No. 4/5/2017-CMD/801-40
Government of India
Central Water Commission
Coastal Management Directorate
****

Room No.906 (S), Sewa Bhawan,
R.K. Puram, New Delhi-110606
dated 4th September, 2017

To,

(As per list attached)

Subject : **15th Meeting of the Coastal Protection and Development Advisory Committee (CPDAC) -Forwarding of the Minutes- reg.**

Sir,

Please find enclosed a copy of the Minutes of the 15th Meeting of the Coastal Protection and Development Advisory Committee (CPDAC) held at CWC, New Delhi on 17/08/2017. Detailed presentations made by participants during the meeting are being made available on CPDAC website. Your comments on the minutes, if any, may kindly be communicated at the earliest.

It is also requested to take follow-up action on the items concerning your State/Department and send a report in this regard to this office.

Yours faithfully,

04/09/2017

(Sharad Chandra)
Director
Tel. 011-29583288
Fax 011-29583286
E-mail: cedte@nic.in

Encl : (As above)

Copy to:

1. PPS to Member (RM), CWC and Chairman (CPDAC), Sewa Bhawan, New Delhi
2. PPS to Member (D&R), CWC, Sewa Bhawan, New Delhi

सं॰ 4/5/2017-सीएमडी/801-40
भारत सरकार
केन्द्रीय जल आयोग
तटीय प्रबंधन निदेशालय
****

कक्ष संख्या 906 (द॰), सेवा भवन,
राम कृष्ण पुरम, नई दिल्ली 110606
दिनांक: 4 सितंबर 2017

सेवा में ,

(संलग्न सूची के अनुसार)

विषय : तटीय संरक्षण एवं विकास सलाहकार समिति की 15वी बैठक का कार्यवृत्त।

महोदय,

तटीय संरक्षण एवं विकास सलाहकार समिति की 15वी बैठक जो कि 17 अगस्त, 2017 को केन्द्रीय जल आयोग, सेवा भवन, नई दिल्ली में आयोजित कि गयी थी, का कार्यवृत्त पत्र के साथ संलग्न किया जा रहा है | बैठक के दौरान प्रतिभागियों द्वारा प्रदर्शित प्रेजेंटेशन समिति के वेबसाइट पर लोड किए जा रहें है | कृपया कार्यवृत्त पर आपके टिप्पणी को शीघ्र भेजा जाए |

आपसे यह भी अनुरोध है कि अपने राज्य/ विभाग से संबन्धित मद पर अनुवर्ती कार्यवाही की जाए और उस संबंध में इस कार्यालय में रिपोर्ट किया जाए |

भवदीय,

संलग्नक : उपरोक्त

2। चन्द्र
04/09/2017

(शरद चन्द्र)
निदेशक
टेलीफोन- 011-29583288
फैक्स: 011-29583286

प्रतिलिपि:

1. सदस्य (नदी प्रबंध), केंद्रीय जल आयोग एवं अध्यक्ष (तटीय संरक्षण एवं विकास सलाहकार समिति) के प्रधान निजी सचिव
2. सदस्य (अभिकल्प और अनुसंधान), केंद्रीय जल आयोग के प्रधान निजी सचिव

List of addressee for Minutes of the 15th CPDAC Meeting:

1 Commissioner (FM),
Ministry of Water Resources, River Development and Ganga Rejuvenation (MoWR,RD&GR)
8th Floor, Block -11
CGO Complex, Lodhi Road,
New Delhi-111003

2 Joint Secretary/ Advisor
(Impact Assessment),
Ministry of Environment , Forest and Climate Change (MoEF&CC),
Indira Paryavaran Bhawan,
Jor Bagh Road, Aliganj
New Delhi-110003

3 Engineer-in-Chief (Irrigation),
Water Resources Department,
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Currency Nagar, Vijayawada-520008

4 Advisor (NRE),
NITI Aayog,
Sansad Marg,
New Delhi-111001

5 Development Advisor (Ports),
537, Transport Bhawan,
Ministry of Shipping,
1, Parliament Street,
New Delhi- 111001

6 Chief Engineer,
Water Resources Organization, PWD.,
Govt. of Tamil Nadu
Madurai region,
Thallakulam, Madurai-625 002

7 Chief Engineer (C&SRO),
Central Water Commission,
Sangamam,
Gandhimaanagar, Peelamedu P.O.,
Coimbatore – 641 004

8 Chief Engineer (Water Resources),
Sinchai Bhawan,
Alto Porvorim,
Goa-403001

9 Director,
National Institute of Oceanography,
Dauna-Paula,
Goa- 403001.

10 Secretary,
Narmada, Water Resources &
Water Supply Department,
Govt. of Gujarat,
Block No. 9, Sardar Bhawan,
Sachivalaya, Gandhinagar- 382011

11 Chief Engineer,
Irrigation & Admin.,
Govt. of Kerala,
Thiruvananthapuram- 695033

12 Director,
Central Water & Power Research Station (CWPRS),
P.O. Khadakwasla, Pune – 411124

13 Chief Executive Officer
Maharashtra Maritime Board,
Indian Mercantile Chamber (3rd Floor)
Ramajibhai Kamani Marg,
Ballard Estate, Mumbai - 400 001

14 Engineer-in-Chief (Water Resources),
Secha Sadan, Govt. of Odisha,
Bhubaneshwar - 751101.
(Odisha)

15 Chief Engineer,
PWD, Daman
Union Territory of Daman & Diu
Opp. Secretariat,Fort Area, Moti Daman,
DAMAN-396 220

16 Head of the Department
Marine Wing, GSI Complex,
Bhu Bijnan Bhavan, 9th. floor
Block: DK-6, Sector-II, Salt Lake
Kolkata-700091
(West Bengal)

17 Secretary,
Irrigation & Waterways Dept.,
Govt. of West Bengal,
Jalsampada Bhawan, Salt Lake,
Kolkata- 700091

18 Head,
Geo Sciences Division,
Space Application Center,
Ambawadi Vistar P.O.,
Ahmedabad –380015

19 Chief Hydrographer to the Govt. of India,
Directorate of Hydrography
West Block IV, Wing -5, R.K. Puram, Sec-1
New Delhi-110 066

20 Chief Engineer,
APWD,
Andaman & Nicobar Administration,
Port Blair-744111

21 Superintending Engineer,
Lakshadweep, PWD,
Kavaratti,
Lakshadweep-682555

22 Chief Engineer,
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34, Lal Bahadur Shastri Street,
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23 Member (Planning),
Ganga Flood Control Commission,
Sinchai Bhawan 3rd Floor,
Patna – 800015.

24 Director (Ports & I.W.T.),
Baithkol, Uttara Kannada,
Karwar – 581302
Karnataka.

25 Economic Adviser,
MoWR,RD&GR,
Room No. 7, B Wing
Shashtri Bhawan
New Delhi – 110001

26 Director,
National Institute of Ocean Technology (NIOT),
Velachery-Tambaram Main Road,
Pallikaranai,
Chennai – 600100

27 Director,
National Centre for Earth Science Studies,
Akkulam,
Thiruvananthapuram - 695 031
(Kerala)

28 Project Director & Sci. G
ICMAM Project Directorate
NIOT Campus,
Velachery-Tambaram Main Road,
Pallikaranai,
Chennai – 600100

29 Director,
Beach Erosion Directorate, CWC
"Jaladhara", 27/1927-A,
Kasturba Nagar, Kochu-Kadavanthra, P.O.
Kadavanthra, Kochi - 682 020.

