VISAKHA SOCIETY
FOR THE PROTECTION AND CARE OF
ANIMALS

REPORT ON THE OLIVE RIDLEY SEA TURTLE PROTECTION PROGRAMME 2012-2013

Visakha Society for the Protection and Care of Animals (VSPCA)

ALL INFORMATION IN THIS REPORT IS FROM THE VSPCA AND ALL SOURCES HAVE BEEN DULY CITED. THIS REPORT HAS BEEN PREPARED BY MS. M. PRATIKA YASHASWI, VOLUNTEER-INTERN AT THE VSPCA.

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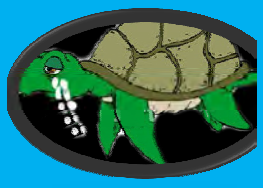
www. vspcadeep.org

The special feature of this year's sea turtle protection effort at our coast has been to bring forth the reality of ocean pollution affecting the sea turtles

Please turn onto the page 11 for more details



ACKNOWLEDGEMENT

The Visakha Society of the protection and care of animals (VSPCA) is grateful to the ANDHRA PRADESH forest department, the winsome Constance kindness trust- Australia, greater good organization- USA, help animals India- USA, and Madras Crocodile Bank Trust- Chennai for their continuous and unswerving support. The sea turtle protection project, a hallmark in terms of expertise, success and quality would not be nearly as successful and exemplary as it is today if not for their help.

We also take the opportunity to thank MS. MADHUSHREE VEMPARALA of Gitam institute of science, Gitam University for her scientific input as a student of environmental studies.

We also take the opportunity to thank MS. M. PRATIKA YASHASWI, Symbiosis University for her contribution in preparation of this document.

Last but not the least, we would like to thank the brave OLIVE RIDLEY SEA TURTLES which make the long and arduous journey from MEXICO to nest in our land's beaches.

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SUMMARY:

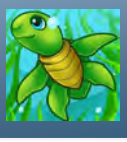
This report is written in order to educate the reader about the endangered olive ridley sea turtle, a species of marine life that conducts its unique and famous nesting ritual on vizag's shores; and the efforts in place by the Visakha Society for the protection and care of animals (VSPCA) to protect it.

All data is collected, maintained and interpreted by the VSPCA. Over the last few years, rapid development along the vizag coast and increasing pollution levels in our city have been causing severe deterioration of our environment, making it utterly difficult for sea turtles to nest here. There have been cases of mother turtles being unable to find a proper place to lay their eggs on account of horrifically dirty conditions in our polluted beach, and so they lay eggs in the water itself, with no hope for eggs to survive. It is tragic because this constrains our efforts to conserve this highly endangered marine creature that has been around in our planet from the time of the dinosaurs. The mighty dinosaurs had become extinct, their kind unable to survive the earth, whereas these humble creatures of the sea continued, until today.

According to the marine turtle specialist group (mtsg) of the iucn , there has been a 50% reduction in population size since the 1960s. Although some nesting populations have increased in the past few years, the overall reduction is greater than the overall increase.

Expansion of the shrimp trawling fishery in the eastern indian ocean in the mid-1970s has resulted in numerous olive ridley deaths… over 10,000 olive ridley carcasses a year have been counted on the orissa coast since 1999 (wright and mohanty 2006). These carcasses have largely been attributed to the shrimp trawl fishery, but trawling is not the only source of olive ridley mortality in the eastern indian ocean. On february 17, 2002, 205 dead olive ridleys entangled in a section of gillnet were washed ashore at gundalba beach, orissa (wright and mohanty 2002).

We would like to draw your attention to the various factors contributing to the deterioration of sea turtle population, and the statistical interpretations of the data from studies and tests conducted in our waters.



A Very Rare Picture Of Sea Turtle Laying Eggs Can Be Seen In Page 6

ABOUT VSPCA

VISAKHA SOCIETY FOR THE PROTECTION AND CARE OF ANIMALS

The VSPCA(Visakha Society for the Protection and Care of Animals) is an animal welfare organization based in Visakhapatnam, Andhra Pradesh that was founded on 30 June 1996. It runs numerous programs for the rescue, protection, care and treatment of all kinds of animals, both domestic and wild.

The VSPCA works to stop the illegal trade in internationally-protected sea turtles, rescues cows and water buffalo too old or injured to be kept by their previous owners, as well as provides permanent happy sanctuary to hundreds of dogs, cats, birds, monkeys, horses, rabbits, tortoises, ducks and other animals who had been suffering severe abuse or neglect at its two shelters.

We currently have over 1300 large and small rescued animals in our sanctuary near the city as well as our new "Kindness Farm". We have provided spay and neuter procedures, as well as vaccines and health checks to more than 80,000 street dogs. The population of street dogs in this area is smaller, healthier and ever shrinking as a result of this wonderful program.

The community based Sea Turtle Protection Program conducted on the coasts of VIZAG and BHEEMUNIPATNAM is one of our oldest programs, having started around the time of conception of the organization itself. We have several achievements in the field of Animal Welfare. More information on this can be found on our website www.vspca.org.

VISAKHA SOCIETY FOR THE PROTECTION AND CARE OF ANIMALS

You Know, Why It Is Difficult To Conserve Olive Ridley Turtles, If not follow me on page 11

THE OLIVE RIDLEY SEA TURTLE

About The Olive Ridley Turtle

The Olive Ridley's scientific name is Lepidochelys Olivacea. It is endangered. Olive Ridleys are found only in warm waters, such as those found in the southern Atlantic, Pacific and Indian Oceans.

Ridleys weigh up to 45- 50kilograms in weight and reach a maximum of about 50-75 centimeters in shell length. It is one of the smallest of the 7 different species of marine turtles in existence today and has a lifespan of up to 50 years.

An adult Olive Ridley can be identified by its olive green circular shell. Hatchlings are usually colored grayish-brown or black. Their front and back flippers usually have one or two claws.

Turtles belong to the same group of animals as the crocodile, snake and tortoise and have been around for millions of years; surviving disasters that killed the dinosaurs. They are omnivores that feed on crabs, mollusks, shrimp, jellyfish and occasionally algae and seaweed. They can dive up to 150 meters deep.

SEA TURTLE LAYING EGGS IN VISAKHAPATNAM BEACH

THE SEA TURTLE PROTECTION PROGRAM

Generally, there are two main methods of protecting the sea turtle rookeries on the shore. (rookery refers to nesting/breeding ground.) In situ and ex situ protection.

In situ protection refers to protecting the turtle eggs without relocating them to another area. Ex situ protection refers to shifting the eggs to a protected hatchery, where they are safe from predators and careless beach walkers.

VSPCA has been doing in situ protection since the beginning of the program more than 15 years ago, but our ex situ protection program started in 2010-11. In situ does not provide adequate protection from the environmental dangers (excessive tourism development, beach activities, heavy lighting, pollution and predators such as beach dogs) and so ex situ becomes necessary to implement. Its success led us to expand it further, and it now has become our favored method of protecting the turtles. VISAKHAPATNAM, JODUGULLAPALEM, RUSHIKONDA, AND BHEEMLI are the primary sites where the hatcheries are set up.

VOLUNTEER MEETING HELD FOR OLIVE RIDLEY SEA TURTLE PROTECTION PROGRAMME 2012-2013

SEA TURTLE PROTECTION FORCE

VSPCA's Sea Turtle Protection Force is a 24 member team of extensively trained local fishermen and volunteers who comb the beaches night and day on patrol, fervently protecting the turtle rookeries from predators, poachers and generally careless beachgoers. The force protects not only the turtle eggs and the hatchlings, but also the mother turtles that come to nest.

