सत्यमेव जयते

GOVERNMENT OF INDIA
MINISTRY OF JAL SHAKTI
DEPARTMENT OF WATER RESOURCES,
RIVER DEVELOPMENT & GANGA REJUVENATION
(http://jalshakti-dowr.gov.in)

ANNUAL REPORT
2022-23

CENTRAL WATER AND POWER RESEARCH STATION
KHADAKWASLA, PUNE-411024
INDIA

ANNUAL REPORT 2022-23

Government of India
Ministry of Jal Shakti
Department of Water Resources,
River Development & Ganga Rejuvenation
(http://jalshakti-dowr.gov.in)

CENTRAL WATER AND POWER RESEARCH STATION
PUNE

VISION

- To be a world class center of excellence in research on hydraulic engineering and allied areas; which is responsive to changing global scenario and need for sustaining and enhancing excellence in providing technological solutions for optimal and safe design of water resources structures.

MISSION

- To meet the country's need for basic & applied research in water resources, power sector and coastal engineering with world-class standards
- To develop competence in deployment of latest technologies by networking with the top institutions globally, to meet the future needs for development of water resources projects in the country effectively
- To disseminate information, build skills and knowledge for capacity-building and mass awareness for optimization of available water resources

MAJOR FUNCTIONS

- Undertaking specific research studies relating to development of water resources, power and coastal projects
- Consultancy and advisory services to Central and State Governments, private sector and other countries
- Disseminating research findings and promoting/assisting research activities in other organizations concerned with water resources projects
- Contributions to Bureau of Indian Standards and International Standards Organization
- Carrying out basic and applied research to support the specific studies
- Contribution towards advancements in technology through participation in various committees at National and State Levels

CONTENTS

FROM THE DIRECTOR'S DESK

With immense pleasure I am presenting the Annual Report of Central Water & Power Research Station (CWPRS), Pune for the year 2022-23.

CWPRS is an apex R&D organization in the field of hydraulic and allied research in the water and power sector. It was established in 1916 by the then Bombay Presidency as a "Special Irrigation Cell" to modify irrigation practice to meet agricultural requirements. In the year 1951, the organization was renamed as Central Water & Power Research Station (CWPRS) and continues to serve the nation for more than 100 years by fulfilling the mandate of 'Service through Research'. CWPRS provides specialized services in areas like river training and flood control, hydraulic structures, ports and harbours, coastal protection, foundation engineering, construction materials, pumps and turbines, ship hydrodynamics, hydraulic design of bridges, environmental studies, earth sciences, cooling water intakes for thermal/nuclear power plants, etc.

During this financial year 2022-2023, CWPRS executed / carried out 118 Nos. of research studies in the area of Water Resources, Coastal Engineering and Earth Sciences including some important projects like flood protection measures in river Sutlej, Chenab, Indrayani,in the states of Himachal Pradesh Jammu & Kashmir and Maharashtra, spillway and power intake of Polavaram Irrigation Project, Andhra Pradesh, the design of seaside dyke to the Kalpasar Project in Gujarat, wave tranquility studies for Vizhinjam International Seaport, Kerala, etc.CWPRS has been part of Government of India's flagship projects viz. National Hydrology Project (NHP)and Coastal Management Information System (CMIS). As a significant mandate of CWPRS, dissemination of knowledge and research findings through research publications, participating in technical events, imparting training programs and delivering invited lectures were accomplished. Training programs were conducted for the benefits of Employees and Students. CWPRS is equipped to play greater role to face the challenges.

I am grateful to the Department of Water Resources, River Development and Ganga Rejuvenation, MoJS for their constant support and providing enough latitude throughout the journey of CWPRS. I am grateful to Technical Advisory Committee for valuable guidance and recommendations in framing key policies towards progress of organization. I would like to extend my thanks to all the Clientele in India and abroad for showing belief and being with CWPRS for all theseyears. I take this opportunity to appreciate all the scientists of CWPRS and their supporting teams who made us stand out to deliver technically sound and sustainable solutions. Finally, I take this opportunity to express my gratitude to my predecessors for successfully steering CWPRS to this stage with the unique identity.

With a well-defined roadmap for the coming years and a clear vision oriented towards transforming CWPRS into centre of excellence, we have an exciting journey ahead. I am delighted to be part of and leading this journey.

Dr. R.S. KANKARA

ABOUT THE INSTITUTE

GENERAL

The Central Water and Power Research Station (CWPRS), Pune, established in 1916 by the then Bombay Presidency as a Special Irrigation District, is the leading national hydraulic research institute under the Ministry of Jal Shakti, Department of Water Resources, River Development and Ganga Rejuvenation (MoJS, DoWR, RD&GR), New Delhi. In its early days of formation, this institute played important role by conducting outstanding research work for the Sukkur Barrage in Sind, the largest irrigation project in the world (1927 to 1932). Recognizing its role in the systematic study of various phases of water flow, including floods, the institution was taken over by the Government of India in 1936. With the dawn of independence, and launching of planned development of water resources of the nation, CWPRS became the principal central agency to cater to the research and development (R&D) needs of hydraulics and allied disciplines for evolving safe and economical designs of hydraulic structures involved in water resources projects, river engineering, power generation and coastal engineering projects. The research activities at CWPRS can be grouped into seven major disciplines as listed below.

- River Engineering
- River and Reservoir Systems Modelling
- Reservoir and Appurtenant Structures
- Coastal and Offshore Engineering
- Foundation and Structures
- Applied Earth Sciences
- Instrumentation, Calibration and Testing Services

Advisory services are offered to the government within the sphere of its activities by participation in various expert committees. The solutions offered by CWPRS are based on the investigations from physical and mathematical models, field investigations coupled with desk studies or from a combination of these. The institution also carries out collection and analysis of field/ prototype data on a variety of engineering, hydraulic and environmental parameters. Disseminating the research findings amongst hydraulic research fraternity, and promoting research activities at other institutions by imparting training to their research manpower, are also undertaken.

Today, as a part of the Ministry of Jal Shakti, Department of Water Resources, River Development and Ganga Rejuvenation (MoJS, DoWR, RD&GR), the mandate of the institution encompasses undertaking specific research studies supported by necessary basic research. Comprehensive R&D support is offered to a variety of projects in fields as diverse as river training and bank protection measures, hydraulic design of bridges and barrages, flood forecasting, dam break analysis, water quality analysis of river and reservoir systems, design of spillways and energy dissipaters, analysis of water conductor and tail race system, optimization of the design and layout of ports and harbours suggesting coastal protection measures based on locally available materials, investigations for foundations of hydraulic structures, analysis of structures subjected to various static and dynamic loads, applied earth sciences studies for the sites of hydro-electric and other projects, calibration of current meters and flow meters, testing of pumps and turbines and instrumentation for dams.

CWPRS campus, situated downstream of Khadakwasla dam in South Westerly part of Pune, occupies an area of about 450 acres, where major research infrastructure available includes water re-circulation system for physical models, workshop, library, computers and communication facilities, auditorium and

housing facilities. CWPRS has been recognized as the regional laboratory of the Economic and Social Commission for Asia and the Pacific (ESCAP) since 1971. The institution, with multi-disciplinary approach in its activities, thus represents unique services available to the country and the ESCAP region.

ORGANIZATIONAL SET-UP

CWPRS is a subordinate office of DoWR, RD&GR. The Director is the Head of the Organization designated as Head of the Department. Additional Director monitors the overall technical activities of the office. The total sanctioned staff strength of CWPRS is 1,084. The research cadre, comprising of Director, Additional Director, Scientist-E, Scientist-D, Scientist-C, Scientist-B, Assistant Research Officer (ARO) and Research Assistant (RA) has a sanctioned strength of 319 personnel. The other supporting staff to the tune of 765 includes technical, auxiliary technical, administration, accounts and ancillary services.TheTechnical Advisory Committee (TAC) under the Chairmanship of the Chairman, Central Water Commission render advice to the Ministry regarding functioning of CWPRS.

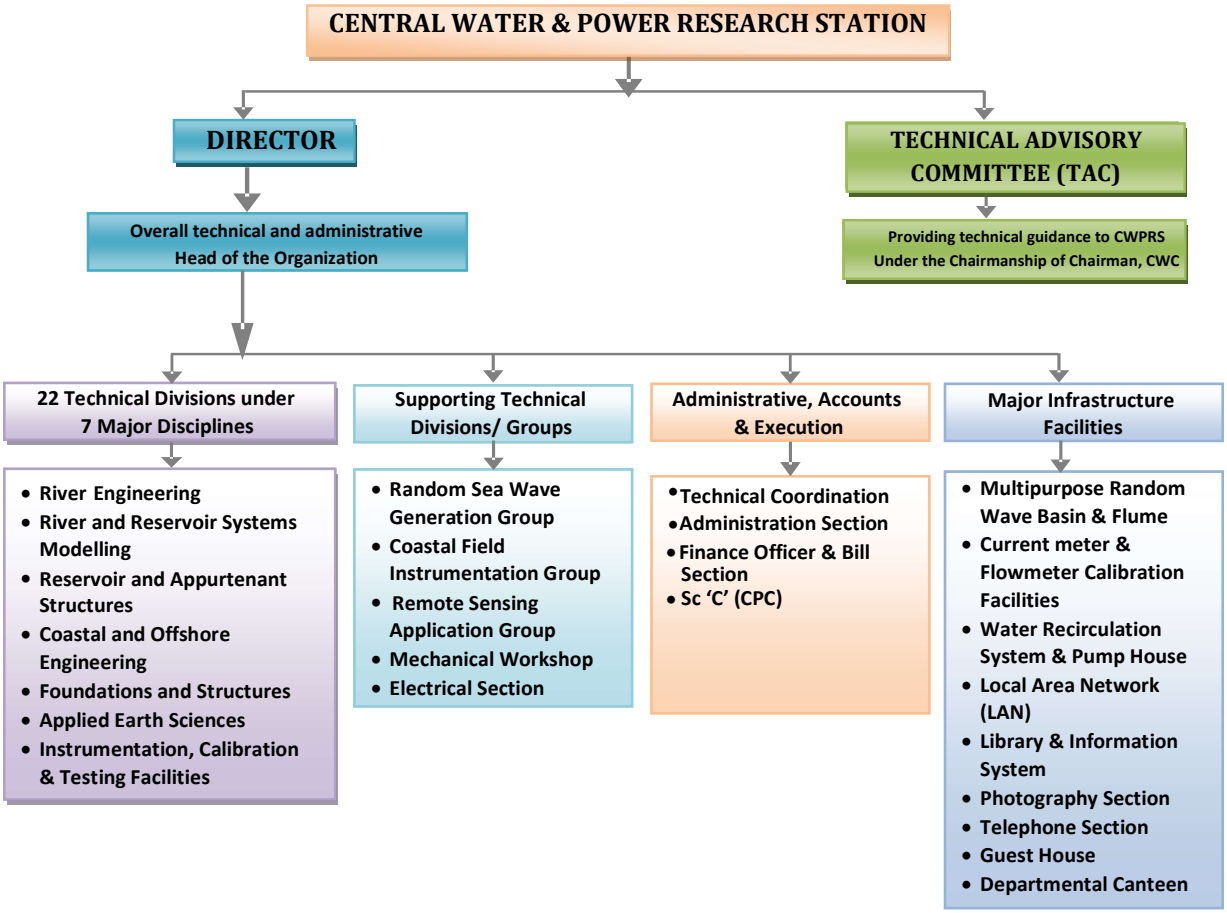
TECHNICAL ADVISORY COMMITTEE

The TAC, chaired by the Chairman, Central Water Commission.The Committee, inter alia, provides an overall perspective and technical guidance to CWPRS in the area of Hydraulic Research, scrutinizes the research programmes and schemes, examines expansion proposals and matters relating to sponsored research work and provides guidance in formulation of collaborative arrangements and Memoranda of Understanding, instruments of exchange of personnel and expertise with other agencies/ institutions both at home and abroad.

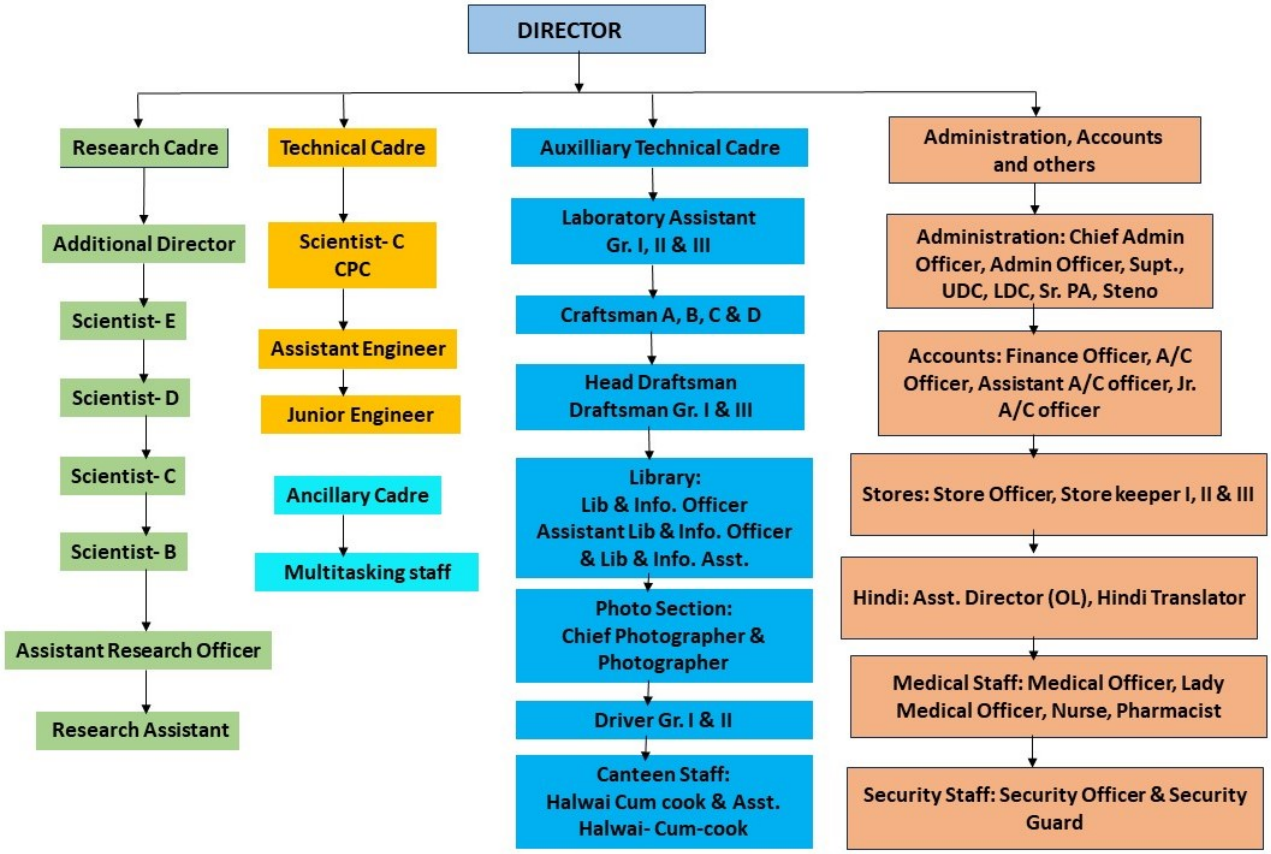
PART-I

GENERAL

ORGANIZATIONAL SETUP



ORGANIZATIONALCHART



BUDGET AND FINANCE

1. Plan Schemes

The main purpose of Plan Schemes is to develop and strengthen the research infrastructure at CWPRS for serving the nation through research more efficiently and effectively. The following scheme was under implementation at the institution during 2022-23.

Name of the scheme	Final Estimate 2022-23
R&D Programme in Water Sector under MoJS, Dept. of WR, RD&GR– CWPRS component	6.56 Crore

During 2022-23 the following important activities were undertaken under the above-mentioned scheme. R&D in Water Sector, Ministry of Jal Shakti, Department of Water Resources, River Development and Ganga Rejuvenation - R&D in Apex organizations – CWPRS component.

Objectives:Under the Plan scheme "R&D Programme in Water Sector", CWPRS has mainly aimed at strengthening and modernization of its laboratories, instruments, and infrastructure facilities. Other major items include ICT, Training and Dissemination, Basic Research and Mathematical Modelling Softwares etc.

Activities: During 2022-23, with a budget outlay of Rs 6.56 Cr., major activities undertaken included:

(i) **Infrastructure**: (Rs.3.73 Cr)

- (Rs. 0.28 Cr) Construction of 2-D flume model for centralized experimental facilities of river engineering studies in REG hangar.
- (Rs.0.10 Cr) Construction of Concrete Technology Laboratory
- (Rs. 0.06 Cr)Construction of Pump House for GVS division.
- (Rs. 1.39 Cr) Renovation of different office buildings, hangars and laboratories.
- (Rs. 0.65 Cr) Re-carpeting of existing road and compound walls.
- (Rs. 0.42 Cr) Maintenance of Garden area attached to Office complex and Guest House area.
- (Rs. 0.83 C) Renovation and up-gradation of residential quarters at CWPRS.

(ii) **Machinery &Equipment**(Rs. 2.23 Cr)

- (Rs. 1.20 Cr)RSWG system for 120 m wave flume.
- (Rs. 0.23 Cr)ArcGIS software.
- (Rs. 0.08 Cr)MobileCompactorsfor Library Information System
- (Rs. 0.02 Cr)Self Compacting Concrete testing equipment.
- (Rs. 0.09 Cr) Vertical Geophone with DAS
- (Rs. 0.01 Cr) Resistivity meter
- (Rs. 0.40 Cr) Computational facility comprising of Workstation and PCs including UPS & peripherals
- (Rs.0.20 Cr) Electrical Installation and appliances for Models

(iii) **Operating Cost**(Rs.0.60 Cr): Expenses for operating cost of electrical usage charges, training and dissemination, basic research,outsourcing of house-keeping tasks etc.

2. Non-Plan Budget

The non-plan budget and expenditure details for the year 2022-23 are given below:

Item/ Head	Amount (Crore)	
	Final Estimate	**Actual Expenditure**
Salary	78.12	78.12
Non-Salary	5.69	5.44
Total (Gross)	83.81	83.56
Recovery	(-)12.00	(-)15.95
Net	71.81	67.61

MONITORING OF RESERVATION STATUS

1. Minority Welfare

The recruitment of personnel from minority community and representation of minorities in Selection Committees/Boards is monitored in accordance with guidelines issued by the erstwhile Ministry of Welfare (present Ministry of Social justice and empowerment) in March 1990. Three minority officials are appointed at CWPRS during April 2022 to March 2023.

2. Monitoring of Reservation for physically handicapped

Reservation for physically handicapped persons is being done to ensure fulfillment of three percent (3%) quota as stipulated. At present, a total 24 persons with disabilities are working in the Research Station with 02, 07 and 15 in group A, B and C respectively. Benefits earmarked like Transport Allowance, Concessions regarding Recruitment fees, Professional Tax exemptions etc. are provided as per Government instructions. Slope ladders and special washrooms are being provided in Research Station wherever possible.

Group	Position as on 31st March 2023
	PH
A	02
B	07
C	15
Total	24

3. Monitoring of Reservations for SC/ST/OBC

Monitoring of the recruitment of candidates form SC/ST/OBC category is made following the guidelines issued from time to time. Shri.A. V. Mahalingaiah, Scientist 'E' guides the overall matters in this regard as Liaison Officer. A summary of posts filled from SC/ST/OBC categories are given below.

Group	Position as on 31stMarch 2022			
	SC	ST	OBC	UR
A	23	12	28	84
B	29	9	41	99
C	56	32	116	204
Total	108	53	185	387

4. Preservation and Enforcement of Right to Gender Equality of Working Women

There are five members in the committee for Preservation and Enforcement of Right to Gender Equality of Working Women with the composition of the committee as per the guidelines issued by the Honorable Supreme Court of India. Dr. (Mrs.) NeenaIssac, Scientist 'E' is the Chairperson of the committee. Meetings of the committee are held regularly. No complaints were received during 2022-2023.

VIGILANCE AND DISCIPLINARY CASES

Break up of vigilance and disciplinary cases in respect of different categories of staffis mentioned below in Tables I & II respectively.

Table –I – Vigilance Cases

Sl.No.	Particulars	Group `A' & `B'	Group `C'
1	No.of cases pending in the beginning of the year	02	00
2	No.of cases added during the year	00	00
3	No. of cases disposed of during the year	02	00
4	No.of cases pending at the end of theyear	00	00

Table-II – Disciplinary Cases where the Director, CWPRS is the Disciplinary Authority

Sl.No.	Particulars	(Categories of officers/staff)		
		Group `A'	Group `B'	Group `C
1	No. of cases pending in the beginning of the year	NA	01	0
2	No. of cases added during the year	NA	01	0
3	No. of cases disposed of during the year	NA	01	0
4	No. of cases pending at the end of the year	NA	01	0

As part of a vigilance awareness programme, Vigilance Awareness Week was observed at Central Water and Power Research Station (CWPRS), Pune, from **31st October – 06th November, 2022** (photo enclosed).

Pledge during the Vigilance Awareness Week

Prize distribution by Dr. R.S. Kankara, Director, CWPRSduring valedictory function

RTI ACT, GRIEVANCES REDRESSAL MECHANISM AND CITIZEN'S CHARTER

1. RTI Act

Under the provisions of Section 4 (b) of RTI Act 2005, manual giving suo-moto information on CWPRS has been published on the Website www.cwprs.gov.in as a part of implementation of the act. The manual is periodically being updated.

Further, all efforts are being taken to administer and implement the act. The citizens are also given guidance in obtaining information under the act. The names, addresses, and other details regarding the Appellate Authority, Public Information Officer, Transparency Officer and Nodal Officer are given below.

Appellate Authority	Dr. Prabhat Chandra Additional Director, CWPRS, Khadakwasla,Pune 411024 Tel. : 020-24103521 e-mail: prabhat.chandra@gov.in
Public Information Officer	Shri A.A. Purohit Scientist-E, CWPRS, Khadakwasla,Pune 411024 Tel.:020-24103508 e-mail: purohit_aa@cwprs.gov.in
Transparency Officer	Dr. (Smt.) Neena Isaac Additional Director, CWPRS, Khadakwasla.Pune 411024 Tel.:020-24103455 e-mail: neena.isaac@.gov.in
Nodal Officer	Shri A.A. Purohit Scientist-E, CWPRS, Khadakwasla,Pune 411024 Tel.:020-24103508 e-mail: purohit_aa@cwprs.gov.in
Asst. Public Information Officer	Shri Amol Borkar, Scientist-"C", CWPRS, Khadakwasla, Pune 411024 Tel: 020- 24103501 E-mail:amol.borkar@cwprs.gov.in

The Department of Personnel and Training (DoPT) has launched a web portal "RTI Online" with URL https://rtionline.gov.in/RTIMIS for receiving and processing RTI applications, appeals online, with the facility to align all the Public Authorities (PAs) of Government of India.

As per the directives, CWPRS has aligned with this RTI-MIS online portal of DoPT and started processing of all requests for seeking information under RTI Act, appeals through RTI-MIS portal. All requests which have been received manually are also being processed and disposed off through the RTI-MIS online portal.

As per the requirements of this online RTI-MIS system, user accounts have been created for Nodal Officer (RTI), CPIO, FAA and five Deemed Public Information Officers (DPIOs).

Information on requests and appeals handled under the act during 2022-23 is summarized below.

	Opening balance as on 1/04/2022	Received during 2022-23 (including cases transferred to other Public Authority)	No. of cases transferred to other Public Authorities	Decisions where requests/ appeals rejected and disposed off	Decisions where requests/ appeals accepted and disposed off
Requests	01	142	6	0	134
First Appeals	0	22	0	0	22
Amount of Charges Collected (Rs) 130					
Registration fee amount		Additional fee & any other charges		Penalties amount	
130/-		Nil		Nil	

2. Grievance Redressal Mechanism

A Grievance Cell under the chairmanship of Dr. Jiweshwar Sinha, Scientist-E, functions with the objective of looking into the grievances and for their redressal. The relevant data pertaining to cases handled during 2022-23 is given below:

Grievance cases pending as on 31st March 2022	01
Cases received during 1st April 2022 to 31st March 2023	09
Cases disposed off during 1st April 2022 to 31st March 2023	10
Cases pending as on 31st March 2023	00

The Centralised Public Grievance Redress and Monitoring System (CPGRAMS), the web-based portal that enables an Indian citizen to lodge a complaint from anywhere and anytime directly, has been implemented at CWPRS. Periodical updating of the entries are being carried out and relevant reports are submitted monthly, quarterly, half yearly and yearly.

3. Cititzen's Charter

The Citizen's Charter in respect of CWPRS, formulated by a Task Force specially constituted for the purpose, has been subsequently upgraded/ revised/ modified in pursuance of related instructions/communications from the Ministry from time to time, including the 7-step model for `Servottam for Citizen Centricity in administration' as per relevant instructions of DARPG. The main components of the Citizen's Charter include: Vision and mission statement, details of business transacted and customers/ clients, service provided by the organization, details of grievances redress mechanism in place and expectations from clients. Presently the Charter is in the process of getting formal approval from MoJS, Dept. of WR, RD&GR.

IMPORTANT VISITORS

Visit of Shri Vijay Srivastava, Deputy Secretary (E-II), Shri Prashant Malik, Under Secretary (E-II), Shri Parveen Kumar, Section Officer (E-II), Shri Jatin Kumar, Asstt. Section Officer (E-II) on 18 April 2022. Primary meeting with CWPRS Officials.

Visit of Shri D. M. Raipure, Chairman, Tungabhadra Board on 08 July2022

Miss. Archana Varma, IAS Additional Secretary, DoWR, RD&RR visited models of Lower Siang Dam and Yamuna River during the visit to CWPRS on 23 September 2022

Dr. R. K. Gupta, Chairman, CWC & Chairman, TAC; ShriVivekTripathi, Chief Engineer, CWC, New Delhi; Dr. M. V. Ramana Murthy,Director, NCCR, Chennai; Dr. B. Venkatesh Scientist 'G' and Head, NIH, Belgaum; Shri S. K. Datir, Associate Director (LWS&A & ESFs), NPCIL, Mumbai; Dr. ManasaRanjan Behara, Associate Professor, IIT Bombay, Mumbai, visited CWPRS for 37th Technical Advisor Committee (TAC) meeting on 29 September 2022

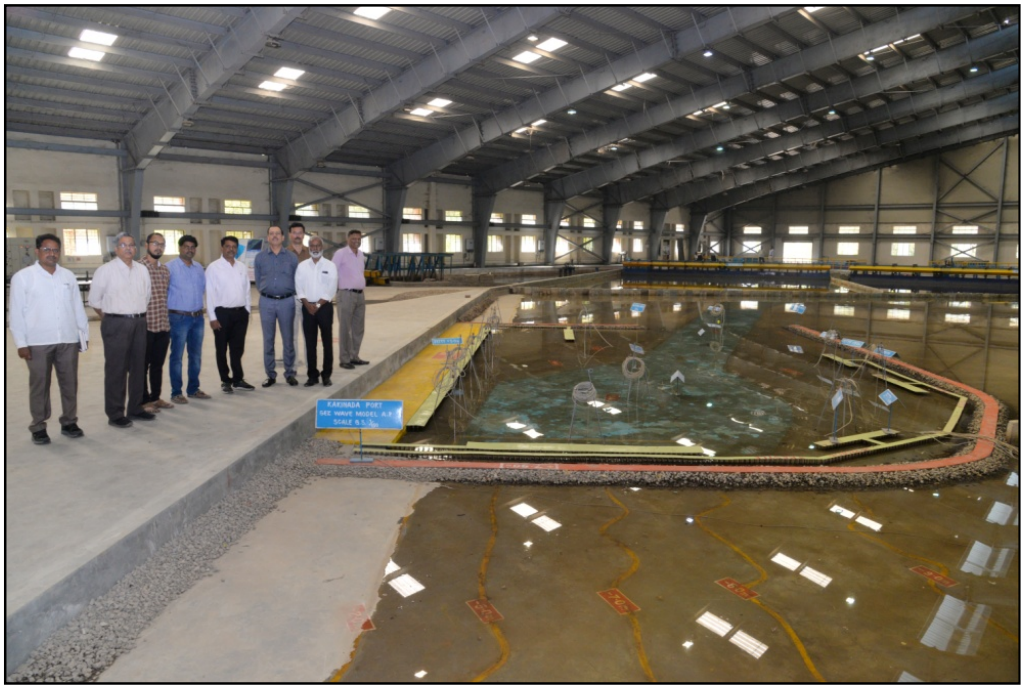
Shri Pankaj Kumar, Secretary DoWR, RD &GR, Shri A.S. Goel, Commissioner (SPR) visited Mumbai Port model and Current Meter Rating Trolley during the visit to CWPRS on 15 October 2022

Delegates from Bangladesh and World Bank visited CWPRS, Pune under NHP Project on 01 November 2022

Shri Subodh Yadav, Joint Secretary (Admin, IC & GW), DoWR, RD & GR, visited Exhibition Hall and Wave Flume at CWPRS Pune on 22 November 2022

Prof. Vijay P. Singh, Distinguished Professor and Regents Professor, Texas A&M University, USA visited Exhibition Halland Kakinada Port model at CWPRS, Pune during 11-12 January 2023

Shri Anand Mohan, Joint Secretary (PP) and Shri Uday Choudhary(IAS), Private Secretary to Minister visited desilting chamber of Kholongchhu H. E. project, Bhutan at CWPRS, Pune on 13 February 2023



Mr. Tim Martin Ruiwel, and Mr. Bakker Pieter, Delta Marine Consultants (DMC), the Netherlands visited Kakinada Port model at CWPRS during 07-23 February 2023

IMPORTANT EVENTS

Glimpses of "AZADI KA AMRIT MAHOTSAV"

A programme on "Cultural Imaginations of North-East and East India" organized at CWPRS on 26 April 2022

Lecture delivered on "Raise awareness of the need for the safe blood and blood products as life saving gifts" by JankalyanRaktapedhi Trusts, Jankalyan Blood Centre at CWPRS (June 2022)

Lecture delivered on life of "Chandrashekhar Azad" by Dr. Vijay Ghodake, Sc-B on 08 April 2022

Lecture delivered on life of "Sardar Vallabhbhai Patel" by CWPRS officials in June 2022

Lecture delivered on life of "Bankim Chandra Chatopadhyay" by CWPRS officials on 05 May 2022

Lecture delivered on "Shri Atal Bihari Vajpayee" on 01 June 2022

"FREE EYE CHECK UP CAMP" organized at CWPRS, Pune in association with Deshpande Eye Hospital & Laser Center on 28 April 2022

"Health Checkup and Vaccination Camp" organized by Health Unit Division at CWPRS, Pune on 27May 2022

Guest Lecture by Shri Vilas B. Joshi, Chief Research Officer (Ret.), CWPRS on "Overview of Historic Development of Pune water supply schemes till Independence, present and future" at CWPRS on 15 July 2022

76th Independence Day Celebration at CWPRS on15 August 2022

Inauguration of RFID Security System in LIBIS Division at CWPRS on 22 August 2022

37th Technical Advisor Committee (TAC) meeting of CWPRS on 29September 2022

जल और विद्युत अनुसंधान शाला, खड़कवासला, पुणे में 30सितम्बर 2022को को हिन्दी पखवाड़ा समापन समारोह मनाया गया

74th Republic day Celebration at CWPRS

Women's Day celebration at CWPRS, Pune on 8th March 2023

Health and happiness Workshop" at CWPRS on 21st March 2023

राजभाषाहिन्दीकेप्रगामीप्रयोगसेसंबंधितप्रमुखगतिविधियाँ

इस अनुसंधान शाला में कार्यालयीन कामकाज में हिंदी के प्रगामी प्रयोग से संबंधित गतिविधियों के बारे में निम्नानुसार जानकारी प्रस्तुत है:

हिंदी दिवस तथा हिंदी पखवाड़ाः

राजभाषा विभाग, गृह मंत्रालय द्वारा जारी दिशा-निर्देशों के अनुसार माननीय गृह एवं सहकारिता मंत्री जी की अध्यक्षता में दिनांक 14 सितंबर 2022 को सूरत में आयोजित हिन्दी दिवस समारोह और 15 सितंबर 2022 को आयोजित द्वितीय अखिल भारतीय राजभाषा सम्मेलन में अनुसंधान शाला के प्रतिनिधि के रूप में सुश्री विजया नागपुरे, सहायक निदेशक (राजभाषा) एवं श्रीमती उमा गंगाधरन, वरिष्ठ अनुवाद अधिकारी ने भाग लिया।

