

SUCCESS STORY

November 2010 – September 2017



ICZM PROJECT SPCB, ODISHA



'SAGAR UTKAL'
CAPTIVE SEA-WORTHY VESSEL

**CENTRE FOR
MANAGEMENT
OF COASTAL
ECOSYSTEM
(CMCE)
PARADEEP**

**COASTAL LABORATORY,
BHUBANESWAR**

**IMPLEMENTED
THOROUGH
ICZM PROJECT**

Major ACHIEVEMENTS : 2010-2017

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FOREWORD

Odisha's unique and diverse coastlines, stretching in the Bay of Bengal for a length of 480 kms have always been a source of fascination and attraction. Coastal ecosystems offer a variety of valuable habitats for numerous plant and animal species and provide important ecosystem services. The beauty and richness of the goods and services coastal zones offer have made them popular settlement areas and tourist destinations, important industrial and commercial zones and transit points. Currently, more than 40 % of the State population lives in coastal areas, and this is expected to increase significantly in the future. Unfortunately, population growth and the excessive exploitation of natural resources have put enormous pressure on our coastal ecosystems and this has led to biodiversity loss and ecosystem degradation, erosion, pollution, and other associated problems.

The threat to Odisha Coast has been gradually increasing as of other coastal zones in the World due to climatic change and other related issues would further intensify. It is our duty to preserve our coasts for present and future generations. To do this, we must aim for integrated, cross-sectoral policy management that respects coastal ecology, economic and industrial development, tourism and local cultures. This will require coordinated action at all governance levels, including cross-border co-operation. Introduction of Integrated Coastal Zone Management Project (ICZMP) in 2010 in Odisha has facilitated better coordination and integration of policies in coastal areas. Over the past four years Odisha Coast has grown into a key platform to promote the implementation of ICZM, stimulating

the exchange of best practices and bringing together major coastal zone stakeholders from all over the State.

The State Pollution Control Board, Odisha being a project executing agency (PEA) under the ICZM Project; has implemented the project assignments for achieving mandates set for the surveillance of the coastal stretch of 80 kilometers on pilot basis from Paradeep to Dhamra in the Bay of Bengal. The success stories of the project have been compiled in this brochure; which describes the few outcomes of these initiatives and summarizes the main lessons learned from the experiences in monitoring a important stretch of the coastline of Odisha in implementing the ICZM Project.

However, the ICZM approach is already implemented and will be continuing, in order to stimulate integrated management approaches in coastal areas and ensure the sustainable management of our valuable coastal areas for many years to come.



Debidutta Biswal, IFS
Member Secretary
State Pollution Control Board
Odisha, Bhubaneswar

INTEGRATED COASTAL ZONE MANAGEMENT APPROACH IN ODISHA COAST (PILOT PROJECT FROM PARADEEP TO DHAMRA)

Introduction

The success story in terms of progress of achieving the mandates of Integrated Coastal Zone Management Project (ICZMP) taken up by Odisha State Pollution Control Board (OSPCB) has been documented here. The evaluation of coastal environment from Paradeep to Dhamra Coastal stretch (Pilot project of approximately 80 kms

coastal stretch) through capacity building has also been enumerated. The surveillance capability of OSPCB on sea front was taken up with an intention of implementing right approach of accomplishing the mandate entrusted. This capacity would play a vital role in conservation of coastal ecosystem which in turn will support the livelihood of its dependents.

Background

For sustainable development of coastal regions as well as conservation of coastal resources, Ministry of Environment and Forests (MoEF), Govt. of India has issued a notification known as the Coastal Zone Management (CZM) Notification, 2011 under the Environmental (Protection) act, 1986. The objective of this notification is for the protection and sustainable development of the coastal stretches and marine environment through sustainable coastal zone management practices based on sound, scientific principles taking into account the vulnerability of the coast to natural hazards, sustainable livelihood for local communities and conservation of the ecologically and culturally significant coastal resources. Under this notification, "Coastal Zone" shall mean the area from the territorial waters limit (12 nautical miles measured from the appropriate baseline) including its sea bed, the adjacent land area along the coast and inland water bodies influenced by tidal action including its bed, up to the landward boundary of the local self-government / local authority adjoining the sea coast,

provided in case of ecologically and culturally sensitive areas, the entire biological / physical boundary of the area may be included. Under this notification, the coastal zone shall be divided into four categories; Coastal Management Zone - I to IV depending upon the ecologically sensitive importance, economically important areas, high population density areas, and culturally / strategically important areas.

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 five main categories:

1. Plan a comprehensive program for prevention, control or abatement of pollution and enforce the environmental laws.
2. Advise 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.



The Board is entrusted with the responsibility of implementation of Environmental Acts, particularly the Water (Prevention and Control of Pollution) Act, 1974, Air (Prevention and Control of Pollution) Act, 1981 and the Environment (Protection) Act, 1986, as amended from time to time, and various rules framed thereunder. The Board is also expected to execute and ensure proper implementation of Environmental Policy of the Union and the State Government and various directives from the Courts. The Board is entrusted with different major Acts and Rules / Notifications issued thereunder, for implementation and execution are as follows:

1. Water (Prevention and Control of Pollution) Act, 1974 and amendments thereof.
2. The Water (Prevention and Control of Pollution) Cess Act, 1977 (subsequently amended in 1991)
3. Air (Prevention and Control of Pollution) Act, 1981 and amendments thereof.
4. Environment (Protection) Act, 1986 and amendments thereof.
5. Hazardous Waste (Management & Handling) Rules, 1989 and amendments thereof.
6. Manufacture, Use, Import, Export and Storage of Hazardous Microorganisms, Genetically Engineered Organisms or Cells Rules, 1989.
7. Manufacture, Storage and Import of Hazardous Chemical Rules, 1989 and amendment thereof.
8. Environment Audit Notification, 1993.
9. Environment Impact Assessment Notification dated 14.9.2006.
10. Public Liability Insurance Act, 1991.
11. Chemical Accidents (Emergency Planning, Preparedness & Response) Rules, 1996.
12. Biomedical Waste (Management & Handling) Rules, 1998.
13. Municipal Solid Waste (Management & Handling) Rules, 2000.
14. Recycled Plastics Manufacturers and Usage Rules, 1998 and amendments thereof.
15. Notification dated 14.09.1999 on Fly-ash utilization.
16. The Noise Pollution (Regulation and Control) Rules, 2000
17. Ozone Depleting Substance (Regulation) Rules, 2000
18. Batteries (Management & Handling) Rules, 2001
19. The Solid Waste Management Rules, 2016
20. The Plastic Waste Management Rules, 2016
21. The Biomedical Waste Management Rules, 2016
22. The Construction & Demolition Waste Management Rules, 2016
23. The Hazardous & Other Wastes (Management and Transboundary Movement) Rules, 2016
24. The E-Waste (Management) Rules, 2016

Apart from above, Coastal Management Cell of OSPCB is also involved in NOSDCP (National Oil Spill Disaster Contingency Plan) as a participatory body on following issues.

- o To develop and implement state policy, programs and legislation to protect and conserve India's natural environment including regulation of dumping of wastes at sea, declaration and management of marine protected areas and conservation of listed threatened, migratory and marine species.
- o To advise on matters relating to the Environment Protection from dumping at Sea including the permitting and reporting of emergency dumping of material at sea.
- o To advise on potential impacts of oil spills on threatened marine and migratory species, such as seabirds, marine turtles, whales and dolphins.
- o To advice on likely to impact of oil spill on marine protected areas in coastal waters.
- o To provide advice on habitats in marine protected areas, seabirds, marine mammals, marine invertebrates and macro algae, along with advice on rates of hydrocarbon biodegradation, dispersal and the use of dispersants.
- o To determine policy for usage of dispersants in the sea areas of the territorial waters over which the state exercises jurisdiction.



Concept of ICZM

Today, more than half of the global population or in absolute figures well above 2½ billion people of the world's major cities are located in coastal areas. Although estimates vary considerably, UNCED's Agenda 21 suggests that up to three-quarters of the global population could be living within 60 km from the coast by 2020. Increasing population density, industrial development, and economic growth have given rise to a variety of additional economic activities, the combined effects of which increase the pressure on coastal areas and their resources. This frequently results in cumulative and complex impacts on the environment, depletion of resources and intensified conflict between competing user groups.

A continuous and dynamic process by which decisions are made for the sustainable use, development and protection of coastal and marine areas and resources. Integrated Coastal Zone Management (ICZM) acknowledges the interrelationships that exist among coastal and ocean uses and the environments they potentially affect. ICZM is a dynamic, multi-disciplinary and iterative process to promote sustainable management of coastal zones. It covers the full cycle of information collection, planning (in its broadest sense), decision making, management and monitoring of implementation. ICZM uses the informed participation and cooperation of all stakeholders to assess the societal goals in a given coastal area, and to take actions towards meeting

these objectives. ICZM seeks, over the long-term, to balance environmental, economic, social, cultural and recreational objectives, all within the limits set by natural dynamics. 'Integrated' in ICZM refers to the integration of objectives and also to the integration of the many instruments needed to meet these objectives. It means integration of all relevant policy areas, sectors, and levels of administration. It means integration of the terrestrial and marine components of the target territory, in both time and space. Integrated coastal zone management (ICZM) is a process for the management of the coast using an integrated approach, regarding all aspects of the coastal zone, including geographical and political boundaries, in an attempt to achieve sustainability. This concept was born in 1992 during the Earth Summit of Rio de Janeiro. The policy regarding ICZM is set out in the proceedings of the summit within Agenda 21, Chapter 17.

The surveillance approach towards coastal environment was reactive rather than proactive in nature. Now the capacity of OSPCB has been expanded to the compliance monitoring and enforcement of various environmental rules and regulations with regard to coastal pollution. The industrial scenario and urban growth in the coastal belt has necessitated to conduct in-depth coastal environmental assessment. The implementation of Coastal Zone Management approach by building capacity in OSPCB, has brought a new arena of scope in fulfilling the gap.