Two members are assigned to each 4 km stretch. They mark the eggs and monitor their progress on a regular basis. Further, they rescue and safely facilitate the release of the turtles as soon as they are hatched, guiding the weaker ones to the ocean; knowing well that they are ensuring that the females among these hatchlings would return 15 years later by virtue of their inherent "nesting site fidelity" which means that adult turtles always, always go back to nest where they were hatched.

We owe a lot to the STPF whose dedication has made it possible to rescue so many sea turtles from poachers.

The force also spreads awareness amongst the public by distributing educational materials and informing them by word of mouth about the turtles and the need to protect them.

SEA TURTLE PROTECTION FORCE -2013

R.K. BEACH HATCHERY 2013 AT VISAKHPATNAM

MR. A. JOSEPH, PRINCIPAL AND CHIEF CONSERVATOR OF FOREST AND CHIEF WILD LIFE WARDEN A.P FOREST DEPARTMENT INAUGURATING THE R.K. BEACH HATCHERY AND RELEASE OF FIRST BATCH OF HATCHLINGS

SEA TURTLE PROTECTION FORCE COLLECTING EGGS FOR SHIFTING TO THE HATCHERY

RELEASING OF HATCHLINGS

VOLUNTEERS PARTICIPATING IN THE RELEASE OF THE BABIES

Do you know, how the turtle are detected , to know follow to page 15

WHY IT IS DIFFICULT TO CONSERVE OLIVE RIDLEY TURTLES

Threats to the survival of Olive Ridleys that nest in Visakhapatnam

"All stages of a marine turtle's life are affected by environmental conditions such as temperature—even the sex of offspring. The warmer the nest beach conditions, the more female hatchlings that emerge from the eggs. Unusually warm temperatures caused by climate change could be disrupting normal sex ratios, resulting in fewer male baby turtles. Warmer sea surface temperatures can also lead to the loss of important foraging grounds for marine turtles, while increasingly severe storms and sea level rise can destroy critical nesting beaches and damage nests." The sea turtles of Visakhapatnam face a severe threat from a lot of sources: the tragedy is that a species that has thrived for millions of years, surviving undersea catastrophes such as volcanoes and tsunamis: things that other larger creatures like dinosaurs haven't survived is now endangered, its population declining in a span of very few years.

The List of hindrances at our coast is

1.DREDGING
2. EXCESSIVE BEACH LIGHTING
3.TOURISM DEVELOPMENT ACTIVATES
4. FISHING NETS ARE TURTLE UNSAFE
5. NATURAL PREDATORS
6. LAND POLLUTION: BLACK SAND
7. SAND MINING
8.BEACH FIRE
9.POLLUTION IN THE OCEAN
10. UNTREATED SEWAGE FILTH AND WATER
11.PLASTIC BAGS CONTAMINATION
12. VIOLATION OF CENTRAL REGULATION ZONE RULES
13. UNAUTHORIZED CONSTRUCTIONS

BREAKING NEWS:

We bring a breaking news which provides clinching evidences that proves the mass deaths of sea turtles along the shores of APPIKONDA, MUTYALAMMAPALEM, DIBBAPALEM, GANGAVARM and PUDIMADAKA under excess toxic situations.

Enclosed is an authentic report investigated and authorized study by MS. MADHUSHREE VEMPARALA, GITAM UNIVERSITY are stated below.

THE POSSIBLE CAUSES FOR DECLINE IN POPULATION OF OLIVE RIDLEY TURTLES - A CASE STUDY

A Project Report Submitted in Partial Fulfillment of
The Requirement for the Award of the Degree of

MASTER OF SCIENCE IN ENVIRONMENTAL SCIENCE

Submitted by

MS. MADHUSHREE VEMPARALA

Under the Guidance of

MR. PRADEEP KUMAR NATH

Founder and President of Vishaka Society for Protection and Care of Animals (VSPCA)

SMT. PADMAVATHI BANDARU

Assistant Professor
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DEPARTMENT OF ENVIRONMENT STUDIES
GITAM INSTITUTE OF SCIENCE
GITAM UNIVERSITY
VISHAKAPATNAM

2011-2013

VISHAKA SOCIETY FOR PROTECTION AND CARE OF ANIMALS

This is to certify that the project work entitled **"THE POSSIBLE CAUSES FOR DECLINE IN POPULATION OF OLIVE RIDLEY TURTLES"** *has been carried out by* **Ms. Madhushree Vemparala,** *2011-2013 batch towards the partial fulfillment for the requirement for the award of* ***MASTER OFSCIENCE IN ENVIRONMENTAL SCIENCE, GITAM Institute of Science, GITAM University, Visakhapatnam*** *during the academic Year 2011-2013 at* ***VSPCA, I Town, Visakhapatnam.*** *It is the record of her work under my guidance and supervision.*

Guide

MR PRADEEP KUMAR NATH

PRADEEP KUMAR NATH
Founder / President
VISAKHA SOCIETY FOR PROTECTION AND

CERTIFICATE

This is to certify that the project work entitled **"THE POSSIBLE CAUSES FOR DECLINE IN POPULATION OF OLIVE RIDLEY TURTLES"** *has been carried out by* **Ms. Madhushree Vemparala,** *2011-2013 batch towards the partial fulfillment for the requirement for the award of* ***MASTER OFSCIENCE IN ENVIRONMENTAL SCIENCE, GITAM Institute of Science, GITAM University, Visakhapatnam*** *during the academic Year 2011-2013. It is the record of her work under my guidance and supervision.*

Co-guide B. Padmavathi

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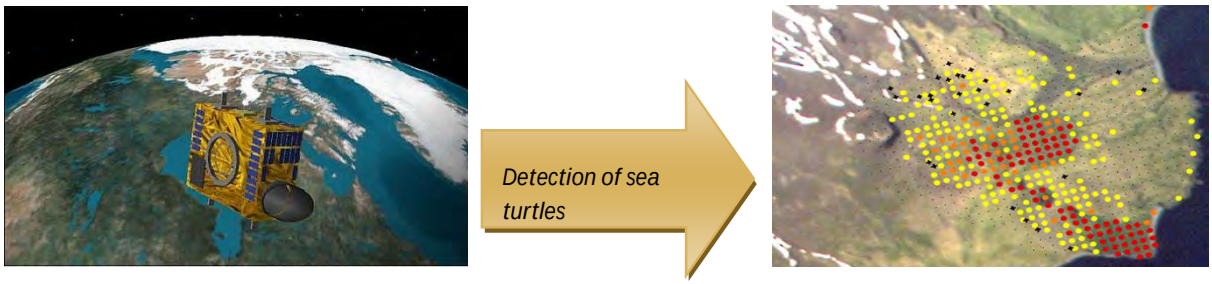
Olive ridley turtles (Lepidochelysolivacea) are globally distributed and nest in large numbers at a few sites (Pritchard1997), including Orissa on the east coast of India (Shankeret al. 2003). In recent years, there has been a decline in the senesting populations due mainly to anthropogenic threats (Shanker et al. 2003).

As there are conflicts between development and conservation, the prioritization of populations and habitats becomes a key component of management and genetic data help in these assessments. The extent and distribution of genetic variation within a species are of fundamental importance to its evolutionary potential and to determining its chances of survival.

In marine turtles, mitochondrial DNA diversity has been widely used to understand their population structure and migration patterns (Bowen & Karl 1997) but the use of micro satellites for population level analysis remains lacking mainly due to the availability of few such markers.

Microsatellites or simple sequence repeat (SSR) markers are ideal for genetic diversity and mapping studies because of their abundance, high polymorphism content, co dominance, easy detection and transferability across studies.