30 Director,
Indian National Centre for Ocean Information Services(INCOIS),
"Ocean Valley" Pragathi Nagar (BO),
Nizampet (SO) ,Hyderabad - 500 090

31 Director,
National Centre for Sustainable Coastal Management,
Koodal Building, Anna University Campus,
Chennai — 600025

32. Surveyor General of India,
Office of Surveyor General of India,
Hathibarkala Estate,
New Cant Road,
Dehradun — 248001

33. Director,
INCSW Secretariat,
CWC, New Delhi

34. Deputy Team Leader,
Climate Resilient Coastal Protection and Management Project
(through e-mail)

35. Dr. M. Ariz Ahammed,
Mission Director,
National Water Mission (NWM), MOWR, RD & GR,
New Delhi-03

36. Sh. Rajesh Yadav
Senior Project Officer
Natural Resources and Agriculture
India Resident Mission, Asian Development Bank
4, San Martin Marg, Chanakyapuri,
New Delhi-110021

37. Sh. Gopal Naik,
Joint Director, PMU
Sustainable Coastal Protection and Management Investment Program
Old Port Office Building Bunder,
Mangaluru-575001

38 Director(RDC-1)
CWC, West Block-1, R.K. Puram ,
New Delhi with request to take necessary action wrt **para 15.3.6**

The 15th meeting of CPDAC was held at CWC, New Delhi on 17th August, 2017 under the Chairmanship of Shri N. K. Mathur, Member (Design & Research), CWC officiating for Member (River Management), CWC & ex-officio Additional Secretary to the Government of India.

List of participants of the meeting is enclosed at **Annexure-I.**

After a brief introduction of all the participants, Chairman welcomed all. Thereafter, point-wise agenda items were taken up and discussed as detailed hereunder.

15.1 CONFIRMATION OF THE MINUTES OF 14TH MEETING

Members of the committee were informed that the minutes of 14th CPDAC meeting held at Goa during 27-28th February, 2014 were circulated vide this office letter No. 4/5/2014-CED/160-91 dated 13th March, 2014 and is also available at http://cwc.gov.in/CPDAC-Website/index.html (under CPDAC meetings link). No comments were received on the same. Hence, the minutes of 14th CPDAC meeting were confirmed.

15.2 STATE WISE COASTAL LENGTHS AND COASTAL ATLAS

15.2.1 STATE WISE COASTAL LENGTH

Members of the committee were informed that during 14th CPDAC meeting, the methodology for arriving the coastline length and the length as computed by National Hydrographic Office (NHO), Dehradun was accepted with the suggestion that the length of Odisha may be discussed and sorted out by Govt. of Odisha and NHO. Later, Govt. of Odisha vide letter No. FF&FRM-19/2015-27940 dated 04.08.2016 has conveyed its acceptance to the coastline length of Odisha as computed by NHO.

Chairman desired to have a relook/ discussion on the methodology adopted for computation of coastline length especially with respect to uniformity of definition of High Water Line (HWL) and scale of surveys used for the computation of coastline for different States/UTs. While responding to above, Capt. J. Gurumani, representing NHO, Dehradun informed to the committee that HWL is as per the definition included in Admiralty Manual of Hydrographic Surveying (AMHS). Dr. S. K. Singh, Director, Geodetic and Research Branch, Survey of India (SoI), Dehradun informed that definition of Survey of India for coastline is different which is Highest High Water Line for 100 year return period. Dr.R.S.Kankara, Scientist-F, ICMAM, Chennai informed that the definition of coastline is as per usage and a general consensus and uniformity should be reached. On a question to use of satellite data for evaluating coastline length, Sh. IIangovan D., Senior Principal Scientist, NIO, Goa informed to committee that coastline length measured through Satellite data and actual ground measurement would be different. He further stated that NHO charts have been used by NIO Goa for assessment of Goa coastline and values obtained are closely matching with the coastline length evaluated by NHO which is under discussion.

In the view of ambiguity of scale adopted for measurement of coastline length of different States/UTs, it was decided to have a reconciliation of data by NHO and CPDAC Secretariat on GIS platform. For this purpose, NHO Dehradun would provide required supplementary information. After reconciliation, if it is found acceptable, the same may be adopted for CPDAC members.

(Action: NHO/ CPDAC Secretariat)

Regarding the evaluation of District-wise/ taluk-wise coastline length from the available data set, NHO informed that it will be a humongous task and cannot be taken

up at this stage by them. This issue was dropped from discussion till finalization of the various aspects related to coastline length.

15.2.2 SHORELINE CHANGE ATLAS OF THE INDIAN COAST

Members were informed that at the behest of CPDAC, Ministry of Water Resources, River Development & Ganga Rejuvenation (MoWR, RD & GR), Government of India (GoI), New Delhi, a project titled, "Shoreline Change Atlas of the Indian Coast", was initiated in 2010 by Space Applications Centre (SAC, ISRO), Ahmedabad, in collaboration with Central Water Commission (CWC) with the major objective to prepare a digital shoreline change atlas in GIS environment on 1:25, 000 scale using satellite data (time frame 1989-91 and 2004-06). The publication of the Shoreline Change Atlas of Indian Coast was accepted by the CPDAC in its 14th Meeting and was published in the Brain-Storming Workshop on "Implementation of Coastal Management Information System(CMIS)" held at CWC, New Delhi in May, 2014. The Status of shoreline protection measures had also been depicted in the Atlas as per the information provided by the maritime State/UT agencies through CWC. This Atlas can be accessed from https://vedas.sac.gov.in/vedas/node/61. A link to this had also been provided to CPDAC-website and steps are also being taken to provide a link to India-WRIS as per the decision taken during the 14th CPDAC meeting. The hard copies of the Atlas had been sent to respective maritime States/UTs for their utilization. During the 14th CPDAC Meeting, it was also envisaged that the Shoreline Change Atlas of Indian Coast will be updated at regular intervals of five years and for undertaking the first updation based upon data of 2012-13. SAC had informed that the atlas is being updated on time frame of 2016-17 and is expected to be completed in this financial year. The States/UTs had been requested to provide the locations of the coastal protection works carried out for the depiction in the Atlas. Till date, the State Govt. of Gujarat and Karnataka had provided the information. Information from Gujarat had already been provided to SAC for incorporation in the Atlas.

Sh. Ratheesh Ramakrishnan, Sci./Engr. SE, SAC, Ahmedabad made a presentation and indicated the latest status of the updation of Atlas to the Members of CPDAC. It was informed that updation work is under progress on time frame of 2004-06 to 2014-16 with following objectives:

- To prepare shoreline database of 2014-16 time frame for all the maritime states and UTs.
- To quantify and classify the shoreline as eroding, accreting or stable in nature.
- To identify hot spot and understand coastal processes
- To generate six volumes of A3 size coloured Shoreline Change Atlas of the entire Indian Coast

It was noted that High Tide Line (HTL) is considered as Shoreline. The definition of HTL based on CRZ Notification, 2011 is the line on the land upto which the highest water line reaches during the spring tide. He explained the methodology of identification of High Tide Line (HTL) for various geomorphic features through satellite imagery. It was informed that the Shoreline change digital database had already been prepared in GIS environment for the states of Gujarat, Karnataka & Kerala. Field verifications had also been carried out for Karnataka & Kerala. Digital database preparation has been initiated for Tamilnadu & Andhra Pradesh. Sample Maps for Karnataka & Kerala were shown in the meeting which showed the Shorelines for 2004-06 and 2014-16 timeframes. During the meeting, it was suggested that maps should represent the shoreline changes for different time frames viz. 1989-91, 2004-06 & 2014-16. It was desired that access to GIS layers may also be made available to CPDAC secretariat. Selected coastal protection structures as seen from satellite imagery and on Google Earth were also shown.