The Beginning

The journey of OSPCB towards building capacity on sea front began in 2010. The Project concept note was submitted for the developing phase of the coastal stretch through inventory by OSPCB. The Board submitted on 19.03.2010 the final version of detailed project report (DPR) to the Nodal Office of the State Project Preparation cell of ICZMP through F&E Dept. of the Government of Odisha. Subsequently MOU was signed on 26.04.2010 between the State Project Management Unit (SPMU) & the Board. One stakeholder's consultation

meeting was organized at Paradeep on Environmental & Social Association of the pilot investment and the Board presented its case before the public on 14.05.2010. Finally SPMU informed to the Board about the commencement of fund flow to Odisha Project in September 2010 and project activity of OSPCB started from November 2010; with an estimated total Project Cost of Rs.1426.13 lakhs and Rs.1298.93 lakhs (91.0%) was meant to be financed by World bank with the contributing share of OSPCB, Odisha of Rs. 127.20 lakhs (9.0%).

Mandates

The major mandates under capacity building of OSPCB are the following broad criteria:

- **Monitoring and analysis of coastal water, air & sediments quality in terms of pollution**
- **Construction and operation of Green facility: Center for Management of Coastal Ecosystem (CMCE) at Paradip**
- **Procurement of instruments & equipments to develop one state-of-art laboratory for analysis of coastal environmental parameters**
- **Development and public disclosure of time series data on sea health assessments**
- **Sustainable approach for the assets created under ICZMP for continuance.**





CONSTRUCTION & OPERATION OF GREEN FACILITY

CENTER FOR MANAGEMENT OF COASTAL ECOSYSTEM (CMCE)

Platinum Rated Green Building

The CMCE building is the first Platinum rated Govt. project in Odisha, constructed under Leadership in Energy and Environmental Design (LEED), which is a certification program for buildings and communities that guides their design, construction, operations and maintenance toward sustainability. It's based on prerequisites and credits that a project meets to achieve a certification level: Certified, Silver, Gold or Platinum. LEED platinum rating, which is the highest rating available in the World, is awarded by GBCI, USGBC. GBCI, USA is the World leader for rating buildings based on Sustainability, is operating in more than 130 countries.

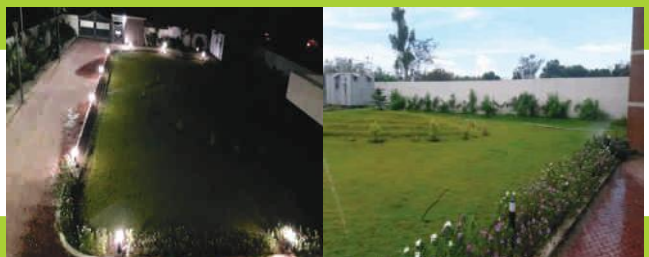
Scientific Process Adopted in the Building to Achieve Leed Certification

- Techno commercial analysis
- Budgeting for Right systems for incorporation
- Adoption of Time tested green features
- Aggressive stakeholders engagements
- Education and hand holding support
- Worked with clear targets, time line and deliverables

Green Features in the CMCE Building

For Efficient Site Development

- Landscaping to address micro climate
- Adequate number of parking spaces are provided for the occupants and visitors
- Provision of 6 bicycle racks are provided at the parking with proper signage along with one shower room
- 2 electric charging points are provided at the parking spaces for the low emitting fuel vehicles.



For Water Efficiency

- o Reduction of potable water consumption by 40% through efficient water fixtures.
- o STP & Usage of STP treated waste water for flushing and landscaping purpose
- o Majority of landscape are covered with native plant species with Drip and sprinkler irrigation system
- o Water meters are installed to monitor and control water consumption.



For Energy Efficiency

- o 40% annual energy saving is estimated as per the preliminary analysis
- o HVAC systems are free from CFC and HCFC based refrigerant & Fire Fighting system is free from Halon
- o Energy meters for sustenance
- o Solar panel of 24 KW panel capacities is installed to reduce the dependency on fossil fuel.
- o Insulated wall and roof, high performance glazing, roof with reflective paints.



Green Efficiency in Materials Used in the Building:

- o 96% of construction wastes has been diverted from disposal
- o Materials used for interior fit outs have more than 10% of recycle content
- o 6 segregated waste bins are placed at different floor levels and common areas for proper storage and collection of waste
- o More than 80% of materials used are locally manufactured.



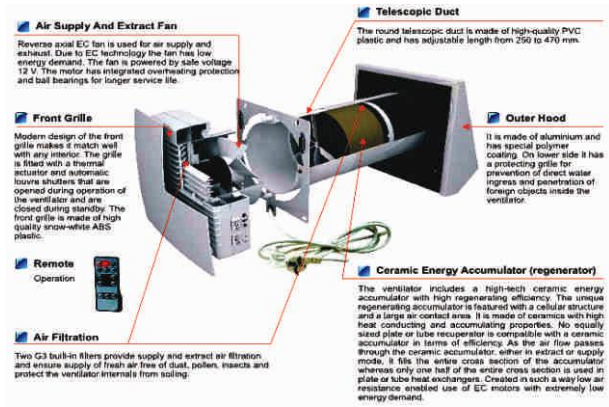
Maintaining Good Indoor Environmental Quality:

- o MDF and plywood free from Urea Formaldehyde are used for the project.
- o No Smoking inside the building & site premises
- o Fresh air fans to increase occupants comfort and for improved health
- o Paints, Sealants, Adhesives used have VOC content within the USGBC prescribed limit and green house keeping chemicals.



Fresh Air Unit:

In order to eliminate the problems associated with health risks, the wet, polluted air must be removed outside and replaced with fresh air. Supply air must always penetrate into room to ensure full and effective ventilation. Therefore, arrangement of the effective forced supply and exhaust ventilation in the rooms is the only correct and rational solution of this problem.



Platinum Rated Green Building Certification



Certified by Green Building Certification INC. (GBCI) of USGBC
(U.S. Green Building Council), Washington, DC

Achievements Through LEED Green Adaptation

- 40 % energy saving**
1.2 Lakhs units of annual energy consumption
- 40% water savings**
18 Lakhs gallons on annual basis
- CO₂ emission reduction**
1.4 Lakhs tons on annual basis

Projection through this achievement

**SETTING TONE FOR OTHER
GOVT. PROJECTS TO FOLLOW
AND LEADING FROM FRONT**

Official Inauguration of CMCE : 28th APRIL 2017

ପୂର୍ବ ଭାରତରେ ପ୍ରଥମ

ପାରାଦୀପରେ 'ଗ୍ରୀନ୍ ବିଲ୍ଡିଂ' ଉଦ୍ଘାଟିତ

ପାରାଦୀପ,୨୮୪(ଅପ୍): ରାଜ୍ୟ ପ୍ରଦୂଷଣ ନିୟନ୍ତ୍ରଣ ବୋର୍ଡର ପରୀକ୍ଷାଗାର ତଥା ଉପକୂଳ ପରିବେଶ ପରିଚାଳନା ସଂସ୍ଥାନର ଏକ ଅତ୍ୟାଧୁନିକ କେନ୍ଦ୍ର ପାରାଦୀପ ମେଗାଭବନ ଗ୍ରୀନଭବନରେ ଉଦ୍ଘାଟିତ ହୋଇଛି । ଏହା ସମଗ୍ର ପୂର୍ବ ଭାରତରେ ପ୍ରଥମ ସରକାରୀ ଗ୍ରୀନ୍ ବିଲ୍ଡିଂ ବୋଲି ଦର୍ଶି କରାଯାଇଛି । ସ୍ଵତନ୍ତ୍ର ପର୍ଯ୍ୟଟନ ଏବଂ ବିଲ୍ଡିଂ ଡିଭିଜନର ହୋଇଥିବା ଯୁଏସ୍ ଗ୍ରୀନ ବିଲ୍ଡିଂ ନିର୍ମାଣ ବିଭାଗ ଡିଭିଜନର ପ୍ରଥମ ବିଲ୍ଡିଂ କାର୍ଯ୍ୟକ୍ରମ ଡିଭିଜନର ପ୍ରଥମ ବିଲ୍ଡିଂ କାର୍ଯ୍ୟକ୍ରମର ଭାଗ ଭାବେ ଉଦ୍ଘାଟିତ ହୋଇଛି ।

ହୋଇଥିବା କୁହାଯାଇଛି । ଏଠାରେ ଅତ୍ୟାଧୁନିକ ପରିଚାଳନା ପଦ୍ଧତିର ଅଧିକାରୀଙ୍କ ପରିବେଶ ସମ୍ପର୍କିତ ଗବେଷଣା ଏଠାରୁ କରାଯାଇପାରିବ । ଜଳ, ବାୟୁ, ମୃତ୍ତିକା ଏବଂ ସାମୁଦ୍ରିକ ପ୍ରଦୂଷଣ ସମ୍ପର୍କିତ ସମସ୍ତ ପ୍ରକାର ପରୀକ୍ଷା ନୀତିକା ତଥା ଗବେଷଣା କରାଯାଇ ନିଦାନ ପ୍ରସ୍ତୁତ କରାଯିବ ବୋଲି କହିଛନ୍ତି । ରାଜ୍ୟ ପ୍ରଦୂଷଣ ନିୟନ୍ତ୍ରଣ ବୋର୍ଡର ଅଧ୍ୟକ୍ଷ ତଥା ଉଦ୍ଘାଟନ କମିଶନର ଆର୍. ବାଲକୃଷ୍ଣନ ମୁଖ୍ୟ ଅତିଥି ଭାବେ ଯୋଗ ଦେଇ ଏହି ବିଲ୍ଡିଂ ଉଦ୍ଘାଟନ କରିଥିଲେ ।

ଏହି ସୌଧରେ ସୌର ଆଲୋକ, ପ୍ରାକୃତିକ ବାୟୁର ବ୍ୟବହାର ସହିତ ବର୍ଷା ଜଳ ସଂରକ୍ଷଣ କରାଯିବାର ସୁବିଧା ରହିଛି । ସେଗୁଡ଼ିକ ଲାଭିଥିବାରୁ ବର୍ଷାରେ କେହି ନ ଥିବା ସମୟରେ ସ୍ଵାମୀ ଏବଂ ଆଲୋକ ଆପଣା ଛାଏ ବଦ ହୋଇଯିବ । ଅର୍ଗାନିକ ବିଆୟାଜ ସହର ଶୈଳୀରେ କାର୍ଯ୍ୟ ନିର୍ମିତ ହୋଇଥିବାରୁ ଅଧିକା ଲାଭିବା ସହ ଏହା କୃମିକମ୍ପ ବିନାଶ ବୋଲି କୁହାଯାଇଛି । ବିଶ୍ଵବ୍ୟାପୀ ଅନୁଦାନରେ ଏହା ନିର୍ମିତ ହୋଇଥିବା ବେଳେ ଏା ଚୋରିର ଉର୍ଦ୍ଧ୍ଵ ଗୋ ଖର୍ଚ୍ଚ