As microsatellite markers are bi parentally inherited, they also help to reveal patterns of male- and female-mediated gene flow which provide efficient markers for understanding genetic relationships between populations of a species. In recent years, several microsatellite markers have been developed for other species of marine turtles [L. kempii (Kichler et al. 1999), Cheloniamydas (Fitzsimmons et al. 1995) and Dermochelyscoriacea (Crim et al. 2002)] but none has been described for olive ridleys.



Sea turtles migrate between their foraging areas and nesting sites with a high degree of accuracy (Limpus et al. 1984, 1992). Genetic studies show that breeding sea turtles return to their region of birth

and tend to re nest in relatively close proximity to natal beaches (Gyruis and Limpus 1988; Bowen et al. 1992). During subsequent nesting attempts within a season, a small percentage of female turtles utilizes more distant nesting sites within a few hundred kilometers from their earlier egg laying site (Bjorndal et al. 1985; Limpus et al. 1992). Results of tag recapture studies on Olive Ridley Turtles (*Lepidochelysolivacea*; Dash and Kar 1990; Pandav and Choudhury 2000) of Gahirmatha in India, Green Turtles (*Cheloniamydas*; Bosc and Le Gall 1986) of Tromelin Island in the Indian Ocean, and on Leatherback Turtles (*Dermochelyscoriacea*; Chaves et al. 1996) of Playa Langosta, Costa Rica suggest that these turtles exhibit strong site fidelity to their nesting beaches. Unlike most marine turtles that migrate among their breeding ground and foraging areas.

Olive Ridley Turtles resemble nomadic migrants that swim hundreds of thousands of kilometers over vast oceanic stretches (Plotkin 1994; Plotkin et al. 1994, 1995). Knowledge of Olive Ridley Turtle migrations is fragmentary throughout most of the species' range. Along the northern Indian Ocean, Olive Ridley Turtles migrate to the Indian coast each winter (i.e., in October/November) to "breed" and nest on suitable beaches. However, the *en-masse* nesting occurs at three major rookeries on the Orissa coast in India.

The Olive Ridley Turtle is well known for its mass nesting aggregation or arribadas (i.e., a Spanish word meaning mass arrival). The three rookeries at Gahirmatha, Devi, and Rushikulya in India support major portion of the world's Olive Ridley Turtle population (Pandav and Choudhury 2000). The recently discovered rookery at Rushikulya lies along the Orissa coast (Pandav et al. 1994). Arribadas have occurred here since 1994, although the estimated number of turtles fluctuates greatly and no accurate figures are currently available (Pandav 2000; Tripathy 2005). Male and female Olive Ridley Turtles along the Orissa coast exhibit fidelity to breeding and nesting grounds (Dash and Kar 1990; Pandav et al. 2000).

Females move between rookeries in Orissa, both within and between seasons (Pandav and Choudhury 2000). Sparse or anecdotal evidence suggests that females migrate and perform inter-rookery movements during the breeding and nesting season along Orissa coast (Pandav and Choudhury 2006). Hence, additional knowledge of the locations and temporal use of Orissa's nesting grounds by Olive Ridley Turtles will help us evaluate the extent of habitat loss and large-scale mortality of turtles in the offshore waters. The traditional method of studying turtle migration is to tag the females on their flippers while they are nesting and record where these tagged turtles are subsequently recaptured (Chavez 1969). Multiple recaptures during nesting documents the migratory capability of sea turtles and nesting site fidelity. The present study adopts this method to examine the spatio-temporal spread of the nesting turtles along the Orissa coast. We evaluated reproductive homing and inter-rookery

movements of Olive Ridley Turtles at the Rushikulya rookery of Orissa, India for three nesting seasons; from 2002-03 to 2004-05. Cross-ref: Basudev Tripathy, 2008.

LOCATIONS WHERE SEA TURTLES HAVE SHOWN MAXIMUM DECLINE IN NESTINGS:

Swarna Andhra SagaraTeeram Road from Bhimili to Visakha:

We had turned the tide of the sea turtles fate at this stretch of coast after immense problems relating to their habitat encroachment. Due to illegal constructions their environment had been virtually robbed away. So they realized a better nascent place further along the Visakha urban nesting. We documented a four-km. stretch with significant nesting per season averaging 200, which is braving all the odds. Olive Ridleys still are an astonishing sight.

At the same time the Swarna Andhra Sagara Teeram Road - nearly 20 kms. stretching from Bhimili to Vuda Beach -- where the Visakha urban nesting ends gave a big coup to the developers. Instead of correcting the thirteen odd shrimp hatcheries with their toxic wastes arbitrarily dumped into the ocean to threaten all fishing, permission was given to construct a four bye-lane towards the seaward side. Encompassing forest reserves and mangroves and transforming the entire area it will usher in more structures which will seriously threaten the sea turtle's innocent habitat.

On the drawing board is the permission for over 34 construction projects to begin any moment for various sorts of entertainment. Because of this the Olive Ridleys now may face a concentration camp.

We remain in utter despair. We hope the Centrally Empowered Committee constituted under The Supreme Court will see rationally through the entire and give the benefit to the sea turtles. A better landscape is needed auguring well for all.

Filed at this Committee under The United Forum for the Protection of the Environment and People's Livelihood Rights at the Coast of Visakhapatnam comprising of six representatives from different fields of concern disappointed at this expansion, namely the 24 fishing villages, that are will be effected and displaced. These short-term attitudes will do much harm to the innocent and peaceful livelihoods and the species, which will be cruelly encroached upon.

We appeal calling for the maintenance and sustenance of our priceless beaches in all its natural splendor. This would thereby not deprive the rightful place of the sea turtles nor disturb the fishermen's occupation.

What is the point of benefiting a few but ultimately permanently destroying the environment? No new resorts or motels can provide the beautiful surroundings of a clean beach.

Decline in Nestings

As I recently answered the journalist for The Hindu Reporter after having consistent nesting gains since 1996-97 in the 4 km. stretch from Naval Coastal Battery to VUDA beach - there was a 20% decline last season. Although there was a rise in nestings in the stretch from MVP area to Bhimili from last year.

The indications are clear that the 20% decline is due to the serious disturbances in the landscaping of the beach. This is mainly where the height of sand is risen very high due to a long stretch of construction work.

For instance the entire area of the submarine base has totally destroyed the nesting grounds of nearly 200 meters on either side. Adding the 200 meters of constructed fencing it is now a raised sand platform while mangroves are densely covered on the sides making the ground a total loss.

Therefore we point out that disturbances such as these are very dangerous to the sea turtle habitats and must never be allowed.

Physical and Chemical Characteristics of Seawater is on page 20

DETAILS OF SEA TURTLE NESTINGS:

(A) VISAKHAPATNAM URBAN BEACH (NAVAL COAST BATTERY TO VUDA PARK) -- DISTANCE OF FOUR KMS.

- A total of 197 nestings sighted - that laid eggs.
- 29 went back without laying.
- Average distance from shore point high tide to nest was 28 feet.
- Much less than last year, when 234 nestings were sighted. This is attributable to the disturbance and occupation of beach sand by construction leading to high sand platforms subsequently covered by mangroves.
-

(B) APPUGAR, MUVVALAVANIPALEM TO ENDADA - DISTANCE OF 5 KMS.

- A total of 123 nestings sighted that laid eggs
- Three went back without laying.
- Average distance from shore point high tide to nest were 20 feet.
- Much more than last year's count of 67 indicating preference to lesser-disturbed areas.

(C) ENDADA TO BHEEMILI -- DISTANCE OF 20 KMS.