प्रति वर्ष की भांति इस वर्ष भी हिंदी पखवाड़े के दौरान अनुसंधान शाला में राजभाषा कार्यान्वयन समिति के मार्गदर्शन में हिंदी निबंध, हिन्दी में वार्तालाप, हिन्दी प्रश्नमंच, तकनीकी शब्दों का अनुवाद, हिन्दी कविता पठन, हिन्दी शुद्धलेखन, तकनीकी संगोष्ठी प्रतियोगिता, हिन्दी टंकण, हिन्दी पोस्टर आदि प्रतियोगिताओं काआयोजन किया गया।

इन प्रतियोगिताओं में संस्था के अधिकारियों एवं कर्मचारियों ने उत्साह से भाग लिया।भारत सरकार द्वारा लागू 'मूल रूप में हिंदी टिप्पण आलेखन पुरस्कार योजना' अनुसंधान शाला में लागू की गई थी। इन प्रतियोगिताओं में योग्यता प्राप्त अधिकारियों एवं कर्मचारियों कोमुख्य अतिथि के करकमलों द्वारा नकद पुरस्कार एवं प्रमाणपत्र देकर सम्मानित किया गया। इसअवसर पर डॉ. पंकज शर्मा, वैज्ञानिक 'एफ', डी.आई.ए.टी., खडकवासला, पुणे अतिथि के रूप में उपस्थित थे।

हिंदी पत्रिका जलवाणी का प्रकाशनः

हिंदी पखवाड़ा समापन समारोह के अवसर पर मुख्य अतिथि के करकमलों द्वारा अनुसंधान शाला की हिंदी गृह पत्रिका "जलवाणी" के 29वें अंक का विमोचन किया गया। अनुसंधान शाला के अधिकारियों एवं कर्मचारियों ने उक्त पत्रिका में विभिन्न विषयों पर लेख, कविता, यात्रा संस्मरणआदि लिखकर अपना बहुमूल्य योगदान दिया है।

तकनीकी/प्रशासनिक हिंदी कार्यशाला का आयोजन:

गृह मंत्रालय द्वारा जारी वार्षिककार्यक्रममें दिएगएनिर्देशोंके अनुसार अनुसंधान शाला में दिनांक 22 जून 2022, 26 सितंबर 2022,13 दिसंबर 2022 तथा 24 मार्च, 2023 को हिन्दी कार्यशालाएँआयोजितकीगईं,जिसमें अनुसंधान शाला के विभिन्न पदों पर आसीन

अधिकारियों/कर्मचारियों ने भाग लिया। दिनांक 13 दिसंबर 2022 को आयोजित कार्यशाला तकनीकी विषयों पर आधारित थी। प्रशिक्षण कार्यक्रम में संघ की राजभाषा नीति, सरकारी पत्राचार के नमूने, टिप्पण, आलेखन एवं भाषा और वर्तनी के बारे में उपयोगी सामग्री उपलब्ध कराई गई। तकनीकी व्याख्याताओं ने तकनीकी विषयों पर व्याख्यान दिए। व्याख्याताओं द्वारा आलेख, चित्रों और विडियो के माध्यम से सहज और सरल तरीके से तकनीकी विषयों को हिंदी भाषा में समझाने की कोशिश की गई। उपस्थितों ने आयोजित तकनीकी एवं प्रशासनिक हिन्दी कार्यशालाओं में दिए गए विषयों और व्याख्याताओं द्वारा दिए गए व्याख्यानोंकी अत्यंत सराहना की।

इन कार्यशाला में व्याख्यान देने वाले व्याख्याताओं के नाम, पदनाम और उनके व्याख्यान के विषय निम्नानुसार थे :

क्र.	नाम व पदनाम	व्याख्यान का विषय
1.	डॉ श्रीमती स्वाती चड्ढा, सहायक निदेशक (राजभाषा) राष्ट्रीय रासायनिक प्रयोगशाला, पुणे	राजभाषा हिन्दी के प्रयोग को बढ़ाने के उपाय
2.	श्री राजेंद्र प्रसाद वर्मा, सहायक निदेशक (टंकण/आशुलिपि), हिन्दी शिक्षण योजना, पुणे	हिन्दी और भारतीय भाषाओं में काम करने के लिए तकनीकी सुविधाएं (कंप्यूटर में डिक्टेशन, ट्रांसलेशन और टाइपिंग के फीचर्स)
3.	श्री महेंद्र कुमार मिश्र, हिन्दी प्रभारी, वैकुंठ मेहता राष्ट्रीय सहकारी प्रबंध संस्थान, पुणे	कार्यालयीन कार्यों में हिन्दी का प्रयोग
4.	डॉ. शंकर सिंह परिहार, राजभाषा अधिकारी, मण्डल रेल प्रबंधक कार्यालय, मध्य रेल, पुणे	राजभाषा नियम/ अधिनियम एवं प्रोत्साहन योजनाएँ
5.	श्री पी. एम.अब्दुल रहेमान, वैज्ञानिक 'ई'	गहरे समुद्र में पम्पिंग चुनौतियां
6.	डॉ. सरबजीत सिंह, वैज्ञानिक 'बी'	महाराष्ट्र राज्य के सातारा जिले में स्थित कोयना बाँध की मरम्मत हेतु सामग्री पर प्रयोगशालात्मक अध्ययन
7.	श्री टोमेस कुमार साहू, सहायक अनुसंधान अधिकारी	प्रवाह मापन की उन्नत तकनीक एवं उनसे संबंधित तकनीकी कार्य और उनकी उपयोगिता
8.	श्री अनिरूद्ध भारदे, अनुसंधान सहायक	नदी प्रशिक्षण और प्रबंधन
9.	सुश्री विजया नागपुरे,सहायक निदेशक (राजभाषा)	कार्यालयीन कामकाज में हिन्दी का प्रयोग
10.	श्री उग्रसेन सिंह, भूतपूर्व सहायक निदेशक (राजभाषा)	हिंदी में यूनीकोड की सुविधा, गूगल के माध्यम से हिंदी टंकण, हिंदी सॉफ्टवेयर एवं मोबाइल के माध्यम से टंकण




तकनीकी /प्रशासनिक हिंदी कार्यशालाओं में उपस्थित अधिकारी व कर्मचारी

कंप्यूटरों में हिंदी साफ्टवेयर :

अनुसंधान शाला के सभी संगणकों में हिन्दी सॉफ्टवेयर लगवाए गए हैं जैसे iLeap, ISM Office, ISM Publisher और iTranslatorइत्यादि। यूनीकोड आधारित सॉफ्टवेयर ISM V6 नेट वर्ज़न का प्रयोग किया जा रहा है । साथ ही गूगल आधारित यूनीकोड सॉफ्टवेयर का प्रयोग भी किया जा रहा है। हिन्दी कार्यशालाओं के माध्यम से अधिकारियों /कर्मचारियों को प्रशिक्षण दिया जा रहा है।

हिंदी वेबसाइट :

इस अनुसंधान शाला की वेबसाइट www.cwprs.gov.in बनाई गई है, जिसमें संस्था के बारे में जानकारी हिंदी में उपलब्ध कराई गई है। इसका समय समय पर अद्यतन किया जाता है।

अनुसंधान शाला के इन्ट्रानेट पर हिन्दी में नेमी प्रपत्र/ मानक मसौदे उपलब्ध कराना :

प्रतिदिन काम आनेवाले नेमी क़िस्म के प्रपत्र, मानक मसौदे जैसे आकस्मिक छुट्टी के आवेदन, कार्यग्रहण रिपोर्ट, प्रस्थान रिपोर्ट, प्रभागों/अनुभागों के नाम, मंत्रालयों/विभागों के नाम, छुट्टियों के प्रकार,वर्तनी, संदेश, गृह पत्रिका जलवाणी का उनतीसवां अंक, हमेशा प्रयुक्त होने वाले वाक्यांश आदि इन्ट्रानेट पर हिन्दी में उपलब्ध कराए गए हैं। साथ ही अनुसंधान शाला द्वारा सभी प्रयोगशालाओं की तकनीकी शब्दावली उपलब्ध कराई गई है ।

हिन्दी भाषा तथा टंकण प्रशिक्षण :

हिन्दी शिक्षण योजना, पुणे के प्रवीण एवं पारंगत पाठ्यक्रम हेतु अनुसंधान शाला से कुल 10 अधिकारियों/कर्मचारियों को नामित किया गया। नवंबर, 2022 में संपन्न परीक्षा में पारंगत परीक्षा के लिए नामित प्रशिक्षणार्थियों ने अच्छे अंक हासिल कर रु. 10,000/- राशि के नकद पुरस्कार प्राप्त किए हैं। साथ ही प्रवीण परीक्षा के लिए नामित प्रशिक्षणार्थियों ने भी अच्छे अंक हासिल कर रु. 1800/- राशि के नकद पुरस्कार प्राप्त किए हैं। हिन्दी टंकण प्रशिक्षण में 02 प्रशिक्षणार्थी शामिल हुए, जिसमें एक नेरु. 800/- राशि का नकद पुरस्कार प्राप्त किया है।

विभागीय निरीक्षण :

हिन्दी पत्राचार को बढ़ाने तथा गृह मंत्रालय के राजभाषा विभाग द्वारा समय-समय पर जारी अन्य निर्देशों के अनुपालन को सुनिश्चित करने हेतु सहायक निदेशक (राजभाषा) द्वारा व्यक्तिगत रूप से प्रशासन अनुभाग, तकनीकी समन्वय प्रभाग तथा निर्माण एवं क्रय कक्ष के साथ-साथ अन्य प्रभागों का निरीक्षण किया गया। निरीक्षण के दौरान यह पाया गया कि लगभग सभी प्रभागों में तकनीकी सारांश एवं उसका अग्रेषण पत्र, छुट्टी के आवेदन, कार्यभार प्रस्थान तथा कार्यभार ग्रहण रिपोर्ट आदि कार्य नियमित रूप से हिन्दी में किए जा रहे हैं। निरीक्षण के दौरान अन्य विषयों से संबंधित पत्राचार को भी हिन्दी में करने के लिए मार्गदर्शन किया गया। अनुसंधान शाला में हिन्दी के प्रयोग को बढ़ावा मिलने के उद्देश्य से राजभाषा विभाग द्वारा जारी जांच बिन्दुओं को सभी अनुभागों एवं प्रभागों में परिचालित किया गया और सभी से अनुरोध किया गया कि अपने-अपने प्रभागों में उसका अनुपालन सुनिश्चित किया जाएं।

हिन्दीमेंकार्यकेलिएअनुभागोंकानामांकन:

निम्नांकितप्रभागों/अनुभागोंमेंकार्यकीकुछमदेंहिन्दीमेंकरनेकेलिएविनिर्दिष्टकीगईहैं।

अ.क्र.	प्रभाग अनुभाग /	प्रभाग द्वारा किए जाने वाले कार्य
1.	प्रशासन	• समूह के कर्मचारियों की "ग"औ र "ख" "क"सेवा पुस्तिकाओं में प्रविष्टियाँ • छुट्टियों के कार्यालय आदेश • आवधिक वेतन वृद्धि के प्रमाणपत्र • छुट्टी यात्रा रियायत अग्रिम का आदेश • वेतन नियतन के कार्यालय आदेश • सेवा निवृत्ति के आदेश • कर्मचारियों की वरिष्ठता सूची • आवास आबंटन की अग्रता सूची • दौरा अग्रिम के आदेश • कुछ फ़ाइलों में टिप्पण आलेखन
2.	प्रशासन (नि औ स्था)	• कर्मचारियों की सेवा पुस्तिकाओं में प्रविष्टियाँ • छुट्टियों के कार्यालय आदेश • आवधिक वेतन वृद्धि के प्रमाणपत्र • कर्मचारियों को ज्ञापन • छुट्टी यात्रा रियायत अग्रिम का आदेश • वेतन नियतन के कार्यालय आदेश • सेवा निवृत्ति के आदेश • कर्मचारियों की वरिष्ठता सूची • कुछ फ़ाइलों में टिप्पण आलेखन
3.	बिल अनुभाग	• द्विभाषी वेतन पर्ची • चिकित्सा अग्रिम के आदेश • चिकित्सा अग्रिम से संबंधित जाँच सूची • दौरा अग्रिम के आदेश
4.	निर्माण तथा क्रय कक्ष	• बेबाकी प्रमाण पत्र • चेकों के अग्रेषण पत्र • प्राप्त हुए भुगतान की पावती
5.	तटीय इंजीनियरिंग के लिए गणितीय प्रतिमानन (संगणक)	तकनीकी रिपोर्टों के सारांश तथा अन्य कार्यों में यथासंभव हिन्दी का प्रयोग किया जाता है।
6.	नदी जलगति विज्ञान	• तकनीकी रिपोर्टों के सारांश तथा अन्य कार्यों में यथा संभव हिन्दी का प्रयोग किया जाता है । • जलवाणी में लेख लिखकर कर्मचारियों का योगदान
7.	जल गुणवत्ता विश्लेषण तथा प्रतिमानन	तकनीकी रिपोर्टों के सारांश तथा अन्य कार्यों में यथा संभव हिन्दी का प्रयोग किया जाता है ।

तकनीकी काम में हिन्दी का प्रयोग :

अनुसंधान शाला के विभिन्न प्रभागों/अनुभागों द्वारा किए जाने वाले अध्ययनों के आधार पर परियोजना प्राधिकारियों को भेजे जाने वाली तकनीकी रिपोर्टों के सारांश, अग्रेषण पत्र, रिपोर्ट प्रलेख पत्र, सार, प्राक्कलन, विषय सूची आदि मदें अंग्रेजी के साथ हिन्दी में भी भेजी जा रहा है। तकनीकी कार्य का रिकार्ड निर्धारित प्रपत्र में आमंत्रित किया गया था । इस प्रयोजनार्थ गठित की गई मूल्यांकन समिति ने रिकार्ड की जाँच के पश्चात –कंपन प्रौद्योगिकी प्रभागको पुरस्कार के योग्य पाया । इस प्रभाग को हिन्दी दिवस के अवसर पर मुख्य अतिथि के कर कमलों द्वारा राजभाषा प्रोत्साहन शील्ड देकर प्रोत्साहित किया गया ।

e-GOVERNANCE ACTIVITIES AT CWPRS

The National e-Governance Plan (NeGP), takes a holistic view of e-Governance initiatives across the country, integrating them into a collective vision. In this connection, various e-Governance activities like eOffice, eHRMS, GeM, eProcurement etc. have been implemented at CWPRS.

e-Office

eOffice is a Mission Mode Project (MMP) under the National e-Governance Programme of the Government. The product is developed by National Informatics Centre (NIC) aimed at improving internal efficiencies in organization through electronic administration leading to informed and quicker decision making, which in turn results in better public service delivery. It promotes less paper office with greater collaboration and knowledge sharing. It assures more efficient, effective and transparent inter-government and intra-government transactions and processes. The product is built as single reusable system by bringing together independent functions and systems under a single framework to enhance transparency, increase accountability and transform the government work culture and ethics. As per MoWR order No. F.No.J-11011(1)/1/2017-e-Gov dated 17/02/2017, CWPRS initiated the implementation of eOffice Premium for 500 users and has been operational since 10th October, 2018. CWPRS has constituted Project Steering Committee (PSC) under the chairmanship of Director, CWPRS for smooth implementation of e-Office as per guidelines mentioned in e-Office Governance Structure. Project Implementation Committee (PIC) has also been formed comprising representatives from different divisions of CWPRS for overall direction and leadership for the implementation in the divisions. Govt email ids for the employees which is a prerequisite for eoffice have been created. eOffice instance for CWPRS **www.cwprs.eoffice.gov.in** has been created. 34 Mbps NICNET connection has been established between NIC, Pune and CWPRS, Pune which is also a pre-requisite for eOffice. As a part of the implementation of eOffice, CWPRS had accomplished the formation of eOffice Helpdesk comprising three experts in eOffice from NIC. This team was providing support to the officials of CWPRS for using eOffice for one year. Employee Master Data (EMD) of staffs from different divisions have been collected through PIC members and completed creation of around 200 e-Office user accounts.

One of the important modules in e-Office is eFile. It is a workflow based system that replaces the existing manual handling of files with a more efficient electronic system. This system involves all stages, including the electronic diarization of inward correspondence, creation of files, movement of correspondences and files, electronic signing of noting & drafts using Digital Signature Certificates (DSC), eSign, and finally, the archival of records.

Setting up of eOffice compatible infrastructure has also been carried out at CWPRS. While switching over to eOffice environment, it was observed that the service divisions like Admin, Bills, CPC, TC Division etc were having very limited number of PCs, Printers, Scanners and that were also 8-10 years old and difficult for working in eOffice environment. In this connection, a proposal for procuring infrastructure had been submitted to Ministry and an amount of Rs.42 lakhs was allotted for the same. Accordingly, 76 PCs, 84 UPS, 3 high speed scanners and 6 Laser printers were procured and distributed to various service divisions.

Electronic Human Resource Management System (eHRMS) –ManavSampada

ManavSampada is a standard ICT solution for the Government sector, addressing maximum requirements of Governments related to personnel management. The first and basic objective of ManavSampada is to provide a generic, product based solution to the State/Central Government organisations for better management of personnel through electronic service record. At CWPRS, eHRMS has been used for applying, approving and sanctioning of leaves and generation of leave orders for various leaves and for submitting Annual Immovable Property Returns.

Central Public Procurement Portal (CPPP)

National Informatics Centre (NIC), Ministry of Electronics & Information Technology, in close association with the Procurement Policy Division, Ministry of Finance, has developed, hosted and implemented the Central Public Procurement Portal customized to cater to the electronic procurement/ tendering requirements of the Central Government Departments and other organizations. The primary objective of the portal is to provide a single point access to the information on procurements made across various Ministries and the line Departments. The CPP Portal is accessible at the URL https://eprocure.gov.in and it has e-publishing and e-procurement modules.

CWPRS is extensively using CPPP portal for all its Civil Works tenders. All procurement related activities for Goods and Services are being carried out using GeM.

PART-II

RESEARCH & DEVELOPMENT

BACKGROUND

CWPRS is mainly engaged in project specific research to evolve safe and cost-effective designs of hydraulic structures involved in development of water resources, river engineering, power plants, and coastal engineering projects. Physical and mathematical model studies coupled with field and laboratory experiments are carried out for this purpose in the seven major areas of expertise of CWPRS as follows:

1. River Engineering: River Engineering mainly deals with river training and bank protection works, hydraulic design of barrages and bridges, and location and design of water intakes using morphological studies. Field studies for measuring water and sediment discharge in rivers and canals are also conducted.

2. River and Reservoir Systems Modelling: Hydrologic and meteorological studies are conducted to estimate extreme values of various parameters such as rainfall, temperature and humidity. Flood estimation and forecast, reservoir sedimentation and water quality studies are carried out using mathematical models and field surveys.

3. Reservoir and Appurtenant Structures: Spillways and Energy Dissipators are studied on physical models. Water conductor systems including head race and tail race channels/tunnels and surge shafts are studied on both physical and mathematical models. Studies are carried out on physical models for desilting basins, sedimentation and flushing through reservoirs, sediment exclusion devices. Sedimentation in reservoirs is also assessed through remote sensing.

4. Coastal and Offshore Engineering: This discipline deals with optimization of location, length and alignment of breakwaters, jetties, berths, approach channel, turning circle etc. for development of ports and harbours. Estimation of siltation in harbours, their disposal and sand bypassing, location of sand trap and hot water recirculation studies are carried out using both physical and mathematical models. Suggesting suitable coastal protection measures based on locally available materials is an important activity of the group.

5. Foundation and Structures: Laboratory and field tests are carried out to determine soil, rock and concrete properties. Mathematical modelling as well as experimental studies are conducted for studying the stability and structural safety of dams and appurtenant structures. Field studies are carried out for assessing the health of hydraulic structures and suggesting suitable repairing measures.

6. Applied Earth Sciences: Seismic surveillance of river-valley projects, assessment of site-specific design seismic parameters, controlled blasting studies for civil engineering construction sites, evaluation of quality of concrete and masonry is done by non-destructive methods and estimation of elastic properties for foundation of massive structures for geophysical methods are the main activities of this group.

7. Instrumentation, Calibration and Testing Facilities: Hydraulic Instrumentation is used for data collection on physical hydraulic models. Field data collection is carried out on coastal parameters like water level, velocity, wave-height etc. A Random Sea Wave Generation (RSWG) system is used for wave flumes and basins. Dam instrumentation is provided on prototype. Current meter and flow meter calibration facilities are also available, which are used extensively.

RIVER ENGINEERING

Divisions

- River Hydraulics
- Hydraulic Analysis and Prototype Testing
- Bridge Engineering

Areas of Specialization/ Expertise

- **Physical and Mathematical Model Studies for**
  - Flood control measures
  - Bridges, river training & diversions
  - River morphological studies
  - River training works
  - Sediment transport

List of Clients

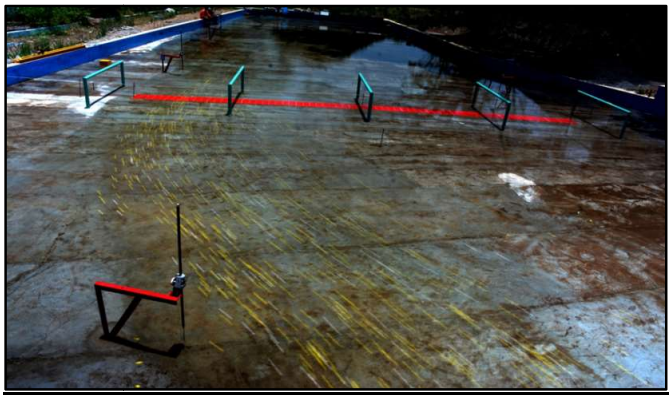
- State Government Authorities
- National Highway Authority of India (NHAI)
- Farakka Barrage Project
- National thermal Power Corporation (NTPC)
- Delhi Metro Rail corporation
- Damodar Valley Corporation
- Indian Railways
- Inland Water Ways Authority of India (IWWAI)
- WAPCOS Limited

Comprehensive report based on the site inspections regarding Kosi Mahasetu guide bund, downstream of Kosi barrage, Bihar.

The river Kosi is a braided river which changes its course repeatedly. The embankments on both banks, series of spurs and barrage near Bhimnagar were constructed to combat the fury of this river. Due to the changes in the flow patterns in the vicinity of the bridge, the guide bunds were in distress during the past 6-7 years. Hence, site inspection was conducted periodically to suggest suitable river training works as per the site conditions along the Kosi guide and afflux bunds. Site Inspection and Physical model studies were performed. Based on the observations made during the site inspection, the following conclusions and recommendations were made:

1. Slope protection works are to be provided to armour the loose soil of the bank to protect it against hydraulic action of the high velocity flow. In case the wire or nylon crates are used, they shall be connected or tied together so that they act as flexible single unit.
2. The launching apron laid over the sloping portion of the underwater portion is stabilized either from the frictional resisting forces or direct bearing forces at the deep bed or both together.
3. The geo-fabric filter is necessary to be provided below the wire crates to filter out the water from the soil bank and embankment safely without disturbing the soil particles due to pore water pressure.

Guide bund of Kosi Mahasetu (Siltation can be seen due to the RCC porcupine dampeners and deflectors

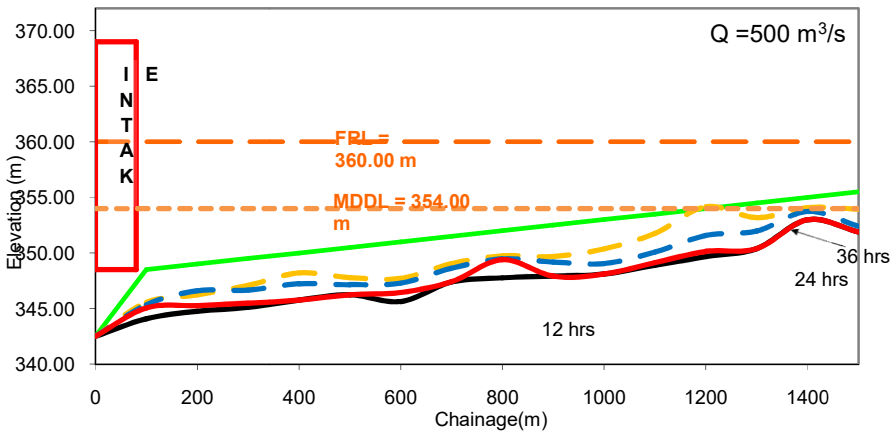


Flow pattern in the vicinity of proposed barrage

Numerical and physical model studies for elimination of desilting basins in hydroelectric projects by sediment management through reservoir operation techniques.

The Himalayan Rivers carry huge quantities of sediment, both bed load and suspended load. The bed load gets deposited in the reservoir reducing the useful capacity and suspended load enters the water conductor system causing damage to the turbine and reduces their efficiency. The suspended load entering the water conductor system is taken care of by providing desilting basins, provision of which is costly. Hence, efforts are being made to avoid provision of these structures by proper operations of the reservoir. To carry out further research in this area, study was taken up for Teesta river basin where both operative and proposed reservoirs are existing. Teesta V is the operative reservoir and Teesta VI is the proposed reservoir. Physical model studies were conducted to optimize the flushing operation for Teesta VI reservoir and to assess whether the desilting basin can be avoided through sustainable reservoir operation techniques combined with drawdown flushing for Teesta Valley H E Projects. 1D numerical model studies were carried out for predicting the sedimentation profile for this project and compared with bathymetric survey data collected by NHPC. Software such as HEC-RAS, ArcGIS and Mike 11 were utilized for the study. The study found that flushing operation was effective for removing the deposited silt in Teesta VI reservoir and that elimination of the desilting basin is not possible in Teesta VI reservoir.

View of Teesta VI physical model after flushing operation



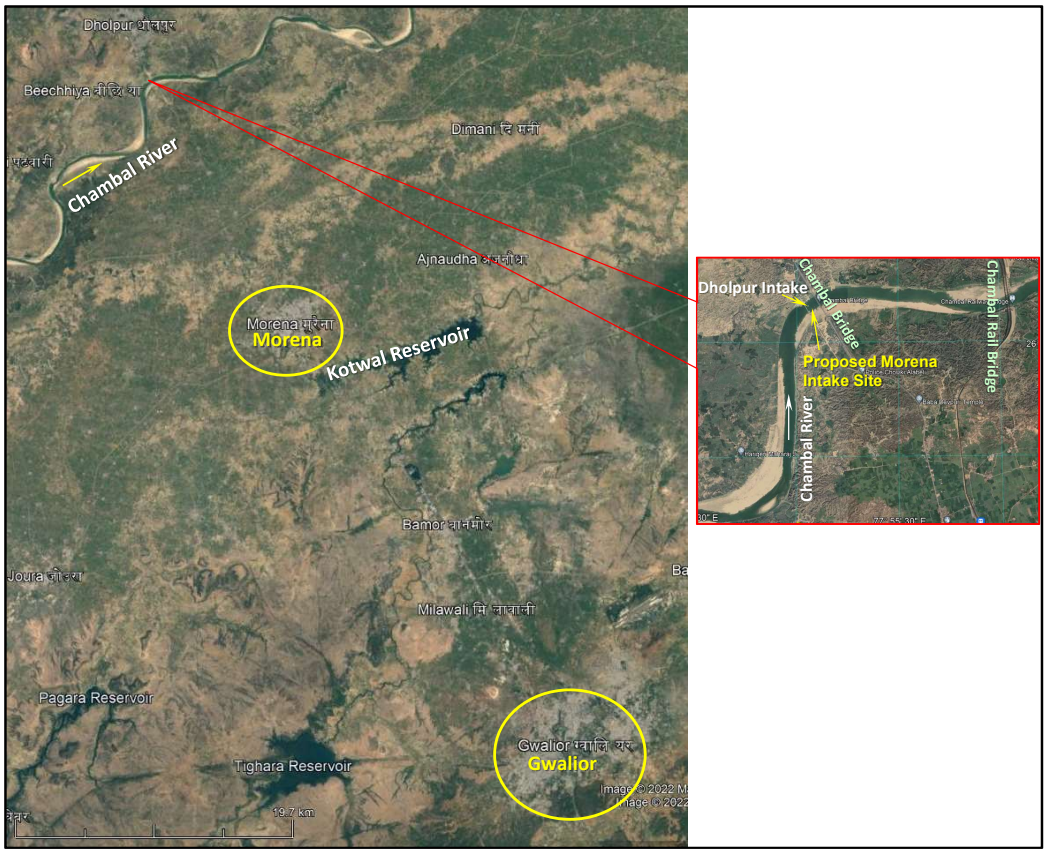
Longitudinal section after flushing for various flushing durations

Desk studies for the location of intake and its hydraulic design in Chambal river for water supply to Morena city, Madhya Pradesh.

Madhya Pradesh Urban Development Co. Limited (MPUDCL)had taken up the work of implementing water supply to Morena Town Municipal area. The abstracting capacity of the proposed intake well was 140 MLD raw water from river Chambal for Morena and Gwalior town. The intake well was proposed to be located on the right bank of Chambal River just opposite to the existing Dholpur intake well.

In this connection, studies for the location and hydraulic design of Intake well are carried out. This study was performed for finalizing Intake location and its hydraulic design.

Survey data is analysed, satellite imageries for past 30 years were studied and site was inspected to finalize intake location. Intake location was recommended in between the old Chambal bridge and the new bridge of NHAI in the deep channel of the river about 450 m from the right bank. A 14 m internal diameter circular shape intake with adequate arrangement for pumping the discharge of 140 MLDwas recommended. Foundation of the intake was recommended below RL 25.77 m considering maximum scour and provision of sufficient grip length. Three openings of size 2 m X 1.5 m each at RL's 111.5 m, 115 m and 120 m with gates and suitable trash-rack were recommended to draw water selectively from different levels for minimizing ingress of sediment into the pumping system.

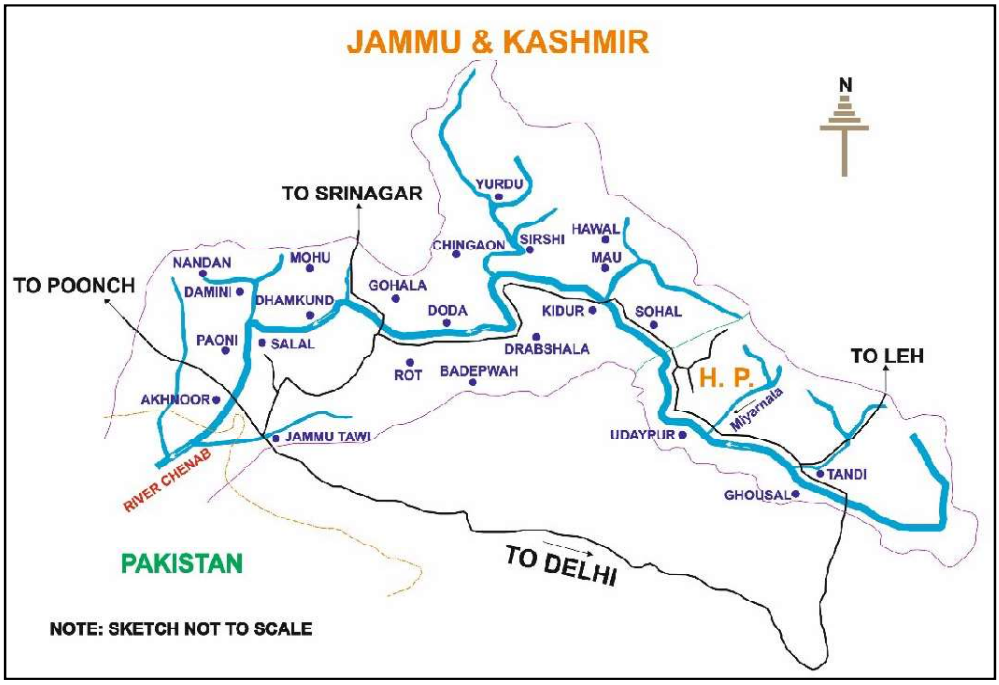


Proposed Intake location near right bank in river Chambal

Mathematical model studies for evolving suitable flood management/ anti erosion measures along river Chenab, Jammu & Kashmir

The Chenab River originates in the Lahaul and Spiti district of upper Himalayas. It flows through the Jammu region of India into the plains of Punjab region of Pakistan before joining the Indus River near the city of Uch Sharif (Pakistan). Due to the migration of river channel, the river is showing tendencies of direct attack on the bank /embankments, the agricultural land, properties, habitations, etc., during the flood. To protect the country side from flood and its consequences, the J & K Government had entrusted the work of preparing Detailed Project Report (DPR) for the flood management works downstream of Akhnoor steel bridge in river Chenab to M/s WAPCOS Limited. However, during the appraisal of the project, CWC authorities had desired that studies of river Chenab be done by CWPRS, Pune for evolving suitable flood management/ anti-erosion measures for the reach of about 27 Km downstream of Akhnoor Steel bridge.