During the meeting it was decided that all the maritime States/UTs (except Gujarat & Karnataka) will provide the location of coastal protection works to CPDAC Secretariat as per the format given in **Annexure–II** by 30th September 2017, so that it can be passed timely to SAC for its depiction in Atlas. It was requested to SAC to complete the work in this financial year i.e. by 31st March, 2018 positively.

(Action: SAC/ Maritime States/UTs/ CPDAC Secretariat)

Members were informed that Shoreline Change Assessment at 1:25000 scale had also been done by Integrated Coastal Marine Area Management, Project Directorate (ICMAM-PD) under Ministry of Earth Sciences (MoES). Dr. R. S. Kankara, Scientist – F & Head (Coastal Processes and Shoreline Management Group), ESSO-ICMAM presented the initiatives taken by ICMAM in this regard. It was informed that the approach adopted for annual shoreline changes is through remote sensing and field monitoring which indicated about 35-38% of shoreline experiencing erosion during timeframe of 1990-2015. Long term shoreline change trend (vulnerability assessment) had been attempted indicating various categories viz. high erosion, moderate erosion, low erosion, stable, low accretion, moderate accretion and high accretion. He mentioned that a web based intranet is being developed for displaying information regarding shoreline change which would be soon shared in public domain for user interaction.

Members were also informed that in addition to above, the preparation of shoreline change maps using aerial photography/satellite imageries on 1:10000 scale had also been taken up for the entire coast of the country by National Centre for Sustainable Coastal Management (NCSCM), Chennai. Dr. B. R. Subramanian, Former Adviser, MoES and Senior Scientific Consultant, NCSCM made a presentation indicating methodology and latest status of work with regard to high resolution erosion/ accretion mapping of Indian Coast. The methodology was explained as follows:

- Collection of Historical shoreline data
- Pre-processing of satellite images using Ground Control Points from Ortho-photos
- Shoreline extraction from multi-temporal satellite images
- Calculation of Shoreline change rates using Digital Shoreline Analysis System (DSAS).
- Assessment of long-term shoreline change (1975- 2011)
- Classifying shoreline change rates based on Linear Regression Rate statistics as erosion/accretion/stable/artificial coast

It was informed that work for western coast had already been completed, while it is under progress for eastern coast. In the instant case, Transect spacing for High resolution mapping is 20m and for low resolution mapping it is 50 m. During the discussions, it was also mentioned that coastline length evaluated for State of Goa under above programme is around 182 km which is comparable to coastline length of 181.48 km as computed by NHO, Dehradun.

The committee was further informed that the Coastal Zone Management (CZM) Plan has to be prepared by all the maritime states/UTs by January 2018 and some of the states have already completed and submitted their CZM Plans. The state of Tamil Nadu has performed this activity by itself and has got the plan verified by NCSCM. State Govt. of Odisha has also completed the preparation of its CZM Plan. Further, it was informed that the above activity is being undertaken by the Environment Department of the states/UTs and CPDAC Members may request them to share this information.

It was observed that different agencies are involved in Shoreline Change Assessment. Chairman, CPDAC opined that there is no harm in it until and unless the

information from their work is shared in public domain with clear cut defined methodology of doing that task.

15.3 DATA COLLECTION, COMPILATION, ANALYSIS AND PUBLICATION

15.3.1 REPORT OF THE SUB-COMMITTEE OF CPDAC ON COASTAL DATA COLLECTION, COMPILATION AND PUBLICATION

Members were informed that based on the decision taken in 13th CPDAC meeting and nominations received from member organizations, the **Sub-committee of CPDAC on Coastal Data Collection, Compilation and Publication** was constituted vide this Office Memo. No. 4/5/2013-CED/53-73 dated 15th January, 2013. The first meeting of the sub-committee was held on 7th October, 2013 at New Delhi. The summary records of discussion of the meeting were accepted by CPDAC in its 14th meeting. Based on the inputs/material available/received from the members, a Draft Report of the Sub-Committee was prepared by the Sub-Committee Secretariat as per the complete ToR. The Draft Report of sub-committee was shared with sub-committee members along with other institutes such as Survey of India (SoI), GSI and IMD for suggestions/ improvement and is also available at http://cwc.gov.in/CPDAC-Website/index.html (under What's New link). Some suggestions had been received from SoI and NHO, which had been incorporated. Chairman desired that a matrix representing different data types available with different agencies be prepared. The same was done and presented to the members of the Committee as per **Annexure–III**. It was decided that the same matrix may be circulated along the minutes to all members/ invitees and their comments/ observations on the same and also on the Draft Report of sub-committee may be invited within 15 (fifteen) days from the issue of minutes; if no observations/ comments were received within this timeline, the draft report will be considered as final and deemed to be accepted by the CPDAC.

(Action: All Members/ Invitees/ CPDAC Secretariat)

15.3.2 Members were informed that State Specific CMIS is being developed in States of **Maharashtra** and **Karnataka** under Asian Development Bank (ADB) assistance programme. CMIS has been developed and hosted on website in both the States. These can be accessed through following URLs.

- https://mahammb.maharashtra.gov.in/1155/Geographic-Information-System-Portal
- http://scpmipk.org/coastal-management-information-system-cmis/

Sh. Alok Mahajan, Chief Engineer, Maharashtra Maritime Board (MMB) presented that details of CMIS devloped by MMB and informed that its CMIS component has following subcomponents:

- Geographic Information System Portal- having details like tide location and alert, cargo and passenger port jetty, storm signal mast, light houses, etc.
- Data centre- having details like Raw Coastal Data available for download in a variety of formats for coastal districts
- Knowledge centre
- Shoreline management programme
- Reporting a problem of coastal erosion

MMB has also developed a Mobile App- 'Maharashtra Maritime Info'.

Representative from Karnataka informed that its CMIS works on a customized and user friendly Web based application with GIS data, both spatial and attribute on its back end. The current initiatives works on all base level information from data on State level, District level, Taluk level, Block level, Village level and Panchayat level. All general information like boundaries, roads, rivers, soil, topography, drainage, slope, relief, etc. are already available as spatial data in a single platform. Data Library has information like designs, statistics, drawings and reports. The coastal data inventory in CMIS include project information, CRZ and EIA information, Hydrodynamic data (like wind, waves, currents, tides), Bathymetric and beach profile data (subject to approval), land use/land cover data, coastal geomorphology and coastal inventory like coastal structures, protection sites, sea walls, etc. It was informed that presently infrastructure is lacking for numerical modelling, physical modelling, and coastal data measurements. Coastal Infrastructure Management Unit (CIMU) has already been established to equip with some of the above facilities in the next 3 years including capacity to undertake coastal projects.

The committee requested other maritime states/UTs to take initiatives in this direction of developing CMIS.

(Action: Maritime States/UTs)

15.3.3 Members were informed that Government of Gujarat had constituted a Task Force for coastal erosion works headed by Sh. M. Baba, Director (Retd.), CESS, Thiruvananthapuram, Kerala. Sh. K. B. Rabadia, Chief Engineer (Southern Gujarat), Govt. of Gujarat, informed that the Task Force had main Terms of References (ToRs) as database generation, development of both hard and soft solution to mitigate coastal erosion, master plan preparation and shore protection manual for Gujarat coast; and training/capacity building. It had 6 (six) meetings so far. A draft for consultancy for facilitating preparation of Integrated Coastal Protection and Management Plan for south Gujarat has also been finalized. Further, it was informed that the list of vulnerable sites with brief history of coastal erosion problem had been prioritized. It was decided that any subsequent development would be shared with CPDAC.