A total of 10 Villages (Chapalaupada, Chinauppada, Chepaladippadapalem, Kotturu, Pukkalapalem, Chokavanipalem, Gowopeta, Gangadapalem, Kapuladippadapalem, Mangavanipeta)
Total Nestings: 37
Total deaths: 19

(D) BHIMILI BEACH TO PEDDANAGANAYYAPALEM -- DISTANCE OF 20 KMS.

A total of four villages (Yerrapalem, Chintalapalem, Chinnanagayapalem and Peddanagayapalem)
Total nestings: 11
Total deaths: 20
(These deaths could have occurred from shrimp hatcheries that leave their toxic waste in the sea.)
(http://vspca.org/programs/seaturtles-2003.php)

Physical and Chemical Characteristics of Seawater:

Seawater is a mixture of various salts and water. Most of the water in the ocean basins is believed to originate from the condensation of water found in the early atmosphere as the Earth cooled after its formation. This water was released from the lithosphere as the Earth's crust solidified. Additional water has also been added to the oceans over geologic time from periodic volcanic action. Some scientists have recently speculated that comets entering the Earth's atmosphere may be another important source of water for the oceans.

Most of the dissolved chemical constituents or salts found in seawater have a continental origin. It seems that these chemicals were released from continental rocks through weathering and then carried to the oceans by stream runoff. Over time, the concentration of these chemicals increased until an equilibrium was met. This equilibrium occurred when the ocean's water could not dissolve any more material in solution. Similarities between fossilized sea life and organisms living today indicate that the composition of seawater stopped changing drastically about 600 million years ago.

Only six elements and compounds comprise about 99% of sea salts: chlorine (Cl^-), sodium (Na^+), sulfur (SO_4^{-2}), magnesium (Mg^{+2}), calcium (Ca^{+2}), and potassium (K^+) (Figure 8p-1). The relative abundance of the major salts in seawater are constant regardless of the ocean. Only the amount of water in the mixture varies because of differences between ocean basins because of regional differences in freshwater loss (evaporation) and gain (runoff and precipitation).The chlorine ion makes up 55% of the salt in seawater. Calculations of seawater salinity are made of the parts per 1000 of the chlorine ion present in one kilogram of seawater. Typically, seawater has a salinity of 35 parts per thousand.

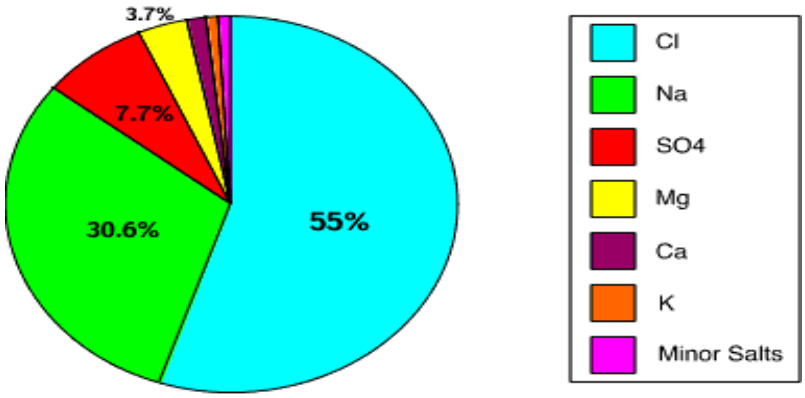


Figure 8p-1: Relative proportions of dissolved salts in seawater.

Water is one of the few substances existing on the Earth's surface in all three forms of matter. At zero degrees Celsius liquid water turns into ice and has a density of approximately 917 kilograms per

cubic meter. Liquid water at the same temperature has a density of nearly 1,000 kilograms per cubic meter. The density of seawater generally increases with decreasing temperature, increasing salinity, and increasing depth in the ocean. The density of seawater at the surface of the ocean varies from 1,020 to 1,029 kilograms per cubic meter. Highest densities are achieved with depth because of the overlying weight of water. In the deepest parts of the oceans, seawater densities can be as high as 1,050 kilograms per cubic meter.

Seawater freezes at a temperature that is slightly colder than fresh water (0.0° Celsius). The freezing temperature of seawater also varies with the concentration of salts. More salt the lower the initial freezing temperature. At a salinity of 35 parts per thousand, seawater freezes at a temperature of -1.9° Celsius.

Sea ice normally contains considerably less salt than seawater. Most of the salts found in liquid seawater are forced out it when freezing occurs. The reason for the exclusion is because the molecules of the various salts do not fit well in the highly orderly molecular structure of frozen water. Because of the density difference between ice and seawater, ice floats on the surface of the ocean.

Seawater also contains small amounts of dissolved gases. Many of these gases are added to seawater from the atmosphere through the constant stirring of the sea surface by wind and waves. The concentration of gases that can be dissolved into seawater from the atmosphere is determined by temperature and salinity of the water. Increasing the temperature or salinity reduces the amount of gas that ocean water can dissolve. Some of the important atmospheric gases found in seawater include: nitrogen, oxygen, carbon dioxide (in the form of bicarbonate HCO_3), argon, helium, and neon. Compared to the other atmospheric gases, the amount of carbon dioxide dissolved in saturated seawater is unusually large.

Some gases found within seawater are also involved in oceanic organic and inorganic processes that are indirectly related to the atmosphere. For example, oxygen and carbon dioxide may be temporally generated or depleted by such processes to varying concentrations at specific locations within the ocean

MATERIALS AND METHODS

EXPERIMENTAL DESIGN:

NESTINGS:

From January to April it is the main nesting season for sea turtles. During nesting the turtles slowly climb on shore for laying eggs. The process is slow and tedious but is necessary as it's a part of its metabolism. Hence no interference is done to encumber this process. The turtle is protected from dogs and other predators with constant vigilance. When the turtle is done walking, it is taken to the shelter set up closest to the spot. There are four shelters at R K Beach, Jodugullapalem, Rushikonda and Bheemli. These shelters are barricaded thereby preventing any harm to the turtle.

After nesting the turtle covers the eggs and leaves for sea. The incubation period starts and the estimated time of hatching is noted. The eggs are hatched and the new born turtles make their way to sea. Their path is protected by volunteers keeping watch. The count of eggs laid, the eggs hatched and those that remained undeveloped are noted down by taking count without touching barehanded and using mitten gloves to ensure the warmth required for eggs. It is essential to keep as little contact as possible with the eggs. By this process the percentage mortality rate is determined and compared to previous data to note the pattern.

Water samples from four beaches where sea turtle's have been maximum affected in and around Visakhapatnam were collected at the depth of sea turtles usually breed, during the month of March. Samples from Pudinaraka beach (in Atchutapuram, Anakapalli), NTPC beach (back of NTPC, Duvvada), Yarada beach (104 Area, Scindia, Visakhapatnam) and Peddanagayyapalem beach (behind Divi's Pharmaceutical company, Bheemunipatnam) were collected and various parameters were analysed. The results were compared and analysed to see how they affected the sea turtles. The following parameters were analysed as per the standard methods.

METHODS:

The Physico-Chemical parameters of the water samples analyzed in duplicate by adapting standard methods from manual of American public health association (APHA, 1988). The water samples were analyzed for the following Physico-Chemical parameters.

pH, Conductivity (mmhos/cm), Total dissolved solids (mg/l), Total hardness (mg/l), Calcium hardness (mg/l), Magnesium hardness (mg/l), Chlorides (mg/l), Sulphates (mg/l), Chemical oxygen demand (mg/l), Biochemical Oxygen Demand.