The 1-D mathematical model indicated the velocities in river Chenab to vary between 7.16 to 8.76 m/s and existence of discharge intensities from 119.37 to 166 $m^3/s/m$ in the reach from RD 0 to RD 4000 m. Gabion retaining wall was suggested in this reach. In the reach from RD 4000 to RD 27000 m, the velocities varied from 5 to 5.88 m/s and discharge intensities varied between 33.09 to 46.92 $m^3/s/m$. The sloping protection works or gabion crated retaining wall was suggested in this reach. Twenty five years return period flood was recommended to be used for the design of protection works and the water levels predicted for 1 in 50-year return period flood was suggested as per site requirements while deciding the height of protection works with adequate freeboard. The RCC porcupine screens/ deflectors were recommended at identified locations. Other components such as launching apron, toe wall, geofabric filter, etc., were alsorecommended.



Typical bank protection works carried out by State Engineers along river Chenab, J & K

TECHNICAL REPORTS SUBMITTED TO CLIENTS

Sl. No.	Title	Division	Report No
1.	Hydraulic Model Studies for proposed activation of Natural channel from 4 Km downstream of Kosi barrage in a length of 14 Km in River Kosi, Bihar.	RH	6009
2.	Mathematical model studies for routing of flood with provision of embankments along river Pawana, Pune, Maharashtra.	RH	6039
3.	Mathematical model studies for evolving flood protection measures along Sutlej River and its tributaries in Tehsil pooh Dist. Kinnaur, Himachal Pradesh.	RH	6047
4.	Comprehensive report based on the site inspection regarding KosiMahasetu guide bund, downstream of Kosi barrage, Bihar.	RH	6048
5.	Mathematical model studies for flood protection measures of Jabbarkhad, Himachal Pradesh.	HAPT	6049
6.	Mathematical model studies for flood protection measures of ChhaounchhKhad, Himachal Pradesh.	HAPT	6050
7.	Mathematical model studies for flood protection measures of GarekiKhad, Himachal Pradesh.	HAPT	6051
8.	Numerical and physical model studies for elimination of desilting basins in hydroelectric projects by sediment management through reservoir operation techniques.	HAPT	6059
9.	Analysis and resolution of deficit discharge in the Rajasthan portion of Narmada main canal(Field studies for assessing discharging capacity of Narmada main canal near Gujarat-Rajasthan border and Mathematical model studies for assessing discharging capacity of Narmada main canal near Gujarat Rajasthan border)	HAPT	6079
10.	Mathematical model studies for evolving suitable flood management/ anti erosion measures along river Chenab, Jammu & Kashmir	RH	6083
11.	Hydraulic model studies for removal of silt from Durgapur barrage pond, West Bengal.	RH	6084
12.	Mathematical model studies for evolving flood protection measures and anti erosion works along the tributaries (Nimbuwala, Kodewala, Devwala, Dhonwala and LohgarhKhala) of river Yamuna Paonta Sahib, Himachal Pradesh.	RH	6085
13.	Desk studies for the location of intake and its hydraulic design in Chambal river for water supply to Morena city, Madhya Pradesh.	BE	6098
14.	Mathematical model studies for routing of flood with provision of embankment along the river Indrayani, Pune, Maharashtra.	RH	6110
15.	Hydrographic survey of Dhruwa reservoir, Getalsud reservoir and Tenughat reservoir in the State of Jharkhand under National Hydrology Project	HAPT	6116

RESERVOIR AND APPURTENANT STRUCTURES

Divisions

- Spillways and Energy Dissipators
- Control Structures and Water Conductor Systems
- Sediment Management
- Pump House

Areas of Specialization/ Expertise

Physical and Mathematical Model Studies for

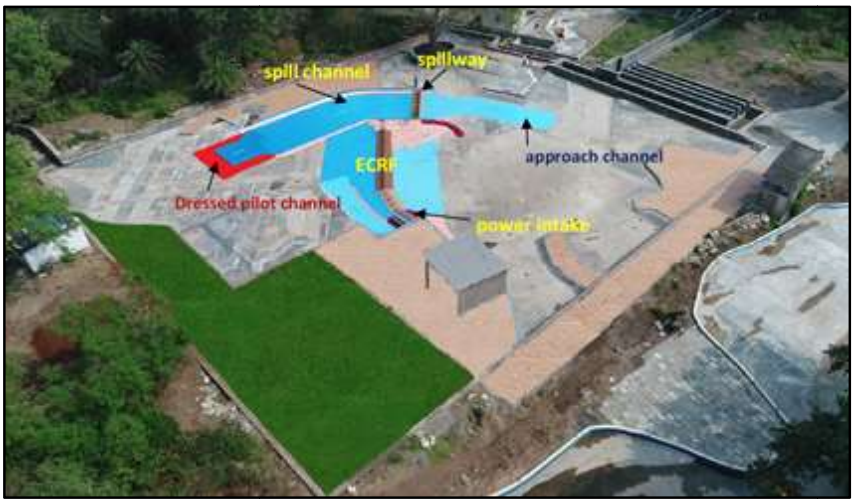
- Spillways and energy dissipaters
- Water conductor systems including head race & tail race channels and surge tank
- Sluices & outlets
- Various types of gates
- Sediment transport, flushing of sediments through reservoirs
- Sediment control and exclusion devices
- Rating of canal structures and discharge measurement in rivers

List of Clients

- NHPC
- WAPCOS
- NJPC
- State Governments
- SJVNL
- Chenab Valley Power Projects Ltd,(CVPPL)
- Brahmaputra Board
- Uttarakhand Jal Vidyut Nigam Ltd. (UJVN Ltd)

Hydraulic Model Studies for spillway and power intake of Polavaram irrigation project, Andhra Pradesh, 1:140 scale 3D comprehensive model.

The aim of the study was to optimize the design layouts of approach channel, guide bund and spill channel. These studies would improve the flow conditions in front of spillway and downstream of spillway and in spill channel and further downstream. Also, assessing the discharging capacity of the head regulators and efficiency of various components of head regulators.Physical model studies using total station and other digital equipment has been used for carrying out the studies. Project is under construction based on the results of model studies.Also, studies are in progress on two 1: 20 scale 2D sectional models of both Left and Right flank Head Regulators of Polavaram Irrigation Project, for assessing the discharging capacity of the head regulators and efficiency of various components of head regulators.Itwas recommended that the dump hill comprising of the overburden material may be thoroughly strengthened to prevent erosion due to seepage and piping. If the dump hill gets eroded, heavy flows may enter approach channel which may destabilize the stability of guide bund and spillway upstream area. So, precautions may be taken to prevent leakage through the dump hill.



Physical model of Polavaram Irrigation Project, Andhra Pradesh at CWPRS

Hydraulic model studies for auxiliary spillway with downstream guide wall for Indira Sagar dam spillway, Madhya Pradesh.

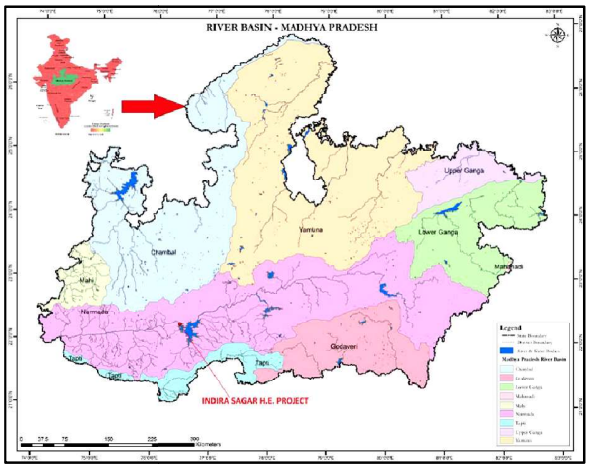
Indira Sagar Project (ISP) is situated on River Narmada, 10 km from village Punasa in Khandwa district of Madhya Pradesh. ISP is a multipurpose Project with an installed capacity of 1000 MW and provides irrigation benefits to about 1.23 Lakh hectares.

Hydraulic model studies were conducted for the following aspects:

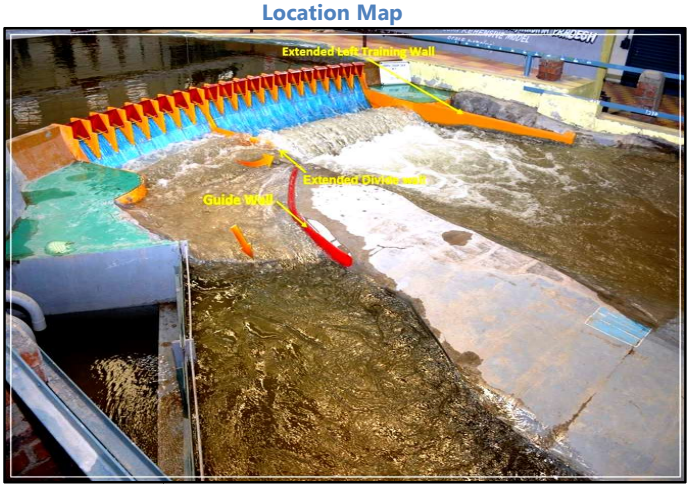
1. Model Studies without provision of Guide Wall to form a Tail Channel of the Auxiliary Spillway and Extended Left Training Wall.
2. Model Studies with a provision of Guide wall to form a Tail Channel of theAuxiliary Spillway and without Extended Left Training Wall.
3. Model Studies with the provision of Guide Wall to form Tail Channel of the AuxiliarySpillway and Extended Left Training Wall

The studies were conducted on a comprehensive 3-D model that was constructed to a geometrically similar scale of 1:20 based on Froudiancriteria.Based on the studies conducted so far, following conclusions are drawn:

Flood release through the tailrace channel may damage/affect the powerhouse area.Therefore, it is suggested that the bifurcation of discharge of the auxiliary spillway, towardsthe main river through the 60 m cut near the divide wall and the tailrace of powerhouseshould be used for any rare high flood event to increase the discharging capacityof the auxiliary spillway.



Location Map



Physical model of Indira Sagar Dam Spillway, Madhya Pradesh.

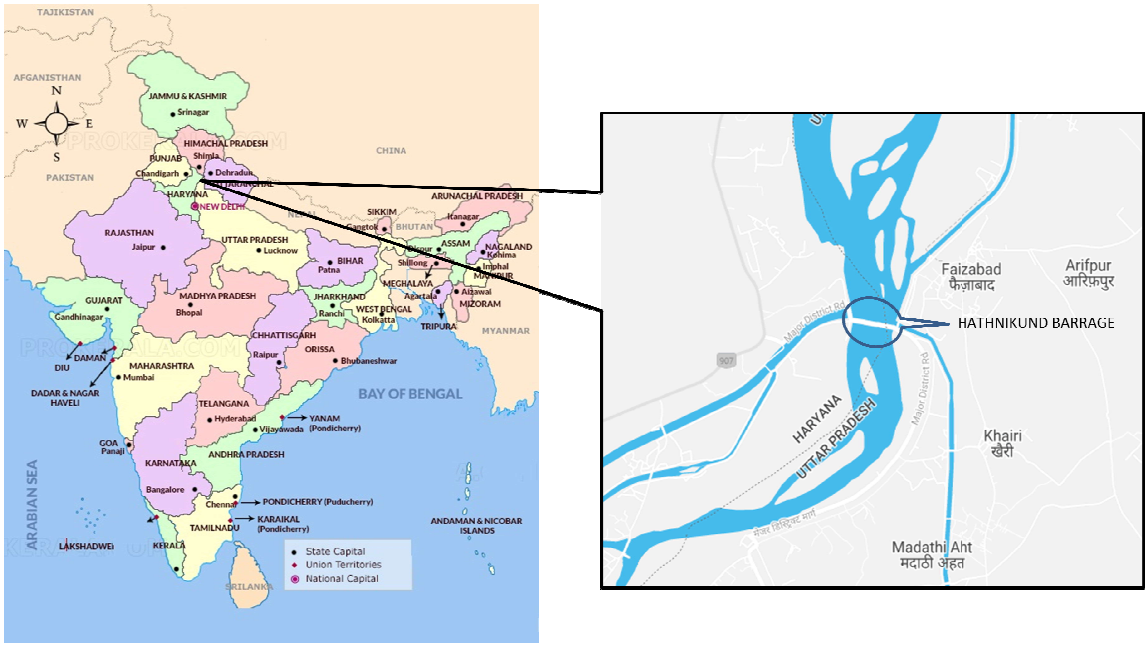
Hydraulic model studies for Hathnikund barrage, Haryana.

The Hathnikund Barrage (HKB) is located on Yamuna River in Yamuna Nagar district of Haryana state, India. The barrage diverts water into the Western Yamuna Canal (WYC) and Eastern Yamuna Canal (EYC) for irrigation purpose. During the floods of the year 2010, the Tajewala weir located about 3 km downstream of HKB which was controlling the TWL of HKB got washed away. This affected the performance of the Energy Dissipation Arrangement (EDA) of HKB.

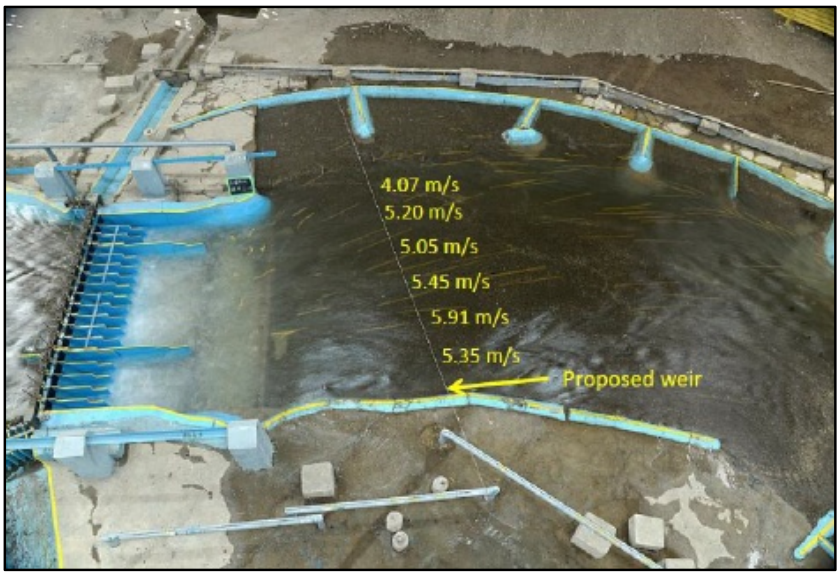
Hence, hydraulic model studies were performed:

- To assess the efficacy of the existing energy dissipation arrangements and suggest additional measures for efficient energy dissipation of the barrage.
- To check the adequacy of various river training measures to reduce the downstream scour.
- To finalize the location and orientation of the proposed weir downstream of Hathnikund barrage to raise the tail water level.

The studies were carried out on the existing model of river Yamuna and HKB constructed to a scale of 1:150 (H) and 1:50 (V) by modifying the downstream topography. Since the new retrogressed water levels were considerably lower than the original water levels, the new TWC at 400 m downstream of HKB was derived using 1-D numerical model HEC-RAS and the same TWC was used in the further studies. The new river bed levels were about 10 to 12 m lower than the original bed, and therefore initially it was decided to provide additional stilling basin with lower apron level. Based on the studies conducted, it was suggested to provide a submersible weir for effective functioning of the energy dissipation arrangement of Hathnikund barrage.



Location Mapof Hathnikund Barrage



Physical model of Hathnikund Barrage (HKB) with proposed submersible weir

Mathematical Model studies for Surge Analysis for Rising Main of TalodhiMokosa Lift Irrigation Scheme Tal. Charmoshi Dist. Chandrapur, Maharashtra.

The TalodhiMokasaLift Irrigation Scheme is located on river Wainganga near village Darshnimal in taluka Charmoshi, Dist. Chandrapur in Maharashtra State. This scheme envisages lifting water from river Wainganga by means of three parallel VT pumps of total discharge 3 m^3/s and the total static lift from the pump sump to the delivery chamber is 30.575 m and with a single rising main of 1350 mm diameter with a static lift of 30.575 m, for irrigation of 9545 Ha of land.Thedistribution point is approximately 3930 m away from the lift point. The scope of work includes providing surge protection devices to mitigate positive and negative water hammerpressures and their tentative locationson the rising main of TalodhiMokasaLift Irrigation Scheme.Surge analysis was conducted using software WH 2.7, which uses an explicit finite difference method for calculating time varying flow and pressure during a time step at each boundary and each conduit section of the water conductor system using the method of characteristics (MOC).

The transient pressures are analyzed for the critical event i.e., tripping of all pump due to power failure without any surge protection devices and with the incorporation of surge protection at critical elevations of the rising main of lift irrigation scheme. Results of surge analysis indicated that unacceptable low and high surge pressures were observed at all locations in the rising main, which indicated the need to provide protective devices to control both maximum and minimum transient pressures. Finally, it was recommended that a total of 7 air valves of the size 200 mm “Kinetic air valve” type, conforming to IS 14845:2000 along with an air vessel of 125 m^3capacity at chainage 10 m were found to be adequate to control the maximum and minimum pressures in the rising main.

TalodhiMokasa lift irrigation scheme Pump House, Dist. Chandrapur in Maharashtra.

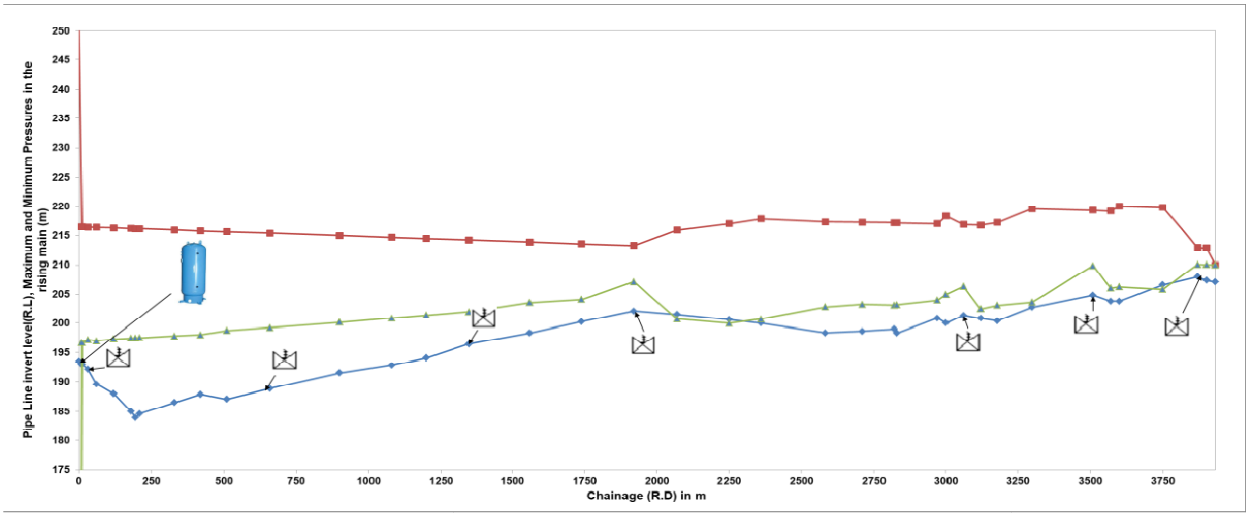


Figure: Maximum and Minimum Pressures along the Rising Main with Air Valves – 7Nos. and AirVessel of 125 m^3 capacity – 1 No

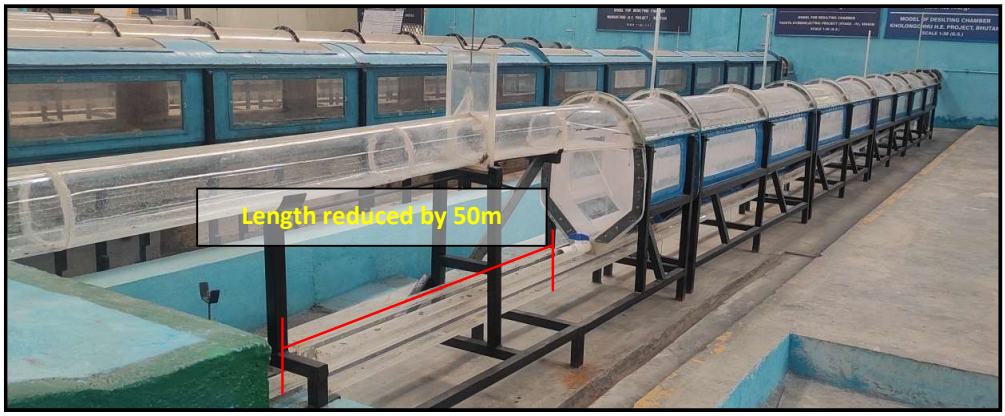
Hydraulic model studies for desilting chamber of Kholongchhu H. E. project, Bhutan

Hydraulic model studies were conducted for the following aspects:

1. Settling efficiency of desilting chamber for 90% removal of sediment size of 0.2 mm and above.
2. Hydraulic performance of inlet transition, outlet transition, settling trench and silt flushing tunnel.
3. Size and spacing of openings connecting desilting chamber with the silt flushing tunnel below.

The studies were conducted on a comprehensive 3-D model that was constructed to a geometrically similar scale of 1:30 based on Froudian criteria. The proposed desilting chamber arrangement comprises two D-Shaped type desilting chambers of 13.0 m (W) X 18 m (H) x 350 m (L) for exclusion of 90% suspended particles coarser than 0.2 mm size. The outcome of study is as outlined below:

1. The length ofeach underground desilting chamber was reduced by 50 m, thereby saving a significant overall project cost. The modified size of 300 m (L) x 13 m (W) x 18 m (H) is adequate for 90% settlement of sediment of size 0.2 mm and above.
2. Performance of other components of desilting chamber viz. inlet and outlet transition, silt flushing tunnel, settling trench and shape of desilting basin was tested on model and found to be satisfactory.
3. Size and spacing of openings connecting desilting chamber with silt flushing tunnel finalized based on model studies.



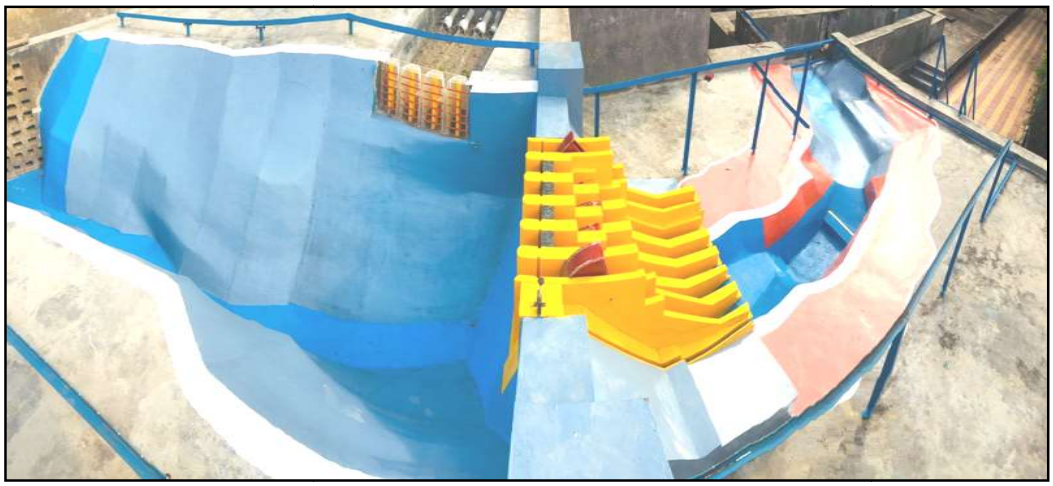
Model of desilting chamber of Kholongchhu H. E. project, Bhutanafter reduction in length

Hydraulic model studies for spillway of Kiru H. E. project, Kishtwar, U.T. of Jammu & Kashmir, 1:75 scale 3D comprehensive model.

The physical hydraulic model studies on 1:75 scale 3-D comprehensive model were performed to understand and estimate the following:

1. Approach flow conditions in the vicinity of power intakes
2. Performance of spillway and energy dissipation arrangement
3. Water surface profiles for the entire range of discharges
4. Flow conditions downstream of spillways

In combined operation of the spillway with the ungated and gated conditions and in the operation of the orifice spillway with gated and ungated conditions from the discharge of 75% of PMF of 10196 m^3/s to 100% PMF discharge of 10196 m^3/s the flow from right bank side orifice spillway and right bank side crest spillway span was grazing the right bank at chainage between 150 m to 200 m downstream of dam axis on a 3-D comprehensive model. Based on the study, it was suggested to provide suitable protection to the right bank between the chainage of 150-200 m downstream of the dam axis.



Physical model of Kiru H.E. Project, J&K.

Site visit by CWPRS team to Kiru H. E. Project, J & K.

TECHNICAL REPORTS SUBMITTED TO CLIENTS

Sl. No.	Title	Division	Report No
1.	Hydraulic model studies for Discharging capacity for full and partial Gate operation for the modified design of Teesta-IV Dam spillway, Sikkim 1:60 Scale, 3-D Comprehensive Model.	SED	6010
2.	Mathematical Model studies for Surge Analysis for Rising Main of TalodhiMokosa Lift Irrigation Scheme Tah. Charmoshi Dist. Chandrapur, Maharashtra.	Pump House	6015
3.	Hydraulic model studies for desilting chamber of Kholongchhu H. E. project, Bhutan	SM	6115
4.	Mathematical model studies for surge analysis of Bambawade lift Irrigation scheme stage-II, part-I TalukaPatan Dist. Satara Maharashtra.	Pump House	6043
5.	Mathematical model studies for surge analysis of Bambawade lift Irrigation scheme stage-II, part-II TalukaPatan Dist. Satara Maharashtra.	Pump House	6044
6.	Mathematical model studies for surge analysis of Tarali Lift Irrigation scheme stage II, Taluka: Patan, District: Satara Maharashtra.	Pump House	6052
7.	Hydraulic model studies for auxiliary spillway with downstream guide wall for Indira Sagar dam spillway, Madhya Pradesh.	SED	6054
8.	Hydraulic model studies for Hathnikund barrage, Haryana.	SMD	6058
9.	Mathematical model studies for surge analysis of modified layout of Dhangarwadi lift irrigation scheme stage-I, Karadtaluka Dist. Satara, Maharashtra.	Pump House	6062
10.	Hydraulic model studies for the spillway of Kwar hydroelectric project, Jammu & Kashmir, 1:70 scale 3-D comprehensive model.	SED	6063
11.	HMS for spillway and power intake of Polavaram irrigation project, Andhra Pradesh, 1:140 scale 3D comprehensive model.	SED	6073
12.	Hydraulic model studies for modified design of spillway and energy dissipater for Devsari H.E. Project Uttarakhand, 1:60 scale 3-D comprehensive model.	SED	6076
13.	Hydraulic model studies for spillway and energy dissipater of Lakhwar multipurpose dam project, Uttarakhand, 1:60 scale 2D sectional model.	SED	6081
14.	Hydraulic model study for Syphon structure on Koparde approach canal, Tarali Irrigation project, Taluka-Patan, District-Satara, Maharashtra, 1:20 scale 3D comprehensive model	SED	6082
15.	Hydraulic model studies for spillway of Kiru H. E. project, Kishtwar, U.T. of Jammu & Kashmir, 1:75 scale 3D comprehensive model.	SED	6097

RIVER AND RESERVOIR SYSTEMS MODELING

Divisions

- Hydrometeorology
- Surface Water Hydraulics / Disaster Management and Planning
- Water Quality Analysis and Modeling / River Rejuvenation

Areas of Specialization/ Expertise

- Rainfall-Runoff and Flood Estimations for River Catchments
- Soil Erosion - Sediment Yield Analysis of River Catchments
- Hydrologic Analysis of Dam Projects
- Flood Forecasting, Extreme Value Analysis (for Peak and Low Flows)
- Water Availability Studies
- Dam Break Flood Analysis
- Determination of Safe Grade Elevation against flooding & Development of Storm Water Drainage System for Power Plants
- Nala Diversion studies
- Physico-chemical analysis, plankton studies
- Mathematical modelling for river and reservoir water quality

Major Clients

- CIDCO, Mumbai
- NPCIL
- WRD, Maharashtra
- Reliance Industries Limited
- Tarapore Atomic Research Station, Maharashtra
- NTPC
- State Irrigation Departments
- Satluj Jal VidhyutNighamLtd.(SJVNL)

Dam break studies and emergency action planning for Kurumurthyraya reservoir, Telangana

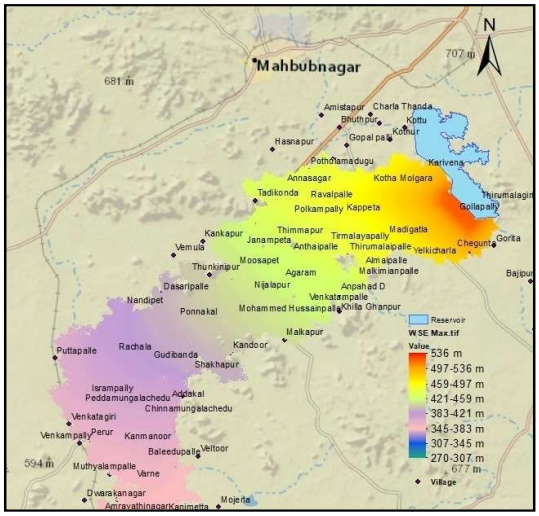
The study consists of dam beak analysis and providing inputs for Emergency Action Planning (EAP) in respect of Kurumurthyraya reservoir under level pool scenario.

The primary objective of the study is to find out the effect of breach of Kurumurthuraya reservoir and estimation of flood levels, water depths, velocities and discharges on the downstream area of the reservoir.

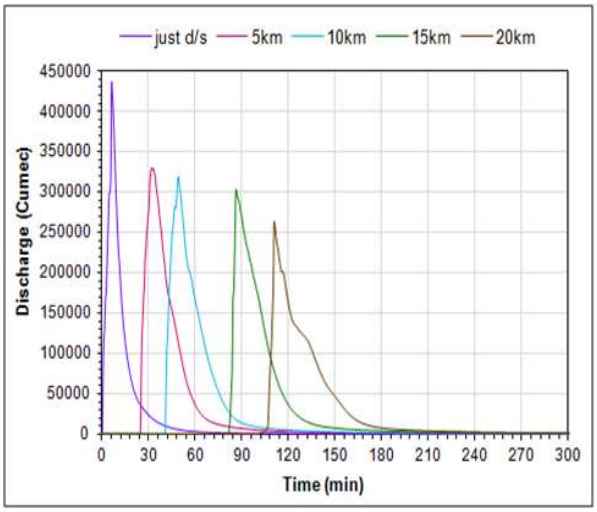
The scope of study is as follows:

1. Estimation of dam break flood hydrograph due to breaching of dam under different scenarios of breaching.
2. Computations of flood levels in the downstream area by routing the dam break flood hydrograph.
3. Demarking the area of inundation at important locations.

The breach parameters estimated for the present study are as per the standard guidelines given in the manual for Dam Break Analysis using Hydrologic Engineering Center - River Analysis System (HEC-RAS) software. The dam break simulations were carried out using the 2-D mathematical model HEC-RAS. Dam break flood hydrograph was estimated. Then the dam break flood hydrograph was routed through the downstream 2-D flow area. The dam break flood hydrograph, stage hydrograph, inundation map, water depth map, velocity map and arrival time map were extracted which can be used as inputs for the preparation of EAP. The inundation maps were superimposed on the base map available with ArcGIS for identification of vulnerable areas. The villages in and nearby the study area were identified and marked on the available base map using Arc-GIS.



Inundation map of downstream of Kurumurthyraya Reservoir



Dam break flood Hydrograph at different Locations D/s of Kurumuthyraya Dam

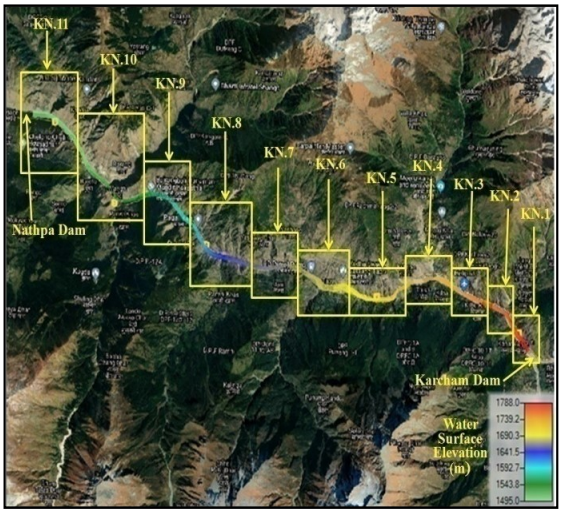
Dam break analysis and flood zone mapping for emergency action planning of Naptha dam, Kinnaur, Himachal Pradesh for M/s SJVN.