(Action: Gujarat)

15.3.4 National Water Mission (NWM)

Members were informed that MoWR, RD & GR has launched NWM as one of the eight National Missions, which forms the core of the National Action plan for Climate Change (NAPCC), launched by the Hon'ble Prime Minister. Under NWM, States/UTs are to develop State Specific Action Plans (SSAP) for Water Sector aligned with the State Action Plan on Climate Change formulated by the States under NAPCC.

These State Action Plans needs to focus in the **coastal areas** as well. Dr. M. Ariz Ahammed, Mission Director, NWM, MOWR, RD & GR informed that some states had submitted SSAP, but those were not acceptable and hence, a detailed chapter wise template including performance indicators/ benchmarks for preparation of SSAP are being finalized. Problems/remedies associated with the coastal areas, collection of data related to Coastal and estuarine water, salinity and tidal water levels and changing discharges in both directions in estuarine areas, establishment/strengthening of ground water monitoring network for coastal aquifers are to be highlighted under this. Based on the technical discussion during the meeting, it was desired that Director (Coastal Management), CWC and representative of ADB would further refine the template for SSAP in respect of performance indicators for Coastal Districts of maritime States/UTs.

The maritime States/UTs were asked to provide the status of preparation of SSAP. Sh. K. B. Rabadia, Chief Engineer (Southern Gujarat), Govt. of Gujarat informed

that SSAP for the State is under preparation. The concerned representatives from maritime States/UTs were also requested for nomination/communication of a nodal officer for this specific task. It was decided that State/UT representative attending this meeting may be considered as nodal officer, if, separate nomination for nodal officer are not received within 15 (fifteen) days from issue of minutes. During the meeting, it was informed that Shri P. B. Akki, Superintending Engineer, Central Planning Organization, Water resources Department, Goa is the nodal officer for this task for Goa.

(Action: Maritime States/ NWM/ CWC)

15.3.5 Coastal Management Information System at Central Level

Members were informed that considering the importance of collection of data on coastal processes relevant for evolving plans towards coastal protection measures, a new component in the XII Plan for creation of "Coastal Management Information System (CMIS)" had been approved by MoWR, RD & GR, GoI under the Plan Scheme "Development of Water Resources Information System (DWRIS)". The preferred implementation model for CMIS was decided to be through signing of a tripartite Memorandum of Understanding (MoU) wherein, CWC would be the 'Project Implementer', the expert agency would be the 'Project Executor' and the concerned State/ UT Government would be the 'Project Facilitator'. MoWR, RD& GR had approved signing of tripartite MoU for implementation of CMIS among CWC, IIT Madras, Chennai and State Govts. of Tamil Nadu, Kerala and UT of Puducherry and the same is under implementation.

Director (Beach Erosion), CWC, Kochi briefed about the latest status of the works in association with IIT Madras, Chennai and State Govts. of Tamil Nadu, Kerala and UT of Puducherry. It was emphasized that till now, activity specific or need-based data collection activities had been undertaken and much of the data were interpolated or extrapolated. This new activity of CMIS focuses on nearshore primary data collection inline to framework decided by CPDAC. The committee was also informed that the activity of CMIS being undertaken by CWC is different from the 2 state specific CMIS (Karnataka and Maharashtra) in scope with respect to the primary data collection.

Committee was also informed that other expert institutions viz. NIO, Goa, CW&PRS, Pune, NIT Surathkal etc. had also been approached for undertaking role of Project Executors in other maritime States/UTs. CW&PRS, Pune is likely to take up the work in Northern Maharashtra and Southern Gujarat coast. A proposal from NIO, Goa for Goa and Southern Maharashtra coast is under examination in CWC. Other maritime States/UTs were requested to collaborate in this regard. They were requested to suggest suitable institutes which can play the role of Project Executor in their State/UT for development of CMIS. States/UTs were also requested to provide the prioritized list of vulnerable sites with brief history of coastal erosion problem at the site for this purpose.

(Action: Maritime States/UTs/ CWC)

15.3.6 OPTIMIZATION OF RIVER DATA COLLECTION NETWORK IN COASTAL AREAS

Members were informed that CWC as well as the maritime States/UTs have network of data collection for the Riverine Data. Committee Members were requested to suggest ways so that existing network can be fine-tuned and optimized for data collection in coastal areas so that the data can be used for addressing the coastal management issues such as Coastal Erosion, Flooding, Salinity ingress, river mouth/tidal inlet closing, and estuarine pollution, etc.

It was also informed that Hon'ble Minister (WR, RD & GR) has desired that due to planned increased industrial activity in coastal areas, there should not be increased

pollution in the river streams discharging into sea near the coast. It was decided that while planning for expansion of data collection network in coastal areas, State Govts./CWC under National Hydrology Project (NHP) should establish one terminal station very near to coast on the streams discharging into the sea so that it can serve the purpose of collection of riverine data as well as coastal data. Invariably, these sites should have facility to monitor water quality data as well. Extra parameters required to monitor water quality in coastal areas should also be included in standard operating procedure.

(Action: Maritime States/UTs/ CWC)

15.4 STUDIES AND RESEARCH

15.4.1 Members were informed that **four** research proposals by Tamil Nadu were submitted to Indian National Committee on Hydraulics (INCH) Secretariat (now INCSW). Funding of those were not possible due to non-refund of unutilized central fund provided to the State for one of its R&D proposal in 2005. However, state Govt. has now refunded that which was also agreed by INCSW secretariat. Further, a research proposal titled "Field Investigation for shoreline erosion and management along the coastal stretch between Bheemunipatnam and Appikonda, AP coast" by AU College of Engineering, Visakhapatnam was submitted for funding. Director (INCSW) requested for submission of the above proposals afresh to INCSW secretariat as per revised guidelines for taking further necessary action.

(Action: Tamil Nadu/ AU College of Engineering, Visakhapatnam/ INCSW Secretariat/ CPDAC Secretariat)

15.4.2 Director (INCSW) made a presentation about the R&D scheme of the MoWR, RD & GR and requested to visit website (http://cwc.gov.in/incsw/) for information with respect to the procedure for submission of the research proposal seeking central assistance/Grant and case Studies of the completed research

(Action: State Govts/ Institutions/ INCSW Secretariat)

15.4.3 Members were informed that under Climate Resilient Coastal Protection and Management Project (CRCPMP), three research studies have been conducted by the Indian Institutes as follows:

Specialist Institute	Study Performed
Indian Institute of Technology Bombay (IITB), Mumbai	Analysis of the downscaled Climate Change Parameters for Wind, Air Temperature and Rainfall from the CORDEX-South Asia Domain.
National Institute of Oceanography (NIO), Goa	Sea level rise trends and Waves projections
Indian Institute of Technology (IIT), Delhi	Storm Surge Projections

Sh. Mani Murali, Sr. Scientist, NIO, Goa presented the methodology and outcome of the study of impact of climate change on Wave climate along Indian coast. Wave simulations for a period of 46 years (1970-2015) was carried out for medium Climate Change (CC) scenario considering 7% increase in the existing wind speeds and considering 11% increase in wind speeds representing Extreme CC scenario. The two main findings are as follows:

- An increase in wave heights up to 16.53% for medium Climate Change (CC) case and up to 26.48% for extreme CC condition is observed (compared to hindcast waves).

- The wave height trends along the Indian coast can have a range between -1.4 cm/yr to 0.89 cm/yr from the hindcast study; -1.6 to 1.7 for medium CC case and -1.8 to 0.6 for extreme CC case.

Dr. Aparna S. Gandhi, Sr. Scientist, NIO Goa presented the details of study regarding estimate of historical sea level trends and linking of them to global sea level projections. She emphasized that on the west coast, Sea Level Rise is more prominent in Central Arabian Sea in comparison to coast. Opposite trends are observed on East Coast where SLR is more prominent on the coast in comparison to Central Bay of Bengal. A comparison of Sea Level Rise based on data from, tide gauge, satellite altimetry and projected trend of sea level was presented which is given in **Annexure-IV**.