ପାରାଦୀପ କନ୍ଦର ଅଧିକ୍ଷ ବିଭାଗ ରେ, ଜଙ୍ଗଲ ବିଭାଗ ପ୍ରଧାନ ମୁଖ୍ୟ ସଂରକ୍ଷକ ତଥା ସମ୍ପଦ୍ଵିତ ଉପକୂଳ ପରିଚାଳନା ପ୍ରକଳ୍ପ ନିର୍ଦ୍ଦେଶକ ଅତିଥି ଭାବେ ସମ୍ବୋଧିତ, ରାଜ୍ୟ ପ୍ରଦୂଷଣ ନିୟନ୍ତ୍ରଣ ବୋର୍ଡର ସଭ୍ୟ ସଚିବ ଦେବାଦତ୍ତ ବିଶ୍ଵାଳ, ଆଇସିଡିଏବିଏସ୍ ଅନୁପମ ନେତା ଅଧିକାରୀ ତଥା ପ୍ରକଳ୍ପ ସଂଯୋଜକ ଅନୁପମ ବେହେରା, ଲିଡ୍ ନିର୍ଦ୍ଦେଶକ ଏମ୍ ସେଲଭାରାଜୁ, ଯୁଏସ୍ ଗ୍ରୀନ ବିଲ୍ଡିଂ ନିର୍ମାଣ ବିଭାଗ ପ୍ରକଳ୍ପ ପ୍ରସିଦ୍ଧା ରୋହିତ ସମ୍ପର୍କିତ ଅତିଥି ଭାବେ ଯୋଗ ଦେଇଥିଲେ ।



CMCE, built for ₹3cr, inaugurated

World Bank funded money for Centre for Management of Coastal Eco-system

STATESMAN NEWS SERVICE PARADIP, 28 APRIL



State Pollution Control Board (SPCB) under ICZMP has implemented the CMCE project in Paradip today with objective to monitor, plan and movement in the coastal stretch from Paradip to Dhamra in the Bay of Bengal.

Development Commissioner and chairman of State Pollution Control Board, Mr R Balakrishnan today inaugurated the Centre for Management of Coastal Eco-system (CMCE), built at a cost of ₹33 crores and funded by the World Bank.

The entire Odisha coast needs integrated efforts for the management of its coastal zone. The integrated coastal zone management project (ICZMP) implies a process for the management of the coastal zone using an integrated approach. Mr Balakrishnan said, "State Pollution Control Board (SPCB) under ICZMP has implemented the CMCE project in Paradip today with objective to monitor, plan and movement in the coastal stretch from Paradip to Dhamra in the Bay of Bengal."

The other activities of CMCE is to study biological oceanography by microscopic observation, real-time on-line inputs to follow the parameters and develop geographical information system for selected critical habits in coastal areas from Paradip to Dhamra. Besides this, the vessel management cell is an operational wing of CMCE to proficiently manage the running, operation & maintenance of pollution monitoring vessels. This centre would act as referral center and

would play a vital role in the sustainable management of coastal eco system, he said. Mr Priyanka Kochhar, representative of Green Business Certification (GBCI) said "CMCE, Paradip has achieved LEED (Leadership in Energy and Environmental Design) platinum certificate in the World independently recognizing excellence in green business industry performance and practice globally. Mr Balakrishnan released a booklet "green aspects considered in CMCE building Project Director, ICZMP Mr Ajit Pattnaik released a report card of Dhamra coastal stretch while member secretary of SPCB Mr Debidutta Biswal released the report card of Paradip coastal stretch.

29 April 2017 r.thestatesman.com/c/18678436



World Environment Day

BHUBANESWAR, MONDAY 05 JUNE 2017 | A MARKETING INITIATIVE

COASTAL POLLUTION WATCHDOG AND A GREEN BUILDING 'LEED-ER'

Global warming has put coastal eco-systems across the globe under focus. Given the fact that these are most populated areas with high economic activities, monitoring the impact of climate change on the coastal regions is key since these eco-systems contribute to socio-economic growth and development of nations in a way which can not be quantified. It is in this context the establishment of Centre for Management of Coastal Ecosystem (CMCE) under the Odisha State Pollution Control Board holds significance. It is the first of its kind coastal environment watchdog built by any of the pollution control body of the country.

Set up under the World Bank-aided Integrated Coastal Zone Management Project (ICZMP), it will assess the coastal stretch from Paradip to Dhamra (spanning 100 km) in the Bay of Bengal. It will take up biological oceanography activities by microscopic observation, real time assessment of ambient air quality (PM10, PM 2.5, TSP, NOx, SO2, H2S, Ozone, NHA, CO), especially the volatile organic compounds and BTEX which are a first in the State. Geo-scientific database using Geographic Information System (GIS) for critical habitats, management of "Sagar Uthai" - a cutlery man vessel for in-situ and on-board measurements - have been undertaken under the project;



GBCI, duly certified by Green Building Certification Inc. (GBCI), Washington, DC. The building was inaugurated at Paradip by Development Commissioner R Balakrishnan recently in presence of OSPCB Member Secretary Debidutta Biswal and the then Project Director of ICZMP Ajit Pattnaik. The rating for CMCE building was considered following adoption of green building criteria including sustainable site, water efficiency, energy and atmosphere, material and resources as well as indoor environment quality. The building boasts of composite walling for all internal and external walls, fresh air unit in each AC room for reduction of excess CO2, occupancy sensor, smoke detection and fire retardant system, energy efficient building, sewerage treatment plant, storm water catchment pond, drip irrigation for entire plantation area, hybridized energy system for energy back up,



generation of 24KVA solar power, grey water recirculation system and reduction in use of fresh water. According to Nodal Officer for ICZMP Anupam Behera the process of making LEED certified building is aimed at bringing benefits in the long run. It would help lower operational costs for long time sustainability annually save water to the tune of 10 lakh gallons while conserving energy to the tune of 1.30 lakh kwhr. Besides, CO2 emission reduction contribution from building is about 1.40 lakh ton a year apart from high-energy cost savings by use of high performance building materials such as insulated wall panels, high performance glazing, lowered lighting power density and high efficiency. Use of on-site 24 KWP solar photovoltaic installations will save 25 percent of the total energy consumption and cut down on use of fossil fuel based electricity. All rain water is collected, harvested and reused back in the site. All these efforts lead to reduction in CO2 emission and supporting protecting environment for the entire life of the building. The CMCE building was designed by Bhubaneswar-based

ପରିବେଶ ପରିଚାଳନା ସଂସ୍ଥାନ ଅଧିକାଧିକା ଉଦ୍ଘାଟିତ

ପାରାଦୀପ, ୨୮ (ବି.ପ୍): ରାଜ୍ୟ ପ୍ରଦୂଷଣ ନିୟନ୍ତ୍ରଣ ବୋର୍ଡର ପରିଚାଳନା ସଂସ୍ଥାନର ଏକ ଅତ୍ୟାଧୁନିକ କେନ୍ଦ୍ର ପାରାଦୀପରେ ଉଦ୍ଘାଟିତ ହୋଇଛି । ଏହା ସମଗ୍ର ପୂର୍ବ ଭାରତରେ ପ୍ରଥମ ସରକାରୀ ଗ୍ରୀନ୍ ବିଲ୍ଡିଂ ବୋଲି ଦର୍ଶି କରାଯାଇଛି ।

ସ୍ଵତନ୍ତ୍ର ପର୍ଯ୍ୟଟନ ଏବଂ ବିଲ୍ଡିଂ ଡିଭିଜନର ହୋଇଥିବା ଯୁଏସ୍ ଗ୍ରୀନ ବିଲ୍ଡିଂ ନିର୍ମାଣ ବିଭାଗ ଡିଭିଜନର ପ୍ରଥମ ବିଲ୍ଡିଂ କାର୍ଯ୍ୟକ୍ରମ ଡିଭିଜନର ପ୍ରଥମ ବିଲ୍ଡିଂ କାର୍ଯ୍ୟକ୍ରମର ଭାଗ ଭାବେ ଉଦ୍ଘାଟିତ ହୋଇଛି ।



ପୂର୍ଣ୍ଣ ପରିଚାଳନା ପଦ୍ଧତିର ଅଧିକାରୀଙ୍କ ପରିବେଶ ସମ୍ପର୍କିତ ଗବେଷଣା ଏଠାରୁ କରାଯାଇପାରିବ । ଜଳ, ବାୟୁ, ମୃତ୍ତିକା ଏବଂ ସାମୁଦ୍ରିକ ପ୍ରଦୂଷଣ ସମ୍ପର୍କିତ ସମସ୍ତ ପ୍ରକାର ପରୀକ୍ଷା ନୀତିକା ତଥା ଗବେଷଣା କରାଯାଇ ନିଦାନ ପ୍ରସ୍ତୁତ କରାଯିବ ବୋଲି କହିଛନ୍ତି ।

ରାଜ୍ୟ ପ୍ରଦୂଷଣ ନିୟନ୍ତ୍ରଣ ବୋର୍ଡର ଅଧ୍ୟକ୍ଷ ତଥା ଉଦ୍ଘାଟନ କମିଶନର ଆର୍. ବାଲକୃଷ୍ଣନ ମୁଖ୍ୟ ଅତିଥି ଭାବେ ଯୋଗ ଦେଇ ଏହି ବିଲ୍ଡିଂ ଉଦ୍ଘାଟନ କରିଥିଲେ ।