Dam Break Analysis for Nathpa dam and flood zone mapping for Satluj river reach from Nathpa to Koldam and hydraulic flood routing study for Satluj river reach from Karcham dam to Nathpa dam was conducted.

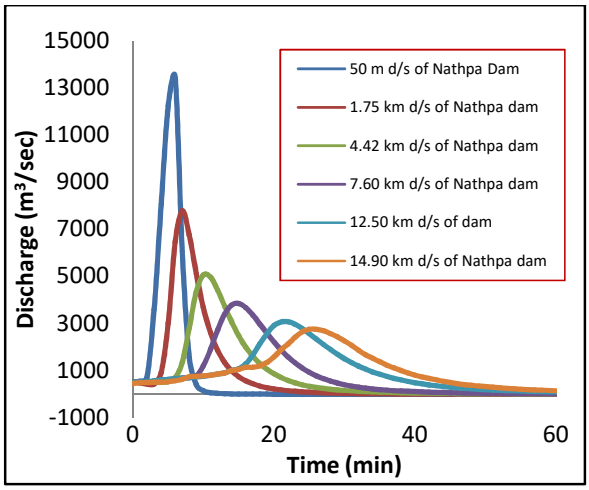
The scope of work for this study is given below:

1. Prediction of flood levels along River Satluj from Karcham dam to Nathpa dam for different releases provided by the project authority.
2. Estimation of dam breach flood hydrographs due to the breach of Nathpa dam.
3. Computation of flood levels in the downstream of Nathpa dam by routing dam breach flood hydrograph and for different releases provided by the project authority.
4. To demarcate the area of inundation at important locations and installations for disaster management and emergency action planning.
5. Providing inputs for the development of Emergency Action Plan in case of dam break.

Dam Break Analysis and flood routing studies have been carried out using HECRAS mathematical model. The flood hydrograph have been generated due to breach of Nathpa dam and routed through downstream reach of River Satluj. Also, flood routing has been carried out from Karcham dam to Nathpa dam for different releases provided by M/s SJVNL. The terrain data of the study area was extracted from Digital Elevation Model (DEM). The breach parameters estimated for the present study are as per the standard guidelines given in the manual for Dam Break Analysis using Hydrologic Engineering Center - River Analysis System (HEC-RAS) software. The dam break simulations were carried out using the 1-D mathematical model HEC-RAS. Dam break flood hydrograph was estimated and was routed through the downstream river channel. The dam break flood hydrograph, stage hydrograph, inundation map, water depth map and velocity map were extracted which can be used as inputs for the EAP. The inundation maps were superimposed on the base map available with ArcGIS for identification of vulnerable areas.



Inundation map of downstream of Karcham Dam uptoNathpa Dam



Dam break flood Hydrograph at different Locations D/s of Nathpa Dam

Site visit of CWPRS team to Naptha Dam

TECHNICAL REPORTS SUBMITTED TO CLIENTS

Sl. No.	Title	Division	Report No
1.	Assessment study for diversion of MahalaniaNala passing over the Chakla Coal Block at Chandwa, Jharkhand.	DMP	6034
2.	Additional assessment study for diversion of river Sukri passing through tubed Coal Block near Latehar, Jharkhand.	DMP	6035
3.	Dam break studies and emergency action planning forKurumurthyraya reservoir, Telangana	DMP	6068
4.	Dam break analysis and flood zone mapping for emergency action planning of Naptha dam, Kinnaur, Himachal Pradesh for M/s SJVN.	DMP	6102

COASTAL AND OFFSHORE ENGINEERING

Divisions

- Ports and Harbours
- Coastal Hydraulic Structures
- Mathematical Modeling Centre
- Coastal Field Instrumentation

Areas of Specialization/ Expertise

- **Physical and Mathematical Model Studies for**
  - Port layouts
  - Shoreline Changes
  - Dredging & Disposal
  - Coastal Protection
  - Breakwaters
  - Safe Grade Elevation
  - Ship Navigation
  - Cooling Water Intake & Outfall
  - Tidal Inlets
  - Coastal Ecology
- **Desk and wave flume studies for**
  - Design of coastal hydraulic structures
  - Design of Coastal protection measures
- **Field investigation for**
  - Hydraulic model studies

List of Clients

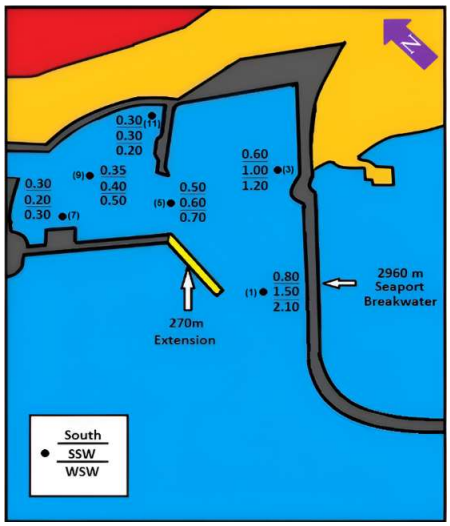
- Major Port Trusts
- WAPCOS
- Indian Navy
- Andaman and Lakshadweep Harbour Works (ALHW)
- ONGC
- Maritime Boards of States
- State Fisheries Departments
- CIDCO
- Vizhinjam International Sea port Limited
- NPCIL

Physical model studies for wave tranquility to assess the effect of Vizhinjam International Seaport, Kerala on the existing fishing harbour.

To study the effects of construction of seaport breakwater and mole on the wave hydrodynamics aspects of the existing fishing harbour and to assess the suitability of new fishing harbourof a major sea port at Vizhinjam in Thiruvananthapuram, District of Kerala. Wave tranquillity studies were conducted in the Multipurpose wave basin (MPWB) Hangar, consisting of shallow wave basin equipped with Random Sea Wave Generation (RSWG) system with SCADA control and multichannel data acquisition system.

Six different scenarios including two remedial measures were analyzed in the present study. The proposed mole of 140m was not effective in providing suitable wave tranquillity at the entrance and at berths. In order to increase the width at the entrance and to provide more comfortable stopping distance,alternative2 with 45 degrees bend of length 270m was evolved to have width more than 180m and more stopping distance.

Physical model for Vizhinjam International Seaport



Remedial measure -2 for all directions

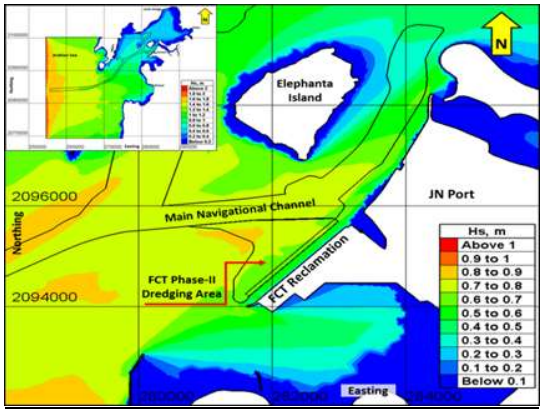
A) Multipurpose Wave Basin Hanger B) Wave Generation System C) RSWG control and DAS Cabin with SCADA System

Wave transformation studies to assess the wave conditions at Fourth Container Terminal (FCT) of Jawaharlal Nehru Port Trust (JNPT)

The Jawaharlal Nehru Port (JN Port), the largest container port of India is situated on the west coast inside the Thane creek at Latitude 18° 56' 43" N and Longitude 72° 56' 24" E. This all-weather port is having access from the Arabian Sea through the main navigational channel which is shared by Mumbai Port and JN Port up to Jawahar Dweep (JD). JN Port has a proposal to develop 2 km long container terminal further on the south of existing terminals in two phases. During Phase-II development, desire to modify the shape of reclamation on leeward side of FCT in order to enhance operability vis-a-vis movement of container on stack-yard and dredged footprint considering the Phase-II deepening of main navigational channel to about 15 m below CD was noted. Hence, mathematical model studies were carried outto assess the wave conditions at Fourth Container Terminal (FCT). By using TOMAWAC (Telemac suite) model, the wave conditions by considering spatially & temporally varying wave & wind climate were determined for past 20 years (1997-2018) taken from NOAA for the Thane creek area.

The studies carried out reveal that Average Significant Wave Height (Hs) at the berth pocket of FCT (16 m w.r.t CD) is about 0.65 m, Av. Wave Period (Tz) = 2.7 sec and is within permissible tranquility criteria, while in manoeuvring area Hs varies between 0.65 – 0.83 m, Tz = 3 sec and mean wave direction 236°- 250° N. Thus 2 km long FCT terminal can be operated round the clock round the year safely except the cyclonic conditions.

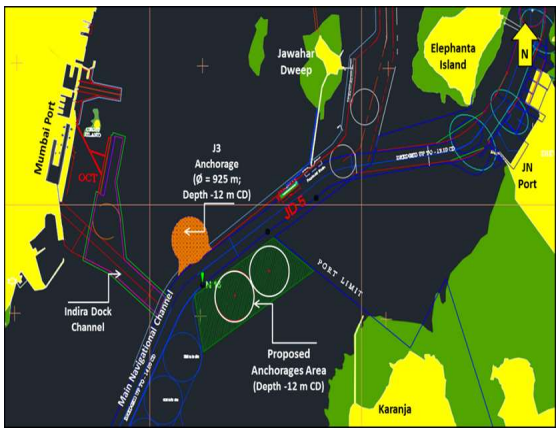
Location of Fourth Container Terminal at JN Port



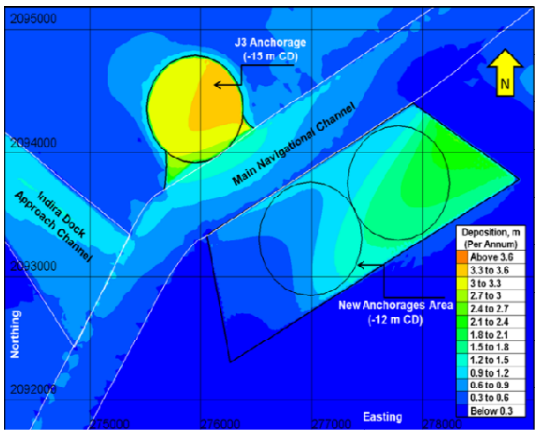
Significant wave height at FCT for predominant wave direction (West)

Mathematical model studies for the development of new anchorages in Mumbai harbour for Mumbai Port

Mumbai Port (MbP) is an all-weather port of India situated on the lee-side of Salsette island in the Thane creek on the West coast of Maharashtra. The mathematical model studies to estimate the likely quantum of maintenance dredging (Siltation) in the proposed 'New Anchorages' as well as in the 'J3' anchorage along the main channel of Mumbai / JN Ports.Telemac-2d &Sisyphe modules (Telemac software suite) were used for the model studies. The coupled tidal hydrodynamic (Telemac-2D) and silt model (Sisyphe) which was calibrated for pre-post dredging data (year 2020) supplied by the Project Authority for main navigational channel (nearby area) was used to estimate the likely rate of siltation per annum in 'New Anchorages' & 'J3' anchorage.The likely rate of siltation in 'J3' anchorage without new anchorages (Dia. 925 m, depth is 12 m below CD) will be about 1.51 M cum per annum. Similarly, the likely rate of siltation in proposed 'New Anchorages' (12 m depth below CD, Dia. 870 m) area and in 'J3' anchorage (dredge depth of 12 m below CD), will be about 2.74 M. cum per annum & 1.62 M. cum per annum respectively.



Layout Plan of 'J3' & Two New Anchorages in Mumbai Harbour

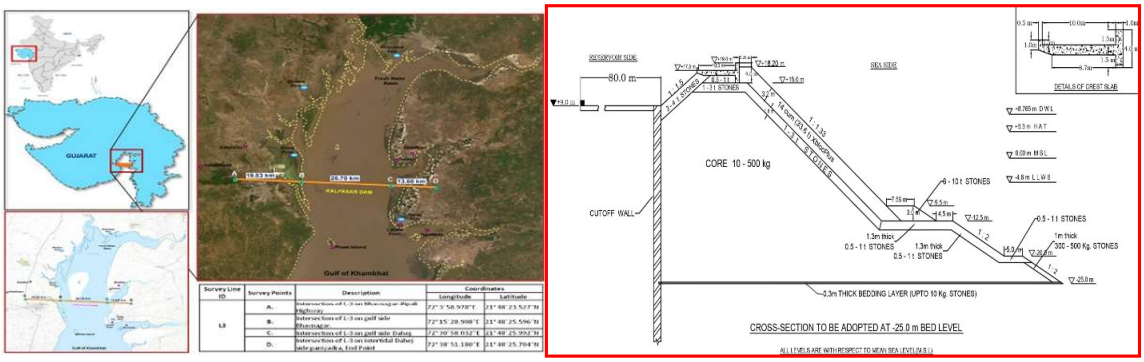


Likely Rate of Siltation per Annum in 'J3' & Two NewAnchorages

Design of seaside dyke for the Kalpasar project, Gujarat

The desk and wave flume studies are being conducted for the design of cross-sections to protect the main dam, Kalpasar Project in Gujarat. The wave flume tests would be carried out with AccropodeTM II and XblocPlus patent blocks suggested by Kalpasar Department.

Wave flume studies have been conducted in Random wave generation basin for different design water levels and wave height conditions.Kalpasar Project envisages construction of a 26.70 km long dam across the Gulf of Khambat (Gujarat) with its extension on either side in shallow water tidal flats having length of about 19.83 km on Bhavnagar side and 13.60 km on Dahej side for establishing a huge fresh water coastal reservoir for irrigation, drinking and industrial purposes.
The maximum Design Water Level (DWL) of +8.765 m with respect to MSL and maximum Significant Wave height (Hs) of 8.10 m have been considered for deign of seaside dyke. The design cross-sections of seaside dyke with AccropodeTM II armour units of 0.50 cum, 3 cum, 6 cum and 14 cum with 1:1.33 slope on sea side at various bed levels from +5.0 m to -25.0 m with respect to MSL have been evolved based on desk and wave flume studies. The design cross-sections of seaside dyke with XblocPlus armour units of 0.75 cum, 3 cum, 6 cum and 14 cum with 1:1.33 slope on sea side at various bed levels from +5.0 m to -25.0 m with respect to MSL have been evolved based on desk and wave flume studies. The top of the parapet provided from el.+12.0 m to el. +19.0 m with respect to MSL.



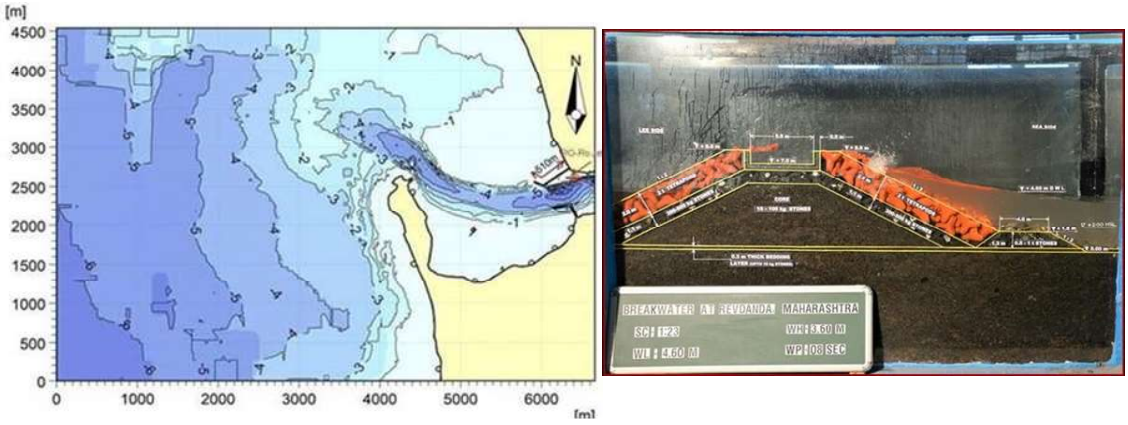
Location map of Kalpasar project, Gujarat Cross section to be adopted at -25 m bed level

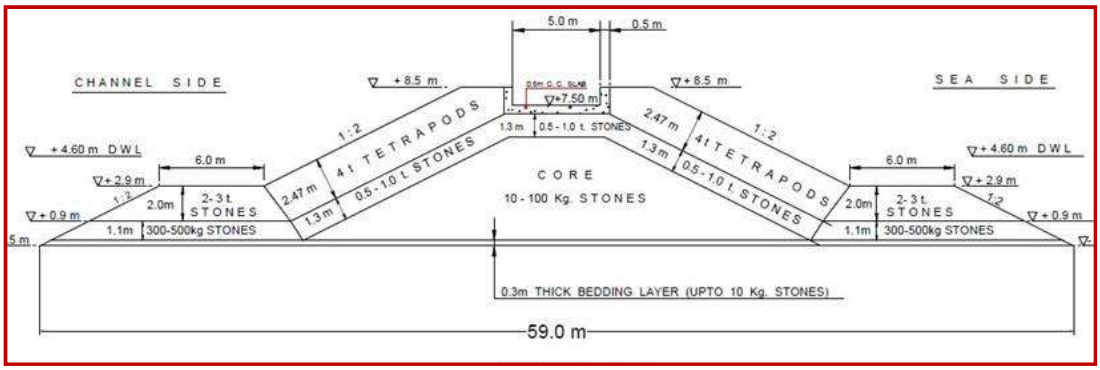
Wave Flume Studies for cross-sections of seaside dyke of Kalpasar project at CWPRS

Desk and wave flume studies for the design of breakwater for Ro-Ro jetty at Revdanda, Alibaug, District, Raigad, Maharashtra

The desk and wave flume studies for the design of breakwater / bank protection structure for RO-RO jetty at Revdanda, Alibaug, district Raigad, Maharashtra.Using desk and wave flume studies the cross-sections of breakwater / bank protection would be evolved based on empirical methods and with experience of CWPRS of coastal hydraulic structures. The hydraulic stability of the Breakwater section would be confirmed through wave flume studies for different design water level and wave height conditions.

Maharashtra Maritime Board proposed to expand the jetty and at the mouth of Revdanda creek and proposes to develop a RO-RO terminal at the north side of the existing JSW jetty. Based on the mathematical model studies carried out at CWPRS, a total breakwater / bank protection structure of length of about 510m extending up to about -0.50 m depth contour have been suggested to arrest the prevailing littoral drift. Based on desk and wave flume studies, the designs of cross sections of breakwater/bank protection at different bed levels with stones/tetrapods in the armour layer have been evolved. It is proposed to provide 5 m wide crest slab at +7.50 m level with parapet wall with top level of +8.50 m for round head section with 4 t tetrapods and 2 t tetrapod for trunk section in armour layer. The hydraulic stability of the breakwater has been confirmed through the wave flume studies with the maximum breaking wave height of 3.60 m (Hb) considering the Design Water Level (DWL) of + 4.60 m at 0.0 m bed level.

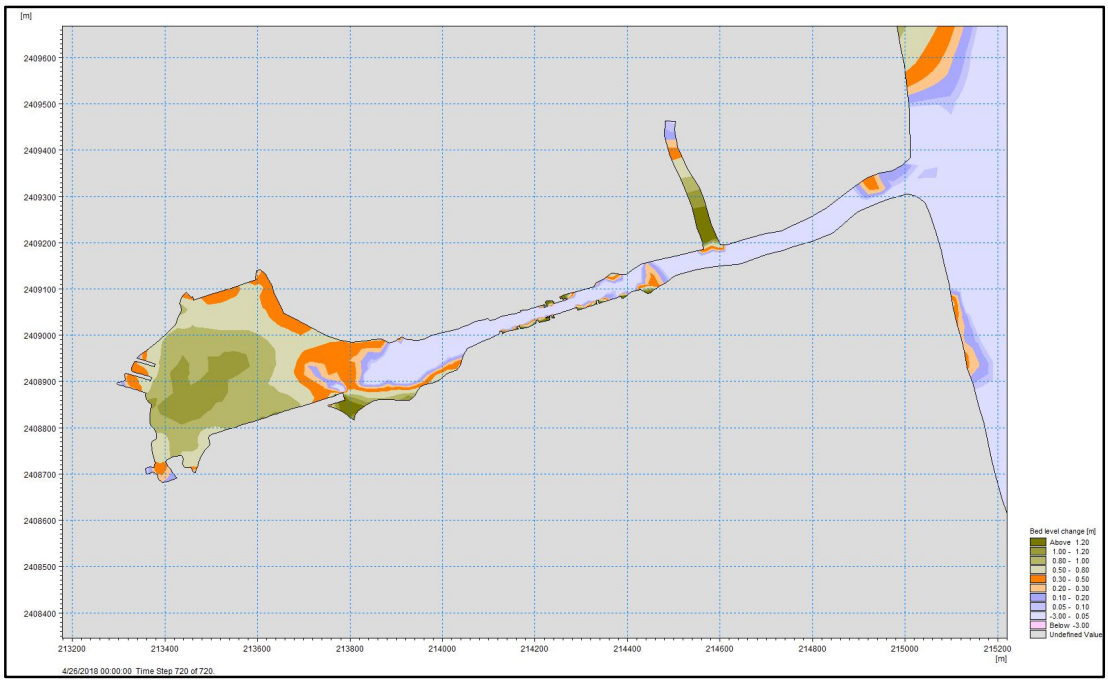




Mathematical model studies for evaluating hydrodynamics and sedimentation for estimating dredging operation in the port of Bhavnagar, Gujarat, for GMB.

Bhavnagar is a city in the Bhavnagar District of Saurashtra region in the Gujarat state of India. Bhavnagar port is an all-weather port owned and operated by Gujarat Maritime Board (GMB) located in the Gulf of Khambhat at Long 72° 14' E and Lat 21° 45' N. The port offers direct berthing facility to small vessels. The port is operated through a Lock gate system to maintain the required tidal water level for navigation in the basin. The lock gate is opened during flood tide for a period of 3-4 hours when water level rises to 5 m above CD and then closed for a period of 8-9 hours to maintain the water level inside the port basin. The basin during this period is used for the purpose of navigation and loading/unloading of vessels mainly barges. Once the gate is opened during high water the suspended sediment load enters into the basin with high speed and tends to settle down naturally at low speed when the gate is closed causing severe sedimentation in the area. It was also observed during the site visit of CWPRS officers that water in the creek region and basin area was highly turbid indicating presence of high suspended sediment concentration. The mathematical model studies for hydrodynamics and sedimentation were carried out for the Bhavnagar Port area. MIKE21 HD and MIKE21 MT models were used for simulation of hydrodynamics and sedimentation in and around the port area. From hydrodynamic studies, it is noticed that flow direction is almost parallel to the depth contours and no cross flow exists. The current velocity at CM1 location was observed to be in the order of 0.034 m/s to 1.65 m/s and at CM2 location was in the order of 0.014 m/s to 2.22 m/s. Sedimentation studies indicates that there is considerable amount of sediment depositing in the port basin being attributed due to the high-water flow carrying sediment load inside the port basin. The average depth of sediment deposition varies from 0.1 m to 1 m in a period of 30 days. The rate of sediment deposition in a period of one month is calculated to be about 72845 m3. In order to maintain the sufficient navigational depth in the basin regular maintenance dredging in the port area would be required.

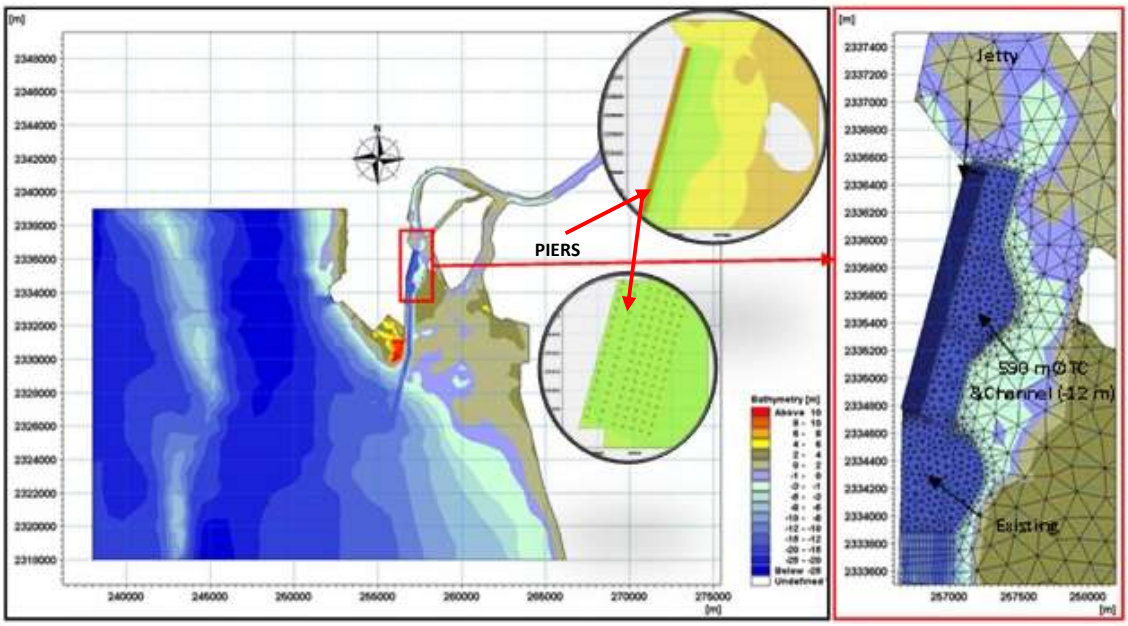
Location Map of Proposed Site at Bhavnagar



Sedimentation Pattern in port basin under Existing Condition

Mathematical model studies to assess hydrodynamics and sedimentation due to proposed jetty at northern side of existing turning circle and its impact on Essar Bulk terminal for M/S. EBTL Hazira, Gujarat.

Essar Bulk Terminals Limited (EBTL), an Essar Group Company, operates a Port Terminal at Hazira on the western shore of the Tapi estuary, Gujarat. EBTL requested CWPRS to carry out the mathematical model studies to assess hydrodynamics and sedimentation due to proposed development at the northern side of existing turning circle and its impact on Essar Bulk Terminal facilities. The mathematical model studies for hydrodynamics and sedimentation were carried out with existing conditions and with proposed development. Model studies carried out with the proposed development (1778 m x 40 m Jetty supported by Piles, 100 m x -15.6 m channel along the jetty, 590 m Ø turning circle and approach channel of -12 m deep) in the computational model. Due to proposed development (Proposal-2) there is significant reduction in current at the locations t1, t2, t3 and t5 of about 0.58 m/s, 0.36 m/s, 0.19 m/s and 0.14 m/s respectively during monsoon season and about 1.05 m/s, 0.92 m/s, 0.27 m/s and 0.15 m/s respectively during non-monsoon season as compared to that of proposal-1. It is also observed that there is slight increase in current at the locations t4 and t6 during both monsoon and non-monsoon seasons as compared to that of proposal-1. The increase in magnitude of current of about 11% at location t4 (in berthing pocket) due to proposed development as compared to that of Proposal-1 in both the seasons. It is also observed that the flow is parallel to the berthing pocket (t4) before the proposed development but there is a tilt in the flow direction of about 12º (during flooding and ebbing) w.r.t true North after the proposed developments in both the seasons.From the sedimentation studies it is observed that the annual siltation in the EBTL approach channel including turning circle is estimated to be about 6.85 Mm3. As a result of proposed development there is an increase in annual siltation in the EBTL area.



2D View of Computational Model- (Proposal-2)

TECHNICAL REPORTS SUBMITTED TO CLIENTS

Sl. No.	Title	Division	Report No
1.	Mathematical model studies for the hydrodynamics and sedimentation for the proposed fisheries harbour at Anjarle Ratnagiri Dist. Maharashtra.	PH-I	6018
2.	Mathematical model studies for evaluating hydrodynamics and sedimentation for estimating dredging operation in the port of Bhavnagar, Gujarat, for GMB.	MMCE-II	6020
3.	Desk and wave flume studies for the design of protection structure/breakwater with Xblocplusarmour units to the proposed main dam of Kalpasar Project, Gujarat.	CHS-II	6021
4.	Mathematical model studies for Hydrodynamics and estimation of sedimentation for the old port at Bedi, Gujarat.	MMCE-II	6022
5.	Field investigation and mathematical model studies for coastal processes, shoreline changes and associated sediment transport along Karnataka coast.	PH-II	6023
6.	Mathematical Model Studies for wave tranquility and shoreline changes due to proposed construction of Groyne Type of Anti-Erosion bund for Development of Fishing Harbour at Mulgaon, TalukaShrivardhan, District Raigad, Maharashtra.	PH-I	6029
7.	Mathematical Model Studies For Storm Wave Hindcasting& Storm Surge And Review Of Safe Grade Elevation For Barc At Trombay, Mumbai.	MMCE	6030
8.	Desk and wave flume studies for the Design of Breakwaters for the Development of Fishing Harbour at Arjipalli (Gopalpur), Ganjam District, Odisha.	CHS-II	6032
9.	Mathematical model studies to assess hydrodynamics and sedimentation due to proposed jetty at northern side of existing turning circle and its impact on Essar Bulk terminal for M/S. EBTL Hazira, Gujarat.	MMCE-II	6033
10.	Mathematical model studies for wave tranquillity and shoreline evolution for development of fisheries Harbour at Arjipalli, Odisha.	MMCE-II	6036
11.	Field data collection and mathematical model studies for development of proposed Jetty for M/S Dev salt Pvt. Ltd. at Morbi, Gujarat.	PH-I	6037
12.	Physical model studies for wave tranquilityfor development of port infrastructure at Kamorta bay, Andaman-Lakshadweep harbour works.	PH-I	6041
13.	Wave tranquility studies on upgraded physical model of Kamarajarport Chennai, Tamil Nadu.	PH-II	6042
14.	Mathematical model studies for wave tranquility to assess the effect of development of Vizhinjam Seaport (V&S) on fishing harbor, Kerala.	PH-I	6045
15.	Desk and wave flume studies for the design of breakwater bank protection for the development of fishery harbour at MulgaonDistrict Raigad, Maharashtra.	CHS-II	6046

16.	Mathematical model studies for the shoreline changes for the proposed development of fishing harbour at Alvedande, Uttarkannada Dist. Karnataka	PH-I	6055
17.	Wave transformation studies to assess the wave conditions at fourth container terminal (Phase-II) at JN port.	PH-III	6056
18.	Mathematical model studies for Hydrodynamics and sedimentation for development of fishing harbour at Alvedande, Uttar Kannada Dist. Karnataka.	PH-I	6060
19.	Mathematical model studies for wave hindcasting and storm surge analysis for proposed development of multipurpose harbour at Maipe, Karnataka.	PH-I	6061
20.	Mathematical model studies for wave hindcasting and storm surge analysis at Byndur Karnataka.	PH-I	6064
21.	Mathematical model studies for the development of new Anchorages in Mumbai harbour for Mumbai Port.	PH-III	6065
22.	Mathematical model studies for hydrodynamics and sedimentation for the proposed expansion of jetty at Salaya, Gujrat for M/s. Essar Bulk Terminal, Salaya Ltd.(EBTSL)	MMCE-II	6067
23.	Mathematical model studies for wave tranquillity and shoreline changes for proposed development for Ro-Ro jetty at Revdanda, Tal. Alibaug, District Raigad, Maharashtra.	PH-I	6072
24.	Desk and wave flume studies for the design of breakwaters for development of fishery harbor at Alvedande, Uttara Kannada district, Karnataka.	CHS-II	6074
25.	Mathematical model studies for wave tranquillity for fish landing center at Bhatodi and UttanPatan, Thane District, Maharashtra.	PH-II	6075
26.	Desk study for analysis prototype data on beach profiles at project Varsha.	PH-II	6080
27.	Desk and wave flume studies for the design of breakwater for Ro-Ro jetty at Revdanda, Alibaug, Dist. Raigad, Maharashtra.	CHS-II	6086
28.	Desk studies for the design of coastal protection work at Silver beach, Erangal beach and Danapani beach at Mumbai suburban, Maharashtra.	CHS-II	6087
29.	Mathematical model studies for estimation of littoral drift and shoreline changes for the proposed development of marine infrastructure at Mazgaon dock, Ship builders Ltd, Mumbai.	PH-II	6088
30.	Desk and wave flume studies for the design of coastal protection work from Bhidia village to Somnath temple, Taluka Veraval, Dist. GirSomanath, Gujarat.	CHS-I	6090
31.	Desk and wave flume studies for the design of offshore breakwater at Janjira fort in Raigad district, Maharashtra.	CHS-I	6092
32.	Mathematical model studies for hydrodynamic and sedimentation for development of jetty and cruise terminal at Bhagwatibunder in Ratnagiri District, Maharashtra.	PH-I	6096
33.	Mathematical model studies for wave tranquillity for proposed development of Belekeri fishing harbour in AnkolaTaluka of Uttar Kannada, Karnataka.	PH-I	6099
34.	Mathematical model studies for assessment of wave tranquillity for proposed development of integrated GurupuraNetravati at Old	PH-I	6100