Prof. A. D. Rao from IIT, Delhi presented the details of study regarding computation of maximum possible storm surges generated by tropical cyclones along the Indian coast. Presentation of data has been done in a 3x3 matrix for stations on both Indian coast.

Sl. No.	Return period	No CC scenario	Most likely CC scenario	Extreme CC scenario
1	10 years	Normal winds	7% increase in wind speed	11% increase in wind speed
2	50 years	Normal winds	7% increase in wind speed	11% increase in wind speed
3	100 years	Normal winds	7% increase in wind speed	11% increase in wind speed

In addition to above, Committee was informed that Coastal Climate Information System (CCIS) has been created as a separate module (web database repository) under existing India-WRIS portal. CCIS will host the exhaustive database related to hydrodynamic and meteorological variables developed and analysed under CRCPMP. Representatives from IIT Bombay, Mumbai were not present in the meeting to give the details with respect to their study

15.5 TRAINING, WORKSHOPS AND SEMINARS

15.5.1 Members were informed about the past training/workshop events organized which was detailed in Agenda Note.

15.5.2 During the meeting, various institutes were requested to inform the members about specialized training programme being organized by them for utilization in future. Representative of ICMAM informed that their Training Calendar will be shared soon. Representative of CWPRS informed that they are already involved with ADB aided CRCPM Project in trainings/workshop and will inform about the next Training Calendar. It was also desired that the training modules developed may be shared with CPDAC secretariat for its uploading on CPDAC-website. Maritime States/UTs were also requested to indicate for any specialized/customized training programme by these institutes, if any required.

(Action: Institutes/ Maritime States/ CPDAC Secretariat)

CRCPMP team was also requested to indicate any further future training programme/ workshop under the project. They indicated lack of budget for this purpose and requirement of further discussions in this regard at appropriate level.

(Action: CRCPMP Team/ CPDAC Secretariat)

15.6 COASTAL MANUAL/GUIDELINES

15.6.1 Members were informed that a manual on "Protection and Control of Coastal Erosion in India" was published by National Institute of Oceanography (NIO), Goa in 1980. The work of updating of this manual had been entrusted to NIO, Goa in 2004-05 at the behest of CPDAC. The completion of work is still pending for last many years. In past CPDAC meetings, NIO, Goa has emphasized to term it as guideline instead of Manual. In June 2017, NIO Goa had provided the Draft and informed that the performance reviews of the existing coastal protection measures are to be incorporated as part of update. In this regard, the performance review carried out by the sub-committee of CPDAC had been made available for incorporating in the guideline. It was informed to NIO, Goa that the 6th Report of the Performance Evaluation done by Sub-committee of CPDAC will be shared on the CPDAC website after its acceptance by CPDAC in this meeting and NIO Goa can incorporate the same into the Guidelines.

Sh. IIangovan D., Senior Principal Scientist, NIO, Goa presented the main contents of the draft Guidelines which has been organized into 6 (six) chapters viz.

i) Coastal erosion and coastal protection measures,
ii) Description on coastline of India,
iii) Surveys and related investigations,
iv) Basic design parameters for different locations,
v) Performance overview of existing coastal protection measures; and
vi) Design guidelines for different coastal protection measures.

Representative of NIO, Goa asked for the final details on the coastline length for incorporation in Guidelines. However, the committee members felt that inclusion of such static information, which is not yet finalized, will lead to further delay in the completion of the Guideline, which has already seen a substantial delay. So NIO, Goa was requested to finish the updating of Guideline including engineering design etc. and submit it to the CPDAC Secretariat within two week's time. Also the Hard copies of the Draft Guidelines would be circulated by NIO, Goa to CPDAC Members/Invitees for their comments/observation.

(Action: NIO, Goa and CPDAC Secretariat)

15.6.2 Members were informed that a Technical Assistance (TA) programme has been signed by Government of India for TA 8652-IND: Climate Resilient Coastal Protection and Management Project (CRCP&MP) to support mainstreaming of climate change consideration into coastal protection and management at the national level and in the two focal states (Karnataka and Maharashtra) where the Sustainable Coastal Protection and Management Investment Programme (SCP&MIP) is already operational under external assistance from Asian Development Bank(ADB). The implementation of this TA is financed by a grant amounting to two million USD ($) from Global Environment Facility (GEF) & administered by ADB. One of the major objectives of this TA is to analyze the climate change impacts into coastal areas and based on the same planning & design criteria and guidelines for coastal climate change adaptation are to be prepared.

CRCPMP Project consultant team made a presentation about **Climate Change Adaption Guidelines for Coastal Protection and Management in India** and informed that it has been organized into 2 (two) volumes; Volume 2 consists of Appendices. The guidelines have two basic categories viz.

i) Regulatory – related to procedural methods and
ii) Interventions – related to coastal protection methods and their implementation methods.

Regulatory guidelines have further been categorized in sub-categories viz. administrative, economic, land use, mining & dredging, and EIA. Interventions guidelines have 4 (four) subcategories viz. coastal protection, monitoring, advisory and island specific. For objective utilization of guidelines environmental softness ladder and C-assessment method have been devised.

15.7 REVIEW OF THE EXISTING WORKS

15.7.1 Members were informed that the Sixth meeting of the CPDAC- Sub-Committee on performance evaluation of coastal protection works was held on 18th June 2015 at Surat. The performance evaluation of coastal protection works in South Gujarat Districts of Surat, Navsari and Valsad were taken up. The field inspection of the coastal areas of these districts was carried out on 18th (AN) and 19th June 2015.

Director (Beach Erosion), CWC, Kochi and Member Secretary of the sub-committee presented the details for consideration of the Committee. During the visit, the sub-committee noticed following three types of anti-sea erosion measures:-

- Rubble Mound Sea (RMS) wall,
- Retaining wall with stone filled Poly Propylene Rope Gabions as toe
- Stone-filled P.P Rope Gabions

Out of above, first two types of works were found to be satisfactory in terms of performance. However, the anti-sea erosion measures using stone-filled P.P. Rope Gabions alone, executed at Onjal Machhivad and Nani-Danti-MotiDanti were found to have got damaged due to various reasons. Pilferage and cutting of ropes by local people had led to dislodging of the stones and consequent collapse. Further, the overtopping of the gabions during high wave conditions has inflicted major damages. Sub-committee suggested that, for future projects experiencing similar coastal environment, the design solution of using stone-filled P.P. rope Gabions as anti-sea erosion measure had to be critically reviewed in view of the experience in South Gujarat.

The Report of sub-committee was discussed and accepted by the Committee. It was also decided that the next meeting of sub-committee for performance evaluation of coastal protection works will be held for the state of Odisha.

(Action: BED, CWC, Kochi & Odisha)

Chairman enquired whether the above Sub-Committee can be associated with the performance evaluation of ADB aided projects in Karnataka and Maharashtra. Sh. Rajesh Yadav, Senior Project Officer, Asian Development Bank (ADB), New Delhi informed that ADB has inbuilt mechanism for review of the projects including its performance and if required the sub-committee of CPDAC can also review the performance of the Projects.

(**Action**: **BED, CWC, Kochi, Karnataka, Maharashtra)**

15.7.2 Members were informed that two projects namely Ullal Coastal Erosion & Inlet Improvement Project in Karnataka and Mirya Bay Coastal Erosion and Protection Project in Maharashtra were taken up under ADB aided Sustainable Coastal Protection and Management Investment Programme (SCPMIP)- Tranche 1. Construction of one Offshore Reef and Beach Nourishment had been taken up in Mirya Bay whereas in Ullal, construction of two offshore reefs and nearshore structures had been taken up under these projects.