ରାଜ୍ୟର ପ୍ରଥମ ସବୁଜ ଘର ଲୋକାର୍ପିତ



ପାରାଦୀପ, ୨୮ (ବି.ପ୍): ରାଜ୍ୟ ପ୍ରଦୂଷଣ ନିୟନ୍ତ୍ରଣ ବୋର୍ଡର ପରିଚାଳନା ସଂସ୍ଥାନର ଏକ ଅତ୍ୟାଧୁନିକ କେନ୍ଦ୍ର ପାରାଦୀପରେ ଉଦ୍ଘାଟିତ ହୋଇଛି । ଏହା ସମଗ୍ର ପୂର୍ବ ଭାରତରେ ପ୍ରଥମ ସରକାରୀ ଗ୍ରୀନ୍ ବିଲ୍ଡିଂ ବୋଲି ଦର୍ଶି କରାଯାଇଛି ।

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Activities at CMCE

To address coastal environmental pollution and its impact in the surrounding of Paradeep-Dhamra coastal stretch (80 kms) in a more systematic manner through the Center for Management of

Coastal Ecosystem (CMCE) at Paradeep is envisaged. This has enhanced the capacity of OSPCB handling issues related to it. The following activities are carried out at CMCE as detailed below:

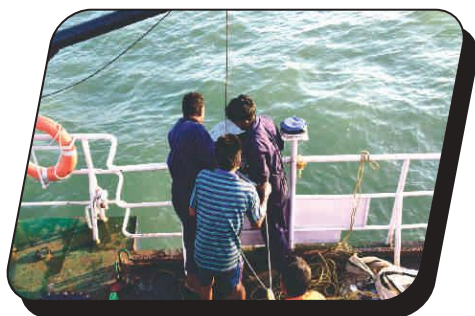
Coastal Environment Monitoring & Coastal Health Assessment:

Industrial as well as port development activities are being associated in the Paradeep-Dhamra coast. Different pollution sources (industrial, domestic sewage, agricultural runoff, atmospheric deposition, oil discharges and spills and solid waste from household, industrial sources) are directly disposed-off in to the sea which seriously affects the coastal resources. Inadequate infrastructure facility to monitor the coastal environment of Paradeep-

Dhamra is at stake and deserves special attention to ensure that unique and valuable marine natural resources along the coast are protected. This requires a sustainable development plan and to enable this, the primary requirement is to monitor and study the coastal environment at regular intervals throughout the coastline. It is also important that this monitoring be carried out meticulously with best available scientific facilities and methodology.

Objectives:

- o To prepare and design a required and well documented monitoring protocol for the entire stretch of 80 kms i.e. from Paradeep to Dhamra in Odisha coast.
- o To continue periodic monitoring of water & sediment quality and biological diversity of the coastal and inshore areas of Paradeep-Dhamra coast to identify changes, if any, beyond the natural variability, to generate a database of Physico-chemical and biological status of this coast and develop a benchmark for further monitoring and management.
- o Survey of coastal flora & fauna and biodiversity status of Paradeep-Dhamra coast.
- o To study the ambient air quality and ambient noise status of the entire coastal stretch
- o Monitoring microbiology in water and sediment of coastal area to assess the health of coastal waters as well as using biota as indicators of toxic contamination and index of pollution.
- o In-situ monitoring of the coastal zone including on-board measurements of the vital parameters and develop methodology for offshore on-board monitoring.



*Monitoring in Vessel "MV Sagar Utkal"
by Scientists of ICZMP, SPCB, Odisha*

Geographical Coastal Information

To create, update and maintain geo-scientific database using geographic information system (GIS), development of GIS based information system for selected critical habitats in the coastal areas of Paradeep-Dhamra coast are the primary focus.

GIS, is envisaged for better management and planning of coastal environment and their resources for safe, secure, prosperous and sustainable coastal zone areas. This would facilitate further development of coastal dependent communities and users. Geo-informatics has apparent potential for contributing significantly to coastal management in a number of ways. The use of geo-informatics is an important tool in management and regulation of coastal areas as with this technology, changes over a period of time can be tracked and future changes can be projected.



Objectives:

- o Provide GIS database applications to a variety of coastal issues, management, and sustainable resource utilization undertake statistical and numerical modeling - particularly pertaining to issues of coastal pollution.
- o Link coastal resource managers with relevant remote sensing technology through data acquisition and access, applied research and development.

Coastal Monitoring Vessel Management:

A coastal/pollution monitoring vessel (CMV/PMV) is inducted for in-situ monitoring and on-board measurements of environmental samples of Paradip-Dhamra coastal stretch. This CMV/PMV would be first of its kind in the State of Odisha and to be engaged for coastal monitoring and surveillance.

Objectives:

- o The Vessel Management is an operational wing of CMCE to proficiently manage the running, operation and maintenance of CMV/PMV through outside agency on contract.
- o Procurement of on-board equipments and spares, dry-dock and other vessel repairs, preparation for all cruises and coordination with the team till end of cruise through offshore and onshore support for both scientific and vessel team, are other major activities of the cell.
- o CMCE would be providing this vessel to the user research institutes and organizations for the successful implementation of Ocean related programmes on request and payment with due approval of competent authority.



Coastal Environmental Management:

To study impact assessment on coastal environment of water, air & sediment and to recommend suitable marine environment management plan to minimize adverse impacts on local ecology.

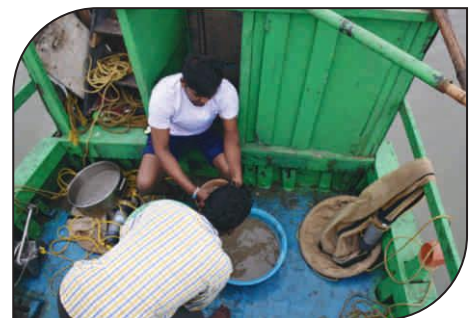
To provide input and advice on coastal environmental impact assessment and would establish the baseline environmental conditions of Paradeep-Dhamra coast. It would identify, predict and assess the significance of environmental effects on air, water and sediment of coastal areas of Paradeep-Dhamra coast.



Objectives:

- o Determination of Waste Load Allocation and Waste assimilation capacity at selected estuaries along coastal areas of Paradeep-Dhamra.
- o To identify extent and sectors affected by degradation due to pollution of estuarine coastal environmental quality and to develop sector specific monitoring and mitigation plans including regulatory measures.
- o To identify the factors arising due to pollution affecting biodiversity of Paradeep-Dhamra coast.
- o To develop environmental modeling to abate pollution in the coastal stretch.

Coastal Monitoring Done by Trawler



Other Activities

(Seminars, Workshop, Awareness Campaign, Coastal issues)

- Participated with the Coast Guard in mitigation programmes of Oil Spills and in implementing the Contingent Plans
- Organized seminars with IUCN, New Delhi for creating awareness amongst the Industries, Departments for coastal sustainability
- Attended to numbers of coastal issues: Fish mortality, Oil Spills at Paradeep
- Reported for declaring Bhitarkanika as Heritage Site to IUCN
- Working with other PEAs under ICZMP, research institutes, Govt. departments, OCZMA, Coast Guard, SPCB/CPCB etc.
- Participated in beach cleaning under Swachha Bharat Abhiyan



NOSDCP Meeting at Goa 2015



NOSDCP Meeting at New Delhi 2017



Workshop at Goa by DG Shipping 2017



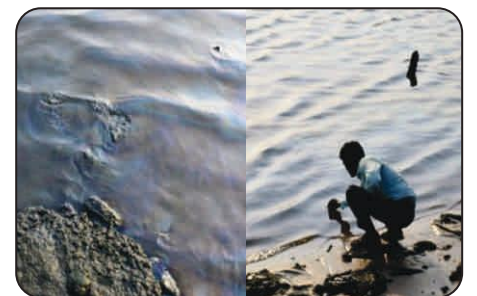
IUCN Workshop 2015



Participated in Swachha Bharat Abhiyan at Paradeep



Sampling during fish mortality at Paradeep



Sampling of Oil spill at Paradeep

FACILITIES DEVELOPED FOR MONITORING & ASSESSMENT OF COASTAL POLLUTION



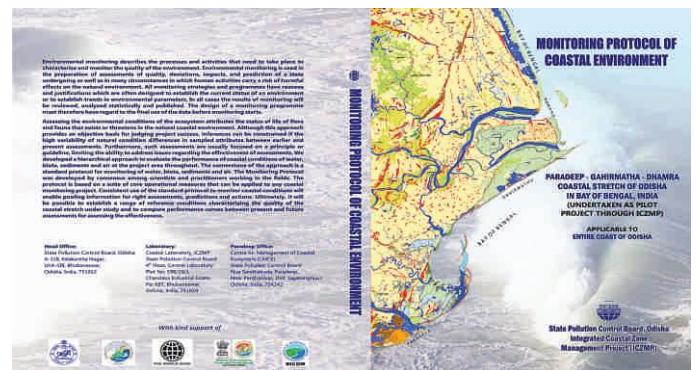
The State Pollution Control Board, Odisha moved forward in building of Board's capacity in terms of specific manpower, infrastructure and analytical capability to assess the coastal environment of the assigned stretch on pilot basis. The assessments of the coastal health in a continuous manner in establishing a strong baseline environmental data (water, air & biota) of Paradeep-Dhamra coastal stretch, their significance in predicting trends, finding hotspots in the stretch, formulating of

mitigation plans, study of impacts in the ecosystem, study of intrinsic developments, degradation, affects between biota & pollution are the prime focus. The approach undertaken has provided consistent time series data for better understanding of coastal pollution and relative dynamics. It is also foreseen to make a Referral Laboratory in the State to address coastal issues and to standardize sampling technique in the dynamic part of the coastal area & estuaries; as well as developing analyzing methods for practical use.

Comprehensive Monitoring Protocol

ICZMP, SPCB consulted and took guidance of different organizations, institutes etc. working in the similar fields (NIO, Vizag, ICMAM, Chennai) in formulating an exhaustive and comprehensive Protocol for carrying out monitoring, selection of locations, methods for sample collection, working plans and proper methodologies for analysis. The projected objectives were depicted below.

- o Guidelines for sampling, monitoring and analysis of coastal environmental samples of the assigned stretch;
- o Assessments of quality of marine water, Sediment and Air as defined by a variety of environmental parameters or indicators;
- o Assessments of quality of air/water for best designated use and guidelines to meet the deviations;



Cover Page of Published Monitoring Protocol



Meeting held for preparation of Monitoring Protocol



- o Assessments of the loads of pollutants entering in the catchment from other sources;
- o Characterisation of the biota (Meio benthos, Micro benthos, Planktons, Chlorophylls etc.) and assessment of biological productivity;
- o Assessment of the use of state of the resources, level of uses and contamination;
- o Acting on the identified contaminant to control, or restoration or rehabilitation of environment;
- o Identification of trends in the condition of the coastal ecosystem.