	Manglore , Karnataka.		
35.	Physical hydraulic model studies to assess the impact of proposed capital dredging on coastal hydrodynamics at Naval Dockyard Mumbai.	PH-II	6106
36.	Mathematical model studies to assess the wave conditions for extension of existing jetties at Bandra for MSRDC, Mumbai.	PH-III	6107
37.	Mathematical model studies to assess the flow conditions for extension of existing jetties at Bandra, Mumbai.	PH-III	6108
38.	Desk and wave flume studies for the design of breakwater for the development of fishery harbour at Belekrri, Uttara Kannada, Dist. Karnataka	CHS-II	6111
39.	Wave flume studies for the design of breakwaters for greenfiled port at Ramayapatnam, Nellore Dist., Andhra Pradesh	CHS-II	6112
40.	Mathematical model studies for evaluating hydrodynamics and sedimentation for estimating dredging operation in the port of Navlakhi, Gujarat for GMB	MMCE	6117
41.	Desk studies for the design of seawall at Okha, Porbandar, Gujarat	CHS-I	6119
42.	Desk and wave flume studies for the design of breakwater at Neil Island, Andaman &Nikobar Islands	CHS-I	6120
43.	Desk studies for the design of coastal protection work for 30" DPPL CNG pipeline near Dabhol, Dist. Raigad, Maharashtra	CHS-I	6121
44.	Mathematical model studies for hydrodynamics and siltation for fish landing centre at Navabag, Vengurla, Maharashtra	PH-II	6122
45.	Physical hydraulic model studies for the construction of wharf at naval dockyard and jetty at Karanja Naval Station, Mumbai	PH-III	6123
46.	Mathematical model studies for assessment of wave tranquility for the development of multipurpose harbour for Marina facility at Byndoor, Karnataka	PH-I	6124
47.	Mathematical model studies for hydrodynamics and sedimentation for the development of Ro-Ro jetty at Revadanda, Tal. Alibag, Dist. Raigad, Maharashtra	MMCE-I	6125
48.	Mathematical model studies for wave tranquillity and shoreline changes due to proposed development of captive passenger jetty at Theronda village at Alibag, Dist. Raigad, Maharashtra	PH-I	6126

Foundation and Structures

Divisions

- Geotechnical Engineering
- Structural Modelling Analysis
- Concrete Technology

Areas of Specialization/ Expertise

- Analysis and Interpretation of instrument data of concrete gravity dam and power house
- 2D & 3D stability and stress analysis of Gravity dam by FEM
- Measurement of strains on Penstock bifurcation, manifolds, penstock ferrules, water pipe line ferrules etc.
- Assessment of suitability of materials for rehabilitation of distressed hydraulic structures
- Temperature control studies for mass concrete gravity dams
- Stability of slopes and settlement analysis

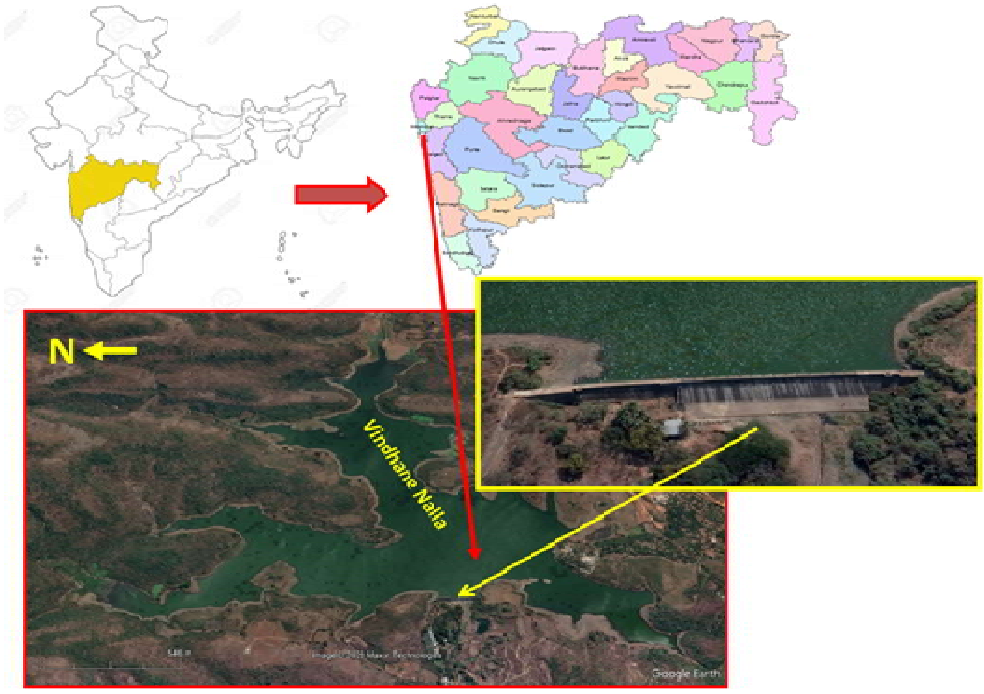
List of Clients

- State Government Authorities
- Polavaram Irrigation Project Head Works, Andhra Pradesh
- Sardar Sarovar Narmada Nigam Limited, Gujrat
- Satluj Jal Vidyut Nigam Limited, Himachal Pradesh
- Karnataka Neeravari Nigam Limited, Karnataka
- Indian Railways

Studies for determining In-situ strength parameters of MIDC Ransai masonry dam, Dist. Raigad, Maharashtra.

The Maharashtra Industrial Development Corporation (MIDC) has constructed Ransai Damacross Vindhane Nalla at village Pohi, Taluka – Uran, District - Raigad, Maharashtra for cateringwater supply demand of NAD, MSEB (GTP), ONGC, UMC and en-route villages. Constructionwork of this dam of 1st stage up to RL 30.48 m was started in 1967 and completed in 1970.During the year 1981, fifteen number of spillway gatesof size 6 X 2 m(Godbole type)at RL37.20 m have been provided. The dam is of masonry gravity type rested on basalt rock. Themaximum height above the lowest point of foundation is 24.40 m and total length of dam is 234.75 m. The length of over flow section is 91.46 m. The Gross Storage Capacity of the dam is 10 Mm^3 and effective storage capacity is 8.55 Mm^3.

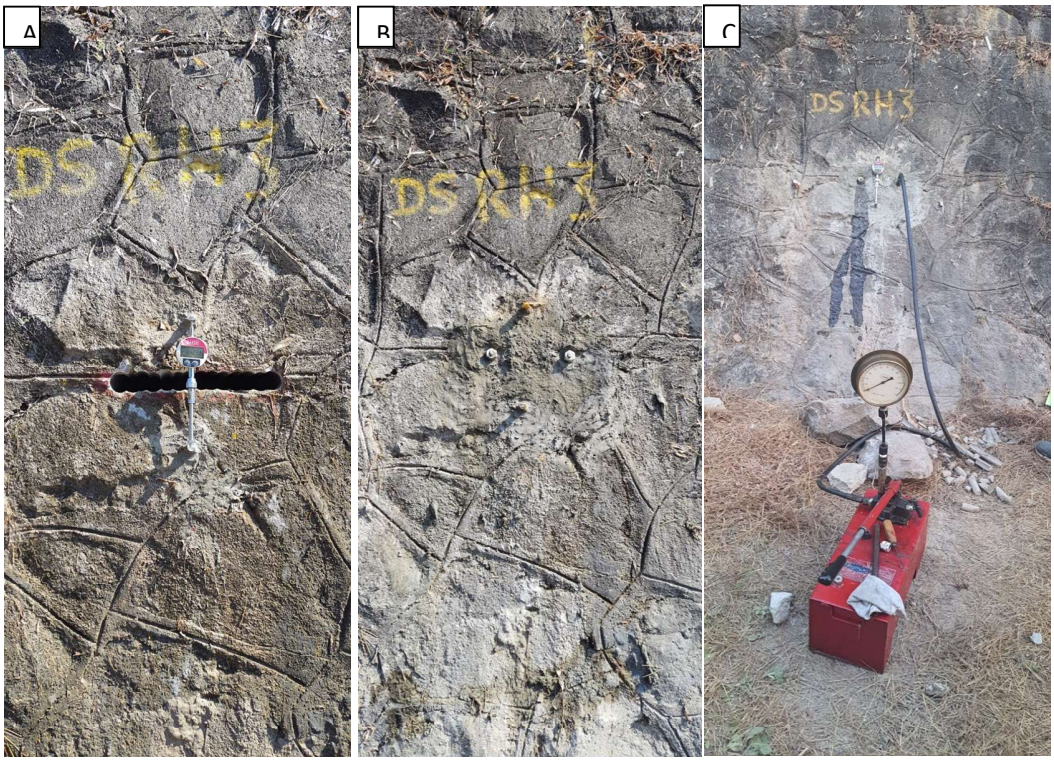
In the monsoon season, lot of water overflows over the spillway and flows downstream of dam. Scope of the study was to determine the properties of masonry at several suitable locations in the dam by conducting in-situ Flat Jack tests. The evaluated in-situ parameters were observed to be in permissible limit and dam masonry found to be of good quality.



Index plan with Google imagery of Ransai Dam

Top view of Ransai Dam

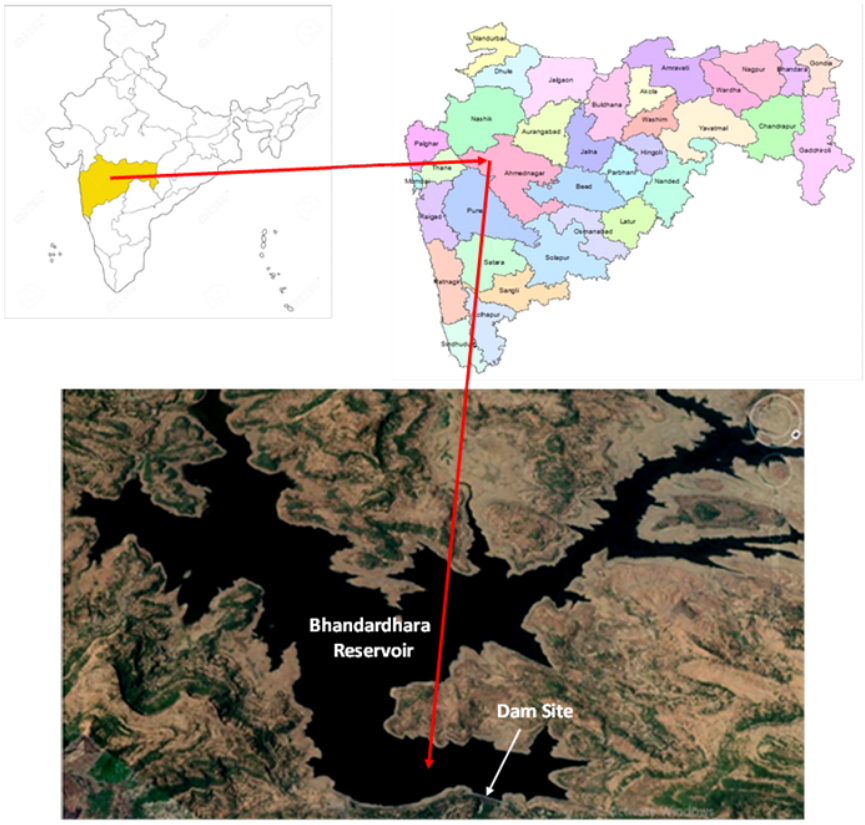
Downstream: view of Ransai Dam



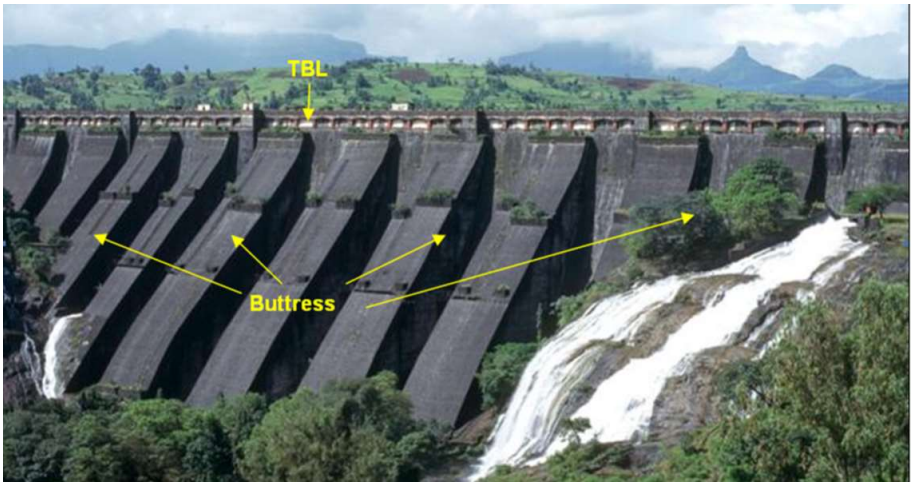
Flat Jack test carried out at Ransai masonry dam

Determining In-Situ Stiffness Parameters by Flat Jack Test of Bhandardara Masonry Dam, Tal. Akole, Dist. Ahmednagar, Maharashtra

Bhandardara Dam also known as Wilson Dam built across Pravara River (Tributary of Godavari), is located in Ahmednagar district of Maharashtra. It is more than 96 years old dam. The height of the dam at lowest foundation level is 82.32 m and is having a length of 507 m. The overflow section consists of 2 nos. of spillway gate with 12.50 M X 7.93 m size. Due to ageing, several distresses were observed in the past and buttresses were added to strengthen the dam. During recent inspection, significant seepage and leaching of material through dam body have been observed. These distresses have warranted to carry out structural safety audit of the dam using in-situ properties of dam body material. The in-situ strength parameters have been estimated by conducting flat jack tests at site in the dam body. The average deformation modulus of elasticity, Em values computed for upstream and downstream face is 9.19 GPa and 9.37 GPathe average Secant modulus of elasticity Ems for upstream and downstream face is 9.64 GPa and 10.42 GPa. Average Poisson's ratio values by flat jack test for masonry is 0.149. The range of Evaluated Compressive Strength of Masonry for applied pressure is between 45.24 to 66.11 Kg/cm^2. Similarly Evaluated Compressive Strength for Buttresses are 86.67 and 78.54 Kg/cm^2.

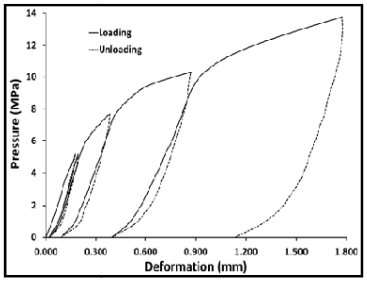


Index plan with Google imagery of Bhandardara Dam

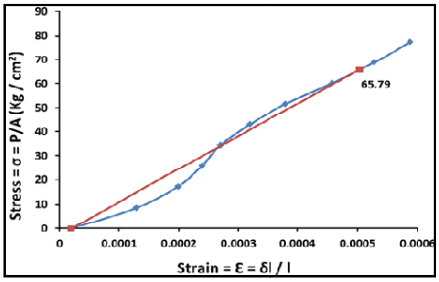


Downstream view of Bhandardara Dam

Flat Jack test set up



Typical Strain-Stress Envelope

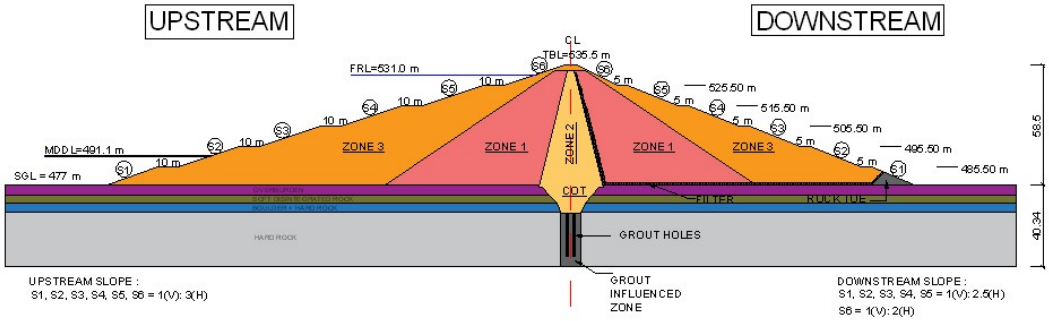


Typical Secant modulus of Elasticity

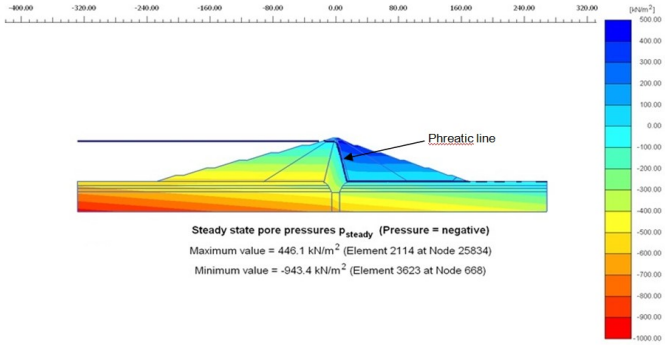
Geotechnical seepage and stability studies for zoned earth dam of Kurumurthiraya reservoir, Telangana

Geotechnical studies for Kurumurthiraya earthen dam of PalamuruRangareddy Lift Irrigation Scheme (PRLIS), Telangana were conducted. Aim of the study was to determine safety of the dam from seepage and stabilitypoint of view and recommend suitable remedial measures if required. Seepage analysis using software PLAXIS 2D for steady state and drawdown conditions was conducted to establish seepage parameters in various zones of the dam. Slope stability analyses using limit equilibrium method were conducted to determine factor of safety. Results of studies indicated that the dam sections were safe from slope stability point of view and no remedial measures for stability were required. Other recommendations regarding seepage prevention, suitability of soil material for construction, rim stability studies and instrumentation of the dam were also made.

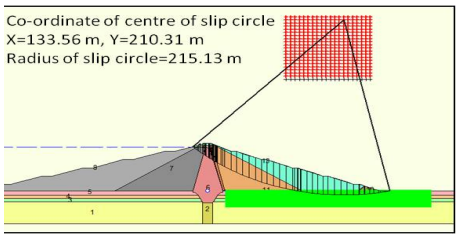
Kurumurthiraya earthen dam



Design of dam section 'III' (Package 14, Reach 'III' and 'IV')



Steady state pore pressure contours for section 'III'



Slope stability analysis of section 'III' for Steady seepage (FS = 1.51)

3D stress analysis by FEM of one penstock bifurcation, Arun-III, HEP, SJVN Ltd., Shimla, Himachal Pradesh

Arun 3 is a runoff river type hydro electric project being constructed in eastern Nepal on Arun river by SJVN limited. Water from the dam reservoir is taken through water conductor system to generate 4 x 225 MW Power. Due to complex geometry of the penstock bifurcation, structural analysis of such complex structure with conventional analytical approach is very much challenging and often results in very approximate estimation of stresses Three-dimensional (3D) Stress Analysis by FEM of one penstock bifurcation for loading conditions consisting of external pressure case, internal pressure case, external-internal pressure case and pressure transfer to surrounding concrete with limiting thickness of 38mm case, has been carried out. The penstock bifurcation consisting all features has been discretized into 12,820 four noded linear shell elements using 13084 nodes by including all the details using ABAQUS general purpose Finite Element software. Studies showed that the principal stresses exceeded allowable limits under both internal and external pressure in the designed bifurcation. Therefore, thickness of various components of the bifurcations has been optimized through several trials of stress analysis by keeping the stresses within allowable limits under full internal design pressure. Suitable remedial measures have been suggested for relieving external pressures through vertical holes over the penstock bifurcation.

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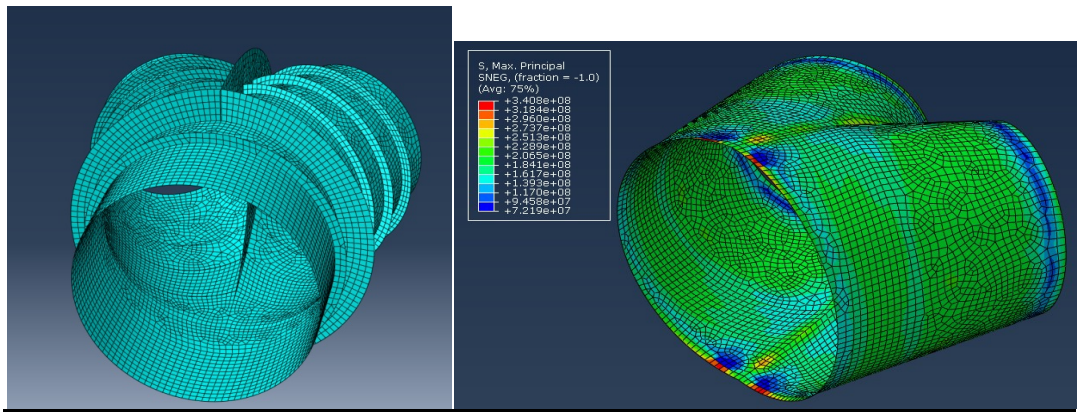
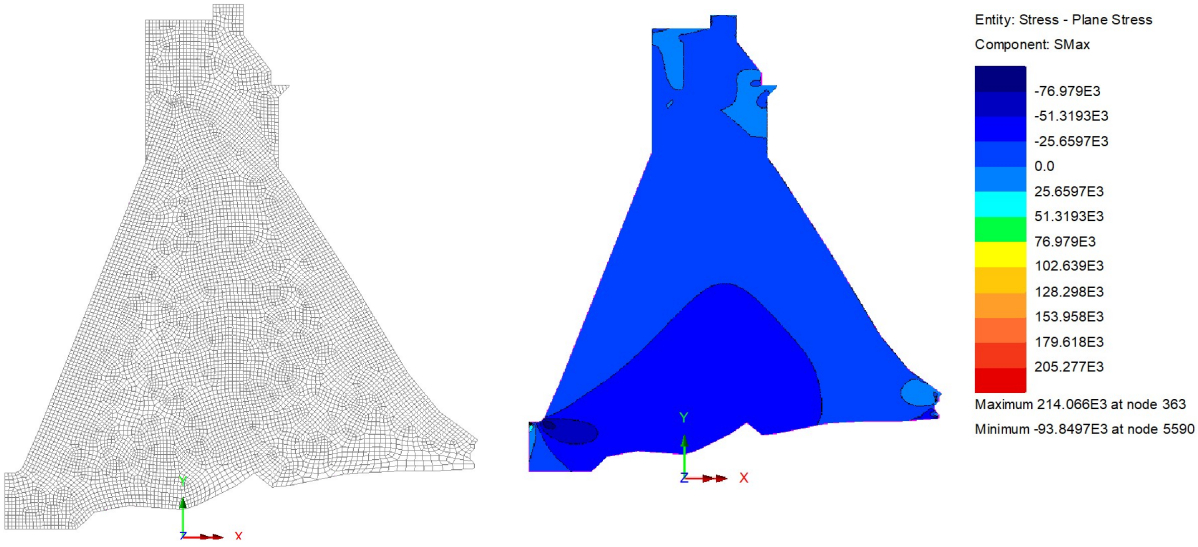


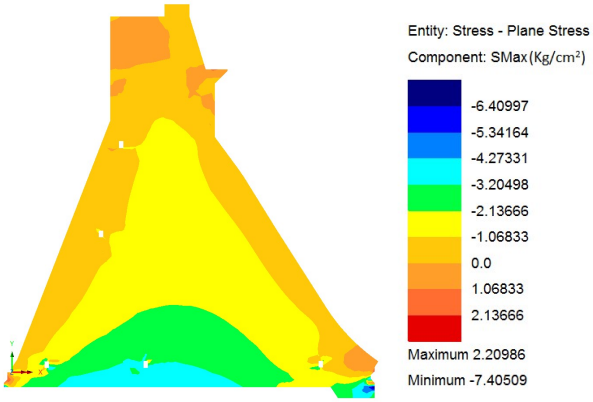
FEM model & Distribution of Maximum Principal Stress in Branch Pipe

2D stress analysis of FEM of 3 Sections namely block No. 35, 44 & 47 of SardarSarovar dam SSNL, Gujarat.

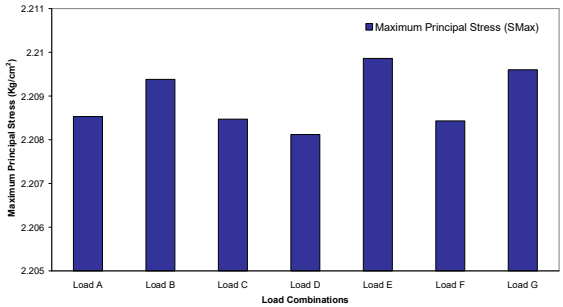
The scope of the study includes to carry out Two-dimensional (2D) Stress Analysis by Finite Element Method of Spillway Block No. 35 under various load combinations as per criteria based on IS: 6512-1984, IS: 1893-1984 (revised in 2002 and 2016) by considering x-section and data as per drawings, material properties and site specific seismic coefficients as supplied Project Authority and submission of final technical report based on results of analysis. It has been observed that under all load combinations, various stresses, displacements and strains are well within the limits indicating elastic and normal behavior of the dam.It is suggested that in future, stress analysis of dam blocks should be carried out by using in-situ dam body as well as foundation rock mass properties. The in-situ properties may be determined by testing extracted cores from dam body and foundation galleries into the rock mass up to adequate depth into the firm rock strata.



FEM model & Distribution of Maximum Principal Stress in Load Condition B



Maximum Principal Stress Distribution in Dam Body under Load Combination E

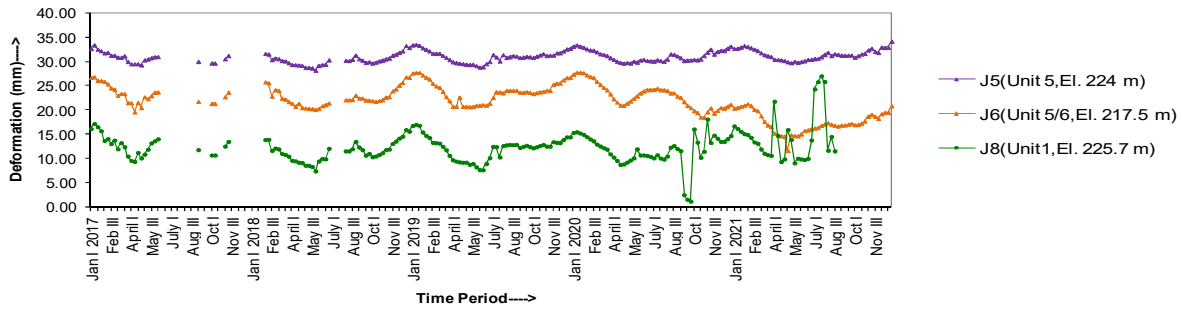


Peak Value of Maximum PrincipalStress under seven Load Combination

Analysis and interpretation of instrumentation data of power house for the period January 2021 to December 2022, Indira Sagar Power Station, Narmada Nagar, Khandwa, MP

The 92-meter high and 653 meter long Indira Sagar dam, is a concrete gravity dam across river Narmada in Madhya Pradesh. In order to long monitoring of structural behaviour of the dam, various instruments have been installed in Block No.13 & 25 of the Dam at different levels and varying distances from dam axis and in Power house also during construction. The studies include detailed analysis and interpretation of the recorded data through plotting of various parameters along with reservoir water level Vs time, 2D Stress analysis by FEM of dam block for various load combinations, interpretation of results and comparison with design / theoretical values. Based on detailed analysis, It is observed that the structural behaviour of the dam during the period January 2020 - December 2020 and Power House structure during the period January 2022 - December 2022 remain normal except development oh high uplift pressure in toe region of the Non overflow block of the dam.

Panoramic View of Indira Sagar Power House with Dam



Variation of relative vertical deformation

LABORATORY STUDIES FOR DESIGNING SUITABLE CEMENTITIOUS GROUT MIX FOR CONTROLLING SEEPAGE THROUGH DAM BODY OF BHATSA DAM, THANE, MAHARASHTRA

Bhatsa dam, is a masonry gravity dam of height 88.5 m and length 959 m and is constructed with U.C.R. masonry with C.M. 1:3 to 1:5 on Bhatsa river near Shahapur, Thane district of Maharashtra state. Bhatsa dam is the major source of water for MCGM (Municipal Corporation of Greater Mumbai) and TMC (Thane Municipal Corporation). The gross storage capacity of the reservoir is 976.10 M. Cum, live storage capacity is 942.10 M. Cum and the catchment area of the dam is about 388.50 Sq. Kms. The Dam has 5 Nos. of Radial gates of sizes 12 m x 8 m provided between ch.365 to ch.443 m. The work of the dam construction was completed during the year 1983. To control seepage, gunitting was provided on upstream face of the dam during construction of the dam. Due to seismic activities in the Thane region, non-overflow portion of the dam has been strengthened against earthquake forces by adding buttresses during the year 1990. Due to ageing, distresses in the form of heavy seepage and leaching of mortar have been observed in the galleries of the dam as well as on downstream face including buttresses throughout the height and along the full length of the dam. Based on the suggestions given by CWPRS Scientists, laboratory studies towards cementitious grout material mix design for controlling seepage through dam body of Bhatsa dam, Maharashtra has been undertaken by CWPRS, Pune. Laboratory studies have been conducted on many combinations of mix design by varying proportions of cement, flyash, silica fume, admixtures and quantity of water. The grout mix design has been carried out after satisfying most of the requisite criteria about strength, flowability, impermeability, segregation and bonding with the masonry. Considerable reduction in seepage has been observed particularly in Monolith No. 25 after carrying out 40% primary grouting since from chainage 838 m to 738 m out of the 39 holes drilled, grouting has been carried out in 16 holes up to a depth of 1.50 m above foundation gallery. As per the data available at site, the seepage has been observed to reduce from 73,542 LPM during June 2018 (RWL @ 134.26 m) to 53,951 LPM (RWL @ 134.53 m) during Jan 2020.