1) pH: It denotes the negative logarithm of hydrogen ion concentration of the water. It is an indicator of the relative acidity or alkalinity of canteen waste. pH value is estimated by the electrometric method.

   Requirements: Beakers, Glass rod, Buffer solution, (pH - 4, 7 & 9) and pH meter.

   Procedure:

   After standardization of pH meter with known buffer solution (pH - 4, 7 & 9) the electrodes must be prepared for use as per manufacturers' instruction manual.
   The glass electrode was inserted into the canteen waste sample, taken in a beaker. And the directly read on the pH meter.

2)CONDUCTIVITY (MMHOS/CM):

Requirements: Conductivity meter, Glass beakers,0.1NKCl solution.

Procedure:

After the calibration of the conductivity meter, the conductivity of well mixed sample was read by directly dipping the conductivity cell into the sample taken into the beaker

TOTAL DISSOLVED SOLIDS (MG/L):

Requirements: porcelain dishes, desiccators, oven and water bath.

Procedure:

A clean porcelain dish was ignited in a muffle furnace and after partial cooling in the air; it was cooled in a desiccators and was weighed. (W1 grams). Twenty five ml of filtered sample was

placed in the dish and evaporated at 100°C on water bath, followed by drying in oven at 103°C for one hour.

- The dish was dried to a constant weight at 103°C, cooled in a desiccator and was weighed. (W2 grams).

  Calculation:
  Total dissolved solids (mg/l) = (A-B) x 1000/V
  Where,
  A = final weight of dish in mg
  B = initial weight of dish in mg
  V = volume of sample taken in ml.

2) Total hardness (mg/l):

Hardness was a measure of its capacity to form precipitate with soap and scales with certain anions present in the sample.

Reagents:
Ethylene demines tetra acetic acid (EDTA), ammonium buffer solutions and eriochrome black-T (EBT) indicator.

Procedure:
10ml of the sample, 2ml of the ammonium buffer and a pinch of eriochrome black-T indicator were added. Stirring was continued and then titrated against ethylene demine tetra acetic acid slowly till the color of the solution turns from wine red to pale blue indicating the end point.

Calculation:
Total hardness (mg/l) as $CaCO_3$ = ml of EDTA used x 1000/vol. of sample taken.

3) Calcium hardness (mg/l):

Reagents:
Ethylene demine tetra acetic acid(EDTA), sodium hydroxide buffer solution and murexidé indicator.

Procedure:
10ml of the sample, 2ml of the sodium hydroxide buffer solution was added to maintain a pH of 12 or 13 and a pinch of murexide indicator were added. Stirring was continued and then titrated

against ethylene diamine tetra acetic acid slowly till the color of the solution turns from pink to purple indicates the end point.

Calculation:
Calculated hardness (mg/l) as $CaCO_3$ = ml of EDTA used x 1000/vol. of sample taken.

4) Magnesium hardness:
Magnesium hardness = Total hardness- Calcium hardness.

Material required:
Potassium chromate, silver nitrate, conical flask and burette.

Procedure:
10ml of filtered sample was taken in a conical flask and pH adjusted between 7.0 and 8.0 . To this sample 1.0 ml of Potassium Chromate was added, color of the solution changes to yellow and then it was titrated against silver nitrate. Color changes from yellow to brick red at the end point.

Calculation:

Chloride (mg/l)=(A-B)xNx35.45x1000/V
Where
A= Volume of $AgNO_3$ for sample
B= Volume of $AgNO_3$ consumed for blank
N=Normality of silver nitrate ($AgNO_3$)
V= Volume of sample taken

5) Alkalinity(mg/l):

Alkalinity is of two types. They are:
a) Total alkalinity,
b) Phenolphthalein alkalinity.
Phenolphthalein indicator methyl orange, conical flask and burette.
Procedure:

Materials required:

10ml of filtered sample was taken in a conical flask. After adding 3 drops of Phenolphthalein indicator, if pink color develops, it indicates the presence of Phenolphthalein alkalinity and vice versa. Then to the same flask solution 3 drops of the methyl orange was added, yellow color develops. The titration is then continued till pH comes down to 4.5. The yellow color slowly changes to orange at the end point.

Calculation:
Total alkalinity as $CaCO_3$= (A or B)x N x 50000/V
Where,
A=Phenolphthalein alkalinity
B= total alkalinity
N= Normality of the EDTA
V= volume of the sample

6) Sulphates(mg/l):

Materials required:
Conditioning reagent , barium chloride crystals, , volumetric flasks.

Preparation of standard curve:

By taking 1, 1.5, 2, 2.5, 3, 3.5, 4, 4.5, 5 and 5.5 ml of standard potassium sulphate solution standard curve was prepared.

Procedure:

10ml of the sample was taken into a volumetric flask and to it 2.5ml of conditioning reagent and 1 gram of barium chloride were added and mixed well. This was made up to the mark by using distilled water and absorbance was read at 420nm. The concentration of sulphates present in the sample was known by plotting a graph using standard curve values.

Calculation:

Sulphates (mg/l) = 1000 x (Conc. From graph)/ vol. of sample taken.

7) Chemical oxygen demand (C.O.D) (mg/l):

This test can be used to identify the degree of pollution in industrial wastewaters. It denotes the amount of oxygen needed for stabilization of both the decomposable organic matter under aerobic conditions.

Materials required:

Standard potassium dichromate, concentrated sulphuric acid, mercuric sulphate, silver sulphate, ferroin indicator, ferrous ammonium sulphate.

Procedure:

25ml of the sample was taken into the reflux flask. To it 45ml distilled water, 10ml of standard potassium dichromate and 200ml of conc. Sulphuric acid were added. 100mg of mercuric sulphate and 100mg of silver sulphate were added and digested for about 2 to 3 hours. After that 4 to 5 drops of ferroin indicator was added and titrated with 0.1N ferrous ammonium sulphate. The color change from bluish green to bluish red was observed at the end point.

Calculation:

COD (mg/l) = (Rb-Rs) x N x 8000/ml of sample.
Where,
Rb = vol. of ferrous ammonium sulphate run down for blank.
Rs = vol. of ferrous ammonium sulphate run down for sample.

RESULTS AND DISCUSSIONS

Ex-Situ Protection (comparative study for past years):

Report of 2007-2008:

Most surprisingly, the nestings in the most disturbed areas has increased by 20% and this brings into fold the fact that the Sea Turtles are in desperate need of a comprehensive protection guaranteed procedures during the nesting seasons. Thus, we are looking at all the angles involving many stakeholders for this co-operation and co-ordination.

Statistic data of sea turtles for the season of 2007-08:

Numbering:

Coastal Battery to Vuda: 154

Vuda to Endada: 174

Endada to Bheemili: 69

Bheemili to Annavaram: 79

Report of 2009-2010:

The sea turtle program which we have continued since 1996-97 moves strongly. We are consolidating the efforts that we were doing since the last 15 years despite the many serious, permanent disturbances to the urban based places. The turtle continues to come in during the February - March season mostly. The urban beaches are not safe for the nests left on their own to be hatched so we have to keep monitoring the nestlings. With all our experience and expertise making the sea turtle a household name in this region, today it is a question that renders deep into our mind and heart that the beaches are shrinking with every passing season and the reasons are the increase in the human population and the consequent related developments in the form of entertainment, industrial and commercial activities.

Therefore, this is our urgent appeal to the Government and Forest Department that while all checks are made during the seasons there is an urgent need helping the sea turtle in the protection and conservation by setting up suitable, selective hatcheries by which and only means left to protect and conserve the Olive Ridley sea turtle of this region.