Sh. Gopal Naik, Joint Director, PMU- SCPMIP, Karnataka presented the details of works done under this project which included various work component, their efficacy etc. Following, three main issues with respect to project were highlighted:

- Need for review of impact of the **off-shore reef** on the shore in between the Gap of North and South reef
- Need for additional inshore berm location
- Need for stabilization of spit area between south break water and jetty

The progress made with regard to Tranche-2 projects was also informed and the need of design review for the projects at Yermal Thenka and Someshwara was highlighted. As informed, loan negotiations for Tranche 2 project was held on 12-05-2017 at New Delhi.

Sh. Alok Mahajan, Chief Engineer, Maharashtra Maritime Board presented the details of the work undertaken in Mirya Bay. It was informed that the Geotextile Reef construction was completed in February, 2016 whereas the work of Beach Nourishment was completed in March 2017. With regard to Mirya Bay project, Sh. Rajesh Yadav, Senior Project Officer, Asian Development Bank (ADB) highlighted the issues related to vandalism in Geotextile reef. It was also informed that upcoming Breakwater in Mirya Bay fishing harbour which has been designed by CW&PRS, Pune may impact the coastal protection project component existing in the same bay as they were not planned in conjunction.

15.7.3 Members were informed that under World Bank aided Integrated Coastal Zone Management Project (ICZMP) in State of Odisha, coastal protection works using geo-tubes had been taken up at **Pentha** in Kendrapara district of Odisha.

Sh. Jugal Kishore Tripathy, Chief Construction Engineer, Rengali Right Irrigation Project, WRD, Odisha gave a presentation on the works of geo-textile tube embankment carried out at Pentha. It was informed that the main objective was to protect the existing retard embankment, immediate cultivable land of 6883 Ha, habitation of village Pentha and adjoining villages from wave action. The design was reviewed in view of the damages due to severe Pailin cyclone during October 2013. After construction, performance was found very satisfactory even in wake of severe cyclone Hudhud during October 2014. The completed length of the Geo tube embankment was 505 m (revised). It was informed that instead of the popular 9 mm PP rope Gabion which suffers quick damage due to anti-social elements or harsh condition, 16 mm PP rope Gabion had been used in front for enhancement of the life of the structure.

15.8 MASTER PLAN FOR COASTAL PROTECTION

Members were informed that under ADB Assistance programme, preparation of **Shoreline Management Plan** (SMP) was contemplated in States of Maharashtra and Karnataka. Representatives of both States presented the latest status on the progress of preparation of SMP. Representative from Maharashtra informed that Shoreline Management Plan for Maharashtra has been prepared in June, 2017 and every beach in Maharashtra were visited and documented. In the State of Karnataka separate SMPs have been prepared and **approved** for all the three coastal districts viz. Dakshina Kannada, Udupi and Uttara Kannada of the State as well as for the whole State.

As it was noted that Coastal Zone Management Plan (CZMP) was completed for the State of Odisha, the representative of Odisha were requested to share with others through CPDAC Secretariat. Other States/UTs were requested to share any existing master plan with them.

(Action: Odisha and other maritime States/UTs)

15.9 CENTRAL ASSISTANCE FOR COASTAL PROTECTION WORKS

Members were informed that during XII Plan, two schemes of Ministry of Water Resources, River Development and Ganga Rejuvenation (MoWR, RD & GR) were in operation for providing Central Assistance for undertaking Flood Management works including Anti-Sea Erosion works.

Scheme Name	Type of scheme	Applicable for
Flood Management Programme	State Sector Scheme	Maritime States
River Management activities and Works Related to Border Areas and Union Territories (RMBA)	Centrally Sponsored Scheme	Maritime UTs

Above schemes are under reformulation under a consolidated scheme for period 2017-20. It was requested that States/UTs may prioritize the area requiring protection from Sea Erosion and may submit schemes for central assistance under reformulated scheme, once it is approved. It was also suggested that mandatory clearances including Coastal Regulation Zone (CRZ) clearance etc. may be taken in advance for the approval of coastal protection projects.

(Action: All Maritime States/UTs)

15.10 ANTI SEA EROSION MEASURES IN LAKSHADWEEP

Members were informed that the expert team of CPDAC under leader-ship of Chief Engineer (Flood Management), CWC visited the Lakshadweep during 16-20th April, 2013 and sent its report including recommendations to concerned authorities in Lakshadweep Administration in May, 2013 for needful action. The set of recommendations included review of design criteria for coastal protection works by CW&PRS, Pune. In this regard, UT of Lakshadweep has requested CW&PRS, Pune to review the design of the present method of anti-sea erosion works. CW&PRS had conducted field visits for this purpose. Representative of CW&PRS informed that they have sought certain information/ data in this regard form Lakshadweep PWD. Sh. C. N. Shajahan, Executive Engineer, LPWD Division, UT of Lakshadweep informed that for providing the information sought by CW&PRS, they have hired NCESS as consultant and fund release to them is under process. It was decided that any subsequent updates/ development in this regard would be shared to CPDAC.

(Action: CW&PRS/ Lakshadweep)

15.11 ANNUAL REPORT OF CPDAC

Members were informed that during 2016, CPDAC Secretariat brought out a publication titled 'Status Report of Coastal Protection and Development in India'. This was circulated to all the CPDAC Members/Invitees as well as is hosted on http://cwc.gov.in/CPDAC-Website/index.html (under Publication link). Going forward it was proposed that CPDAC would bring an **Annual Report** which will have details of activity carried out by the Member/Invitee organizations in line to assigned function of the Committee (corresponding to each 11 (eleven) functions as enumerated in the resolution constituting the CPDAC Committee). Chief Engineer (CSRO), Coimbatore, CWC appreciated the proposal and stated that since, the coastal sector is a multi-disciplinary sector involving various stakeholder agencies, such a compilation would be unique as well valuable for bringing diverse set of information under one document in regular and time bound manner. However, it was emphasized that it won't be a successful step without the active support of the states/institutes. Chairman desired that the first attempt for Annual Report should start from 2016-17 itself. The proposal as well as the broad framework for the content of the Annual Report (**Annexure - V**) was accepted unanimously. It was requested to all members

to send the material for preparation of Annual Report for the year 2016-17 latest by 30th September, 2017. Subsequently, materials should be sent by 30th April (e.g. for the Annual Report of 2017-18, it should reach by 30th April, 2018).

(Action: All Members/ Invitees of CPDAC & CPDAC Secretariat)

15.12 PRESENCE ON SOCIAL MEDIA

Members were informed that CPDAC Secretariat would try to have presence on the Social Media via sites as FaceBook, Twitter, etc. Through these platforms, members may collaborate and share pertinent information including upcoming Seminar, Conference, Training Programmes, etc. for wider circulation and increased participation. The proposal was unanimously accepted and they were requested to share their e-mails and mobiles for creation of Facebook page and Twitter handle.

(Action: All Members/ Invitees of CPDAC & CPDAC Secretariat)

15.13 REVIEW OF COMPOSITION AND FUNCTIONS OF CPDAC

Members were informed that based on the recommendations of 14th CPDAC meeting and subsequent recommendations for selection of non-official members by Chairman (CPDAC), proposal for re-constitution of CPDAC was sent to Flood Management (FM) Wing of MoWR, RD & GR. Further, during 14th CPDAC meeting, various changes were suggested in the composition of the committee and subsequently suggestion from NITI Aayog (erstwhile Planning Commission) regarding the change in representation from their side was received. In line to above, proposal for reconstitution of CPDAC was sent to MoWR, RD & GR. As representative from FM wing of MoWR, RD & GR were not present at that instant, it was decided that CPDAC secretariat will take up the case with FM wing of MoWR, RD & GR for its early amendment in the resolution constituting the CPDAC Committee. It was also noted that after reorganization of Andhra Pradesh (AP) & Telangana, Water Resources Department of AP has been reorganized/ relocated which may require amendments in the composition of CPDAC. Other Members were also requested to intimate the change in name of designation/department so that same may also be included in the revised composition.

