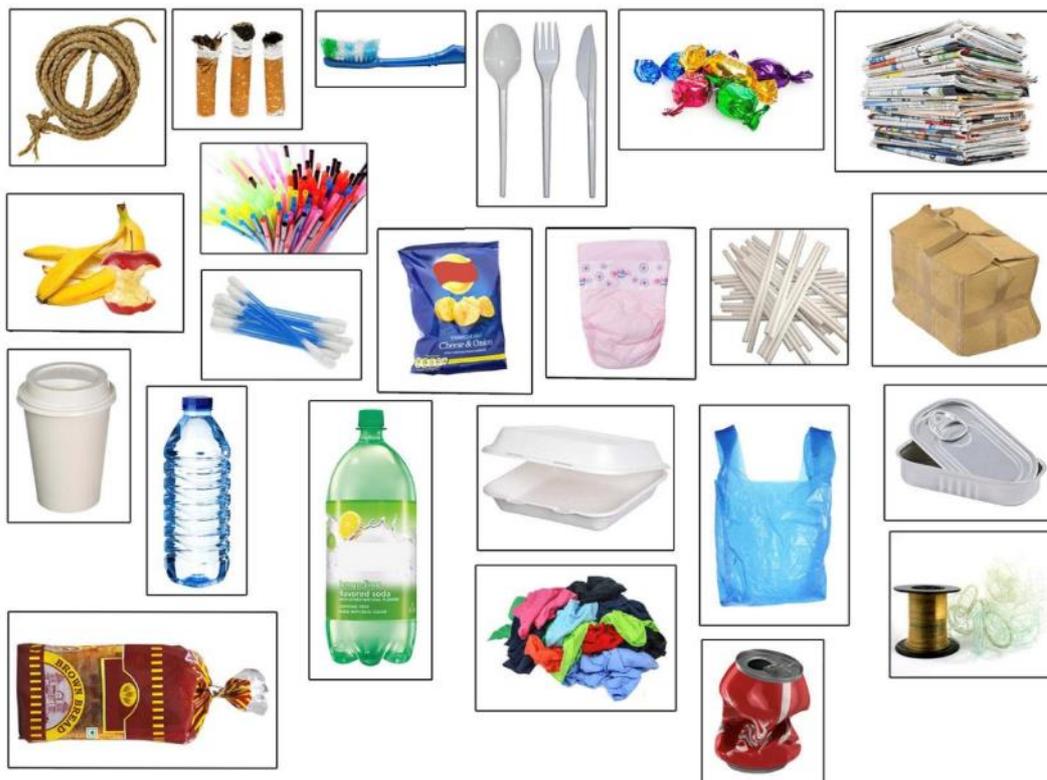
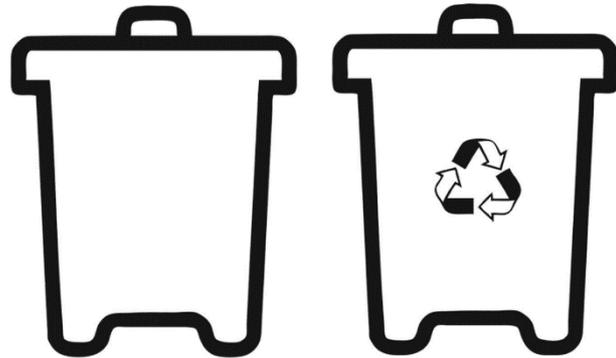


What Can be Recycled?

Print out slides number 29-30. Cut out the litter items and discuss which can be recycled, and which recycling category each one is.

Place them on the recycled bin print out, or on the secure bin for waste removal.

Discuss with the group what they could do at home to reduce litter in the streets.



Talk for Turtles

With the help of teachers, students can raise awareness about the importance of sea turtle protection and steps to conserve through skit/play/poetry. With the help of teachers/school administration, perform this skit/play in public places like beaches, parks, etc. Students can use charts and pamphlets that they created in previous tasks for the skit/play/poetry.