Downstream view of dam before and after preliminary grouting

TECHNICAL REPORTS SUBMITTED TO CLIENTS

Sl. No.	Title	Division	Report No
1.	Analysis and Interpretation of Instrumentation Data of Power House for the period Jan 2021 to Dec 2021 Indira Sagar H.E. Project, M.P.	SMA	6012
2.	Geotechnical Seepage studies for Zoned earth dam of Kurumurthiraya Reservoir, Telangana.	GE-II	6017
3.	Analysis and Interpretation of Dam Instrumentation Data for the period January 2019 to December 2020 of Indira Sagar Dam, Narmada Nagar, M.P.	SMA	6019
4.	2D stress analysis of FEM of 3 Sections namely block No. 35, 44 & 47 of SardarSarovar dam SSNL, Gujarat.	SMA	6024
5.	Analysis And Interpretation of Dam Instrumentation Data For Period January 2019 To December 2019 for Non-Overflow Block 25, Indira Sagar Dam, M.P.	SMA	6026
6.	Determining In-Situ Stiffness Parameters by Flat Jack Test of Bhandardara Masonry Dam, TAL. Akole, Dist. Ahmednagar, Maharashtra	FS	6027
7.	Analysis and interpretation of dam instrumentation for the period January 2020 to December 2020 for non overflow black 25, Indira Sagar Dam, MP	SMA	6071
8.	3D stress analysis by FEM of one penstock bifurcation, Arun-III, HEP, SJVN Ltd., Shimla, Himachal Pradesh	SMA	6093
9.	2D stress analysis by FEM of 3sections namely block no 35,44 and 47 of SardarSarovar dam, SSNNL, Gujrat.	SMA	6094
10.	Studies for determining In-situ properties of Kalzondi Masonry dam, District- Ratnagiri, Maharashtra.	FS	6095
11.	Studies for determining In-situ strength parameters of MIDC Ransai masonry dam, Dist. Raigad, Maharashtra	GE-I	6113
12.	Laboratory studies for designing suitable cementitious grout mix for controlling seepage through dam body of Bhatsa dam, Thane, Maharashtra	CT	6114
13.	Analysis and interpretation of instrumentation data of power house for the period January 2021 to December 2022, Indira Sagar Power Station, Narmada Nagar, Khandwa, MP	SMA	6118

APPLIED EARTH SCIENCES

Divisions

- Engineering Seismology
- Vibration Technology
- Geophysics
- Isotope Hydrology

Areas of Specialization/ Expertise

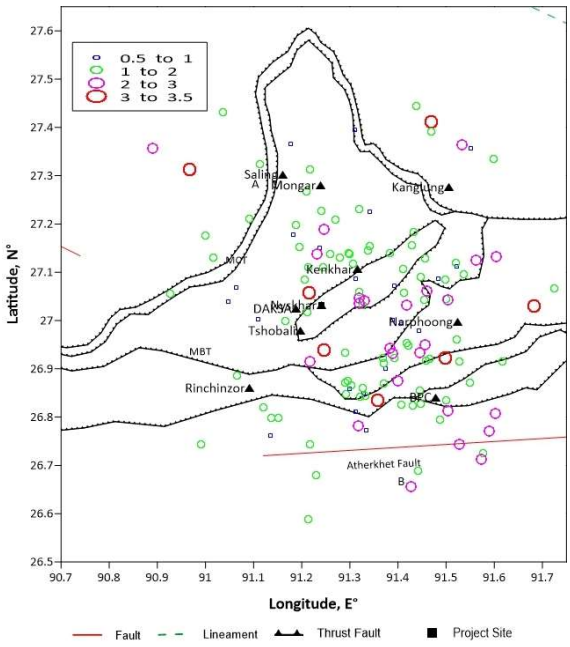
- Site Selection & Installation of Instruments for setting up of Seismological Observatories
- Analysis & Interpretation of Instrument Data (MEQ) for Epicenter Location, Source Parameter & Magnitude Estimation etc.
- Analysis & Interpretation of Data for estimation of Strong Motion Parameters for Peak Ground Acceleration, Response Spectra, Acceleration Time History & Seismic Coefficients
- Estimation of Site Specific Seismic Design Parameters
- Non-destructive tracer and bore hole geophysical logging techniques
- Delineation of seepage zones in hydraulic structures
- Determination of ground water characteristics
- Solutions to problems related to foundation of dam sites, structures of river valley, maritime and nuclear power projects

List of Clients

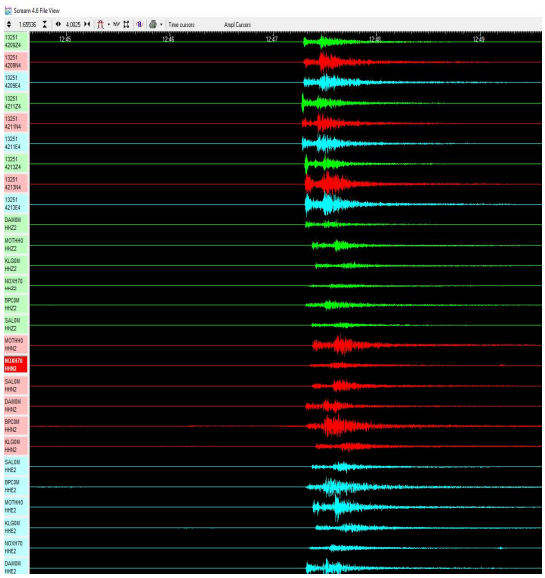
- Govt of Karnataka
- NHDC
- Govt. of Maharashtra
- JKSPDC
- Govt of Mizoram
- WAPCOS
- NHPC
- Mazgaon Dock Ltd., Mumbai
- Govt. of Goa
- Central Water Commission
- NPCIL
- NWDA

Analysis and Interpretation of Micro earthquake Data forKuriGongri H.E. Project, Bhutan.

The proposed Kuri-Gongri (KG) Hydro Electric Project (HEP) envisages construction of a 250 m high and 484 m long concrete gravity dam on the river Kuri and Gongri with left axis coordinate as Latitude 27°2'34.70"N, Longitude 91°14'11.17E" and right axis coordinate as Latitude 27°2'37.20"N, Longitude 91°14'1.01"E. The installed capacity of the project will be 2640 MW. The project is located on Kuri–Gongri River in Pemaghatshel and Mongardzongkhag of Eastern Bhutan. The site is located in Himalayan region which is seismically very active region and lies in seismic zone V of the seismic zoning map of India as per IS 1893:2016. Incidentally, Main Central Thrust and Main Boundary Thrust (MBT) lies near the project area.For assessing seismic potential of site and delineation of active sources, eleven observatories have been installed for recording seismic activities for six months from January 2020 to June 2020.Total 134 earthquakes have been recorded during the span of six months within 50 Km having magnitude range ML 0.5 to ML 3.5. The depth range for these earthquakes are from 0.5 Km to 59 Km. Out of 134 events, 118 events lie within depth range 0-35 km. The 'a' and 'b' value obtained from this study are 2.715 and 0.671 respectively. Moreover, some activity has been observed between station Kenkhar and Mongar.



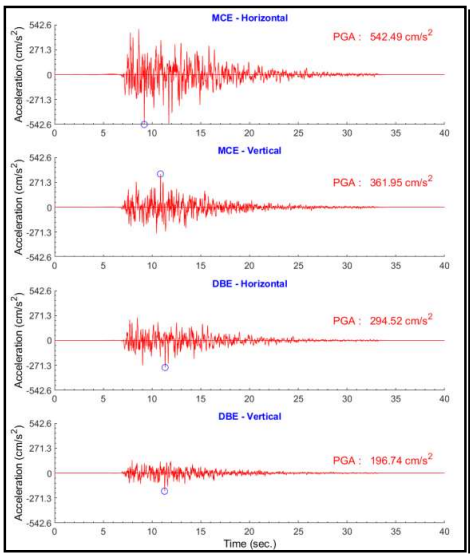
Correlation of the epicenters of measured earthquakes events with major tectonic features in the project region



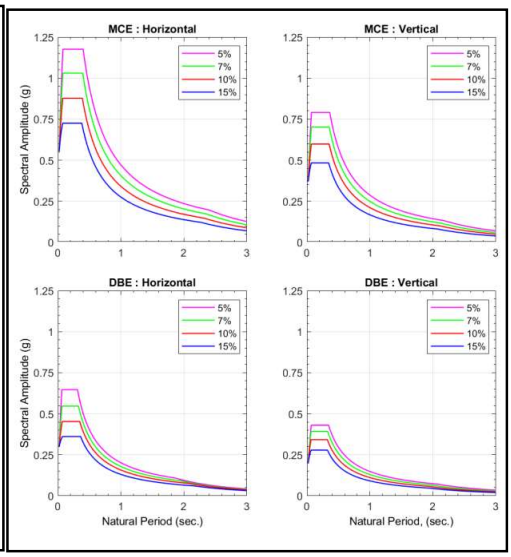
Waveform of an earthquake event detected by all observatories

Estimation of site Specific seismic design parameters for Sarasvati River Rejuvenation and its Heritage Development Project, Haryana.

Sarasvati River Rejuvenation and its Heritage Development Project (SRRHDP) envisages construction of Adi Badri dam of concrete gravity in nature with height 37.5 m and base width 32.15 m (as per the cross-sectional drawing received from the Project Authority) across Somb river and also envisages construction of Somb-Sarasvati Barrage with height 23 m and base width 68.5 m (as per the cross-sectional drawing received from the Project Authority) across Somb River which is at 477 m (approx.) upstream of the Rampur-Gainda bridge for revival of holy Sarasvati River. The project site of Adi Badri Dam is located at latitude 30° 27' 34.855'' N and longitude 77° 20' 19.45'' E and Somb-Sarasvati Barrage is located at latitude 30° 26' 37" N and longitude 77° 19' 40" E. The Project area falls under highly seismically active Seismic Zone IV as per BIS (1893 – 2016, Part - I). In the present report, site-specific design ground motion has been estimated for SRRHDP site by carrying out detailed analysis of the data on seismo-tectonic and geological features and past seismicity in the region. Site-specific design ground motion has been estimated for earthquake resistant design of the SRRHDP using regional data on tectonic features, seismicity and local geotechnical characteristics in the region. The average shear wave velocity for the top 30m (V_{s30}) has been taken as 822.4 m/secfordamand the same for the barrage (riverbed) has been considered as 505.4 m/sec as per investigation carried out at the site. Hence, the ground motion for the dam site and the barrage site are estimated separately. Both deterministic and probabilistic approaches have been applied to arrive at the Maximum Credible Earthquake (MCE) and Design Basis Earthquake (DBE) levels of ground motion. The deterministic spectra of the dam and the barrage sites are found to be governed by the MCE magnitude 7.0 associated with MFT at a closest distance of2.0km and 0.25 km respectively, and magnitude 8.0 associated with decollement surface at a closest distance of 5.0 km from the SRRHDP site. The probabilistic spectra are based on the total seismicity expected to occur in various seismic source zones identified in the region. For MCE and DBE levels of ground motion the probabilistic and deterministic spectra differ by more than 25% and hence the envelope of the deterministic and probabilistic spectra have been taken as the target spectra for the horizontal and vertical components for both Dam and barrage sites. The design accelerograms of horizontal and vertical components of motion are obtained separately using the respective target spectra and suitable phase differences. The values of the peak ground acceleration of the dam site for horizontal and vertical components are found to be 0.553g and 0.369g for MCE condition, and 0.300g and 0.200g for DBE condition respectively and for barrage site, the horizontal and vertical components are found to be 0.716 g and 0.481 g for MCE condition, and 0.390g and 0.262g for DBE condition respectively. Smoothed design response spectra are computed for damping ratios of 5%, 7%, 10% and 15% of critical from these design accelerograms. Recommendations are also made for site specific design seismic coefficients needed for conventional stability analysis. Site specific design seismic coefficients (α_h and α_v) are estimated as per the NCSDP guidelines, IS 1893:1984 and IS 1893: 2016 (Part 1) respectively for conventional design.



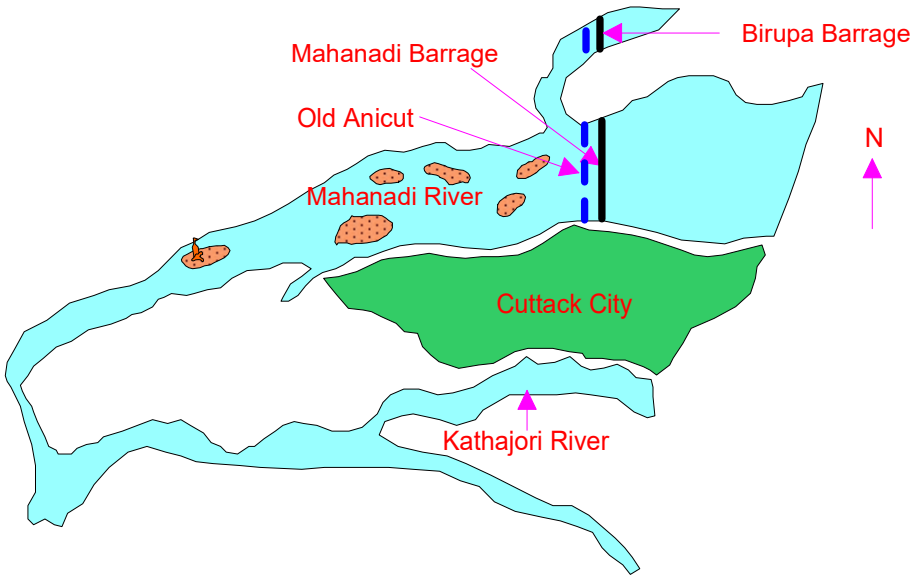
Horizontal and vertical components of design accelerograms for MCE and DBE levels for dam site.



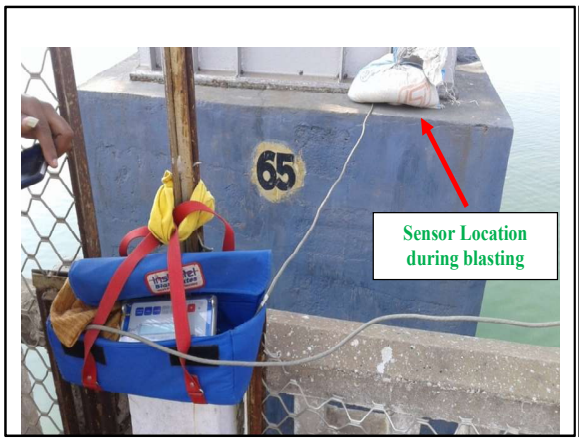
The design response spectra with different damping ratios of horizontal and vertical components of MCE and DBE levels for dam site.

Monitoring of blast vibrations during the dismantling of old anicut at Jobra, Mahanadi barrage, Cuttack, Odisha

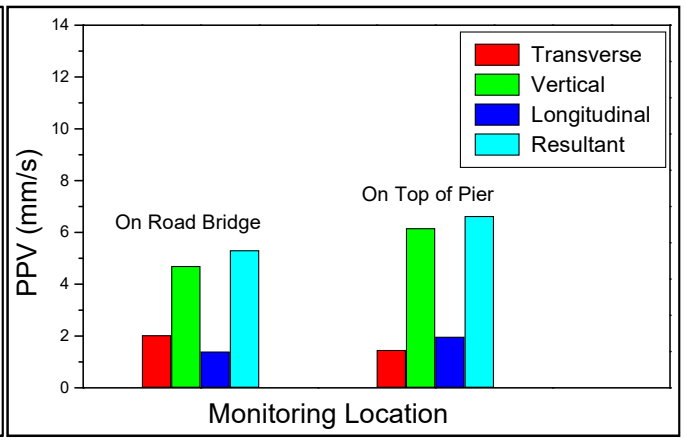
The New Mahanadi Barrage having 79 spillway bays and 16 under sluice gates is located on river Mahanadi at Cuttack, Odisha. The old Jobra anicut located 60 m upstream of New Mahanadi Barrage was constructed in the year 1885 on river Mahanadi at Cuttack, Odisha. The crest level of New Mahanadi Barrage is 17.2 m whereas the crest level of old anicut is 19.65 m. hence, the old anicut acts as a barrier for passage of silt Therefore, for better hydraulic performance of the New Mahanadi Barrage, it was suggested to lower the crest level (19.65 m) of the old anicut to the upstream floor level (17.2 m) of the New Mahanadi Barrage. The excavation work has been carried out from Block No. 24 to 43 and from Block No. 61 to 76. Monitoring of blast vibrations have been carried out by deploying engineering three component seismographs near top of the Pier and Road Bridge to optimize the blasting pattern to be used during actual dismantling operation. Considering the nature and type of the structures a PPV level of 10 mm/s was adopted as safe vibration level to ensure the safety of Piers and Road Bridge against ground vibrations resulted from blasting. The suggested PPV level in the present blasting operation was only 40% of the safe vibration level suggested by IS 14881:2001 to protect the engineered structures i.e. 25 mm/s. Based on the results obtained from the blast vibrations conducted at the Mahanadi Barrage site, it was observed that the maximum vibration level recorded at different locations of Mahanadi Barrage were found to be well within the adopted safe vibration level of 10 mm/s for RCC structures. Using, the recommended blast design parameters, the excavation work has been successfully completed without endangering the safety of New Mahanadi Barrage.



Location plan of the Old Jobra Anicut with respect to the New Mahanadi Barrage



Monitoring of vibrations for blast No. 3, on top of Pier No. 65



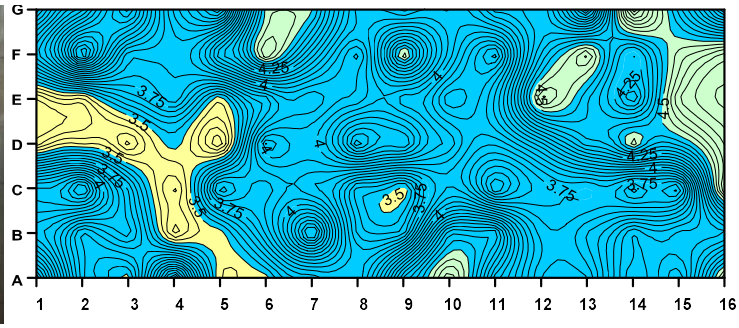
Maximum PPV levels observed on Road Bridge and on top of Pier

In-situ quality assessment by NDT of Power House structure, Rengali HEP Rengali OHPC Ltd, Odisha.

Rengali Hydro Electric Project under Odisha Hydro Power Corporation (OHPC) Ltd., Odisha consists of a 1,040 m long and 70.5 m high masonry-cum-concrete gravity dam which was constructed during the year 1985. The Power house of Rengali has a 250 MW installed capacity having five generating units of 50 MW capacity each. Due to ageing effect, various distresses in the form of leaching and seepage were observed in the powerhouse. The visible distresses raised apprehensions about the structural safety of the powerhouse. In this context, assessment of in-situ quality of concrete of distressed structural member of Rengali Power House structure has been carried out by applying Non-Destructive Techniques at various locations. In order to cover maximum portion of the concrete surfaces, test surfaces have been divided into several grids of dimension 50 cm x 50 cm. Grease has been applied at each grid points to have good coupling between transducers and test surface. Portable Ultrasonic Non-destructive Digital Indicating Tester (PUNDIT) equipment with 54 KHz transducers and Schmidt Rebound Hammer has been used for evaluating the in-situ quality of the structural concrete. During the present study, about 860 velocities of elastic compressional waves and about 700 rebound numbers have been recorded. In-situ Ultrasonic testing conducted during the field study is shown in Fig. given below. The distribution of computed velocity based on measured travel time is shown in the form of contours and colourful zones in Fig. shown below. Based on the analysis of the NDT results, weak zones have been identified at several locations of the powerhouse and necessary remedial measures have been suggested to improve the quality of the structure at these locations.

Top view of Rengali Power House

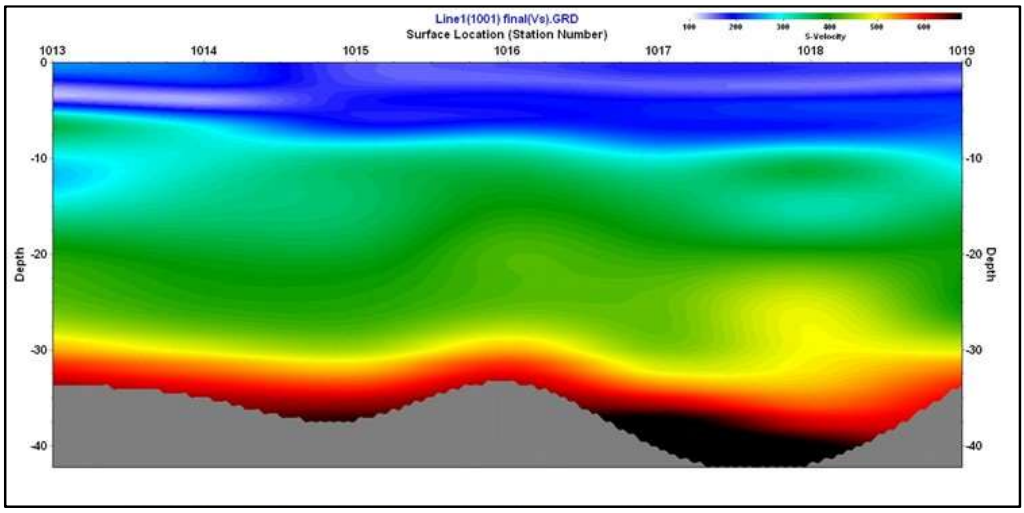
In-situ Ultrasonic tests in progress



Velocity contours for Conference Room

Estimation of average shear wave velocity (Vs 30) at Kathakal irrigation project site, Assam.

The Kathakal Irrigation Project envisages construction of a barrage with 17m height across Dhaleswari / Kathakal River near Gharmura for irrigation and household uses in Hailakandi District of Assam. The proposed barrage site is located in the seismic zone-V, which is seismically most active region in India. The purpose of geophysical investigations is to estimate the average shear wave velocity (Vs30) at different locations in vicinity of barrage site by Multi Channel Analysis of Surface Waves (MASW) technique. Shear wave velocity has been an important parameter to evaluate the dynamic properties of the soil at the site. Vs30 is one of the parameters used in estimation of the Peak Ground Acceleration (PGA) by generating synthetic accelerograms for MCE and DBE level of earthquakes at the site. The shear wave velocities are varying from 100 m/s to 250 m/s up to a depth of 10m and these velocities are varying from 250 m/s to 450 m/s below 10 - 30m along the profile-1 on the right bank. The shear wave velocities on the other hand varying 100-250 m/s up to a depth of 15m and it is varying 250 m/s to 500 m/s below 15 - 25m along the profile-2 on the left bank. The Vs30 values estimated are varying from 289.177 m/s to 307.635m/s on the right bank of the river. The average of these values is calculated to be 298.56 m/s. In addition, the Vs30 values estimated are varying from 246.548 m/s to 255.735 m/son the left bank of the river. The average of these values is calculated to be 248.83m/s. The final Vs30 value of the project site is 273.7 m/sec, which is calculated by taking the average Vs30 values obtained on the right bank and left bank of the river.



2-D Shear Wave Velocity Section along Profile-1 on the right bank.

MASW layout on left bank

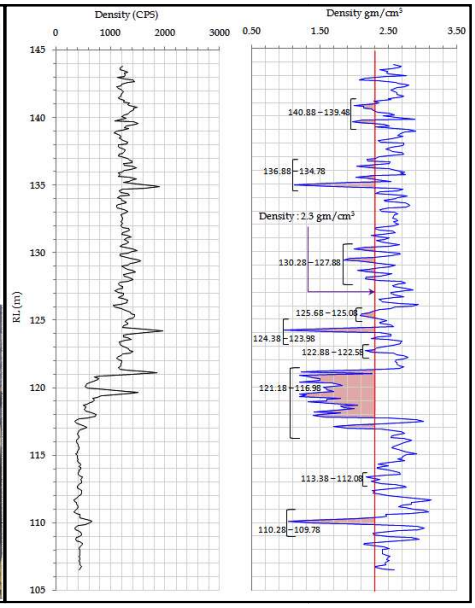
MASW data acquisition

MASW layout on right bank

Borehole logging for seepage studies at Bhasta Dam, Maharashtra

Bhatsa Dam is a masonry dam constructed in 1983 on Bhatsa River near Shahapur, Thane district in state of Maharashtra in India. The height of the dam above the lowest foundation is 88.5 m while the length is 959 m. Bhatsa dam is the major source of water for MCGM (Municipal Corporation of Greater Mumbai) and TMC (Thane Municipal Corporation) and hydroelectric power which has a capacity of 15MW. Due to aging, distresses in the form of seepage and leaching of mortar have been observed in the galleries of the dam as well as on the downstream face throughout the height and all along the entire length of the dam. Hence project authorities requested CWPRS, Pune to conduct suitable studies to decipher the cause of seepage. Accordingly, eight (8) Nx size (76mm) borehole locations were selected at different chainage(s) corresponding to respective monoliths by CWPRS, Pune in consultation with the project authorities for conducting the nuclear density logging studies. Accordingly, the Nuclear Density Logging studies were conducted at Bhatsa Dam, Maharashtra towards the determination of in-situ density of the monoliths. The results of the nuclear logging studies indicated that, the density of masonry varied from 1.14 gm/cm3 to 3.10 gm/cm3 and the zones with density values below the design density of 2.35 gm/cm3 were identified as weak zones.

Downstream of the dam showing prominent seepage



Density logging results showing Probable weak zones

TECHNICAL REPORTS SUBMITTED TO CLIENTS

Sl. No.	Title	Division	Report No
1.	Estimation of Site-specific Design parameters for Kirthai-II HE Project, Jammu & Kashmir.	ES	6011
2.	Estimation of site specific seismic design parameters for Sarasvati River Rejuvenation and its Heritage Development Project, Haryana.	ES	6013
3.	In-situ quality assessment by NDT of Power House structure, Rengali HEP Rengali OHPC Ltd, Odisha.	VT	6014
4.	Estimation of site-specific seismic design parameters for Kondhane Dam Project, Raigad District, Maharashtra.	ES	6016
5.	Analysis and Interpretation of Micro earthquake Data for KuriGongri H.E. Project, Bhutan.	ES	6028
6.	Borehole logging for seepage studies at Bhasta Dam, Maharashtra	IH	6066
7.	Estimation of site specific seismic design parameters for Sillahalla pumped storage hydroelectric project, Tamilnadu.	ES	6070
8.	Monitoring of blast vibrations during the dismantling of old anicut at Jobra, Mahanadi barrage, Cuttack, Odisha	VT	6089
9.	Estimation of average shear wave velocity (Vs 30) at Kondhane dam site, Maharashtra for M/s CIDCO Mumbai.	GP	6103
10.	Estimation of average shear wave velocity (Vs 30) at Kathakal irrigation project site, Assam.	GP	6109

INSTRUMENTATION, CALIBRATION AND TESTING SERVICES

Divisions

- Hydraulic Instrumentation
- Hydraulic Machinery and Cavitation
- Current Meter Calibration

Areas of Specialization/ Expertise

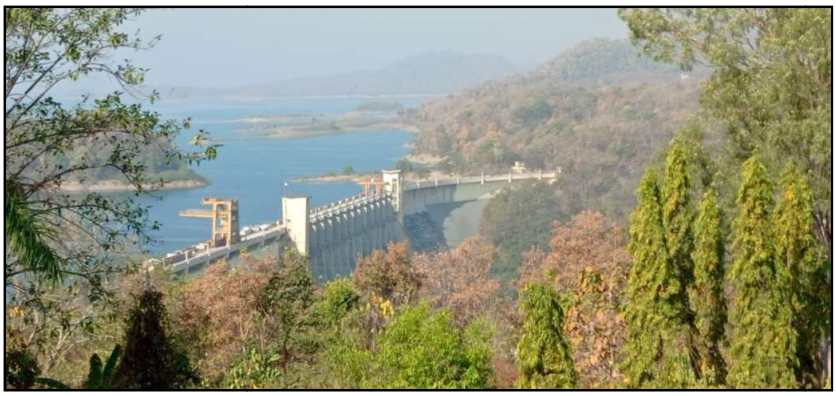
- Calibration / Testing of turbines, pump sets, flow meters, filter, valves, field tests etc.
- Design, fabrication and installation of ATG and RSWG systems on models
- Hydrographic survey
- Fixing and installation of dam instruments
- Testing and calibration of Current Meters
- Canal Automation Facility

List of Clients

- CWC
- Pump manufacturers
- BWSSB, Bangalore
- SAIL, Bokaro
- NEEPCO
- NHPC
- MAHAGENCO
- NPCIL
- GERI, Govt. of Gujarat
- KOPT, Kolkata
- NHDC, MP
- State Governments

Hydrographic survey for capacity assessment of Rihand Reservoir at Sonbhadra, Uttar Pradesh.

Rihand Dam, also known as Govind Ballav Pant Sagar was constructed across the Rihand River near Pipri village located in Sonbhadra district of Uttar Pradesh state. This dam is gravity dam and having hydroelectricity power station of 300 MW (6x 50MW) capacity. Many super thermal power stations are located in the vicinity of catchment area of the dam. This project is designed and constructed to cater the needs of water supply for irrigation, hydro power generation. The sedimentation in reservoir is one of the prime concerns in today's reducing water resources potential. The life span of the reservoir is determined by the rate of sedimentation, which gradually reduces the useful storage capacity of the reservoir. Central Water & Power Research Station, Pune, had taken up the hydrographic survey to estimate the reservoir storage capacity and other parameters such as sedimentation, area elevation curve etc. Accordingly, the hydrographic survey of Rihand dam was conducted in two different phases by using single beam dual frequency (210 KHz and 33 KHz) echo-sounder and global positioning system. The studies were conducted using Integrated Bathymetry system (IBS) at reservoir E.L from 261.79 m to 257.74 m. The Bathymetry survey and land survey covered total area of 403 Sq. Km at FRL 268.20 m E.L and the maximum depth was 70 m. The analysis was carried out using software such as Hypack, Surfer, Eiva Navisoft, Google earth, AutoCAD etc. When comparing the survey result about present storage capacity with reservoir design capacity that was 10604 MCM, it was found that there was a reduction of 1457 MCM, i.e. nearly 14% in the gross storage capacity of the reservoir at FRL 268.20 m.



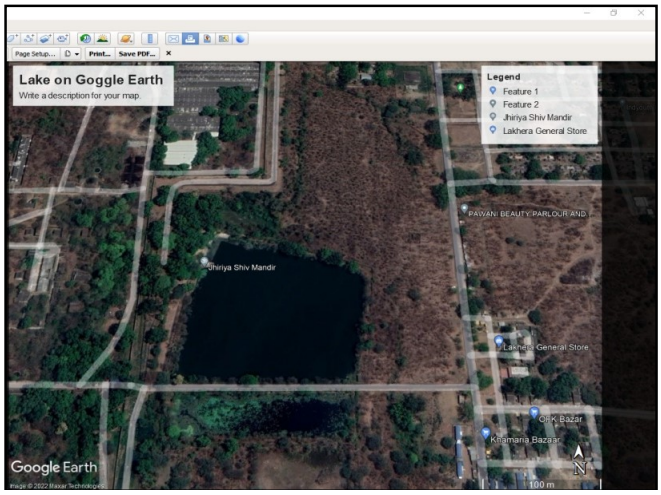
A view of Rihand Dam

Echo-sounder & GPS used during the survey

Hydrographic survey for siltation study of storage reservoir at Ordinance FactoryKhamaria, Jabalpur, M.P.

The storage reservoir in Ordinance Factory Khamaria (OFK), Jabalpur, M.P is a natural pond having area 200.00 m x 200.00 m and appx. avg. depth of 4.00 m is located near gate no. 3 in OFK campus. This storage pond has been catering the need of water supply needed for day to day activity in the ordinance factory. The hydrographic survey was carried out using Integrated Bathymetry system (IBS) consisting of single beam dual frequency (210 KHz and 33 KHz) echo-sounder; Differential Global Positioning System. The studies were conducted to estimate the reservoir storage capacity and other parameters such as sedimentation, depth capacity curve, etc. The studies were conducted with 10 m grid interval covering an area of 40,000Sq.m. The storage pond on Google map is shown. After data analysis, contours of reservoir bed at 0.5 m interval, capacity of the reservoir and Sediment volume of the reservoir were calculated. The analysis was carried out using software such as Hypack, Eiva-Navisoft , Surfer, Global Mapper, Google Earth, Auto-CAD etc. It is found that, the present storage capacity of storage pond is 115057.7 cubic meter.

Echosounder sensor with readout unit and DGPS antenna

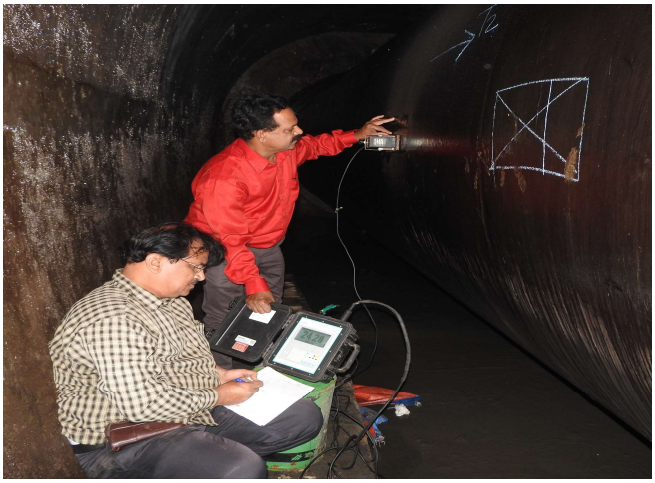


Storage pond on Google earth map

Head loss test/Field measurement in Water Conductor System of BairasiulPower Station, Himachal Pradesh

Head of the Project, Baira–Siul Power Station, Surangani, Chamba, Himachal Pradesh,requested CWPRS to carryout actual head loss measurement in the water conductor system and efficiency measurement of turbine units in Bairasiul Power Station, Surangani, Chamba, Himanchal Pradesh. Head loss tests on all the three Francis turbines of Baira-Siul Power Station (BSPS) was conducted at two different levels of the reservoir around 1122.15 to 1119.15m and 1121.35 to 1116.9m at site in two visits i.e. in July 2022 and November 2022. The head measurements were carried out covering the entire length of water conductor system at different locations, i.e at drop shaft, Disc Valve and Main Inlet valve. These head measurements are extrapolated to measure head losses at Surge shaft, accordingly head losses are calculated at different stages with reference to the static head. Flow measurement was also carried on all three turbine units in isolation and combination. At designed load of 180 MW head losses were observed 26.78m (measured on unit I) at the total plant flow of 77.569 m^3/s when all three units are running.