It is important to note that significant nesting grounds to the North of Andhra Pradesh (A.P.) is always a crucial factor as located adjacent to the State of Orissa where the beaches attracts mass nesting and is the largest rookery for Olive Ridleys in the world.

Thus, the beaches of North A.P. gains significance with large beaches for more successful hatchings. The season 2009-10 has seen a steady increase in the nesting with lesser incidences in the disturbed areas pulling Sea Turtle further north into remote areas.

Report of 2013: Present year study when compared with the previous years:

A study was conducted by Mr. Pradeep Kumar Nath and his team of volunteers since 2007 and his work has been discussed in detail, so that it can be compared with present scenario. The study shows that the nestings have increased due to the work of VSPCA each year. But due to many reasons, there have been a decline in the survival of eggs. Many are destroyed by predators like dogs and some birds. Some eggs are trampled by humans. Also many dead bodies of turtles have been washed ashore as they could not acclimatize to the conditions of the changes in water. Also during the transit many turtles are killed by stray dogs. The work has shown a good success rate of survival of eggs. Though the causes for infertility could not be dealt with and there has been an increase in dead and undeveloped eggs.

Monthly Report of 2013 from Jan to March:

Total Hatchlings: 315

Months	Jan	Feb	March	Jan	Feb	March
ZONE	**(nests)**			**(eggs)**		
Zone 1	30	112	46	3583	13876	5346
Zone 2	22	77	38	2496	9453	4283
Zone 3	16	23	14	N/A	N/A	N/A
Total nests		39037				
Total turtles		5108				

Report of 2013 from Jan to March:

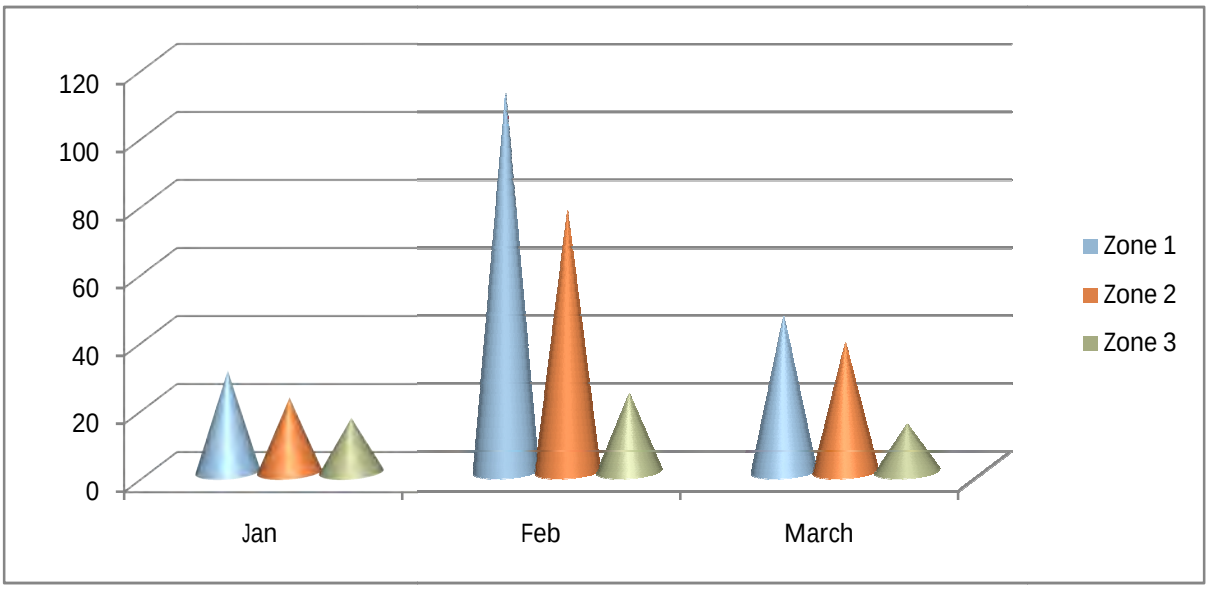
ZONE	No of nests	No of eggs	No of hatchlings	No of Undeveloped egss	No of dead hatchlings
Zone 1	73	9088	5460	3007	621
Zone 2	62	7526	4534	2141	851
Zone 3	29	3319	3310	804	859
Zone 4	23	2429	2429	457	100
Total	187	22362	13722	6209	2431

Percentage values:

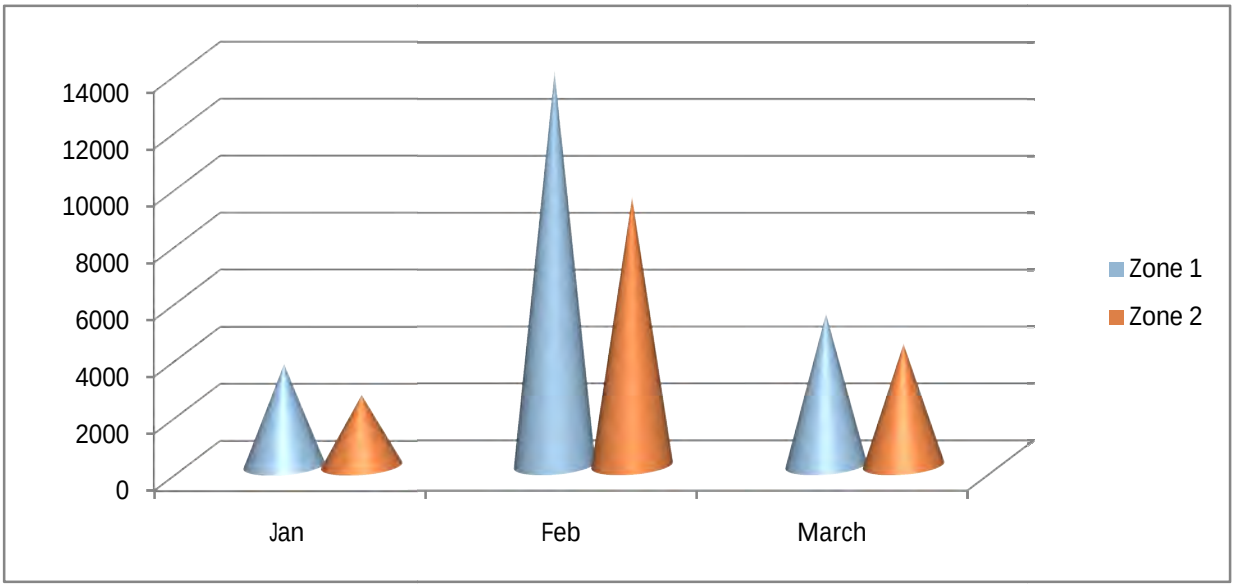
Released: 61.36%

Dead: 10.87%

Undeveloped: 27.77%



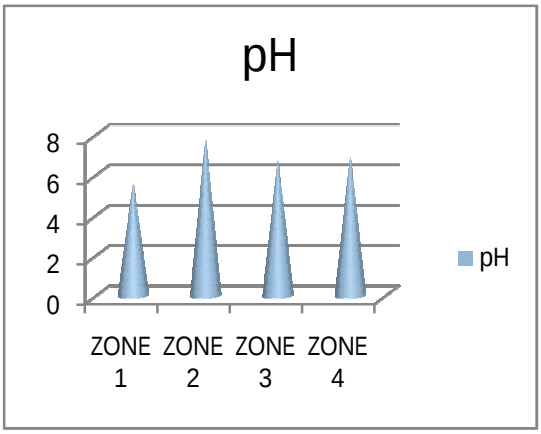
Graph 2.1: monthly nests report (2013)