The OSPCB prepared the desired protocol for monitoring and analysis of environmental samples for the assigned stretch. It took nearly 2 years to finalize by the Protocol committee. It is already published.



Release of "Monitoring Protocol" on 14th Sept. 2017

Sea Worthy Pollution Monitoring Catamaran Vessel

For assessment of health of coastal stretch of Paradeep - Dhamra, which aims in understanding the coastal pollution through in-situ monitoring and onboard measurement, coastal survey and near shore multi-disciplinary work; a monitoring vessel or work boat 'Sagar Utkal' was undertaken, which is 1st of its kind in the State. This vessel was constructed at Vishakhapatnam as per the approval of DG Shipping and under the supervision of Indian Register of Shipping (IRS). The Ocean Engineering, IIT, Chennai was the consultant in finalizing the design of the vessel and the acceptance of the vessel.



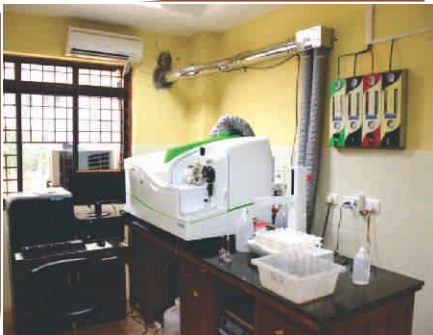
OPERATION OF STATE-OF-ART COASTAL LABORATORY

Coastal Laboratory & ICZMP Office at Patia, Bhubaneswar

The State-of-art instruments and equipments have been procured under ICZMP, SPCB. This analytical capacity of OSPCB is a complete new inclusion, as no facility was available towards coastal assessment prior to this for coastal water assessment. The capacity towards sea viz in-situ monitoring, sampling and onboard & laboratory analysis have been developed

fresh. This has been intended primarily to develop into a referral laboratory of the State as coastal subject is concerned. The instruments/equipment in the Coastal Laboratory of OSPCB created through this project is also quite unique and modern in accuracy and precision of analyzing coastal samples.

Photographs of Few Instruments housed in Coastal Laboratory



ICPMS



Auto Analyser



CHNS Analyser



AOx Analyser



GCMS (TQ)



TOC Analyser



GCMS (SQ)



MDS



HPLC

Coastal Laboratory at Bhubaneswar:

A full-fledged coastal environmental laboratory with state-of-art is set up in the Central Laboratory of Odisha State Pollution Control Board at Chandaka, Bhubaneswar for analysis of Physico Chemical, Biological, and Sediments of coastal samples.

Objectives:

- o To equip and operate the stat-of-art equipments and instruments in the laboratory for analysis.
- o Accomplishment of proper methodology for analysis of different parameters and adoption/development of new methodology for these purposes.
- o Proper maintenance and surveillance of the equipments and instruments, accessories etc.
- o Online transmission of analytical data to the CMCE, Paradeep for storage and further interpretations.

Knowledge, Governance and Policy Implementation

This would act as a central repository for the dispersed information on the Odisha coast. The knowledge management system of the centre would assist those interested in coastal governance to access the most relevant

information on coastal issues. This division would also serve as an advisory to the government on coastal governance and policy issues of coastal management.

Objectives:

- o Information and Data Bank
- o Coordination
- o Communication & Dissemination
- o Initiation of R & D Activities
- o Promotion of different trainings
- o Implementation of Coastal Law and Policy



The laboratory has been operative since May 2014 and more than 4000 numbers of water samples were analyzed till August 2017 being collected from Paradeep – Dhamra coastal stretch and were analyzed. The results and their interpretations have been consolidated & documented.

This is the Central Laboratory of State Pollution Control Board, Odisha. The Coastal Laboratory developed under ICZMP has been set up in this building. It is located at Patia, Bhubaneswar

OUTCOMES & LESSEONS LEARNED



PUBLIC DISCLOSURE OF TIME SERIES DATA ON COASTAL HEALTH

Data Generation

Consistent time series data on physical, chemical and biological parameters of coastal water (creek, estuary, sea) are being generated towards the monitoring of the assigned stretch (Paradeep-Dhamra) since May 2013, performed periodically

(three times a year). The data for last four years are being subjected for statistical interpretations by developing models, quality index, impact mapping etc. and are documented in the form of status report, health card and research publications.



Publications

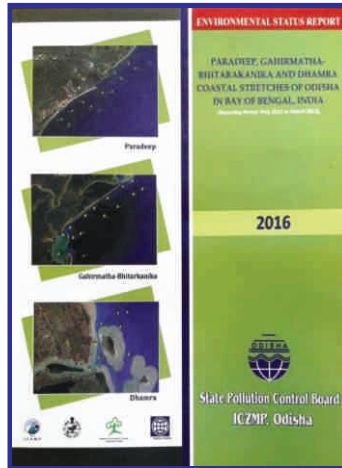
To fulfill its mandate; OSPCB, ICZMP has brought out different publications for public disclosure and awareness.

Already Published

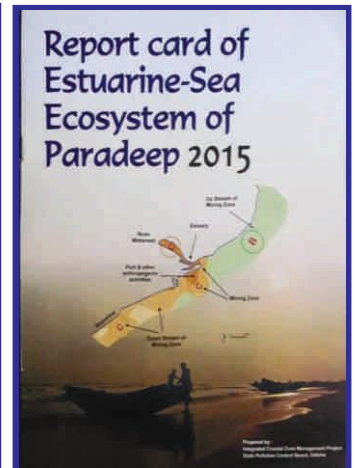
- Status Report of Paradeep, Gahirmatha-Bhitarakanika & Dhamara Coastal Stretches of Odisha in Bay of Bengal, India (2013-2015)
- Report Card on Paradeep, Dhamra and Gahirmatha (2015)
- Booklet on adopted features in the CMCE building to get the LEED certificate from GBCI, Washington DC.
- Monitoring Protocol of Coastal Environment for the State of Odisha

Under Publication

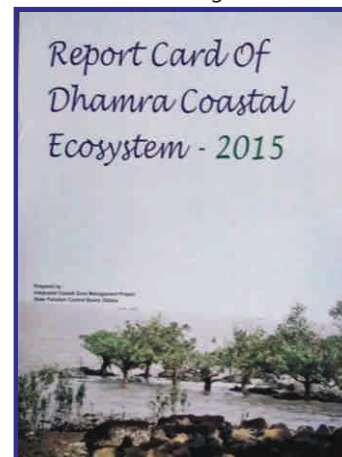
- A research paper entitled 'Spatio-temporal variation of Phytoplankton in relation to physicochemical parameters along Mahanadi estuary & inshore area of Paradeep coast, north east coast of India in Bay of Bengal.' In Indian Journal of Geo-Marine Sciences.
- Report Card on Paradeep, Dhamra and Gahirmatha (2016)
- Status Report of Paradeep, Gahirmatha-Bhitarakanika & Dhamra Coastal Stretches of Odisha in Bay of Bengal, India (2015-17)



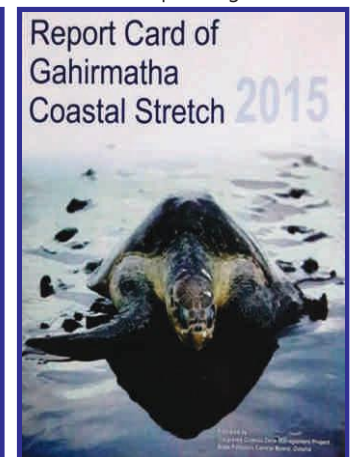
The status of coastal waters of Paradeep – Dhamra Stretch done during 2013-2015



Status of Health of Estuarine – Sea Ecosystem of Paradeep during 2015



Status of Health of Estuarine – Sea Ecosystem of Dhamra during 2015



Status of Health of Estuarine – Sea Ecosystem of Gahirmatha during 2015

CMCE building achieved Leadership in Energy & Environment Design (LEED) Platinum Certification from GBCI

BENEFIT ACHIEVED

- Lowered Operational costs for long time sustainability
 - Annual water saving to the tune of 18.0 lakhs gallons/year
 - Annual energy saving to the tune of 1.20 lakhs kwhr
 - Resultant CO2 emission reduction contribution from building is about 1.40 lakhs tons /year
- High energy cost savings by use of high performance building materials such as insulated wall panels, high performance glazing, lowered lighting power density & high efficiency AC system.
- Enhanced fresh air systems in all regularly occupied spaces. State of the art fresh air system specifically brought from Italy ensures to pump fresh air into each space to maintain 'good indoor air quality'.
- Increased employee productivity due to the fact that good indoor environmental quality has been maintained.
- Use of energy efficient LED lighting fixtures which reduces the total lighting power density inside the office space upto 60%.
- Use of onsite 24 KWp Solar PV to the tune of 25% of the total energy consumption reduces the use of fossil fuel based electricity considerably throughout the year.
- Reduced consumption of portable water for domestic use in toilet flushing, landscape irrigations etc. Also the rainwater which is collected, harvested and reused back in the site completely.
- Use of onsite sewage treatment plant to reuse treated waste water in toilet flushing and landscape irrigation has eliminated the extent of use of portable water.
- Overall, this effort leads to reduction in CO2 emission and support in protecting environment for the entire life of the building

OTHER SITE IMPLEMENTED PHOTOGRAPHS

Electric Vehicle Charging Station Storm Water Pond & STP

Bicycle Commuter Parking

SRI Paint

Car Pool Parking

Fresh Air Unit for AC Unit

ABOUT LEAD CONSULTANCY & ENG SERVICES, BENGALURU: GREEN CONSULTANCY CONSULTANT

LEAD was established in the year 2008 to offer design consultancy services in the sphere of MEP design & Green Consultancy Services. In just a matter of Eight years, LEAD has become a leader, pioneer and trend setter in its business. LEAD has completed successfully more than 150 green projects from a very diverse range of clients and segments, across India, leading to immense pride and satisfaction to all their stakeholders.

