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From the Coordinator's Desk...

I am glad to know that State Environmental Information System (ENVIS) Hub, Centre for Environmental Studies, Odisha is going to publish its 67th issue of ENVIS Quarterly Newsletter. ENVIS is providing information on different issues related to Environment. Publication of Newsletter is one of the ways for dissemination of information among wider public. This Newsletter focused on one of the important topics **"Pollution in Coastal Ecosystem and associated different laws"**.

Prevention and control of coastal erosion and pollution is critical for the coastal zone ecosystem since the local communities dependent on this ecosystem. Considering the dynamic nature of the coastal ecosystem, a broad perspective and a multi-sectoral approach to ensure conservation of crucial habitats and to maintain their ecological integrity is required at regional, national and global level.

I hope this publication will serve as a useful source of information for Researchers, Environmentalists, Scientists and people who are working in the coastal zone management.

I would like to thank Dr. K. Murugesan, IFS, Member Secretary, State Pollution Control Board, Odisha for providing valuable inputs in publishing of this newsletter.

Rajiv Kumar

(Rajiv Kumar)

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Pollution in Coastal Ecosystem and associated different laws

Dr. K. Murugesan, IFS
Member Secretary, State Pollution Control Board, Odisha

Odisha has a coastline of 480 kms with diversified ecosystems, including largest brackish water lagoon the Chilika, marine sanctuary the Gahirmatha, 240 sq. kms. of mangrove belts of Bhitarkanika, Mahanadi delta, Devi mouth, the diversified sand dunes, and mud flats. The ocean constitutes almost 70% of the globe. It is estimated that around 50-80% of Oxygen produced on Earth comes from the oceans. Pollution of sea does not only affect humans, but the entire marine ecosystem.

The oceans acidification, climate change, polluting activities and exploitation of ocean resources have led to some serious damage over the years to our oceans. The world's oceans – their temperature, chemistry, currents and life - drive global systems that make the Earth habitable for humankind. Over three billion people depend on marine and coastal biodiversity for their livelihoods. The wellbeing of the oceans and humanity are inextricably linked to one another. Despite ecological richness and the contribution to national economy, the coastal and marine areas have not been received adequate protection, and are under stress. Rapid urban-industrialization, maritime transport, marine fishing, tourism and aquaculture have led to a significant increase in demand for infrastructure, resulting in the overexploitation of natural resources along with pollution load.

Indiscriminate releases of untreated or partially treated wastes without considering the assimilative capacity of the 'waste receiving water body' have resulted in creating pockets of polluted environs with depleted coastal resources and loss of biodiversity. Coastal and marine water pollution has increased throughout the world, mainly due to contaminants influx with riverine system, agricultural run-off,domestic& industrial effluents,oilspills,contaminants from shippingetc.In addition to all these factors, the oceans are highly affected by carbon dioxide and climate changes, which impact primarily the ecosystems and fish communities that live in the ocean.

Toaddress marine pollution different laws were formulated at different time. The London Convention (1972) was one of the first laws with an objective to promote the effective control of all sources of marine pollution and to take all practicable steps to prevent pollution of the sea by dumping of wastes and other matter. MARPOL convention (1973)listed various forms of marine pollution by ships from operational or accidental causes,to deal with oil, noxious liquid substances, harmful substances in packaged form, sewage and garbage from ships, etc. There are different Conventions to which India is a signatory country and have obligatory responsibilities.

Table 1. Convention to which India is a signatory

Convention	Bindings
UNCLOS	Disposal of ship-based wastes.
Basel Convention, 1992	The Basel Convention contains specific provisions for the monitoring of hazardous waste. A number of Articles in the Convention oblige Parties (national governments which have acceded to the Convention) to take appropriate measures to implement and enforce its provisions, including measures to prevent and punish conduct in contravention of the Convention.
Ocean Police Statement	Sets out basic principles through which the development of ocean is to be carried out.
Convention on Migratory species	Convention gives protection to many species of crocodiles, Sharks, turtles etc.
MARPOL 73/78	Disposal of ship-based wastes.

There are different laws and acts having potentiality to control marine / Coastal pollution from respective sectors of origination (Table 2).