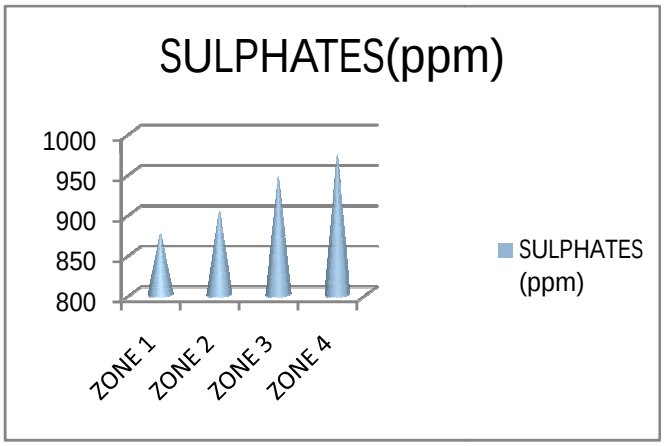
Graph 2.2 monthly eggs report (2013)

FEW OF THE POSSIBLE REASONS FOR DECLINE IN POPULATION OF TURTLES:

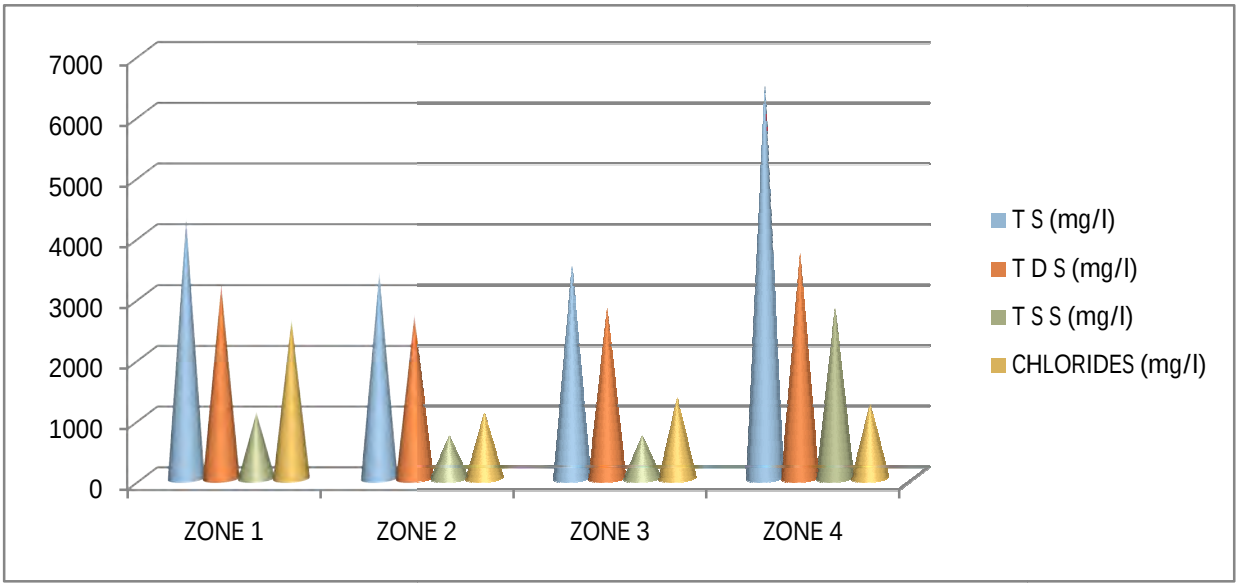
As for the parameters analyzed in the primary four beaches in Visakhapatnam where sea turtles come onto the beach for nesting, some values do not meet the expected values in the sea. The low range of pH and also the high value of hardness and chemical oxygen demand, which was so high that it needed to be analyzed with 1% of the sample diluted with distilled water. The cause could be probably due the presence of industries near the beach which discharge the waste into the open sea with improper treatment. Another possible cause could be due to activities of local fishermen that were observed especially the beach of Pudimadaka, where the water is also collected for the production of salt. Yarada on the other hand is a tourist spot where many parties are held. Humans throw waste into the sea leading to contamination. It also lies downstream from beach near Duvvada so some pollution from there could have seeped downstream which explains similar readings.



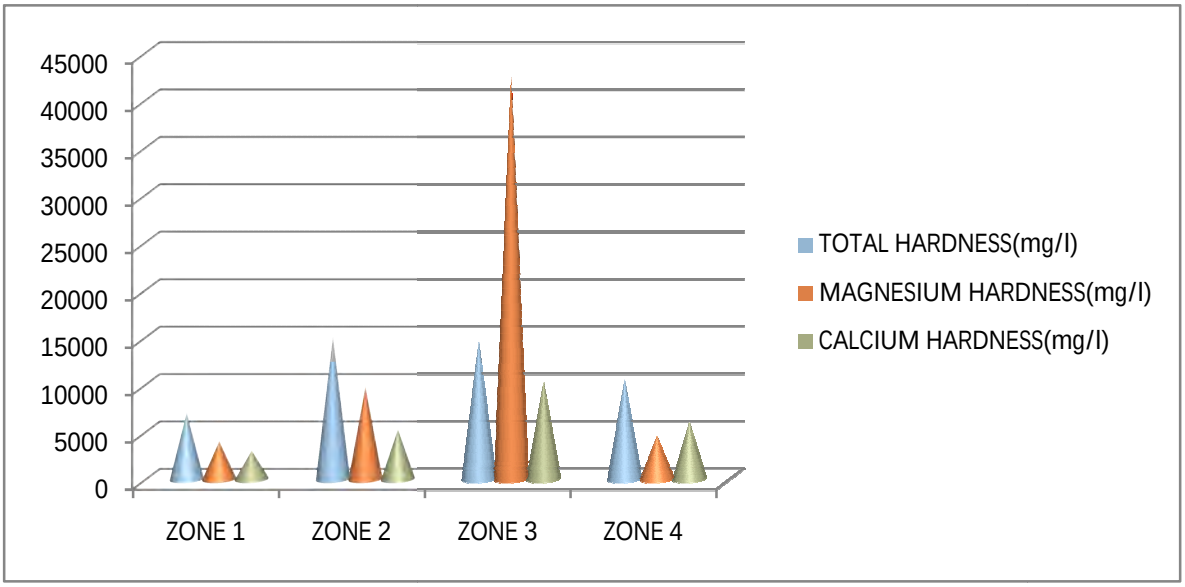
Graph 1.1 showing pH



Graph1.2 showing sulphates



Graph 1.3 showing TS, TDS, TSS and chlorides



Graph 1.4 showing hardness

Being a tourist spot and the most scenic beach in Visakhapatnam, Yarada is succumbing to waste thrown into the sea. It is a polluted beach despite there being no presence of any major industries surrounding Yarada as it a heavily secured Naval Base quarters and is deemed 104 area. Pharma beach on the other hand is a deserted location with not much human activity observed. Though the presence of Industries maybe partially responsible for the pollution in the area.

The beach at Peddanagayapalem, have some human settlements around the beach which could be partially responsible for the pollution. Speaking to the local people of the area in Pudimadaka and peddanagayapalem, they stated that all their waste is thrown into the beach.

They are mostly uneducated and village people who need education and awareness. The change in the beaches could be partially responsible for the deaths and reduction in reproduction observed for the last three years by VSPCA as the turtles are losing the habitat they have been acclimatized to.