LEAD, with its national presence, offers a gamut of design consultancy services that includes complete Green building services & MEP design services under one roof. As we march forward in our journey to create sustainable designs that leave an everlasting legacy, we, the team at LEAD, promise and dedicate ourselves to deliver the very best possible design solution for the benefit of built environment to sustain its operation for the entire life.

LEAD was appointed as the green building consultants for the project to facilitate and deliver the coveted LEED Platinum Rating under the GBCI.

Joint publication ICZMP, SPCC, Odisha & LCES, Bengaluru

"BRINGING GLORY TO STATE OF ODISHA"

ODISHA

CENTRE FOR MANAGEMENT OF COASTAL ECOSYSTEM
STATE POLLUTION CONTROL BOARD, ODISHA, PARADEEP
(UNDERTAKEN THROUGH ICZMP PROJECT)

AWARDED COVETED LEED PLATINUM RATING FOR THE PROJECT FROM

GREEN BUSINESS CERTIFICATION INC (GBCI), WASHINGTON DC
(FIRST OF ITS KIND IN THE STATE ODISHA IN GOVT. SECTOR)

Green Brochure on Platinum Rated Green Building

SUSTAINABILITY APPROACH ADOPTED FOR CONTINUANCE OF FACILITIES

It is also important to highlight that besides conforming mandates of ICZMP, SPCB has developed a strategy for sustainability. ICZMP, SPCB have following three major components, which need to be addressed on their sustenance. The detailed sustainability plan prepared has been duly approved by the OSPCB.

- FACILITIES DEVELOPED FOR ICZMP (INSTRUMENTS, EQUIPMENTS, ACCESSORIES ETC.)
- OPERATION OF CMCE AND FOLLOW UP MAINTENANCE OF CMCE (GREEN BUILDING)
- MONITORING VESSEL AND ITS MANAGEMENT.

A. Relevancy: Enhance the analytical capability of the laboratory for environmental samples with these instruments for the ongoing ICZMP, SPCB and also after the completion of ICZM Project.

B. Acceptability: As the Central laboratory is going for NABL accreditation along with facilities incorporated through ICZMP, the data generated through these instruments would be having better acceptance worldwide. The different stakeholders / beneficiaries of this project will get advantage of this.

C. Economic and Financial Viability: The facilities to deal with the coastal assessment with regard to monitoring in-situ & on-board analysis in vessel/trawler and those analyzing instruments, equipment, gadgets etc. available; would be shared by the present users and stakeholders working in similar fields. This would definitely reduce the burden of expenditure of the PEA as well as would be helpful to the institutions/organizations without developing similar facilities. Thereby, it would create a compatibility on economic and financial viability.

D. Implementation and Monitoring strategy: The Board will take adequate steps to monitor the effectiveness of the work and fulfillment of its objective, from time to time through Coastal Management Cell of SPCB.

E. Post implementation operation and maintenance (O&M): The project will be merged after completion of the project period as per the memorandum signed thereof and will continue as one of the activities of the SPC Board. The present operating cost is borne by the Board since 1.1.2016.

F. Sustainability strategy: The facilities developed through the ICZM project will be operated by the Coastal Management Cell with allocation of budget as earmarked already for these activities to continue as one of the functionaries of SPCB and would work as regular wing of Odisha State Pollution Control Board.

LESSONS LEARNED

1. Start with a clear vision

We started with a clear vision to fulfill the mandate of Integrated Coastal Zone Management. It was critical for OSPCB to clearly understand their role in coastal endurance and to contribute in developing state agenda in coastal protection. The capacity developed by OSPCB in mainstreaming, evaluating the coastal health; has encouraged us in addressing issues like climate change actions and supporting the government's sustainable development objectives at both the local and regional levels.

2. Understand and integrate requirements of inter-sectoral feedback

A state/country needs to take holistic approach with proper requirements into consideration within its own political, social, economic, cultural and environmental contexts. This took place by considering existing elements, processes, laws and regulations at the national level that were specifically applicable to the coastal zone Action Plan – as well as to safeguards and stakeholder participation processes.

3. Consider sequence during the development of required activities

It was evident that predefining the Action Plan before having a detailed analysis of direct and indirect drivers of Coastal pollution would not allow for a comprehensive and strategic approach. Similarly, SPCB, ICZMP identified that the implementation of social and environmental safeguards without having prioritized action plan for sustainable coastal ecosystem in national strategy would be a theoretical exercise with limited applicability.

4. Recognize that a change in the intervention scale has implications

Analyzing how to stop Pollution and restore coastal ecosystem at the macro and micro level represented a radical conceptual shift for OSPCB, compared to the previous mind set and approaches, in which often-disconnected in macro level survey and investigation (Research & Development). This **change in the intervention scale for the measurement of results** had various implications during the Pilot project phase. For example, as OSPCB was only concerned with the discharges of effluents from point and non point sources and whether they are meeting the prescribed standards or not. But, there exist many factors which influences the impact of these pollutants on target organism in their ecosystem, which is the main concern for the ecosystem balance and its conservation. However, a local vision has also been fundamental for the analysis of drivers of coastal health, and has subsequently allowed for the identification of areas for intervention with prioritized the need that were coherently articulated in the Action Plan.

5. Recognize the importance of the political dimension

OSPCB's experiences demonstrated that in order to finance and implement a Project, the plan needs to be aligned with existing framework and contribute to the state/national Agenda and current initiatives, rather than duplicating efforts. Achieving results on pollution reductions at the generation level, the department learned, requires a coordinated intergovernmental and multi-sectoral approach, especially given the fact that the main drivers of Coastal Health originate outside of the said sector.

6. Acknowledge the importance of Knowledge management and capacity building at individual, technical and institutional levels.

Based on its experience, OSPCB recommends considering needs, capacities, strengths and limitations in the design of technical solutions for the development of approaches for sustainable coastal health. Its experiences also showed that institutional strengthening and the institutionalization of management information is critical for the sustainability of the political and coastal health governance processes related to climate change and land use planning. The learning process for preparation, which has evolved during the last five years, has been lengthy and gradual. OSPCB, ICZMP identified that the exchange of knowledge and experiences among different stakeholders is a very useful exercise to understand various challenges and approaches and to assist in accelerating the research process.

HEALTH REPORT OF PILOT STRETCH

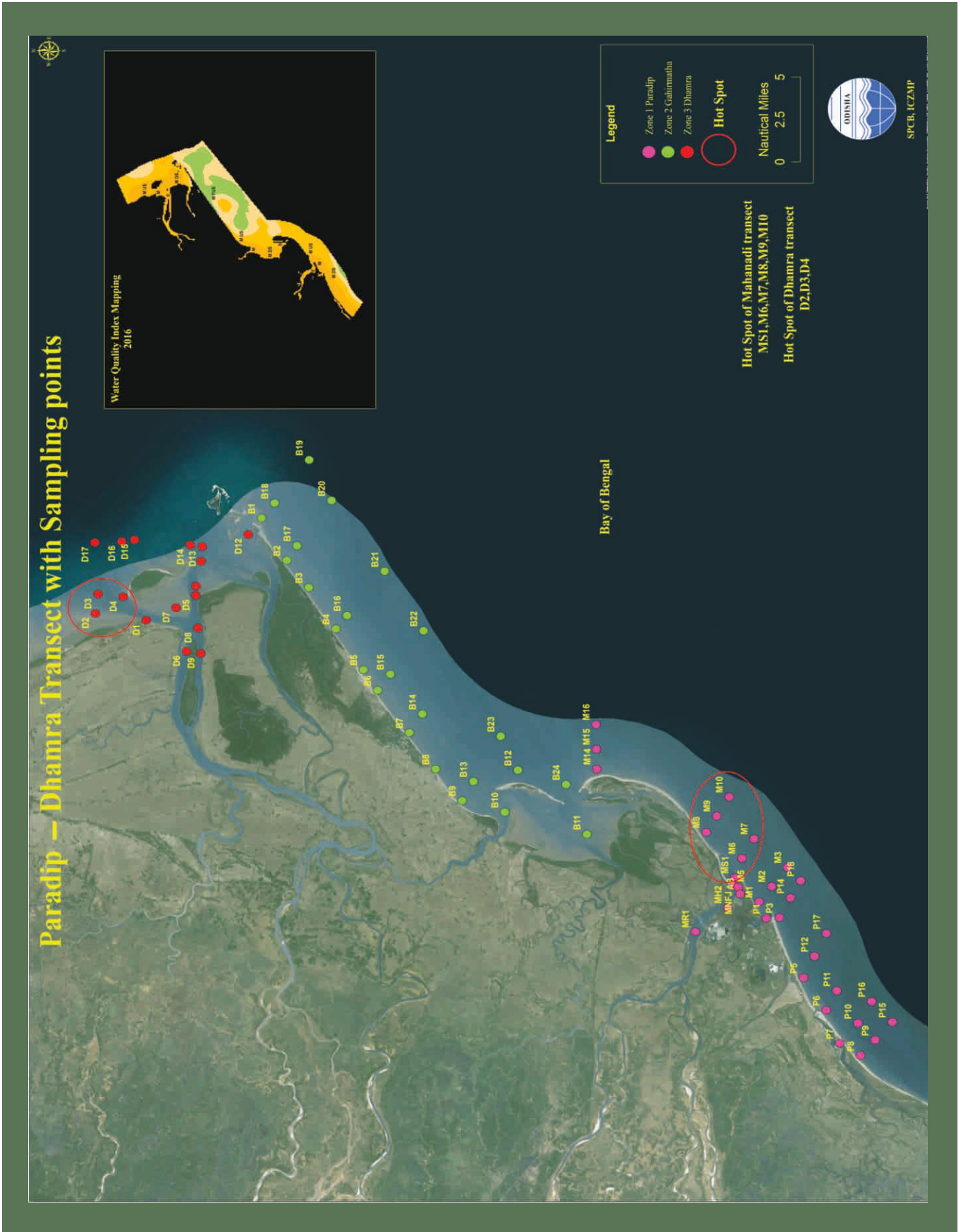
To compare the qualities of sea water; it was evaluated through Water Quality Index (WQI) considering the following parameters and standards as available.