Table 2. An Overview of Existing Laws and Policies in India

Existing Act/ Rules	Salient Features
Environment Protection Act (EPA), 1986	*An umbrella Act*
• Coastal Regulation Zone Notification, 1991	Regularizes the various activities in coastal zone.
• Coastal Zone Management Plans (CZMPs)	Supreme Court Intervention: all the Coastal States prepares their CZMPs.
• Hazardous Waste Management Act, 1989	This Act provides guidelines for hazardous waste management and also for the import and export of hazardous waste in Country.
• Environmental Impact Assessment Notification, 1994 & 2006.	The objective of this Act is to conserve and protect the environment.
Water (Prevention and Control of Pollution) Act, 1974, Amended in 1988	Control of pollution from land-based sources Pollution Control Board was constituted under this Act.
Indian Ports Act,1908	Enactment relating to ports and port charges. Provides for rules for the safety of shipping and conservation of ports
Major Port Trust Act, 1963	The Act makes provision for the constitution of port authorities for certain major ports in India and to vest the administration, control and management of such ports in such authorities and for matters connected therewith.
Merchant Shipping Act,1958	Control of pollution from ships and off-shore platforms.
Coast Guard Act, 1950	Provides levying of heavy penalties for the pollution of port waters. In 1993, Coast Guard under Ministry of Defence made directly responsible for combating marine pollution.
Maritime Zones Act, 1976	Describes various zones such as territorial waters, EEZ, Continental shelf etc.,
Forest Conservation Act, 1980, Amended in 1988	Protection to Marine Bio diversity
Wildlife Protection Act, 1972 (Amended in 1983, 1986, 1991, 1997, 2001)	Offers protection to marine biota. Creates conditions favorable for in site conservation of fauna and flora. Amended in 2001 to include several species of fish, corals, sea cucumbers and sea shells in Schedule I and III Whale shark placed in schedule I
Indian Fisheries Act, 1897	Offers protection to fisheries against explosives or dynamites.
Marine Fishing Regulation Act, 1978	A model act, which provides guidelines to the maritime States to enact laws for protection to marine fisheries by regulating fishing in the territorial waters. The measures include: regulation of mesh size and gear, reservation of zones for various fishing sectors and also declaration of closed seasons.Laws framed and amended from time to time by different maritime States.
National Environmental Tribunal Act, 1995	This has been created to award compensation for damages to persons, property and the environment arising from any activity involving hazardous substances.

The National Environment Appellate Authority Act, 1997	Addresses appeals with respect to restrictions of areas in which classes of industries etc., are carried out or prescribed subject to certain safeguards under the EPA. The objective is to bring transparency, accountability and to ensure the smooth and expeditious implementation of developmental schemes and projects.
Biodiversity Act, 2002	The Act that has been passed, with an aim to protect and conserve biodiversity and sustainable use of its components.

State Pollution Control Board, Odisha, a statutory body, was constituted in pursuance of sub-section (1) of section 4 of the Water (Prevention and Control of Pollution) (Amendment) Act, 1974. Responsibilities of the Board can broadly be classified into the following five main categories:

1. Plan a comprehensive program for prevention, control or abatement of pollution and enforce the environmental laws.
2. Advice the State Government on any matter concerning prevention and control of water and air pollution.
3. Conduct Environmental Monitoring and Research.
4. Create public awareness
5. Stipulation of stricter environmental standards considering the assimilative capacity of the local environment.

Water Act 1974 aims to prevent and control water pollution, under which Pollution Control Boards were created, with a responsibility for implementation of its provisions to maintain and restore the 'wholesomeness' of its aquatic resources. Till 2009 the OSPCB was primarily concerned with the rivers, ponds and other inland water bodies towards monitoring and implementing the regulatory provisions to restore. The Coastal Regulation Zone Notification 2009 and subsequent modification in 2011, 2019 and 2021, declares the coastal water under state jurisdiction for its territorial water limit upto 12 Nm(1Nm=1.852 Km, 12Nm=22.224km) from low tide line (LTL) into sea. OSPCB that time was not having the capability to monitor, sampling and analyze coastal samples in line with world standards in sea front. Therefore, on 24.4.2010 adopted a World Bank Project by signing the MoU, to develop capacity and agreed to adopt the activity on coastal monitoring as continual manner as part and parcel of Boards functioning through creating a 'Coastal Management Cell' in 2010.The OSPCB moved forward edifying Board's capacity in terms of specific manpower, infrastructure and analytical capability to assess the coastal environment of Paradeep to Dhamra of 80 Km stretch on a pilot basis.

For the purpose of systematic monitoring along the coast of Odisha a well-defined "Monitoring Protocol" has been documented, which addresses all aspects of monitoring and analysis; such as selection of monitoring sites, monitoring process, methods of measurement, data validation etc. (*"Monitoring Protocol of Coastal Environment"* published by OSPCB in 2017).The assessments of the coastal health in a continuous manner establishes a strong baseline on coastal environmental data with their significance in predicting trends, finding hotspots, formulating mitigation plans, through impactstudies in the said ecosystem. Study of intrinsic developments, degradation rate, and effectof pollution on biota are some of the prime focus in this study.