(Action: MoWR, RD & GR/ All Members/ CPDAC Secretariat)

It was also noted that CPDAC was constituted in 1995 and many of its functions may need review in the changed scenario. Further, it was noted that some of the functions are entirely under the domain of Maritime State Govts. It was decided that while sending material for preparation of proposed Annual Report (starting from 2016-17) of CPDAC, Maritime States/UTs will send materials corresponding to each 11 (eleven) functions as enumerated in the resolution constituting the CPDAC Committee. Functions of CPDAC as per resolution are also given in **Annexure-VI**.

(Action: All Members/ Invitees of CPDAC)

15.14 VENUE OF THE NEXT MEETING OF CPDAC

Members were informed that as per Government of India resolution regarding constitution of CPDAC, its meeting needs to be organized twice (at least) in a year. The same could not have been achieved in the past due to various reasons including delays in seeking consent from maritime States/UTs for hosting of the meetings. Now onwards, it was proposed to conduct one of the meetings of CPDAC in a year at CWC, New Delhi mandatorily, whereas the 2nd meeting may be organized on rotational basis in each maritime State/UTs. The proposal was accepted unanimously.

Members decided the venue of the 16th CPDAC meeting (2nd meeting in the year 2017-18) at Gujarat after consultation/ agreement with State representative, sometime during last week of February, 2018.

(Action: Gujarat/ CPDAC Secretariat)

15.15 ANY OTHER ITEM WITH THE PERMISSION OF CHAIR

The status of finalization of report regarding bathymetry and hydrological study of Pulicat Lake, being done by National Institute of Ocean technology (NIOT), Chennai, was briefly discussed and it was requested to NIOT to submit it on priority (latest by 15th Sep, 2017) to dispose of PMO Reference on opening of mouths at Tettupeta and Raidoruvu between the sea (Bay of Bengal) & Pulicat Lake. It was highlighted that submission of report is already substantially delayed.

(Action: NIOT, CWC)

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Annexure-I

List of Participants of the 15th CPDAC Meeting held on 17th August, 2017 at Central Water Commission, New Delhi:

S.N.	Name & Designation
1.	Sh. N. K. Mathur, Member (D&R), CWC - **in Chair**
	Members
2.	Sh. N. M. Krishnanunni, Chief Engineer (CSRO), CWC, Coimbatore
3.	Sh. R. Selvaraj, Chief Engineer (WRO), PWD, Madurai Region, Govt. of Tamil Nadu.
4.	Sh. K. A. Joshi, Chief Engineer (Irrigation and Admin), Govt. of Kerala.
5.	Sh. Rakesh Toteja, Senior Joint Commissioner, FM Wing (MoWR,RD&GR) representing Commissioner (FM), MoWR,RD&GR
6.	Sh. Alok Mahajan, Chief Engineer, Maharashtra Maritime Board (MMB), Maharashtra representing Chief Executive Officer , MMB.
7.	Captain C Swamy, Director (Ports & I.W.T.), State Govt. of Karnataka.
8.	Sh. S. T. Nadkarni, Chief Engineer (WRD), State Govt of Goa.
9.	Sh. Jugal Kishore Tripathy, Chief Construction Engineer, Rengali Right Irrigation Project , WRD, Odisha representing Engineer-in-Chief, WRD.
10.	Sh. Mahalingaiah A.V., Scientist D, CWPRS, Pune representing Director, CW&PRS.
11.	Sh. K. B. Rabadia, CE (S.G.) & Additional Secretary, N.W.R.W.S. & K Dept., representing Secretary, N.W.R.W.S. & K, Govt. of Gujarat,
12.	Sh. Arun Kumar Sharma, Head, Geo Sciences Division, SAC, Ahmedabad.
13.	Sh. Gopal Sharan, Scientist-C, NITI Aayog, New Delhi representing Advisor (NRE), NITI Aayog.
14.	Sh. C. N. Shajahan, Executive Engineer, LPWD Division, UT of Lakshadweep representing Superintending Engineer, PWD.
15.	Sh. Shanmuga Sundaram, Superintending Engineer, Puducherry representing Chief Engineer, PWD.
16.	Sh. IIangovan D., Senior Principal Scientist, NIO, Goa representing Director, NIO.
17.	Sh. K. Krishna Bhat, Director (TC), Operations West Coast- I, Marine & Coastal Survey Division, GSI, Mangalore, Karnataka representing Head of Department, Marine Wing, GSI.

S.N.	Name & Designation
18.	Captain J. Gurumani, Director, Directorate of Hydrography, NHO, representing Chief Hydrographer to Govt of India, NHO.
19.	Sh. Ravi Shanker, Chief Engineer (P&D), CWC - **Member Secretary**
	Permanent/Special Invitees
20.	Sh. Basanta Kumar Jena, Scientist – F, Coastal and Environmental Engineering Division, NIOT, Chennai representing Director, NIOT.
21.	Dr. R. S. Kankara, Scientist-F & Head (Coastal Processes & Shoreline Management Group), ICMAM-P.D., Chennai representing Project Director (ICMAM-PD).
22.	Dr. T. N. Prakash, NCESS, Thiruvananthapuram, Kerala representing Director, NCESS.
23.	Sh. R. Thangamani, Director (Beach Erosion) CWC, Kochi- Permanent/Special invitee
	Other Invitees/Participants
24.	Dr. M. Ariz Ahammed, Mission Director, National Water Mission (NWM), MOWR, RD & GR, New Delhi.
25.	Dr. B. R. Subramanian, Former Adviser, MoES and Senior Scientific Consultant, NCSCM representing Director, NCSCM, Chennai.
26.	Dr. S. K. Singh, Director, Geodetic and Research Branch, Survey of India (SoI), Dehradun representing Surveyor General of India (SoI).
27.	Sh. Anuj Kanwal, Director, INCSW Secretariat, CWC, New Delhi
28.	Sh. Rajesh Yadav, Senior Project Officer, Asian Development Bank (ADB), New Delhi
29.	Sh. Gopal Naik, Joint Director, PMU- SCPMIP, Karnataka.
30.	Sh. Ratheesh Ramakrishnan, Sci./Engr. SE, SAC, Ahmadabad.
31.	Sh. Jiweshwar Sinha, Scientist D, CWPRS, Pune representing Director, CW&PRS.
32.	Smt. Aparna S. Gandhi, Sr. Scientist, NIO Goa
33.	Dr. R. Mani Murali, Sr. Scientist, NIO, Goa.
34.	Sh. Pankaj Kumar Singh, Deputy Commissioner, FM Wing (MoWR,RD&GR)
35.	Sh. A D Rao, Professor , IIT, New Delhi (CRCPMP)

S.N.	Name & Designation
36.	Smt. Puja Upadhyay, IIT, New Delhi (CRCPMP)
37.	Sh. Joseph Mathew, CRCPMP Team.
38.	Sh. N. P. Kurian, CRCPMP Team.
39.	Sh. Rupesh Kr Sinha, CRCPMP Team.
40.	Sh. Murli Krishna, CRCPMP Team.
CPDAC Secretariat	
41.	Sh. Sharad Chandra, Director (Coastal Management) , CWC, New Delhi
42.	Sh. Shiv Sunder Singh, Deputy Director (Coastal Management), CWC, New Delhi.
43.	Sh. Sanjay Meena, Assistant Director (Coastal Management), CWC, New Delhi
44.	Smt. G. Vijaya Lakshmi, Assistant Director-II (Coastal Management), CWC, New Delhi