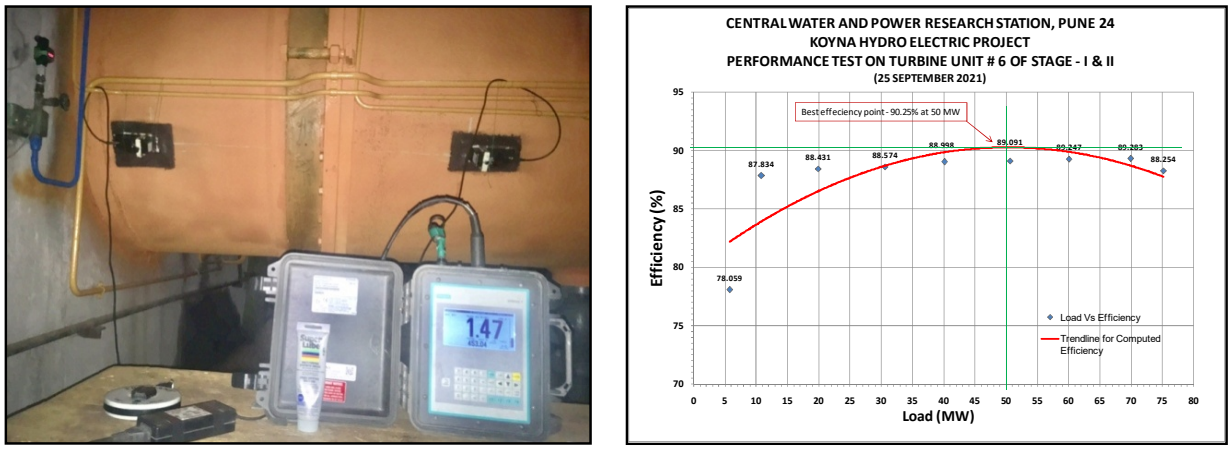
Head measurement at MI Valve



Flow measurement on penstock at Disc valve

Measurement of water discharge through penstock of Koyna stage I & II generating units of Koyna HEP.

The Chief Engineer, MAHAGENCO, KGSC, Pophali, Maharashtra had requested to Central Water and Power Research Station, Puneto explore the feasibility of undertaking water discharge measurements at Koyna Stage – I& II H. E. Project, Pophali.Efficiency evaluation for all the eight multijets Pelton turbines of Koyna Stage I & II were carried out at 623 m KRL, 640 m KRL, 652 m KRL and 658 m KRL at site. The flow and pressure measurements were carried out covering the entire operating range of the hydro turbines in terms of power output. Measurement of discharge passing through four turbine units of Stage I & II was done using clamp-on type Ultrasonic flow meter, for load variation between 5 MW and 75 MW in steps of 5 MW. It was observed that for the load range from 50 MW to 70 MW all the units were operating with better performance with flow varying between 11.5 to 16.5 m^3/s. For load above 70 MW most of the units draws discharge more than 17 m^3/s, with a little drop in efficiency. Hence for best performance it is better to operate the machines around 70 MW.



Flow measurementcarried at Koyna HE

TECHNICAL REPORTS SUBMITTED TO CLIENTS

Sl. No.	Title	Division	Report No
1.	Surge analysis and suggesting anti surge devices for rising mains of NER I & II lift irrigation scheme of JiheKathapurKoregaon, Satara, of Maharashtra.	HMC	6025
2.	Performance testing of High Head Twin Centrifugal Pump for Toyam Technologies India Pvt. Ltd., Pune.	HMC	6031
3.	Testing of fire water submersible pump of 400 M^3/Hr at 150 M head capacity driven by diesel engine at CWPRS, Pune for Hitech Solutions pvt.ltd. Mumbai.	HMC	6038
4.	Hydrographic survey for siltation study of storage reservoir at ordinance Factory Khamaria, Jabalpur, M.P.	INST-II	6040
5.	Measurement of water discharge through penstock of Koyna stage I & II generating units of Koyna HEP.	HMC	6053
6.	Hydrographic survey for capacity assessment of Rihand Reservoir, at Sonbhadra, Uttar Pradesh.	HI-II	6057
7.	Measurement of water discharge through penstock of Koyna stage IV generating units for MAHAGENCO Pophali.	HMC	6069
8.	Measurement of water discharge through penstock of Koyna stage III generating units of MAHAGENCO Pophali.	HMC	6077
9.	Efficiency evaluation of turbine units(2X 40MW) of Bhira tail race hydro power station	HMC	6078
10.	Head loss/ field measurement test in water conductor system of Bairasiul Power Station. Himachal Pradesh.	HMC	6091
11.	Site calibration of full bore electromagnetic and insertion type ultrasonic flowmeters installed at Shinganapur Head Works and Balinga Water Works for Kolhapur Municipal Corporation.	HMC	6101
12.	Efficiency evaluation of turbine units (1X 12 MW) of Ujjani Hydro Power Station.	HMC	6104
13.	Hydrographic survey for capacity assessment of breakwater reservoir at BkTPP, Birbhum, West Bengal.	HI	6105

PROJECTS OF NATIONAL IMPORTANCE

NATIONAL HYDROLOGY PROJECT

The Government of India has approved the implementation of National Hydrology Project (NHP) under the Ministry of Water Resources, River Development Ganga Rejuvenation (MoWR,RD&GR) with an outlay of Rs 3679.7674 crore vide order No. F. No. X- 92021/1/2016-NHP/1118-1258 dated 23rd June 2016. The project duration is 8 years beginning from FY 2016-17. The Project Implementation Plan (PIP) of CWPRS has been approved by Secretary, MoWR,RD&GR vide OM No. X-88014/1/2016-NHP/2524-2528 dated on 30 th Nov 2016. The total fund allocation for CWPRS component of NHP was then Rs 60 crore. After Mid Term Review Meeting, PIP has been revised as per actual progress and execution of proposed activities. CWPRS revised PIP has been approved by the Ministry vide NO X-63013/1/2017-NHP-2962 dated 08.12.2021 amounting Rs 39.74 crore. By the end of financial year 2022-23, the total cumulative expenditure of the project is Rs 20.6 crore.

CWPRS, one of the central implementing agency under National Hydrology Project has been identified as centre of excellence for providing technical expertise for Hydro-Met-WQ Instrumentation including Data Loggers, Telemetry systems etc. so as to support water resources management program of State Implementing Agencies. CWPRS proposal under NHP included establishment of state of the art Hydro-Met-WQ Instruments testing, calibration and certifying facility, Training and support to IAs on Hydromet instrumentation, Bathymetry survey etc, Strengthening existing research facilities, Infrastructure development, Capacity building, Purpose driven studies involving special technical support within the overall framework of National Hydrology Project etc.

Purpose Driven Studies (PDS) & Studies/ Knowledge Product:

CWPRS is carrying out three PDS under NHP, out of which, two PDS have been completed.The reports for PDS namely, 1) Study of Surface and Subsurface Water Interaction using Remote Sensing, Geohydrological and Geophysical Techniques and its Modeling and 2) River Rejuvenation of Mutha River Reach Flowing through Pune City and Suburbs, Maharashtra have been submitted to National Institute of Hydrology (NIH). Third PDS, Field survey, mathematical model and remote sensing studies for coastal processes associated with coastal erosion, shoreline changes assessment at few locations in Maharashtra Coast,started in May 2021 is in progress. In addition to this, three studies/ Knowledge product assign to CWPRS Viz. Bathymetry Survey of Three Dams in North East Viz. Singda Reservoir, Khuga Reservoir, Khoupum Reservoir (Completed),Bathymetryof Jharkhand Dams Viz. Dhruwa, Tenughat, Getalusand (using survey method-report submitted to NPMU), Sedimentation Survey using Sentinel Satellite Remote Sensing Technology (for Dhruwa, Tenughat, Getalusand Reservoirs - in progress)

Establishment of Testing, Calibration and Certification Facility under NHP

Various laboratories are being established at CWPRS under NHP. These laboratories accommodate Testing, Calibration and Certification Facility (TCCF) for: Surface Water Level measurement, Ground Water Level measurement, Automatic Weather Station and Rain gauges, Water Quality Instrumentation,Calibration of ADCP, Current meter, ADV etc. and Data logger and Telemetry. Establishment of INGRESS PROTECTION (IP XX) Test Lab is under progress at CWPRS.

Followingmajor activities under NHP have been completed:

1) Up-gradation of CMRT Lab for Testing/ Calibration of Current Meter, ADCP etc
2) Establishment of Reference AWS for Testing/ Training Purpose to IA'S
3) Establishment of Field Testing setup (Field Calibrator) for AWS Senor
4) Establishment of Reference GW Station for Testing/ Training Purpose to IA'S
5) Establishment of Field Testing/ Calibration (Field Calibrator) Setup for GW level Sensor

6) Establishment of laboratory Calibrator Setup for GW level Sensor
7) Establishment of Field and lab Testing/ Calibration Setup for Telemetry-GSM/GPRS
8) Establishment of Reference Data Logger Setup for Training Purpose to IA'S
9) Establishment of Lab Testing/Calibration Setup for Data Logger
10) Establishment of Reference Surface Water Level Station for Training Purpose to IA'S
11) Establishment of Testing/Calibration Setup for Water Quality Sensor

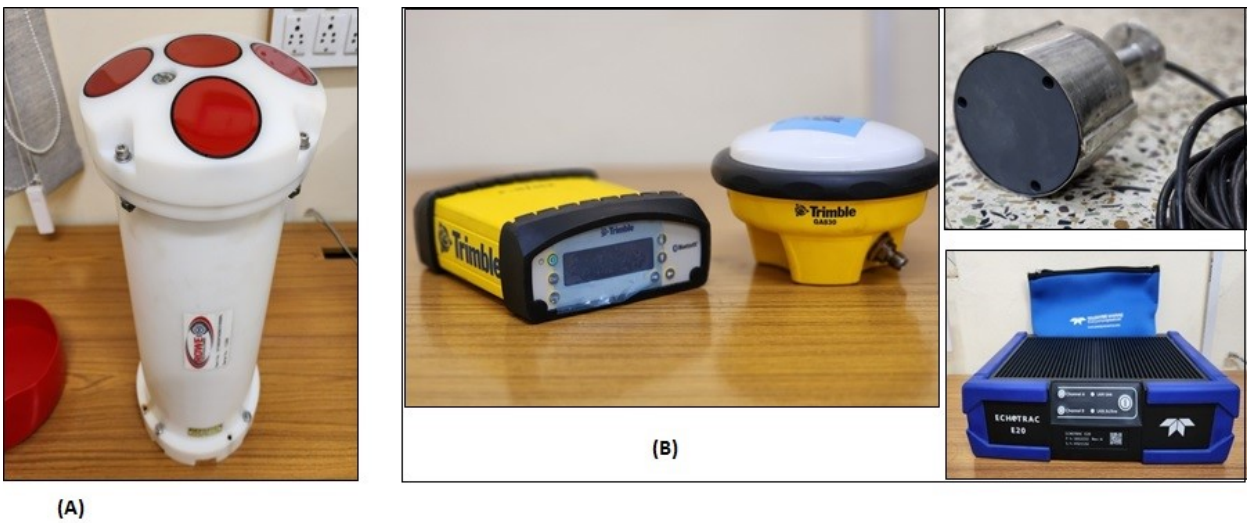
Capacity Building

Six national trainings in physical mode and one in online modefor support to IAs and 4 webinars/in-house trainings were conducted in 2022-23 under NHP.So far 18 national trainings are conducted under NHP by CWPRS. CWPRS team visited following states for technical guidance/ inspection of recently installed Hydromet instruments under NHP during FY 2022-23.

Sr. No	Site Type	IA's Name
1	Automatic Weather Station (AWS)	Andhra Pradesh, Kerala, Madhya Pradesh
2	Automatic Water level Recorder (AWLR)	Madhya Pradesh, Maharashtra, Odisha
3	Ground water level Sensor (DWLR)	Rajasthan, Telangana, Pondicherry
4	Real Time Water Quality Monitoring Systems (RTWQMS)	Rajasthan

(A) (B)

A) Automatic Weather Station (AWS) at CWPRS B) Rain Gauge calibrator



(A) (B)

A) ADCP procured under NHP B) DGPS with Eco-sounder procured under NHP

(A)

(B)

B) Lab Calibrator- TCCF GW B) Field Visit to Rajasthan IA's for Testing of RTWQMS

(A)

(B)

A) Field inspection of AWS and AWLR, installed by Water Resources Department (WRD),Bhopal

B) Training Course on "RTDAS for AWLR and its Installation" and Site Inspection at WRD Kerala

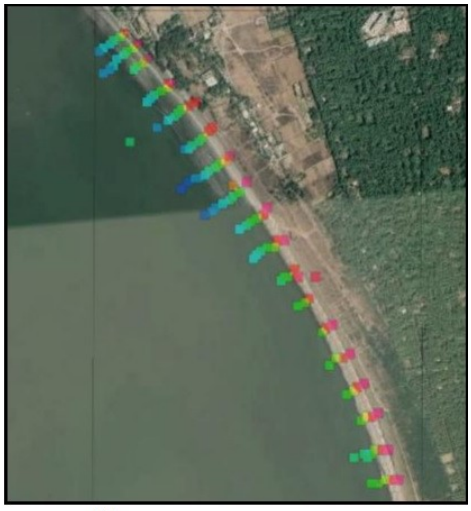
COASTAL MANAGEMENT INFORMATION SYSTEM (CMIS)

Field observed data on coastal processes is one of the essential requirements for evolving long term plans and coastal protection measures. In view of this, for collection of such data a scheme of Coastal Management Information System (CMIS) was approved by the Government of India under the on-going Scheme 'Development of Water Resource Information System (DWRIS)' of Ministry of Jal Shakti, Department of Water Resources, River Development & Ganga Rejuvenation (MoWR, RD & GR). Central Water and Power Research Station (CWPRS) was awarded the work as Project Executor for implementation of CMIS at two sites viz. Satpati in Maharashtra (Northern region) and Nani Danti- Moti Danti in Gujarat (Southern region). The total cost of the project is Rs. 6.95 Crores with total duration of the work as five years (up to June 2024) wherein various coastal data such as wave, tide, tidal currents, shoreline and cross-shore profile, suspended and bed sediments, river /creek discharges, winds, rainfall etc. is being collected. Further, these data would be processed to be used at front-end and linked to Centralised Data Centre (CDC).Theequipmentsviz., detailed bathymetric survey instruments, tide gauge, Marine Current Profiler, Automatic weather station, Sieve shakers, Beach survey instruments, river discharge profiler, LISST for in situ sediment data and CTD meter, have already been procured and installed for data collection at both sites.

During the year 2022-23, two wave rider buoys and two water samplers worth of Rs. 1.90croreswere procured. Comprehensive beach profile surveys and beach sediment analysis were carried out at both the sites for a reach of about 1.5 km each during the month of May 2022 and September 2022 to assess impact of monsoon. Bathymetric survey for pre monsoon period was carried out in May 2022. Similarly, riverine data which include river discharge, salinity, temperature and river sediment load was collected in pre-monsoon and monsoon period of 2022.

The deliverables of this project will setup a comprehensive field monitoring programme which will help in the decision making in the long term and in a sustainable manner. This project will also provide data relevant to the designers, decision makers and modelling group that are not available otherwise. This project is very significant as it will reduce the risk on the stability of the shoreline by reducing dependence on assumed wave and current climate conditions because of sparse field networks and relatively limited historical records.

(A)



(B)

A) **Measurement of River Discharge using ADCP** **B) Extensive Beach Surveys**

PART-III

DISSEMINATION OF INFORMATION

PAPERS PUBLISHED

1. B. Gopikrishna, J.D. Agrawal, "Estimation of littoral drift for non-monsoon using beach and near shore profiles" online published in ISH Journal of Hydraulic Engineering on 13th June 2022.

2. Rolland Andrade, S. Bhowmick, Archana K. Pund "Application of Tritium (^3H) as a tracer in seepage studies through hydraulic structures" published online in Hydro Research Journal, Elsevier publication on 09th July 2022.

3. M.S.R. Naidu, P. M. Abdul Rahiman, S. Y. Bhosale, Sanket S. Renukdas, Omkar R. Supekar, Prerana J. Varhadi, Roshan R. Jadhao"Different types of anti swirl devices to mitigate swirl in pump intake" published in "International Research Journal of Modernization in Engineering Technology and Science" Volume 04.

4. Archana S. Shinde, N. Vivekanandan, C. Srishailam, R. G. Patil "Estimation of peak flood discharge for ungauged catchments of River Beas, Himachal Pradesh using rational formula and GIS based synthetic unit hydrograph approach" Published in Water and Energy International Journal of CBIP.

5. N. Vivekanandan, C. Srishailam, R. G. Patil, "Intercomparison of estimates of reference evapotranspiration of Surat region of Gujarat, India" Published in Journal of Civil Engineering and Urbanism.

6. V. P. Gadhe, S. R. Patnaik, M. R. Bhajantri, V. V. Bhosekar, "Physical and numerical modelling of flow pattern near upstream guide wall of Jigaon Dam spillway, Maharashtra" Published online in the Journal of Water Science and Technology Library book series (WSTL, volume 117).

7. R. Vighneswaran, S. J. Pillai, SarbjeetSingh , K. Balachandran, Jai Prakash Meena, Ankit Sahu, "Effective measure to control seepage in Masonry Gravity Dams- A case study" Published in "6th International Dam Safety Conference -2022"during 10-12 October 2022, Jaipur, Rajasthan.

8. Vijay K. Ghodake, Prakash K. Palei, Rizwan Ali, S. Santosh Kumar, Rajendra Singh Gurjar, "Assessment of In-Situ quality of concrete of Rengali power house structure by non-destructive testing methods, Rengali, OHPC, Ltd, Odisha-A case study" Published in "6th International Dam safety conference - 2022"during 10-12 October 2022, Jaipur, Rajasthan.

9. M. Z. Qamar, M. K. Verma, A.P. Meshram, Neena Isaac, "Model Studies for desalting basin for Teesta-VI H.E. Project, Sikkim- A case study" Published in "9th International Symposium on Hydraulic Structure (ISHS 2022)" during 24-27 October 2022, IIT, Roorkee.

10. V. S. Ramarao, Y. N. Srivastava, "Hydraulic behaviour of spill channel of Polavaram spillway without left embankment" Published in "9th International Symposium on Hydraulic Structure (ISHS 2022)" during 24-27 October 2022, IIT, Roorkee.

11. V. S. Ramarao, Amit Kulhare, "Effect of deficient tailwater on the performance of slotted roller Bucket of Indira Sagar Dam, Madhya Pradesh" Published in "9th International Symposium on Hydraulic Structure (ISHS 2022)" during 24-27 October 2022, IIT, Roorkee.

12. R. R. Bhate, "Recent challenges in design of spillway-An Indian scenario" Published in "9th International Symposium on Hydraulic Structure (ISHS 2022)" during 24-27 October 2022, IIT, Roorkee.

13. P. P. Gadge, Kunal Kapur, "Estimation of discharging capacity and assessing the performance of overflow spillway with full and partial operation of gates using numerical modelling" Published in "9th International Symposium on Hydraulic Structure (ISHS 2022)" during 24-27 October 2022, IIT, Roorkee

14. V. P. Gadhe, S. R. Patnaik, "Physical and numerical model studies of Hirakud Dam additional spillway- A case study" Published in "9th International Symposium on Hydraulic Structure (ISHS 2022)" during 24-27 October 2022, IIT, Roorkee.

15. B. S. Sundarlal, V. P. Gadhe, S. R. Patnaik Amol H. Gaikwad, "Physical and numerical model studies for hydraulic design of stilling basin as an energy dissipater of a spillway- A case study" Published in "9th International Symposium on Hydraulic Structure (ISHS 2022)" during 24-27 October 2022, IIT, Roorkee.

16. Sushma Vyas , Y. N. Srivastava, "Flow over orifice spillway: physical and numerical study for spillway profile design of hydroelectric project" Published in "9th International Symposium on Hydraulic Structure (ISHS 2022)" during 24-27 October 2022, IIT, Roorkee.

17. Jitesh N. Vyas, Supriya Nath, R.B. Deogade, "Importance of risk and hazard assessment of river projects in India" Published in "9th International Symposium on Hydraulic Structure (ISHS 2022)" during 24-27 October 2022, IIT, Roorkee.

18. R. B. Deogade, Harshali Khandagale, Omkar K. Sakurikar, M. Someshwara, "Experimental evaluation of drag force on different shapes of Pontoons at different water stream velocities at specified loads and submergence" Published in "9th International Symposium on Hydraulic Structure (ISHS 2022)" during 24-27 October 2022, IIT, Roorkee.

19. R. B. Deogade, Harshali Khandagale, M. Someshwara, "Performance testing of acoustic doppler current profiler used for stream flow measurement" Published in "9th International Symposium on Hydraulic Structure (ISHS 2022)" during 24-27 October 2022, IIT, Roorkee.

20. Srinivas Billankanti, Nishchay Malhotra, Dudekula Nikhil Kumar, R. B. Deogade, "Impact of climate change on water bodies and adaptation strategies" Published in "7th India Water Week-2022 Conference " Ministry of Jal Shakti 01-05 November 2022 at India Expo Centre, Greater Noida.

21. M. Selva Balan, R.Garimella, Sreekanth Sampath, "A1 / ML based flood warning through gate control techniques" Published in "7th India Water Week-2022 Conference " Ministry of Jal Shakti 01-05 November 2022 at India Expo Centre, Greater, Noida.

22. Nishchay Malhotra, SrinivasBillankanti, Supriya Nath, R. B. Deogade, "Corporate social responsibility scheme to address the water issues: A case study" Published in "7th India Water Week-2022 Conference " Ministry of Jal Shakti 01-05 November 2022 at India Expo Centre, Greater, Noida.

23. Nishchay Malhotra, P. S. Akhil , Jitesh N. Vyas, R. B. Deogade, "A comprehensive review of the status of persistent organic pollutants under the Indian scenario" Published in "7th India Water Week-2022 Conference " Ministry of Jal Shakti 01-05 November 2022 at India Expo Centre, Greater, Noida.

24. N. Vivekanandan, C. Srishailam, R. G. Patil, "Intercomparison of estimators of seven probability distributions for assessment of peak flood discharge" Published in "7th India Water Week-2022 Conference " Ministry of Jal Shakti 01-05 November 2022 at India Expo Centre, Greater, Noida.

25. Suneeta Jatwa, "Assessment of long term coastline monitoring from satellite imageries using geospatial techniques from Panvila to Pullaviala, Kerala, India- A case study" Published in "7th India Water Week-2022 Conference " Ministry of Jal Shakti 01-05 November 2022 at India Expo Centre, Greater, Noida.

26. A. V. Mahalingaiah, U. B. Patil, N. S. Ganesh, "Design of Breakwater with Permissible Overtopping Discharge through Wave Flume Studies for the Development of Port" published in "23rd Congress of the International Association for Hydro Environment Engineering and Research - Asia Pacific Division(IAHR-APD-2022)" organized by Indian Institute of Technology Madras, Chennai from 14-17

December,2022.

27. M. Z. Qamar, M. K. Verma, A. P. Meshram, Neena Isaac, "By-Pass Tunnel- A Lifeline for Run-of-River Hydro Projects" published in "23rd Congress of the International Association for Hydro Environment Engineering and Research - Asia Pacific Division(IAHR-APD-2022)" organized by Indian Institute of Technology Madras, Chennai from 14-17 December,2022.

28. Sushma Vyas, Y. N. Srivastava, "Comparison of Physical and Numerical Analysis to Study Effect of Discharge and Water Depth on Spillway Downstream Water Quality" published in "23rd Congress of the International Association for Hydro Environment Engineering and Research - Asia Pacific Division(IAHR-APD-2022)"organized by Indian Institute of Technology Madras, Chennai from 14-17 December,2022.

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30. B. Suresh Kumar, Archana Pund, S. Bhowmick, "Importance of Borehole logging studies in Design of foundation for Civil Engineering Structures" published in "Indian Geotechnical Society(IGC)-2022, Kochi Chapter in association with Dept. of Civil Engg., Cochin University of Science and Technology (CUSAT) Kochi, Kerala during 15-17 December 2022.

31. T. Samanta, J. S. Edlabadkar, A. D. Khot, "Optimization of Remedial Measures for Mitigation of Foundation Seepage in Earth Dam- A Case Study" published in "Indian Geotechnical Society(IGC)-2022, Kochi Chapter in association with Dept. of Civil Engg., Cochin University of Science and Technology (CUSAT) Kochi, Kerala during 15-17 December 2022.

32. S. Bhowmick, "Characterization of Subsurface using Vp/Vs and Poisson's Ratio Prior to the Foundation of Critical Civil Structures" published in "Indian Geotechnical Society(IGC)-2022, Kochi Chapter in association with Dept. of Civil Engg., Cochin University of Science and Technology (CUSAT) Kochi, Kerala during 15-17 December 2022.

33. G. A. Panvalkar, A. D. Chunade, "Significance of Acoustic and Electrical Logging Studies at Nuclear Power Plants" published in "Indian Geotechnical Society(IGC)-2022, Kochi Chapter in association with Dept. of Civil Engg., Cochin University of Science and Technology (CUSAT) Kochi, Kerala during 15-17 December 2022.

34. विजय कोकणे, "मिरिया बे महाराष्ट्र, भारत में एक उच्च लीटटोरल जहाज बहाव खेत्र में लीटटोरल ड्रिफ्ट और शोरलाइन परिवर्तन का सिमुलेशन" राष्ट्रीय तटीय अनुसन्धान केंद्र, चेन्नई द्वारा आयोजित "पृथ्वी विज्ञान" पर हिंदी वैज्ञानिक संगोष्टी में तकनीक लेख प्रस्तुति और भागीदारी, 19 दिसम्बर 2022.

35. सागर चंदा,"तटीय क्षेत्र में मत्स्य बंदरगाह के विकास के लिए गणितीय मॉडल द्वारा अध्ययन" राष्ट्रीय तटीय अनुसन्धान केंद्र, चेन्नई द्वारा आयोजित "पृथ्वी विज्ञान" पर हिंदी वैज्ञानिक संगोष्टी में तकनीक लेख प्रस्तुति और भागीदारी, 19 दिसम्बर 2022.

36. Prabhat Chandra, R. K. Chaudhari, S. K. Kori, "Restoration of River Inlet Channel in a Creek through Numerical Model Technique" published in 27th International Conference on "Hydraulics, Water Resources, Environmental and Coastal Engineering (HYDRO-2022)"organized by Punjab Engineering College (PEC), Chandigarh, under the aegis of 'The Indian Society for Hydraulics (ISH), Pune' during 22-24 December 2022.

37. H. C. Patil, Sagar Chanda, J. D. Agrawal, N. Ramesh, "Wave tranquility studies to evaluate harbour layout- A case study" published in 27th International Conference on "Hydraulics, Water Resources,

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38. M. K. Verma, M.Z. Qamar, Neena Isaac, "Alleviation of Suspended Sediment from Water Conductor System of Hydropower Projects"published in 27th International Conference on "Hydraulics, Water Resources, Environmental and Coastal Engineering (HYDRO-2022)"organized by Punjab Engineering College (PEC), Chandigarh, under the aegis of 'The Indian Society for Hydraulics (ISH), Pune' during 22-24 December 2022.

39. V. S. Ramarao, K. T. More, "Uncommon type Energy Dissipaters for Spillways" published in 27th International Conference on "Hydraulics, Water Resources, Environmental and Coastal Engineering (HYDRO-2022)"organized by Punjab Engineering College (PEC), Chandigarh, under the aegis of 'The Indian Society for Hydraulics (ISH), Pune' during 22-24 December 2022.

40. A. Basu, A. A. Purohit, "Importance of blending the parametric and global atmospheric wind models in reliable simulation of extreme cyclonic waves" published in 27th International Conference on "Hydraulics, Water Resources, Environmental and Coastal Engineering (HYDRO-2022)"organized by Punjab Engineering College (PEC), Chandigarh, under the aegis of 'The Indian Society for Hydraulics (ISH), Pune' during 22-24 December 2022.

41. V. P. Gadhe, "Role of model studies in Optimization of Stilling Basin type Energy Dissipator" published in 27th International Conference on "Hydraulics, Water Resources, Environmental and Coastal Engineering (HYDRO-2022)"organized by Punjab Engineering College (PEC), Chandigarh, under the aegis of 'The Indian Society for Hydraulics (ISH), Pune' during 22-24 December 2022.

42. K. T. More, R. R. Bhate, " Efficient Hydraulic Design of Spillway & Energy Dissipator intended for High Tail Water Levels- Case Studies through Physical Modeling" published in 27th International Conference on "Hydraulics, Water Resources, Environmental and Coastal Engineering (HYDRO-2022)"organized by Punjab Engineering College (PEC), Chandigarh, under the aegis of 'The Indian Society for Hydraulics (ISH), Pune' during 22-24 December 2022.

43. B. S. Sundarlal, P. P. Gadge, Amit Kulhare, "Optimizing the design of a breast wall spillway and energy dissipater for a dam project through hydraulic model studies" published in 27th International Conference on "Hydraulics, Water Resources, Environmental and Coastal Engineering (HYDRO-2022)"organized by Punjab Engineering College (PEC), Chandigarh, under the aegis of 'The Indian Society for Hydraulics (ISH), Pune' during 22-24 December 2022.

44. R. K. Chaudhari, S. S. Kori, Prabhat Chandra, "Prediction of Maneuvering Behavior of 5000 DWT Cargo Vessel at Sharp Bend in Restricted Water Ways" published in 27th International Conference on "Hydraulics, Water Resources, Environmental and Coastal Engineering (HYDRO-2022)"organized by Punjab Engineering College (PEC), Chandigarh, under the aegis of 'The Indian Society for Hydraulics (ISH), Pune' during 22-24 December 2022.

45. N. A. Sonawane, Kuldeep Malik, "Studies for Optimizing Waterway of Ujh River Barrage, J&K" published in 27th International Conference on "Hydraulics, Water Resources, Environmental and Coastal Engineering (HYDRO-2022)"organized by Punjab Engineering College (PEC), Chandigarh, under the aegis of 'The Indian Society for Hydraulics (ISH), Pune' during 22-24 December 2022.

46. Kuldeep Malik, N. A. Sonawane, "Hydraulic Model Studies for Power Intake of Tapovan-Vishnugad Hydro Electric Power Project, Uttaranchal" published in 27th International Conference on "Hydraulics, Water Resources, Environmental and Coastal Engineering (HYDRO-2022)"organized by Punjab Engineering College (PEC), Chandigarh, under the aegis of 'The Indian Society for Hydraulics (ISH), Pune' during 22-24 December 2022.

47. A. K. Singh, Naval S. Jagtap, J. Sinha, "Optimization of Breakwater Layout to Assess the Hydrodynamics and Sedimentation in a Port" published in 27th International Conference on "Hydraulics, Water Resources, Environmental and Coastal Engineering (HYDRO-2022)"organized by Punjab Engineering College (PEC), Chandigarh, under the aegis of 'The Indian Society for Hydraulics (ISH), Pune' during 22-24 December 2022.

48. Komal Vighe, M. Karthikeyan, J. Sinha, "Monitoring Coastline Changes using Mathematical Modeling and Google Images along North Karnataka Coast published in 27th International Conference on "Hydraulics, Water Resources, Environmental and Coastal Engineering (HYDRO-2022)"organized by Punjab Engineering College (PEC), Chandigarh, under the aegis of 'The Indian Society for Hydraulics (ISH), Pune' during 22-24 December 2022.

49. B. Krishna, M. Karthikeyan, L.R. Ranganatha, "Hydrodynamics and Siltation Studies for the Proposed Passenger Jetty at an Inlet- A Case Study" published in 27th International Conference on "Hydraulics, Water Resources, Environmental and Coastal Engineering (HYDRO-2022)"organized by Punjab Engineering College (PEC), Chandigarh, under the aegis of 'The Indian Society for Hydraulics (ISH), Pune' during 22-24 December 2022.

50. Naval S. Jagtap, A. K. Singh, J. Sinha "Cell-Centric Volume Method for Computing Dredging in a Port" published in 27th International Conference on "Hydraulics, Water Resources, Environmental and Coastal Engineering (HYDRO-2022)"organized by Punjab Engineering College (PEC), Chandigarh, under the aegis of 'The Indian Society for Hydraulics (ISH), Pune' during 22-24 December 2022.

51. M. M. Vaidya, K. R. Karambelkar, A. A. Purohit, "Development of FSRU near Wide Estuarine entrance- A need for coupled modeling approach" published in 27th International Conference on "Hydraulics, Water Resources, Environmental and Coastal Engineering (HYDRO-2022)"organized by Punjab Engineering College (PEC), Chandigarh, under the aegis of 'The Indian Society for Hydraulics (ISH), Pune' during 22-24 December 2022.

52. Rahul D. Sawant, KomalVighe, J. Sinha, "Wave Tranquility Studies for Breakwater Extension at Island Harbour using Mathematical Modeling" published in 27th International Conference on "Hydraulics, Water Resources, Environmental and Coastal Engineering (HYDRO-2022)"organized by Punjab Engineering College (PEC), Chandigarh, under the aegis of 'The Indian Society for Hydraulics (ISH), Pune' during 22-24 December 2022.

53. Sushma J. Vyas, R. B. Deogade, Raj Kumar, Vipul Gupta, "Experimental investigations for Hydraulic Behavior of Tail Race Tunnel and the Influence of Tail Water Level on Water Level Fluctuation in the Surge Tank" published in 27th International Conference on "Hydraulics, Water Resources, Environmental and Coastal Engineering (HYDRO-2022)"organized by Punjab Engineering College (PEC), Chandigarh, under the aegis of 'The Indian Society for Hydraulics (ISH), Pune' during 22-24 December 2022.