Study site and Monitoring Framework

The study stretch of Paradeep to Dhamra (80 km) wasdivided into three zones (Figure 1).The samples being collected from identified GPSlocations and subjected for generation of time-series 'database' for the assigned coastal stretch. As

per the Monitoring Protocol; all three zones (Paradeep, Gahirmatha and Dhamra) are characterized with following coastal features:

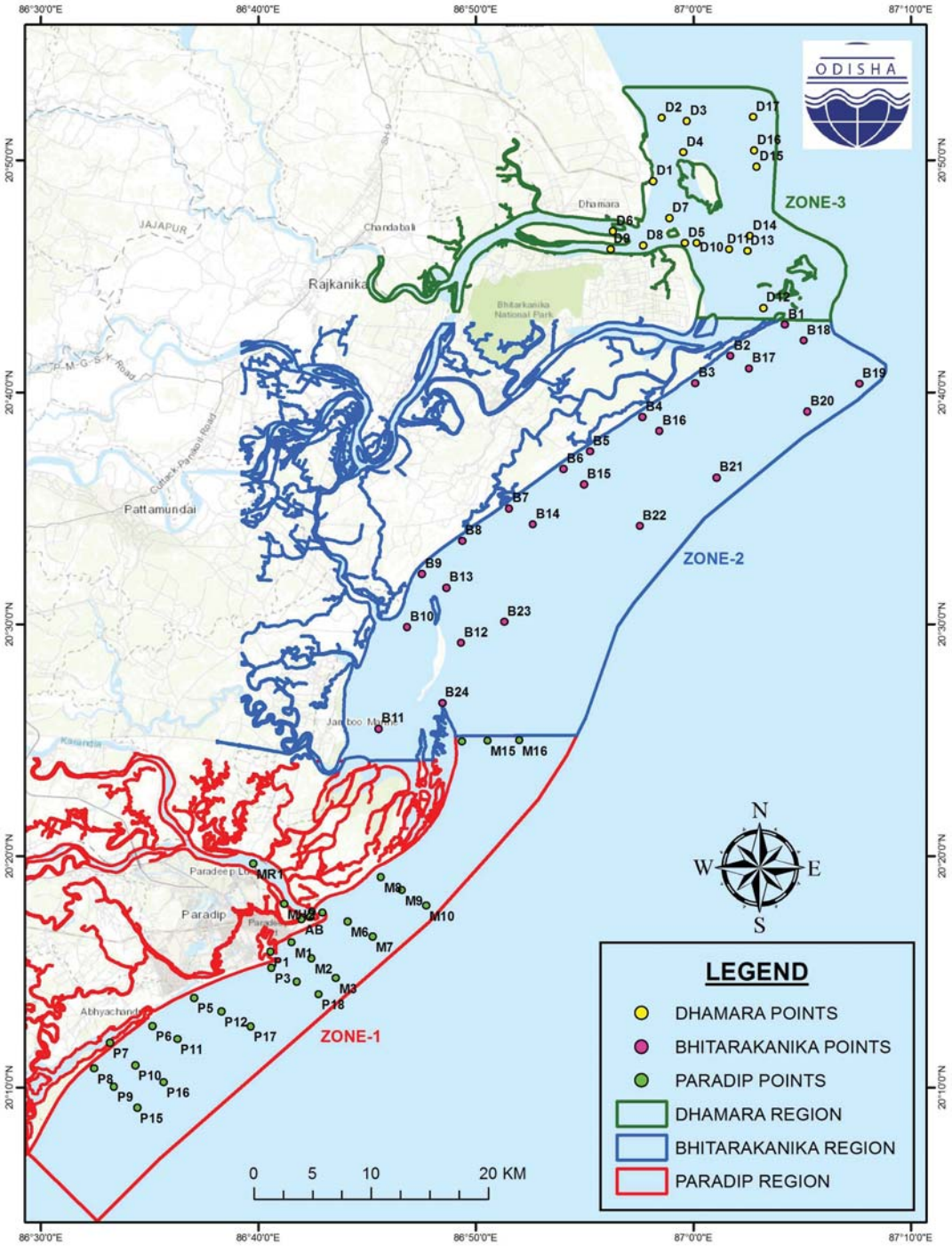
- Geomorphological characteristics
- Zone of influence (industrial/township)
- Eco sensitive or protected areas
- Riverine inflow influence

Objectives

- To find out long-term trends of selected parameters in 80 Km stretch of Bay of Bengal from Paradeep to Dhamra.
- Carry out the monitoring ensuring consistent standards in line with national and international monitoring programmes for marine environmental studies.
- Provide and maintain a high quality dataset for key variables in the marine environment, which will be available for policy makers.