Annexure –II
(Para 15.2.2)

Format for providing details of coastal protection works

Sr. No.	Name of work	Village	Taluk	District	Length in Meter	Year of construction	Type of Work[1]	Starting Point of Work		End point of Works	
								Latitude[2]	Latitude[2]	Latitude[2]	Latitude[2]
1											
2											

1- Seawall/groyne/bund/jetty/ Saline Embankment/Breakwater, etc.
2- Longitude and Latitude may be provide upto **two decimal accuracy** for second e.g. *93° 50' 28.57"E , 6° 46' 19.28" N*

Annexure-III
(Para 15.3.1)

Summary of Inventory of Coastal Data with various Organizations

Agency	Wave	Current	Tide	Riverine Data	Wind	Coastal Sediment	Beach Profile	Bathymetry	Shoreline Change	Remark
MoES	☑	☑	☑	☒	☑	☑	☑	☑	☑	For selected locations/time frame
SAC	☒	☒	☒	☒	☒	☒	☒	☒	☑	
NCSCM	☑	☑	☑	☑	☑	☑	☑	☑	☑	For Odisha (2012-13)
CWC	☒	☒	☒	☑	☒	☒	☒	☒	☑	For selected rivers/time frame
IMD	☒	☒	☒	☒	☑	☒	☒	☒	☒	For selected locations/time frame
SoI	☒	☒	☑	☒	☒	☒	☒	☒	☒	For selected locations/time frame
GSI	☒	☒	☒	☒	☒	☑	☒	☒	☒	For selected locations/time frame
NIO	☑	☑	☑	☒	☑	☑	☑	☒	☒	For selected locations/time frame
CWPRS	☑	☑	☑	☒	☒	☑	☑	☒	☒	Data obtained from States
NHO	☒	☒	☑	☒	☒	☒	☒	☑	☒	For selected locations/time frame

Agency	Wave	Current	Tide	Riverine Data	Wind	Coastal Sediment	Beach Profile	Bathymetry	Shoreline Change	Remark
CEFS, Kerala	☑	☑	☑	☑	☒	☑	☑	☒	☑	Manual Observations
KERS, Karnataka	☒	☒	☒	☒	☒	☒	☑	☒	☒	In State of Karnataka
IHH, Tamil Nadu	☒	☒	☒	☒	☒	☒	☒	☒	☑	In State of Tamil Nadu
KoPT	☒	☒	☑	☑	☒	☑	☒	☒	☑	For Hugli River
RRI, WB	☑	☒	☒	☑	☑	☑	☑	☒	☒	For Digha Beach
CDO,Gujarat	☑	☑	☑	☒	☒	☒	☑	☒	☒	Provided to CWPRS
PWD, Goa	☑	☒	☑	☒	☒	☒	☑	☒	☒	Provided to CWPRS
MMB, Maharashtra	☑	☒	☑	☒	☒	☒	☑	☒	☒	Provided to CWPRS

Annexure-IV
(Para 15.4.3)

The details of the tide gauges used, the data availability and the comparison between trends calculated using tide gauge data, altimeter data and projection data for Sea Level Trends

Sr. No.	Station Name	Time period of data availability (Tide Gauge)	Time period of data availability (Altimeter)	Sea level trends using tide gauge data (mm/yr)	Sea level trend using altimeter data (mm/yr)	Sea Level trend using altimeter and projection data
Arabian Sea (West Coast of India)						
1.	Okha	January 1975 to August 2008	January 1993 to December 2014	1.28 ± 0.38	2.81 ± 0.58	2.66 ± 0.05
2.	Kochi	January 1939 to December 2007	January 1993 to December 2014	1.40 ± 0.12	2.39 ± 0.39	4.38 ± 0.03
3.	Mumbai	January 1878 to June 1994	January 1993 to December 2014	0.74 ± 0.05	2.96 ± 0.64	3.54 ± 0.06
Bay of Bengal (East coast of India)						
4.	Paradip	January 1966 to December 2011	January 1993 to December 2014	1.79 ± 0.42	2.00 ± 1.05	3.97 ± 0.04
5.	Vishakhapatnam	January 1937 to December 2011	January 1993 to December 2014	0.96 ± 0.17	3.35 ± 0.9	3.98 ± 0.04
6.	Chennai	September 1952 to December 2011	January 1993 to December 2014	0.4 ± 0.19	2.62 ± 0.75	4.17 ± 0.03

Annexure-V
(Para 15.11)

Broad Framework for Annual Report of CPDAC

1-History, function and composition of CPDAC

2-Details with respect to activities carried out by Members/Invitees from **Central Govt.**

- Organogram of Member's organization dealing with coastal protection and development
- Research activity carried out wrt functions of CPDAC and information related Open Access research papers
- Workshop, Training/Seminars organized
- Infrastructure available like Numerical Modelling, Physical modelling , availability of Instrument for coastal data collection
- Design of coastal protection and development works
- Activities with respect to coastal data collection and Its Inventory
- Significant coastal events having repercussion on coastal erosion and protection
- Activities carried out with respect to each 11 functions of CPDAC
- Any other relevant information

3-Details with respect to activities carried out by Members/Invitees from **States/UTs.**

- Organogram of Member's organization dealing with coastal protection and development
- Extent of coastal erosion problem in the State/UT, district-wise
- Erosion hotspots/vulnerable sites
- Coastal Protection work carried out
- Physical and Financial Progress for coastal protection works
- List of Proposed Protection Works in the vulnerable areas & tentative source/requirement of funding for Coastal Protection Works
- Research activity carried out wrt functions of CPDAC
- Workshop, Training/Seminars organized
- Availability/Update of Schedule of Rates applicable for coastal protection works
- Damages due to coastal erosion
- Status of development of Shoreline Management Plan/Master Plan for coastal protection
- List of sites for coastal data collection
- Coastal Data Inventory
- Infrastructure available like Numerical Modelling, Physical modelling , availability of Instrument for coastal data collection
- Activities carried out with respect to each 11 functions of CPDAC
- Any other relevant information

Annexure – VI
(Para 15.13)

Functions of Coastal Protection and Development Advisory Committee (CPDAC) as per MoWR Resolution No.15/2/91-BM dated 17th April, 1995

(i) To organise a co-ordinated programme of collection, compilation, evaluation and publication of data relating to various natural phenomena in coastal processes, which affect the coastline, through Coastal Engineering Research Centre and other State organisations.

(ii) To organise general investigation, studies and research with the help of Central and State Coastal Engineering Research Institutions.

(iii) To lay down principles in construction techniques of coastal protection measures for the guidance of State Authorities.

(iv) To review the performance of the works carried out by States and evolve improved design techniques based on such experience from time to time.

(v) To inter-act with international agencies engaged in the work of coastal protection and technology transfer in the field of coastal protection.

(vi) To identify the coastal zone to be developed behind the coastal protection works with the help of State Governments.

(vii) To identify the development potential in various techno-economic activities and advise the concerned State Govts. to prepare programme for development.

(viii) To draw up long-term and short-term plans for coastal protection and development of the coastal zone.

(ix) To appraise and recommend various coastal protection and development works for inclusion in State plans.

(x) To arrange effective and timely monitoring of the coastal protection & development projects.

(xi) To review the action plan for rehabilitation and resettlement of the coastal development affected people and monitor the progress on rehabilitation and resettlement.

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