WATER QUALITY GRADES & WATER QUALITY INDEX:

- A** **80-100%** All water quality indicators meet the desired levels of Standard. The water quality in those locations tends to be very good, most often leading to very good habitat condition for Marine lives.
- B** **60-80%** Most water quality indicators meet the desired levels of Standard. The water quality in those locations tends to be good, most often leading to good habitat condition for Marine lives.
- C** **40-60%** Blend of good and poor levels of water quality indicators. Quality of water in these locations tends to be fair, leading to fair habitat conditions for Marine lives.
- D** **20-40%** Few water quality indicators meet desired levels. Quality of water in these locations tends to be poor often leading to poor habitat conditions for Marine lives.
- F** **0-20%** Very few or no water quality indicators meet desired levels. Quality of water in these locations tends to be very poor, most often leading to very poor habitat conditions for Marine lives

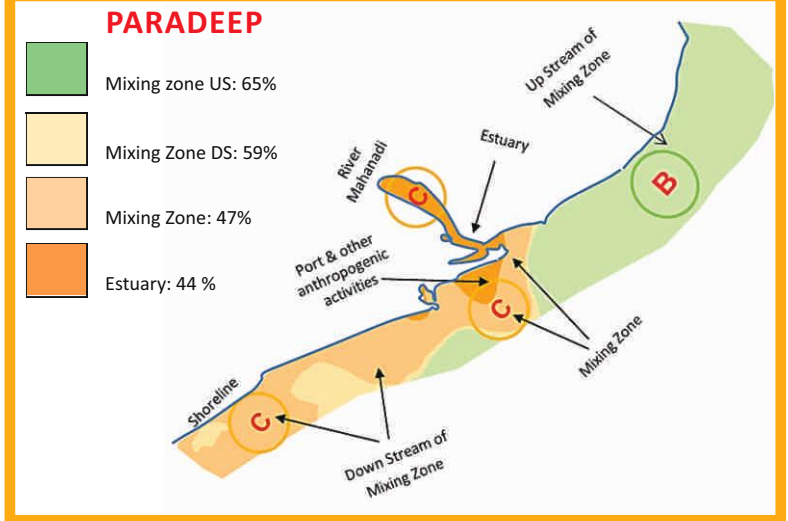
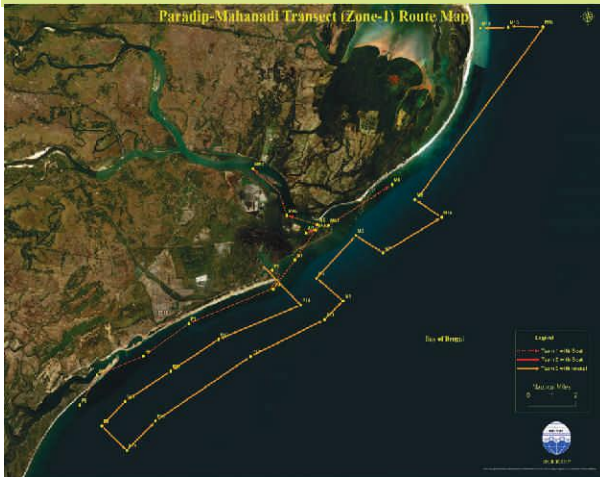
WATER QUALITY INDEX		
Water Quality Parameters & Standards Considered and Sources		
Indicators	Desired Conditions	Source of Data
Temperature	20°C-30 °C	SPCB, ICZMP
pH	6.5-8.5	CPCB
Dissolved Oxygen	≤3 mg/l	CPCB
BOD	≤ 3 mg/l	CPCB
TSS	≤ 20 mg/l	ANZECC(2000)
Turbidity	8 NTU	ANZECC(2000)
TOC	≤0.3 mg/l	ANZECC(1992)
Nitrate	≤ 1 mg/l	ANZECC(2000)
Phosphate	≤ 0.1 mg/l	ANZECC(2000)
Silicate	0.3-1.0 mg/l	ANZECC(2000)
Fecal Coliform	≤ 100 nos./100 ml	CPCB
Chloro phyll-a	≤ 3.4 µg/l	ANZECC(2000)
Mercury	≤ 1 µg/l	CPCB
Manganese	≤ 500 µg/l	CPCB
Iron	≤ 500 µg/l	CPCB
Lead	≤ 1 µg/l	CPCB
Cadmium	≤ 10 µg/l	CPCB

Hot spots Identified in the Coastal Stretch

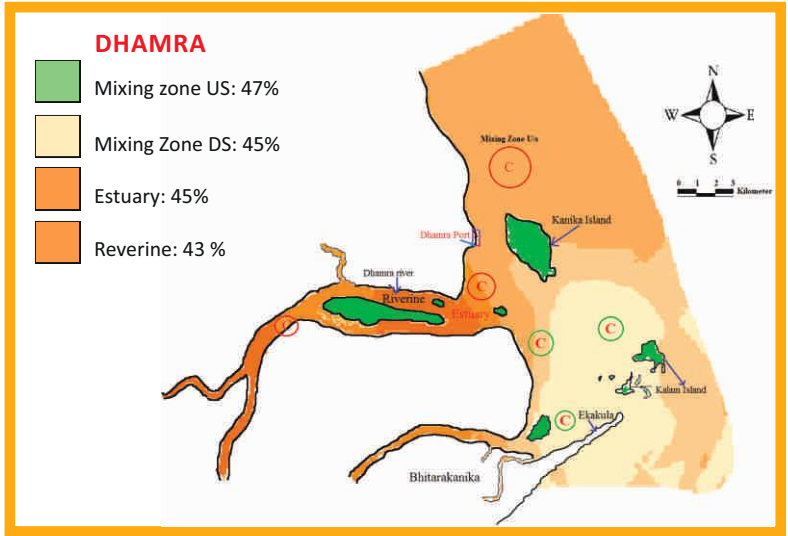


ESTUARY-SEA ECOLOGICAL INTERACTIONS (2013-15)

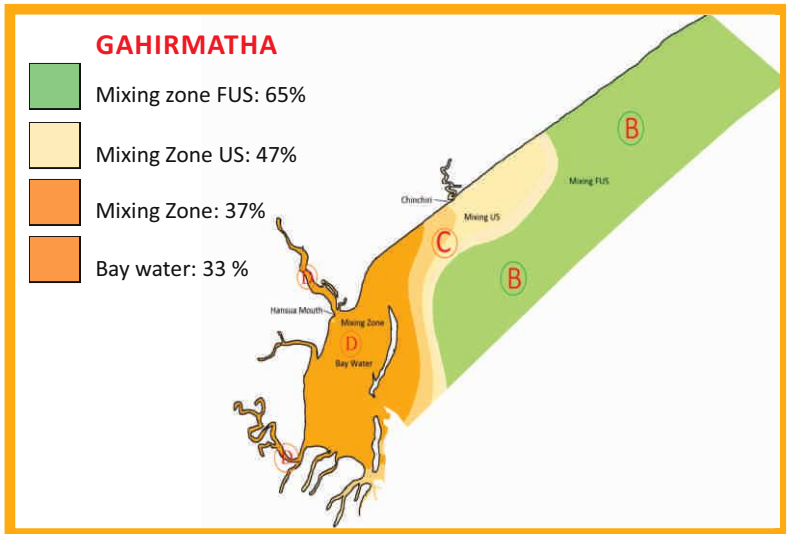
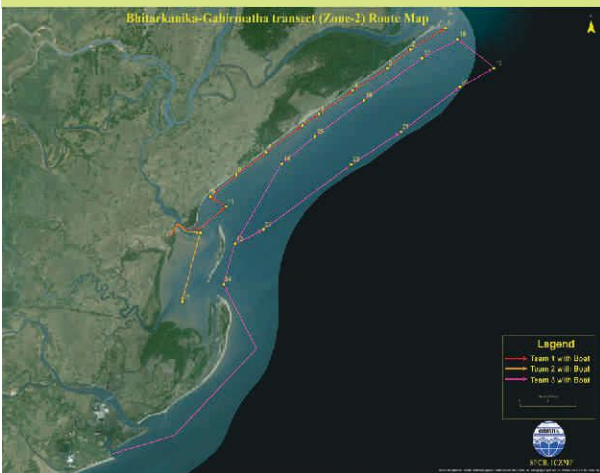
PARADEEP COASTAL STRETCH OF 38kms



DHAMRA COASTAL STRETCH OF 14kms



GAHIRMATHA COASTAL STRETCH OF 31kms

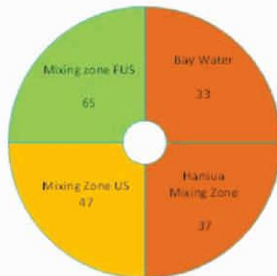


COMPARISON OF ESTUARY-SEA ECOLOGICAL INTERACTIONS (2013-15 & 2015-17)