Monitoring and sampling have been carried out covering three seasons (Pre monsoon, Monsoon & Post monsoon) ineachyear; as below;

Pre Monsoon-	March, April, May and June
Monsoon-	July, August, September and October
Post Monsoon-	November, December, January and February



Zoning of the designated coastal stretch (Paradeep to Dhamara) and selected sampling sites.

Conclusion

Sea water quality statuswith respect to pollution for specific parameters and their trend station-wisethrough long-term assessmentsgiving a right picture for proper implementation for control of pollution. On scrutiny a trend is identified, station wise with respective parameters towards significant increaseorsignificant decrease or without any changein respective stretches.

Intensity of decreasing and increasing trend of different parameters with respective stretches

PARAMETERS	Percentage (%) of Station with Increasing trend			Percentage (%) of Station with decreasing trend		
	P	G	D	P	G	D
pH	**36**	8	18	4	8	6
TSS	**44**	25	24	0	0	12
Turbidity	28	25	6	20	8	24
DO	4	0	18	**32**	8	0
BOD	**36**	17	12	16	8	0
FC	12	8	0	16	25	12
Mercury	12	25	**35**	8	0	18
Manganese	4	0	6	16	8	12
Iron	12	8	12	4	8	12
Lead	4	17	18	0	17	29
Cadmium	8	0	0	8	0	**35**

N.B. P: Paradeep, G: Gahirmatha, D: Dhamra

The zone falling under riverine, near shore and estuary are influencing more, as most of the sediments and contaminants are brought in to the marine environment through rivers.Dissolved oxygen content however showed a decreasing trend in Paradeep; whereas, more or less unchanged in rest of stretches.When FC is concerned the freshwater river sites are generally of a high values during summer in low flow conditions. Bacterial concentrations are more during periods of prolonged rainfall. In general, water quality at freshwater (riverine, estuaries) sites are more influenced by direct land-use discharges of surface run off than marine waters. Generally, estuaries are characterized with slow moving;hence warm waters promote bacterial survival and reproduction. Thus only at estuarine and riverine points; Paradeep stretch observedwith increase FC in comparison to other sites.In Gahirmatha stretchthe water quality has not been deteriorating rather improving in major locations during the time period (2013 to 2018). Significant decreasing trends have been observed in Dhamra stretch for Turbidity and increasing trends for DO; which supports the Ecological environment. In Paradeep stretch, turbidity, pH, TSS, BOD andHg have shown increasing trends; which suggests threat to this coastal stretch. Decreasing oxygen level (DO) in few locations at Paradeep might be associated with annual variations in air temperatures andhigh discharge of River (Mahanadi)/ industrial/sewage effluent. There are few non-significant trends in water quality over the reporting period, which needs to be monitoredfor long term to assess the trends of pollutants.

These findings suggest the importance of protection of coastal ecosystem especially in the context for Paradeep and Dhamra stretches.As seen few polluting parameters are found to be in increasing trends; which may be vulnerable with time. None the less it has to conclude that adverse impacts are being observed in both stretches; which might be due the pollution from agricultural run-offs, urban discharges, industrial discharges, port discharges and other sources of pollution. This corroborates our earlier findings of demarcating 'hotspots' in both stretches. However, the Gahirmatha stretch under observation is found more or less undisturbed. But, it is required to be carefully guarded. The percentage (%) of Stations with increasing trend for TSS (44), BOD (36) in Paradeep and for Mercury (35) in Dhamra is of concern. In addition to these, % of stations showing decreasing trend for DO (32) in Paradeep making more vulnerable and may be consider as a hot spot. Thus it may be concluded that phasing out of specific pollutants with growing trendas predicted in specific stations/region, with respect to time is quite important.Considering all associated factors of influences there is anurgent need for proper mitigative measures addressing ecosystem level.

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A REPORT ON THE ACTIVITIES CARRIED OUT DURING 3RD QUARTER OF 2021-22 BY THE STATE ENVIS HUB, ODISHA

Under Ek Bharat Shrestha Bharat Programme:

Odisha State ENVIS Hub has conducted Webinars and Quiz Competition jointly with BNHS-ENVIS Resource Partner (as paired state) for the observation of "Ek Bharat Shrestha Bharat" Programme as follows.