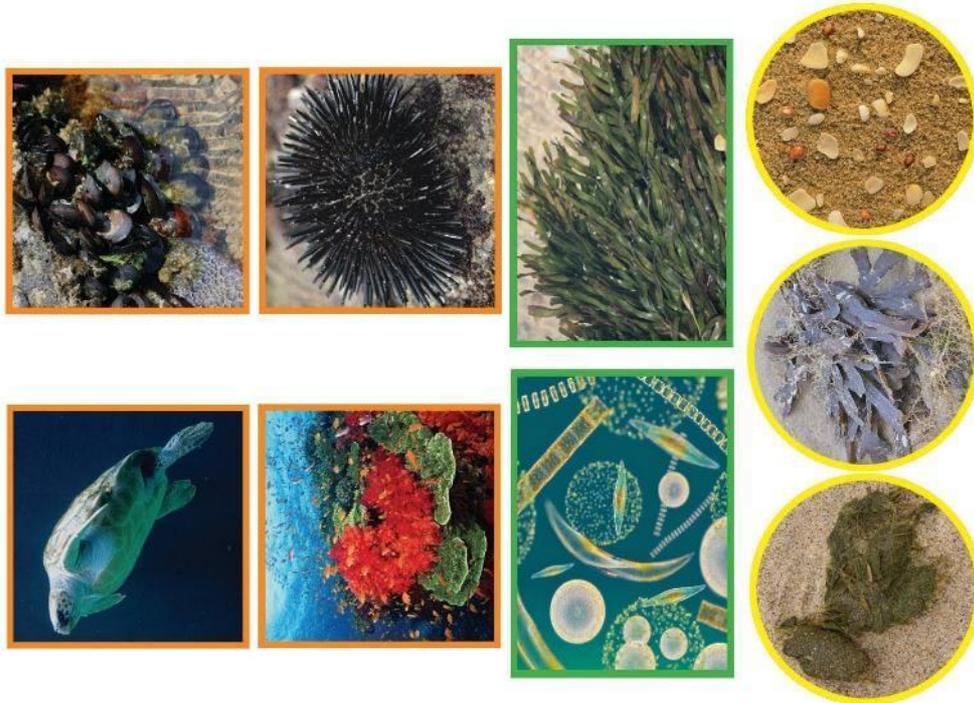
Teachers/school administration can share this pamphlet on Facebook or other social media platforms to spread the word.

Extension

If you live in a city which has a beach, with the help of teachers/school administration you can build partnerships with other schools/existing turtle conservation communities in your

city and take part in turtle walks during nesting season or participate in beach clean-up with family/friends.

Eco-Puzzle Cards - Print and cut out the cards to model patterns of interdependence



References

Karthik Shanker. “A half century of sea turtle conservation”

<https://round.glass/sustain/conservation/sea-turtle-conservation/>

Morjim, Mandrem, Agonda and Galjibag to be declared as Silent Zones. Published on 9th December 2020. Herald Publication (<https://www.heraldgoa.in/Goa/Morjim-Mandrem-Agonda-and-Galjibag-to-be-declared-as-Silent-Zones/168452>)

Turtles in Trouble. NatureScope. Centre for Environment Education (CEE)

Reading Resource: <https://www.juaraturtleproject.com/projects/sea-turtle-conservation/>

Video resources

Tracking Olive Ridley turtles on India's west coast (Case study, English; Duration 4.42 mts)

<https://www.youtube.com/watch?v=epaaLSaaAxo>

Protect our planet | Conservation Experiences | Phinda Turtle Nesting Adventure | South Africa (English, Duration: 1.54 mts.)

<https://www.youtube.com/watch?v=1OFMyWvf4Bo>

Juara Turtle Project - Green Turtle Necropsy (Case study, English; Duration: 2.02 mts)

https://www.youtube.com/watch?v=Q4RQ_xH0Y4k&t=1s