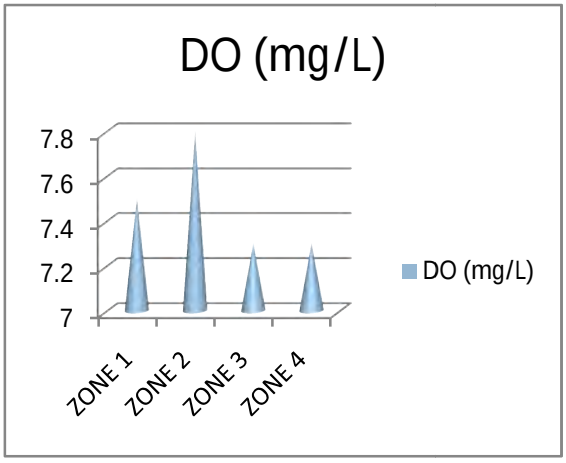
ZONE CODES:

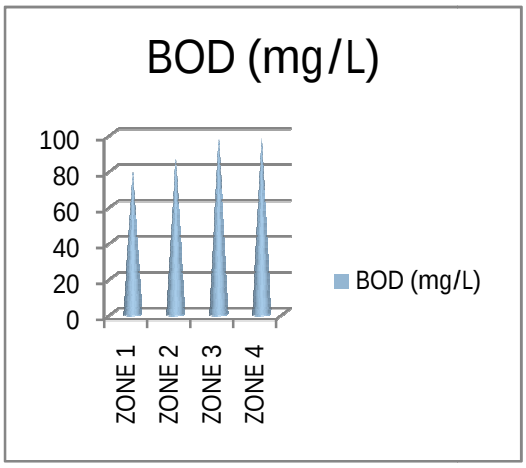
ZONE	AREA
Zone 1	Naval coast to VUDA park
Zone 2	VUDA park to Rushikonsda
Zone 3	Rushikonda to Bheemili
Zone 4	Bheemli to Annavaram

Table 1: Sea water analysis

PARAMETERS	ZONE 1	ZONE 2	ZONE 3	ZONE 4
pH	5.56	7.74	6.71	6.88
T S (mg/l)	4300	3400	3500	6500
T D S (mg/l)	3200	2700	2800	3700
T S S (mg/l)	1100	700	700	2800
CHLORIDES (mg/l)	2624.265	1074.699	1324.629	1224.657
TOTAL HARDNESS(mg/l)	7000	15000	14500	10500
MAGNESIUM HARDNESS(mg/l)	4000	9750	42500	4500
CALCIUM HARDNESS(mg/l)	3000	5250	10250	6000
SULPHATES(ppm)	876	904	947	975
COD (mg/L)	36000	92000	76000	32000
DO (mg/L)	7.5	7.8	7.3	7.3
BOD (mg/L)	78.9	86.5	97.8	97.8

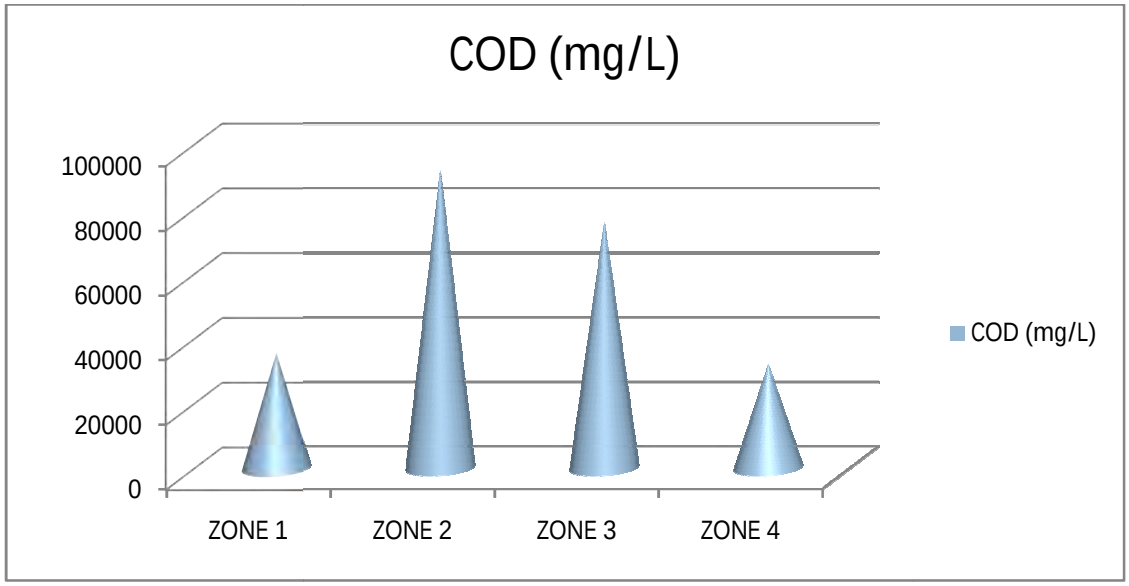
Graph 1.4 showing hardness





Graph 1.5 showing DO

Graph 1.6 showing BOD



Graph 1.7 showing COD

COMPARATIVE REPORT 2011-2012 TO 2012-2013

There is a vast change in air

Young aspirants to old experts actively contributed their uniqueness with sea turtle protection force with lots of love toward s sea animals

Much awareness is created in villagers, sea hunters and sea traders .and still training programs are going in day and night, by a force comprising of local fishermen and volunteers who comb the beaches with the intention to Protecting nests either in situ or by taking the eggs to the beach-hatchery.
They rescue and safely release of disoriented hatchlings. As well as helping the weak ones past the ocean breakers. Informing people on the beach about the turtles during their beach patrol
Distribution of education materials creating awareness

Number of hatchlings increased from 63% to 86%

Number of undeveloped eggs decreased from 34% to 9 %

DATA FROM ANNUAL PROTECTION PROGRAM

Results from 2011-2012: TOTAL EX-SITU PROTECTION

Area	Eggs	Hatchlings	Undeveloped	Dead
NAVAL COASTAL BATTERY TO VUDA PARK	8987	5781	3007	199
VUDA PARK TO JODGULLAPALEM	6704	4346	2141	214
JODGULLAPALEM TO RUSHIKONDA	2635	1703	804	128
RUSHIKONDA TO BHEEMILI	3017	1630	1164	223
TOTAL	21,343	13,460 *63%*	116 *33.42%*	764 *3.58%*

In 2011-12, there was a severe decline in the number of nests. Possible reasons cited were

1. Black sand

Sand turns black when it is affected by a high degree of moisture and pollution from untreated sewage water

2. 2012 Indian Ocean EarthquakesUntil 2012 March end we received steady visit by the Olive Ridley nesting at our coasts. High tides from the undersea earthquakes at Indonesia in the last week of March 2012 drenched the hatcheries and nests. After this, no further nesting took place.

2012-2013: PARTIAL INSITU, PARTIAL EXSITU PROTECTION

This year we had an overwhelmingly positive response from the sea turtle protection program. The number of nestings that took place had increased by threefold. There were fewer dead hatchlings this year, and nests were larger with more eggs per nest than was observed in the previous years. Since our programme has been going on for 15 whole years, the time span required for a turtle to reach maturity, it is quite possible that the hatchlings we rescued back in 1998 have returned by virtue of nesting fidelity. More turtles rescued= more turtles return to nest on our shores.

Hatchery	Eggs	Hatchlings	Undeveloped	Dead
BHEEMILI AND ANNAVARAM (IN-SITU)	8,935	7,265	1231	439
JODIGULLAPALEM (EX -SITU)	16,232	14,607	1033	592
YOGA VILLAGE (EX -SITU)	49,419	42,710	4788	1921
TOTAL	74,586	64,582 86.5%	7052 9.45%	2952 4%