Date	Webinar Topic	Speaker	No. of Partici-pants
27.11.21	Forts of Maharashtra	Dr. Jayant Wadatkar	350
19.12.21	Chilika Wetland and it's Conservation	Dr. Ananta Sahu, Ecologist, ICZMP Odisha	168
Date	**Quiz Topic**	**Target Group**	**Partici-pants**
15.11.21	Know Your Birds	Classes 5-10th	5159
30.11.21	Environment Pollution	Classes 8-10th	1645
10.12.21	Know Your Birds	For all students	1199

Under Azadi Ka Amrit Mahotsav Programme:

Odisha State ENVIS Hub has conducted different competitions for students of class 6th to 12th on the observation of Iconic Week from 04.10.2021 to 10.10.2021 under Azadi Ka Amrit Mahotsav Programme as follows. E-Certificate has been given to all participants.

Date	Name of the Activity	No. of Partici-pants
04.10.21	Innovative ideas by using waste plastic	246
05.10.21	Poster making on "Curbing single-use plastic"	245
06.10.21	Essay writing on "How to develop habit of plastic free lifestyle"	689
07.10.21	Online Quiz Competition on Plastic Waste Management	2977
08.10.21	Online Quiz Competition on Wildlife & Environment	4888

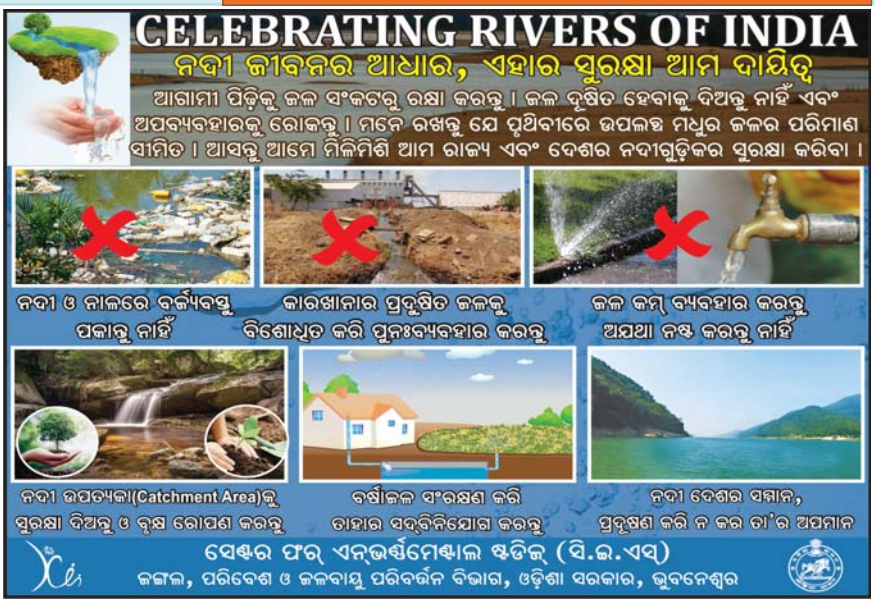
Swachhta Pakhwada

CES, Odisha published advertisements in local daily Odia & English newspapers on 01.12.2021 for the observation of Swachhta Pakhwada for creating awareness among the students, teachers and general public. Besides, awareness meeting on Sanitation & Curbing use of single use plastics and Essay & Painting competitions were conducted for students at district level.

Celebrating Rivers of India

Centre for Environmental Studies, Odisha published advertisement in local daily Odia & English newspapers on 21.12.2021 for the Celebrating Rivers of India for creating awareness among the students, teachers and general public.

Besides, Padayatras & different competitions on the theme were conducted by the eco-clubs at the district level.



OBSERVATION OF NATIONAL ENERGY CONSERVATION DAY 2021

Every year on 14th December, Centre for Environmental Studies (CES), Bhubaneswar organizes various activities on Energy Conservation for school students on the eve of National Energy Conservation Day.

This advertisement was published in local daily Odia & English newspapers on 14.12.2021 to create awareness among the students, teachers and general public

A Webinar was organized on 14.12.2021 for teachers and students on the eve of celebrating National Energy Conservation Day. Sri Arup Pattnaik, Technical Officer, Odisha Renewable Energy Development Agency (OREDA) and Ms. Reema Banerjee, Coordinator, East Regional Office, Centre for Environmental Education (CEE) shared valuable information on Renewable Energy and Energy Audit by Schools respectively. It was coordinated by Odisha ENVIS team.

One online quiz competition was organized for students of class-8th to 10th. Total 4388 students participated. Participation certificates have been sent to students.

Selected Paintings on Energy Conservation:

Mugpal Government High School, Mugpal, Jajpur

Government Boys High School, Kantabanji, Bolangir

Gengutia Panchayat High School, Basulei, Dhenkanal

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