54. J. S. Edlabadkar, T. Samanta, , A .D. Khot, Sheetal Waghmare, "Geotechnical Seepage and Stability Studies for Multi-Zoned Earth Dam- A Case Study" published in 27th International Conference on "Hydraulics, Water Resources, Environmental and Coastal Engineering (HYDRO-2022)"organized by Punjab Engineering College (PEC), Chandigarh, under the aegis of 'The Indian Society for Hydraulics (ISH), Pune' during 22-24 December 2022.

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56. Amol S. Borkar, Prabhat Chandra, "Numerical Modeling for Wave Tranquility inside the Mega Port on

the West Coast of India" published in 27th International Conference on "Hydraulics, Water Resources, Environmental and Coastal Engineering (HYDRO-2022)"organized by Punjab Engineering College (PEC), Chandigarh, under the aegis of 'The Indian Society for Hydraulics (ISH), Pune' during 22-24 December 2022.

57. Amol S. Borkar, Santosh Kori, Prabhat Chandra, "Numerical Wave Modeling for Adequacy of Fishing Harbour on the West Coast of Karnataka" published in 27th International Conference on "Hydraulics, Water Resources, Environmental and Coastal Engineering (HYDRO-2022)"organized by Punjab Engineering College (PEC), Chandigarh, under the aegis of 'The Indian Society for Hydraulics (ISH), Pune' during 22-24 December 2022.

58. A. V. Mahalingaiah, Uday B. Patil, N. S. Ganesh, Prabhat Chandra, "Hydraulic Model Studies for the Design of deep water breakwater with Accropode™-II Armour units to the dam of Kalpasar Project, Gujarat" published in 27th International Conference on "Hydraulics, Water Resources, Environmental and Coastal Engineering (HYDRO-2022)"organized by Punjab Engineering College (PEC), Chandigarh, under the aegis of 'The Indian Society for Hydraulics (ISH), Pune' during 22-24 December 2022.

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60. Vijay K. Ghodake, Prakash K. Palei, S. Santhosh Kumar, Varsha Jain, Rizwan Ali, "Non-Destructive Testing for Assessment of In-Situ Quality of Concrete of Barrel Concrete Structure of Bhatghar Power House, Maharashtra- A Case Study" published in 27th International Conference on "Hydraulics, Water Resources, Environmental and Coastal Engineering (HYDRO-2022)"organized by Punjab Engineering College (PEC), Chandigarh, under the aegis of 'The Indian Society for Hydraulics (ISH), Pune' during 22-24 December 2022.

61. N. Vivekanandan, C. Srishailam, R. G. Patil, "Effect of Data Length on Assessment of Extreme Rainfall using L-Moments of Probability Distributions" published in 27th International Conference on "Hydraulics, Water Resources, Environmental and Coastal Engineering (HYDRO-2022)"organized by Punjab Engineering College (PEC), Chandigarh, under the aegis of 'The Indian Society for Hydraulics (ISH), Pune' during 22-24 December 2022.

62. C. Srishailam, N. Vivekanandan, Annapurna Patra, R. G. Patil, "Estimation of Peak Flood Discharge for Daund-Kalaburagi Railway line Doubling Project , Central Railway, Mumbai" published in 27th International Conference on "Hydraulics, Water Resources, Environmental and Coastal Engineering (HYDRO-2022)"organized by Punjab Engineering College (PEC), Chandigarh, under the aegis of 'The Indian Society for Hydraulics (ISH), Pune' during 22-24 December 2022.

63. R. K. Chaudhari, S. K. Kori, Prabhat Chandra, " Efficient Mooring Arrangement for a Bulk Cargo Vessel using Mathematical Model Technique" published in 27th International Conference on "Hydraulics, Water Resources, Environmental and Coastal Engineering (HYDRO-2022)"organized by Punjab Engineering College (PEC), Chandigarh, under the aegis of 'The Indian Society for Hydraulics (ISH), Pune' during 22-24 December 2022.

64. T. Samanta, J. S. Edlabadkar, A. D. Khot, , , Sheetal Waghamare "Geotechnical Stability and Settlement Analysis of Rubble Mound Breakwater- A Case Study" published in 27th International Conference on "Hydraulics, Water Resources, Environmental and Coastal Engineering (HYDRO-2022)"organized by Punjab Engineering College (PEC), Chandigarh, under the aegis of 'The Indian Society for Hydraulics (ISH), Pune' during 22-24 December 2022.

65. Uday B. Patil, A. V. Mahalingaiah, N. S. Ganesh "Hydraulic Model Studies for the Design of Breakwater/Training wall for Development of Fishery Harbour at Anjarle" published in 27th International Conference on "Hydraulics, Water Resources, Environmental and Coastal Engineering (HYDRO-2022)"organized by Punjab Engineering College (PEC), Chandigarh, under the aegis of 'The Indian Society for Hydraulics (ISH), Pune' during 22-24 December 2022.

66. R. B. Deogade, H. R. Khandagale, Milankumar Someshwara, "Impact of Obliquity on Current Meters during Calibration and Measurement Procedure" published in 27th International Conference on "Hydraulics, Water Resources, Environmental and Coastal Engineering (HYDRO-2022)"organized by Punjab Engineering College (PEC), Chandigarh, under the aegis of 'The Indian Society for Hydraulics (ISH), Pune' during 22-24 December 2022.

67. Sudheer. S. Chavan, M. D. Sawant, Prabhat Chandra "Utility of Physical Wave Model in Studying Effects of Wave Reflections from Adjacent Breakwater- A Case Study" published in 27th International Conference on "Hydraulics, Water Resources, Environmental and Coastal Engineering (HYDRO-2022)"organized by Punjab Engineering College (PEC), Chandigarh, under the aegis of 'The Indian Society for Hydraulics (ISH), Pune' during 22-24 December 2022.

68. R. Rangarajan, Rolland Andrade, "Understanding shallow Basaltic Aquifer System near West Coast of Maharashtra, India" published in Journal of Geosciences Research (JGSR) by University Grants Commission (UGC).

69. M. Prabhakar, N. K. Dudekula, R. B. Deogade, "Mula-Mutha river-water quality and river rejuvenation" published in 55th IWWA Annual Convention-2023 organized by Indian Water Association and hosted by IWWA, Pune 20-22 January 2023.

70. Sushma Vyas, V. S. Ramarao, "Performance analysis of a power intake located in Himalayan region-A case study" published in 55th IWWA Annual Convention-2023 organized by Indian Water Association and hosted by IWWA, Pune 20-22 January 2023.

71. V. B. Sharma, Prabhat Chandra, Vaibhav Konde, "Numerical modelling for demolition of retaining wall at Marriot Hotel, Goa" published in 4th International Conference on "Sustainable Practices and Innovations in Civil Engineering (SPICE-2023)" organized by Department of Civil Engineering, Sri Sivasubramaniya Nadar College of Engineering, Chennai during 23-24 March 2023.

72. Shivani Sahu, Prabhat Chandra, A. S. Borkar, A. K. Bagwan, published in 4th International Conference on "Sustainable Practices and Innovations in Civil Engineering (SPICE-2023)" organized by Department of Civil Engineering, Sri Sivasubramaniya Nadar College of Engineering, Chennai during 23-24 March 2023.

PARTICIPATION IN SEMINARS/ SYMPOSIA/ CONFERENCES/ WORKSHOPS

Sl. No.	Title	Event, Place, Date	No. of Participant(s)
April 2022 – (1 No.)			
1.	International Conference on "Hydropower and Dams Development for Water and Energy Security- Under Changing Climate	Organized by THDC India Ltd., CBIP and INCOLD Rishikesh, Uttarakhand 07-09 April 2022	2
May 2022 – Nil			
June 2022- (1 No.)			
2.	National Workshop on "Dam Safety Act 2021 for Dam Safety Governance of India"	Organized by DoWR, RD & GR, Ministry of Jal Shakti New Delhi 16th June 2022	4
July 2022 – Nil			
August 2022- (2 Nos.)			
3.	One day Conference on "3rd CADFEM ANSYS Simulation Conference-2022"	Organized by CADFEM India Pvt Ltd.SheratonGrand, Pune 18th August 2022	2
4.	6th World Water Summit-2022 (WWS-2022)	New Delhi 24-25 August 2022	1
September 2022- Nil			
October 2022 – (3 Nos.)			
5.	"6th International Dam Safety Conference-2022"	Organized byDRIP,CWC,INCOLD and CBIP, Jaipur, Rajasthan 10- 12 October 2022	2
6.	International conference on "World Waste-to-Wealth Summit & Expo-2022 "	Organized by World Hydrogen Energy Summit, New Delhi 16-17 October 2022	1
7.	"9th International Symposium on Hydraulic Structures (ISHS 2022)"	Organized by Indian Institute of Technology, Roorkee(IITR), Uttarakhand 24-27 October 2022	11

November 2022 – (3 Nos.)			
8.	"7th India Water Week-2022 Conference"	Organized by Ministry of Jal Shakti, India Expo Centre, Greater Noida. 01-05 November 2022	4
9.	Workshop on "BHOONIDHI Web Portal"	Organized by NRSC, Hyderabad 02nd November 2022	1
10.	National symposium on " Geospatial Technology: Journey from data to intelligence"	Organized by ISRS-ISGHyderabad, International Convention Centre (HICC)Telangana, India 15-17 November 2022	1
December 2022 – (43 Nos.)			
11.	"23rd Congress of the International Association for Hydro Environment Engineering and Research Asia Pacific Division (IAHR-APD-2022)"	Indian Institute of Technology Madras, Chennai 14-17 December 2022	4
12.	"Indian Geotechnical Conference (IGC)-2022"	Indian Geotechnical Society, Kochi Chapter in association with Dept. of Civil Engg., Cochin University of Science and Technology (CUSAT), Kochi Kerala 15-17 December 2022	4
13.	"पृथ्वीविज्ञान"	राष्ट्रीय तटीय अनुसंधान केंद्र, चेन्नई (पृथ्वी विज्ञान मंत्रालय) 19 दिसम्बर2022	2
14.	"3rdModellers Meet"	National Institute of Hydrology, Roorkee in association with NPMU, NHP under NHP, Hotel Shangri-La, New Delhi 19-20 December 2022	4
15.	27th International Conference on "Hydraulics, Water Resources, Environmental and Coastal Engineering (HYDRO-2022)"	Department of Civil Engineering, Punjab Engineering College (PEC), Chandigarh under the aegis of Indian Society for Hydraulics (ISH), Pune 22-24 December 2022	29
January 2022- (2 Nos.)			

16.	55th IWWA Annual Convention-2023 on "Sustainable Management of Water & Sanitation; Availability for all"	Organized by Indian Water Works Association and hosted by IWWA, Pune 20-22 January 2023	2
17.	Workshop on "Subseasonal Prediction"	Organized by IITM, Pune & IMD, Pune atIITM, Pune 30th January 2023	2
February 2022- Nil			
March 2022- (2 Nos.)			
18.	"4th International Conference on " Sustainable Practices and Innovations in Civil Engineering (SPICE-2023)"	SSN College of Engineering, Chennai 23-24 March 2023	2
19.	One day Workshop on "Urban Groundwater Recharge and Management" under NHP	Groundwater Surveys and Development Agency (GSDA), Pune at Bhujal Bhavan, Shivaji Nagar, Pune 27th March 2023	2

INVITED LECTURES DELIVERED

Sl. No.	Title	Event, Place, Date	Name of Officer
April 2022 -(05 Nos.)			
1.	" River Bank Erosion and River Training Works"	Training workshop on "Flood Management and Erosion Control" Organized by North Eastern Hydraulic and Allied Research Institute (NEHARI), Guwahati, Assam. 18-22 April 2022	Shri Arun Kumar, Sci. 'C'
2.	"Flood forecasting –Indian Experiences"		Shri N. Vivekanandan, Sci. 'B'
3.	Flood Estimation by Unit Hydrograph Techniques"		
4.	Vigilance/Disciplinary Rules	Induction training Program for newly appointed (CWES) Group 'A' officers 28th March-04th November 2022(32 weeks) National Water Academy, CWC, Khadakwasla, Pune-411024 04thand 05thApril 2022	Shri Rajendra Aswale,Chief Administrative Officer
5.	Right to Information Act 2005		
May 2022 -(06 Nos.)			
6.	" River Bank Erosion and River Training Works"	Training workshop on "Flood Management and Erosion Control" Organized by North Eastern Hydraulic and Allied Research Institute (NEHARI), Guwahati, Assam. 09-13 May 2022	Shri Arun Kumar, Sci. C'
7.	"Flood forecasting –Indian Experiences"		
8.	"Flood Estimation by Unit Hydrograph Techniques"		Shri N. Vivekanandan, Sci. 'B'
9.	"River behavior and Morphology basic concepts of processes and terminology brief introduction to physical modeling aspect of a reverse course example Kosi River model "	Induction Training Program for newly appointed (CWES) Group 'A' officers 28th March-04th November 2022(32 weeks) National Water Academy, CWC, Khadakwasla, Pune-411024 13th May 2022	Shri Arun Kumar, Sci. 'C'
10.	"River Behavior Management"	Induction Training Program for newly appointed (CWES) Group 'A' officers 28th March-04th November 2022 (32 weeks) National Water Academy, CWC, Khadakwasla, Pune-411024 27th May 2022	Shri Arun Kumar, Sci. 'C'
11.	"River Training Structures / Works for Flood Management"		

June 2022- (01 No.)			
12.	"Hydraulic Model Studies for the Layout of Breakwater & Design of Breakwater"	Under the training programme on "Initiation & DPR preparation of high value infrastructure projects under FIDF& PMMSY for the Coastal State of India" Organized by National Fisheries Development Board (NFDB), at Hyderabad, Telangana, 09-10 June 2022	Shri M. Phanikumar, Sci. ' D' Shri B.R. Tayade, Sci. 'D'
July 2022- Nil			
August 2022- (05 Nos.)			
13.	"Indian Statistical System and Carrier Opportunities"	The occasion of "Prof P.V. Sukhatme's birth anniversary" Department of Statics, Moden College, Shivaji Nagar, Pune 01st August 2022	Dr. Ruhi S. Kulkarni,Senior Research Officer
14.	FEM: Theory, methodology, assumptions & limitations, different types elements & its application	Induction Training Program for newly appointed (CWES) Group 'A' officers 28th March- 04th November 2022(32 weeks) National Water Academy, CWC, Khadakwasla, Pune-411024 02nd August 2022	Shri V. S. Ramarao,Sci. 'C'
15.	FEM: Static & dynamic analysis		
16.	"Introduction to physical modeling in the field of Coastal Engineering"	"Faculty Development Program" Yashoda Technical Campus, Satara 23-27 August 2022 (online mode)	Shri Jamir Bagwan, Sci. 'B'
17.	"Role of hydraulic model studies in evolving efficient spillway designs of Hydropower Projects"	Induction Training Program for newly appointed (CWES) Group 'A' officers 28th March- 04th November 2022(32 weeks) National Water Academy, CWC, Khadakwasla, Pune-411024 30th August 2022	Shri Rizwan Ali, Sci. 'E'
September 2022- (02 Nos.)			

18.	"Hydraulic modeling of spillways and energy dissipaters"	"One day workshop for civil engineering students" Marathwada Mitra Mandal's Institute of Technology (MMIT), Lohegaon, Pune. 17th September 2022	Shri V. S. Ramarao, Sci. 'C'
19.	"Data acquisition, wireless data and transmission system for Dam structure including instrumentation of Dam and related demonstration"	Induction Training Program (ITP) for appointed (CWES) Group 'A' officers 28th March-04th November 2022 (32 weeks) National Water Academy, CWC, Khadakwasla, Pune-411024 19th September 2022	Dr. M. Selva Balan, Sci. 'E'
October 2022– (01 No.)			
20.	"Advances in Coastal Engineer"	"Faculty and students of Civil Engineer " Dr. D.Y. Patil, Institute of Technology, Pimpri. 01st October 2022	Dr. R. S. Kankara, Director
November 2022- (03 Nos.)			
21.	"Role of Hydraulic Modeling for Design of Water Resources Structures "	"The Knowledge Leadership Forum(KLF) lecture series for the odd semester of the Academic year 2022-23 " School of Civil Engineering, SATARA Deemed University, Thanhavur, Tamilnadu 11th November 2022 (Online Mode)	Kum. Suneeta Jatwa, Sci. 'C'
22.	" Basic Induction Training on Irrigation Water Management to Newly Recruited Engineers in Water Resources Department"	"Basic induction training on Irrigation Management to newly recruited Engineers onSCADA-Reservoirs and Canals" Water And Land Management Institute (WALMI), Dharwad, Karnataka 18th November 2022 (Online Mode)	Dr. M. Selva Balan, Sci. 'E'
23.	"Review of structural safety and rehabilitation of gravity dams"	"Seminar on Dam Safety and Rehabilitation of Krishna Raja Sagar Dem, Mysore" WRD 16 of BIS New Delhi 28th November 2022 (Online Mode)	Shri Rizwan Ali,Sci.'E'
December 2022 - (03 Nos.)			

24.	"Unmanned Systems: Aerial, Ground and Underwater Vehicle and Challenges"	"Training programme for BEL Engineers" IETE, BEL, Bangalore (Online mode) 08th December 2022	Dr. M. Selva Balan,Sci. 'E'
25.	"Role of smart sensors and communication networks in dam instrumentation projects"	"Geotechnical Instrumentation and Numerical Modeling" CSMRS, New Delhi 08-09 December 2022	Dr. M. Selva Balan,Sci.E'
26.	" SCADA-Reservoir and Canals"	"Basic induction training on Irrigation Management to newly recruited engineers in Water Resources Department" Water and Land Management Institute (WALMI), Dharwad, Karnataka 21st December 2022	Dr. M. Selva Balan,Sci.'E'
January 2022- (04 Nos.)			
27.	"Application of numerical modeling and GIS for addressing coastal engineering and water resources problem"	Points-23 Programme DIAT, Pune 5th January 2023	Dr. R. S. Kankara, Director
28.	"Non contact measurement and AI/ML Control Techniques in Water Resources application"	Technical lecture at IETE, Pune Centre. Institute of Electronics and Telecommunications Engineers (IETE), Pune 19th January 2023 (Online Mode)	Dr. M. Selva Balan, Sci. 'E'
29.	"Physical Hydraulic Modelling Techniques in Coastal Engineering"	2 days seminar (24th and 25th January 2023) on "Coastal Engineering an Overview" Dr. D.Y.Patil Institute of Technology, Pimpri, Pune 24th January 2023	Shri A. A. Purohit, Sci. t 'E'
30.	a) Establishment Matters: Service Book, Increment Reservation Roaster, DPC, Deputation Seniority, Promotion Pay Parity, ACP/CGHS/AMA Rules/Quarters/ HRA/LF etc b) Office Procedures, Filling System & Record Management	Induction training program for newly recruited Junior Engineers of Central Water Commission (Batch-3) National Water Academy, Pune 30th January 2023	Shri Vishal D. Dond,CAO
February 2022- (02 Nos.)			

31.	"Long term structural health monitoring of dams using dam instrumentation"	Inaugural ceremony of Pimpri Chinchawad College of Engineering and Research, IGC Chapter Pimpri Chinchawad College of Engineering and Research, Raveet, Pune 17th February 2023	Shri M. S. Hanumanthappa, Sci. 'D'
32.	"Basic Induction training on Irrigation Water Management to Newly Recruited Engineers in Water Resources Department"	Training program for newly recruited engineers Water and Land Management Institute (WALIM), Dharwad, Karnataka 24th February 2023	Dr. M. Selva Balan, Sci. 'E'
March 2022- (02 Nos.)			
33.	"Hydrographic survey & recent advancements; Bathymetry data analysis"	" Reservoir Sedimentation : Assessment & Monitoring" under NHP National Water Academy, CWC, Pune 21st March 2023	Dr. M. Selva Balan, Sci. 'E'
34.	"Role of hydraulic modeling for design of water resources structures"	"The Knowledge Leadership Forum" lecture series. School of Engineering, SASTRA Deemed to be University, Thanjavur, Tamilnadu 17th March 2023 (Online mode)	Smt. Sushma Vyas, Sci. 'C'

TECHNICALCOMMITTEE MEETINGS ATTENDED

Sl. No.	Name of Committee	Date and Venue	No. of Participant(s)
1.	93rd Meeting of NCA(Narmada Control Authority)	12th April 2022 Civil Service Officer's Institute,New Delhi	1
2.	13th R&D Session on PDS (NHP) under the Chairmanship of the Director, NIH for review of approved PDS.	Online mode 27th April 2022	1
3.	25th Meeting of WRD1 Sectional Committee of BIS	Online mode 28th April 2022	2
4.	25th meeting of Hygrometry Sectional Committee WRD-1	Online mode 28th April 2022	1
5.	Meeting with Research Advisory Committee (RAC), NCCR, Chennai.	Online mode 06th May 2022	1
6.	3rd Meeting of working group with National Water Informatics Center (NWIC), MoJs along with department of Telecommunication, Ministry of communication for identification of 5G use cases and it's Adaption in Water Resources Sector.	Online mode 11th May 2022	4
7.	2nd Meeting for initial deliberations on developing a "National Coastal Mission" under national action plan for climate change under Chairmanship of Additional Secretary MoEFCC	Online mode 01st June 2022	1
8.	20th BIS meeting regarding Dams and Spillways WRD 09	Online mode 01st July 2022	3
9.	4th Meeting of NLSC at NHP wrap up at World Bank Mission under Chairmanship of Secretary (DoWR)	Online mode 05th July 2022	1
10.	25th BIS meeting regarding Sectional Committee of CED 48 Rock Mechanics.	Online mode 05th August 2022	2
11.	20th meeting of Water Conductor Systems Sectional Committee, WRD 14	Online mode 29th August 2022	5
12.	DRIP meeting on Seismic Hazard Assessment of North and North East India at CWC, New Delhi.	New Delhi 13th September 2022	3
13.	BIS 21st meeting on 'Groundwater & Related Investigation"	22nd September 2022	2
14.	37th Technical Advisor Committee (TAC) meeting of CWPRS chaired by the Chairman CWC& Chairman TAC	CWPRS, Pune 29th September 2022	14
15.	37th STAC meeting of CSMRS at Delhi.	New Delhi 06th October 2022	1
16.	53rd meeting of GFCC under Chairmanship of Chairman, GFCC	CWC, New Delhi 13th December 2022	1
17.	Meeting of Research Committee under the Chairmanship of Additional Secretary & F.A Ministry of Ports, Shipping & Waterways regarding R&D Project.	Online mode 5th January 2023	1

18.	25th Meeting of WRD-01 Hydrometry Sectional Committee of BIS.	CWPRS, Pune 20th January 2023 (Hybrid mode)	4
19.	BIS meeting, WRD	Online mode 23rd February 2023	5
20.	21st Meeting of WRDCsectional committee of BIS.	Online mode 06th March 2023	1
21.	37th Meeting of National Committee on Seismic Design Parameters (NCSDP) under the Chairmanship of member	CWC, New Delhi 10th March 2023	4
22.	10th Meeting of Project Monitoring Committee of Kalpasar Project.	NCCR, Chennai 14th March 2023	1

TRAINING PROGRAMS ATTENDED

Sl. No.	Title	Event, Place, Date	No. of Participant(s)
1.	Training Course on " Mapping Crops and their Biophysical Characteristics with Polarimetric SAR and Optical Remote Sensing"	NASA-ARSET 12th, 19th,26th April and 03rd May	1
2.	Workshop on "Noting and Drafting (WND-41)"	ISTM, New Delhi 18-19 April 2022	1
3.	In house training course under National Hydrology Project	Inst-I Division CWPRS, Pune 4-5 May 2022	33
4.	21 days Summer School training program on "Roles and methods of Geointelligence to achieve tangible UN sustainable development goals"	Organized by Symbiosis institute of Geoinformatics, Symbiosis International university Pune 23rd May to 11th June 2022	1
5.	Training programmeon " Know your Library & TC"	Organized by TMC on 27th May 2022	75
6.	Training programme on "Introduction to Artificial Intelligence (AI-01)	Organized by ISTM New Delhi 06-08 June 2022	3
7.	Online training programme on "Statistical Tools and Techniques"	Organized by ISTM New Delhi 06-09 June 2022	5
8.	हिंदीकार्यशाला	केन्द्रीयजलऔरविद्युतअनुसंधानशाला, पुणे। 22 जून, 2022	25
9.	Training programme on "Introduction to Google Earth Engine and Its Applications in Water Resources Management"	Organized by National Water Academy, Pune under NHP 11- 22 July, 2022.	2
10.	Training programme on "Laboratory Information Management System (LIMS) & Audit (as per ISO/IES 17025:2017 &NABLRequirement)"	Organized by Central Pollution Control Board (CPCB), New Delhi through Gujarat EnvironmentManagement Institute (GEMI), Gandhinagar under NHP 13- 15 July, 2022	1
11.	In house training programme on " Research Methodology"	Organized by TMC 14-15 July 2022.	33
12.	Training programme on "Introduction Training Course for new staff" of CWPRS, Pune	Organized by TMC at CWPRS, Pune 03-04 August 2022	68
13.	Two day dissemination workshop on "BRAHMA (Braided River Aid Hydro-Morphological Analyzer)"	Organized by North Eastern Hydraulic and Allied Research Institute (NEHARI), Brahmaputra Board jointly Indian Institute of Technology, Guwahati (IIT-G) Assam, 17-18 August, 2022.	2
14.	Training Course under NHP on "Hydrological Modeling using Soil and Water Assessment Tool (SWAT)"	Organized by NIH, Roorkee 22-26 August 2022.	1
15.	Training course on "Coastal erosion and sustainable protection measures"	Organized by at CWPRS, Pune 23-24 August 2022.	2
16.	Training course on "Monitoring and Modeling Flood using Earth Observations"	Organized by NASA-ARSET 14th and 21st September 2022	1

17.	Training programme on "Introduction of Python Programming & Its Applications in Water Resources Sector"	Organized by National Water Academy, Pune 19-23 September 2022	3
18.	National workshop on "Advances in design Installation and Operation of Large Pumps and Turbines"	Organized by Hydraulic Machinery and Cavitation Division, CWPRS, Pune 22-23 September 2022	12
19.	Training programme on "MIKE-3 WAVE FM"	Organized by TMC at CWPRS, Pune 12-14 October 2022	20
20.	Training course on " Geo-data sharing and Cyber Security"	Organized by Indian Institute of Remote Sensing (IIRS), ISRO 17-21 October 2022	1
21.	Training programme on "Science and Sustainability in India"	Organized by NIAS sponsored by DST under Plan Scheme-"DISHA Programme for Women in Science" 17-21 October 2022	2
22.	Training course on " Disaster Assessment using Synthetic Aperture Radar (SAR)	Organized by NASA-ARSET 19th 20th and 27th October 2022	1
23.	Training programme on "Preventive Vigilance (OTP-PV-08)"	Organized by Institute of Secretariat Training & Management, Department of Personal & Training, New Delhi 03-04 November 2022	2
24.	Training course on " Remote Sensing and its Applications"	Organized by TMC at CWPRS, Pune 23-24 November 2022	32
25.	Training course on "Chairs, Conveners & Expert in International Committees"	Organized by NITS, WRD, BIS 24-25 November 2022	1
26.	Training programme on "Building Health Inspectors Level-1"	Organized by CSIR-Central Building Research Institute (CBRI), Roorkee (CIDC) and (NIDM) 28-30 November 2022	1
27.	Training programme on "Geotechnical Instrumentation & Numerical Modeling"	Organized by CSMRS, New Delhi 08-09 December 2022	3
28.	हिन्दी कार्यशाला	केन्द्रीयजलऔरविद्युतअनुसंधानशाला, खड़कवासला, पुणे। 13 दिसम्बर2022	22
29.	Training Course on "Field data collection for costal and water resources projects and its applications"	Organized by TMC at CWPRS, Pune 05-06 January 2023	46
30.	Training Course on "Connecting Citizen Science with Remote Sensing"	24th, 26th and 31st January 2023	1
31.	"Residential training programme on Public Procurement (Basic)"	Organized by Arun Jaitley National Institute of Financial Management (AJNIFM) 30th January to 04th February 2023	2
32.	Training programme on "Arc Hydro and Advanced WRM Applications"	Organized by National Water Academy, Pune 06th -10th February 2023	3
33.	Training programme on "Recent Advances in Water Resources Engineering and Management"	Organized by NIT Hamirpur, Himachal Pradesh 27th February to 03rd March 2023	2

34.	Training programme on "A Resilient Future Science and Technology for Disaster Risk Reduction"	Organized by Lal Bahadur Shastri National Academy of Administration (LBSNAA), Mussoorie 27th February to 03rd March 2023	2
35.	Training programme on "Reservoir sedimentation: Assessment and Monitoring	Organized by National Water Academy (NWA) under NHP 20-24 March 2023	4
36.	हिन्दीकार्यशाला	केन्द्रीयजलऔरविद्युतअनुसंधानशाला, खड़कवासला, पुणे| 24 मार्च2023	25
37.	In-house training course on "Induction training for newly recruited research cadre"	Organized by CWPRS, Pune 27-31 March 2023	24

TRAININGS / CONFERENCES / SEMINARS ORGANIZED

Sr. No.	Title
1.	Online training course on "Role of Modeling in Ports &Harbour Development" organized by Ports &Harbour Division-III at CWPRS, Pune during 26- 27 April 2022
2.	In house training course under National Hydrology Project organized by INST-I division at CWPRS, Pune on 4-5 May 2022.
3.	Online training course on "Automation of canal with modern measurement and control techniques" organized by Canal Automation Division at CWPRS, Pune during 24- 25 May 2022.
4.	In house training Programme on "Know your Library & TC" organized by TMC at CWPRS, Pune on 27th May 2022.
5.	केन्द्रीय जल और विद्युत अनुसंधान शाला, पुणे में दिनांक 22 जून 2022 को हिंदी कार्यशाला काआयोजन किया गया।
6.	Online training course on "Importance of prototype data collection for Coastal Engineering problems & dredging aspects" organized by TMC at CWPRS, Pune during 26- 27 July 2022.
7.	In house training course on "Research Methodology" organized by TMC at CWPRS, Pune during 14-15 July 2022.
8.	Online training course on "Physical and Mathematical Modeling of Reservoir & Appurtenant Structures" organized by SED Division at CWPRS, Pune during 02- 03 August 2022.
9.	In house training course on "Induction training of new staff of CWPRS" organized by TMC at CWPRS, Pune during 03-04 August 2022.
10.	Online training course on "Coastal Erosion and Sustainable Protection Measures" organized by CHS-II Division at CWPRS, Pune during 23- 24August 2022.
11.	Online training course on "Advanced techniques of bathymetry survey for reservoirs and coastal projects" organized by INST-II Division at CWPRS, Pune during 20- 21 September 2022
12.	Online National workshop on" Advances in design installation and operation of large Pumps and Turbines" organized by Hydraulic Machinery and Cavitation Division, CWPRS, Pune during 22-23 September 2022
13.	In house training programme on "MIKE-3 WAVE FM" organized by TMC at CWPRS, Pune 12-14 October 2022
14.	Training Course on "Field Implementations of AWS and Surface Water Level Measurement System along with Data Logger and Telemetry" organized by RSA division under NHP during 09-11 November 2022.
15.	Online training course on "Testing & Calibration facilities at CWPRS for various Current Meter Acoustic Doppler Current Profiler (ADCP), Pumps and Flow meters Sensors for Environmental Parameters" organized by CMC Division at CWPRS, Pune during 15-16 November 2022.
16.	In house training course on " Remote Sensing and its Applications" at CWPRS, Pune during 23-24 November 2022
17.	Online training course on "Review of structural safety and rehabilitation of distressed hydraulic structures including seismic aspects" organized by SMA division during 13-15 December 2022

18.	केन्द्रीय जल और विद्युत अनुसंधान शाला, खड़कवासला, पुणे में 13 दिसम्बर 2022 को हिन्दी कार्यशाला का आयोजन किया गया।
19.	In house training course on "Field data collection for coastal and water resources projects and its applications" organized by TMC at CWPRS during 05-06 January 2023
20.	Online training course on "Geophysical and Tracer studies for Civil Engineering Projects" organized by Geophysics division during 10-11 January 2023
21.	Online training course on "Dam Break analysis and emergency action planning" organized by CWPRS, Pune during 22-23 February 2023 under NHP
22.	Online Webinar on "GW Level Sensors different aspects of instrumentation, site selection, installation and maintenance" organized by CWPRS, Pune on 28th February 2023 under NHP
23.	केन्द्रीय जल और विद्युत अनुसंधान शाला, खड़कवासला, पुणे में 24 मार्च 2023 को हिन्दी कार्यशाला का आयोजन किया गया।
24.	In house training course on "Induction training for newly recruited research cadre" CWPRS, Pune organized by TMC at CWPRS, Pune during 27-31 March 2023.

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