2013-15



DHAMRA

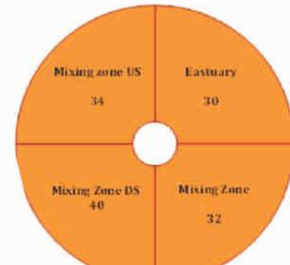


GAHIRMATHA



PARADEEP

2015-17



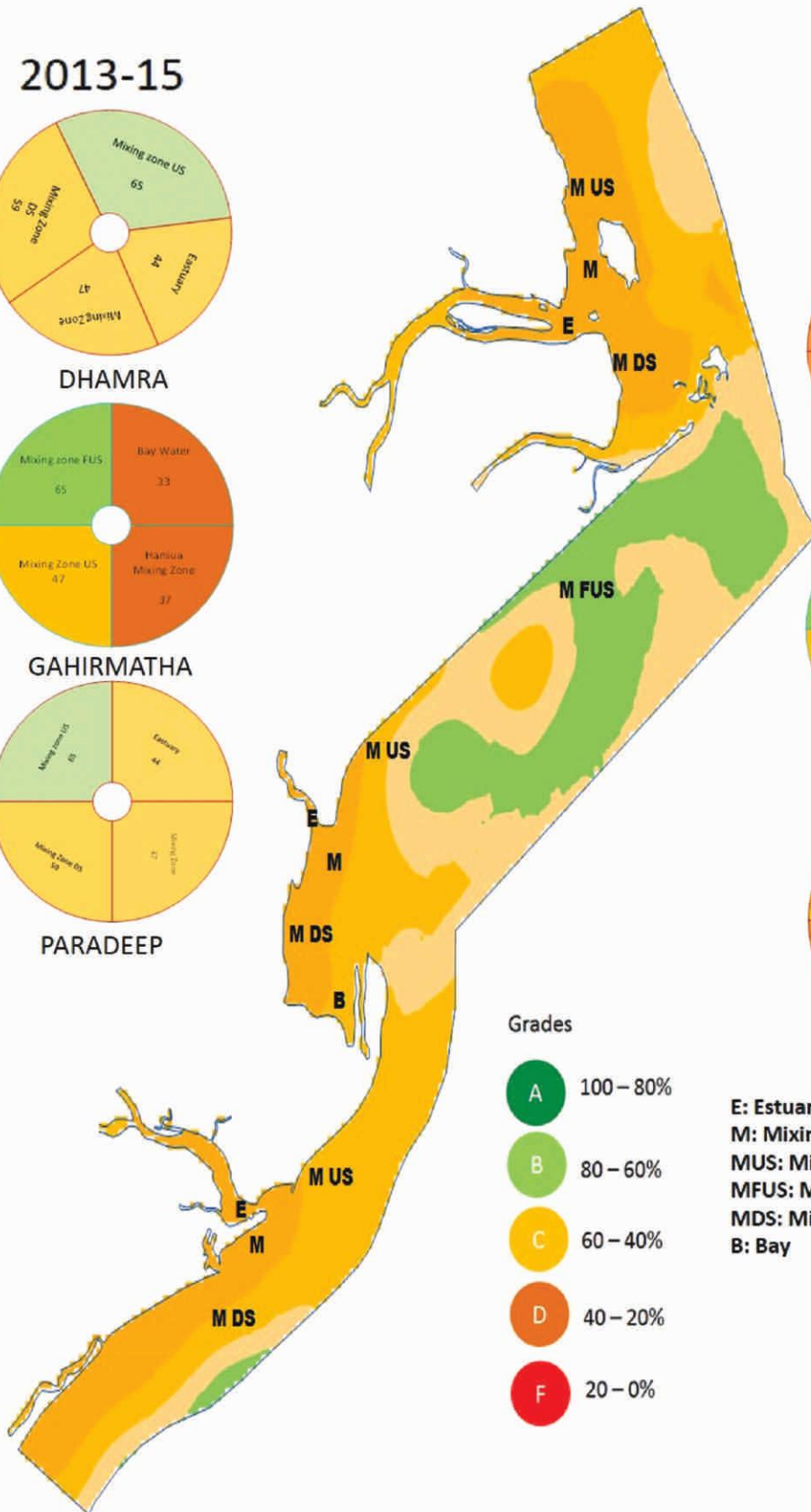
DHAMRA



GAHIRMATHA



PARADEEP



Grades



E: Estuary
M: Mixing zone
MUS: Mixing zone upstream
MFUS: Mixing zone further upstream
MDS: Mixing zone down stream
B: Bay

IDENTIFICATION OF HOTSPOT ON ASSESSMENT OF WATER QUALITY IN PARADEEP-DHAMRA COASTAL STRETCH: 2013-2017

During the monitoring of Paradeep - Dhamra (80 kms) coastal stretch since 2013; it has been observed deviations/divergence with regard to water quality in certain areas adversely as well as favourably. The influential changes those being undergone during course of time adversely has been considered here as hot spots or important areas for concern.

HOT SPOT IN MAHANADI TRANSECT

The coastal stretch of Paradeep in 2013-15 was broadly found in 'C' grade as per water quality index (WQI); whereas it was found 'D' grade in 2015-17, indicating a deteriorating trend. The influence of riverine impact is more in this stretch. The result also corroborated the same as the riverine and estuarine stretch found more or less in same scale of D-grade; which might be due to their influences respectively or vice versa. The lower value in the upstream (U/S) of mixing zone (45%) in 2015-17 in comparison to the WQI value in 2013-15 (65%), is strongly indicating additional impacts; which might be due to port activities situated in close vicinity. Storm water contributes a high load of sediment, nutrients and heavy metals to the Paradeep coastal stretch. The dredging of the Mahanadi river mouth, discharges from agricultural runoff & other discharges from catchment area entering with riverine systems, might have been those factors for deteriorating the qualities (Grade-D) in the estuary as well as in the mixing zone heavily; which further put impacts on the upstream deteriorating the water quality.

The changes observed in the locations at MS1, M6, M7, M8, M9 and M10 (Refer sampling points in Map) particularly near Muhana (confluence) and U/S of Muhana (confluence) towards Gahirmatha. The water qualities found deteriorated in those sampling locations are being considered as hotspot/important points in Mahanadi Transects (Refer Map), which is required further study for ratification of the problems.

HOTSPOT IN DHAMRA TRANSECT

Similarly the water quality of Dhamra coastal stretch broadly found in 'D' grade during 2015-17. The quality deteriorated from 2013-15 status (grade 'C'). The influence of riverine impact is also more in this stretch. It is ascertained that the impact of Dhamra Port has influenced more rather than riverine impact. The result also corroborated the same. The impacts of port activities, contribution of storm water with high load of sediment, nutrients and heavy metals to the coastal stretch have been the major factors in the change observed. The sampling points D2, D3 and D4 in Dhamra transect (Refer sampling points in Map), located near the

Dhamara Port and U/S of port towards north, found deteriorated in 2015-17 from its status of 2013-15. These locations are considered important (hotspot) areas in Dhamra Transects (Refer Map); which are needed for further study.

HOTSPOTS IN GAHIRMATHA TRANSECT:

As the Gahirmatha Coastal Stretch is encircled the sensitive Bhitarkanika sanctuary; the entire stretch is considered to be a sensitive zone. As such the water quality is comparatively good in comparison to the water quality at Paradeep & Dhamra stretch under study. The water quality in this stretch mostly found in the 'B' & 'C'-grade in the entire monitoring period from 2013-17.

Sea is an extremely complicated dynamic system where atmospheric forces and the biological processes occur within; impart temporal and spatial variability to the region. In addition to strong variability in character of the atmospheric and oceanic circulation during monsoon, the Paradeep-Dhamra coastal stretch has several other significant features. This requires different mitigation plans to restrict the inflows of pressures to upgrade the quality, ultimately the ecosystem.



FRAMEWORK FOR THE MANAGEMENT OF COASTAL ENVIRONMENT

Key management response strategies to be adopted including as follows:

1. Establishing hierarchical and multi scalar inventory of hydrological, ecological, socioeconomic and institutional features and ecosystem services to support management planning and decision making including different Stakeholders (Water Resource, Wildlife, Fisheries, IMD, Coast Guard, etc.) to understand the complexities of the ecosystem.
 2. Detailed studies with collaboration of different institute to calculate other aspects like silt movement and nutrient dynamicity of the estuary-sea ecosystem to promote sustainable management practices.
 3. Help to promote sustainable livelihood by maintaining nutritional security to ensuring health of the coastal ecosystem and promoting institutional integration with other institutes such as Universities, IITs and other working groups/stakeholders in this field for sharing of knowledge and formulating innovative strategies to restore.
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ACKNOWLEDGMENT

I am delighted that Integrated Coastal Zone Management Project (ICZMP) has been implemented successfully by State Pollution Control Board, Odisha. These achievements have been depicted and dealt here exclusively and comprehensively. I sincerely congratulate and thanks to all scientists & staffs of SPCB, ICZMP, who were involved in making this successful. I would like to thank especially to our present Chairman Mr. R, Balakrishnan, IAS & Member Secretary Mr. Debidutta Biswal, IFS for their encouragement and support in accomplishing the project.

I would also like to thank the Steering Committee & Governing body of Integrated Coastal Zone Management Society (ICZMS), Dept. of MoEF, Govt. of Odisha, MoEF & CC, Govt. India, State Project Management Unit (SPMU), ICZMP, SICOM (Society for Integrated Coastal Management), New Delhi and World Bank for their active support and guidance in culminating this. I also wanted to thank all previous Chairmen & Member Secretaries of OSPCB who supported in making this possible.

I would also specially like to thank Dr. Ajit Kumar Pattnaik, Ex-Project Director, ICZMP, Odisha, Mr Susant Nanda, Project Director, ICZMP, Dr. (Prof.) Madhab Chandra Dash, Ex-Chairman, SPCB, Odisha, Dr. B.K, Mishra, Mr. Sidhanta Das, DG, Forest, Govt. of India, Sri Lalit Kumar Tiwary, IFS, Sri Rajiv Kumar, IFS (Ex -Member Secy.) for their active involvement and support in making this successful.

Last but not the least I would like convey my thanks to Spl. Project Director, Addl. Project Director (F&A), Administrative officer, Accounts Officer and all Experts & other staffs of SPMU, ICZMP, all members of the Protocol Finalization Committee, scientists & staffs of Central Laboratory and OSPCB for rendering timely help in making this feasible.

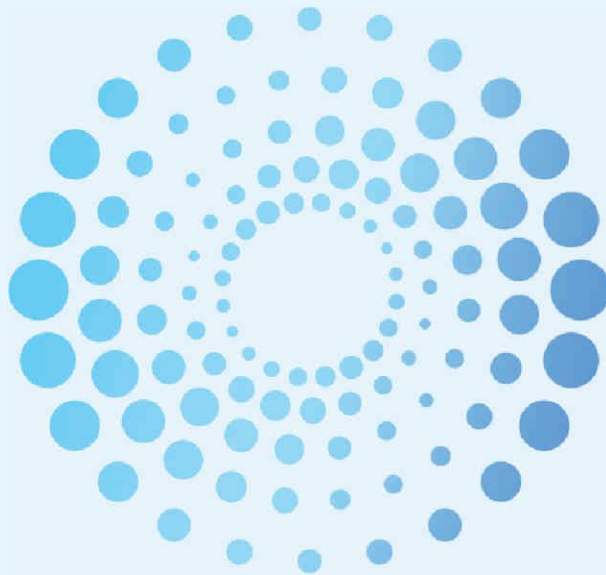
My heartfelt thanks to all in ICZMP, SPCB, Odisha and I wish implementing this meticulously and bringing glory to the organization.

Good Wishes,



Anupam Behera

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