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HYDROLOGICAL AND HYDRODYNAMIC ASSESSMENT OF KEDARNATH FLOOD OF JUNE 2013

N.N. RAI*

ABSTRACT

Uttarakhand and neighboring states experienced heavy to very heavy rainfall during 16-18th June 2013. As per IMD heavy rainfall more than 10 cm in a day were reported at many stations in Uttarakhand and heavy rainfall is also reported at number of stations in Himachal Pradesh, Haryana and Punjab. The incessant, heavy rainfall over three days coupled with bursting of Chorabari glacial lake resulted in very severe flooding and landslides at different places in Uttarakhand. The devastation due to rain and landslide has been huge but the largest impact has been at the temple town of Kedarnath, which was in the midst of the annual pilgrimage season. In the present paper an attempt has been made to simulate the flooding phenomenon of Kedarnath during 16-17th June 2013 using hydrological and hydrodynamic models. The flooding event of 16th June 2013 has been analysed using kinematic wave flood model of HEC-HMS. The Chorabari lake outburst event has been simulated using dam break and hydrodynamic modules of MIKE11 mathematical model. For hydrodynamic routing of dam break flood the cross sections of river from Chorabari lake location upto downstream of Kedarnath complex has been extracted from GIS processing of ASTER DEM. From the cartosat imagery available at Bhuvan it was possible to estimate the breach parameters for moraine dam of Chorabari lake.

Keywords —Glacial lake; kinematic wave flood model; hydrodynamic model; hydrodynamic routing

1.0 INTRODUCTION

Uttarakhand and neighboring states experienced heavy to very heavy rainfall during 16-18th June 2013. As per IMD heavy rainfall (more than 10cm) in a day were reported at many stations in Uttarakhand and heavy rainfall is also reported at number of stations in Himachal Pradesh, Haryana and Punjab. The incessant, heavy rainfall over three days coupled with bursting of Chorabari glacial lake resulted in very severe flooding and landslides at different places in Uttarakhand. The India Meteorological Department (IMD) linked heavy to very heavy rain-fall on the higher Uttarakhand, Himachal and Nepal Himalaya to the convergence of the Southwest Monsoon trough and westerly disturbances, which led to the formation of dense cloud over the Uttarakhand Himalaya. The devastation due to rain and landslide has been huge but the largest impact has been at the temple town of Kedarnath, which was in the midst of the annual pilgrimage season. The flash flood in Mandakini river originating from the Chorabari Glacier near Kedarnath in Uttarakhand, on 16-17 June 2014, resulted huge loss of life and property in Kedarnath valley. A huge rock got stuck behind Kedarnath Temple and protected it from the ravages of the flood. The waters gushed on both the sides of the temple destroying everything in

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their path. Even eyewitness observed that one large rock got carried to the rear side of Kedarnath Temple, thus causing obstruction to the debris, diverting the flow of river and debris to the sides of the temple avoiding damage. The spatial distribution of rainfall on 16th and 17th June 2013 is shown in Fig.1. In the present paper an attempt has been made to analyze the flooding phenomenon of Kedarnath during 16-17th June 2013.

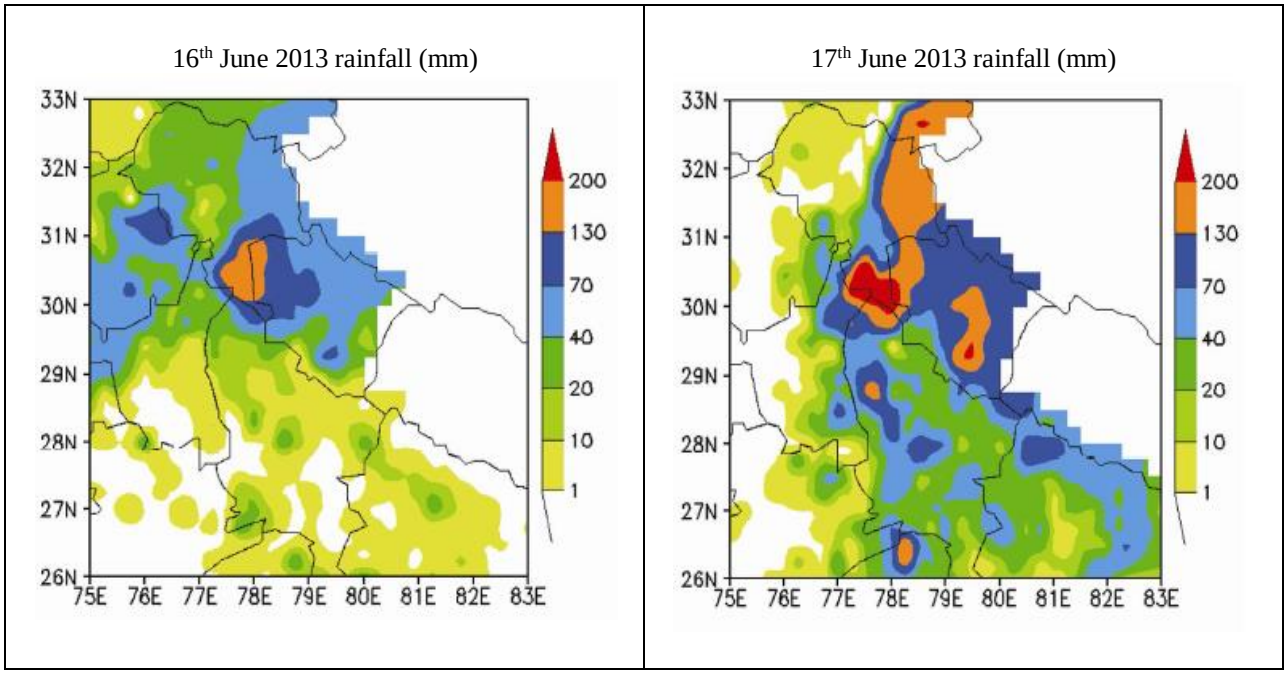

Fig. 1: Spatial distribution of 16-17 June 2013 rainfall in Uttarakhand and other neighboring States (source: IMD)

2.0 FLOOD DISASTER AT KEDARNATH

Kedarnath area was subjected to two consecutive flood disasters at an interval of about 12 hours. As per the WIHG scientific correspondence published in Current Science Journal, the first flood event occurred on 16 June 2013 at 5:15PM when the torrential rains flooded the Saraswati river and Dudh Ganga catchment area, resulting in excessive flow across all the channels. Due to heavy downpour, the town of Rambara was completely washed away on 16 June evening. The second event occurred on 17 June 2013 at 6:45a.m., after overflow and collapse of the moraine dammed Chorabari Lake which released large volume of water that caused another flash flood in the Kedarnath town leading to heavy devastation downstream viz Gaurikund, Sonprayag, Phata, etc. Kedarnath area is situated in the U shaped valley where the elevation varies from about 2700 m to 6900 m.

River Mandakini originates from Chorabari glacier situated upstream of Kedarnath temple complex. The river is joined by Saraswati River near Kedarnath which originates from Companion glacier of Chorabari glacier upstream of Kedarnath. The river passes Rambara and Gaurikund. The Madhu Ganga and Dudh Ganga are the main tributaries that merge into the Mandakini River at Kedarnath town. Another equally important tributary of Mandakini River is Son Ganga which originates from Vasuki Lake and has a confluence with Mandakini River at Sonprayag. The river finally merges with Alaknanda River at Rudraprayag.

The drainage area of Mandakini river at Rambara has been mapped using ASTER DEM. The is about 64 sq.km, out of which about 14 sq.km lies above elevation 5000 m as shown in Fig.2.

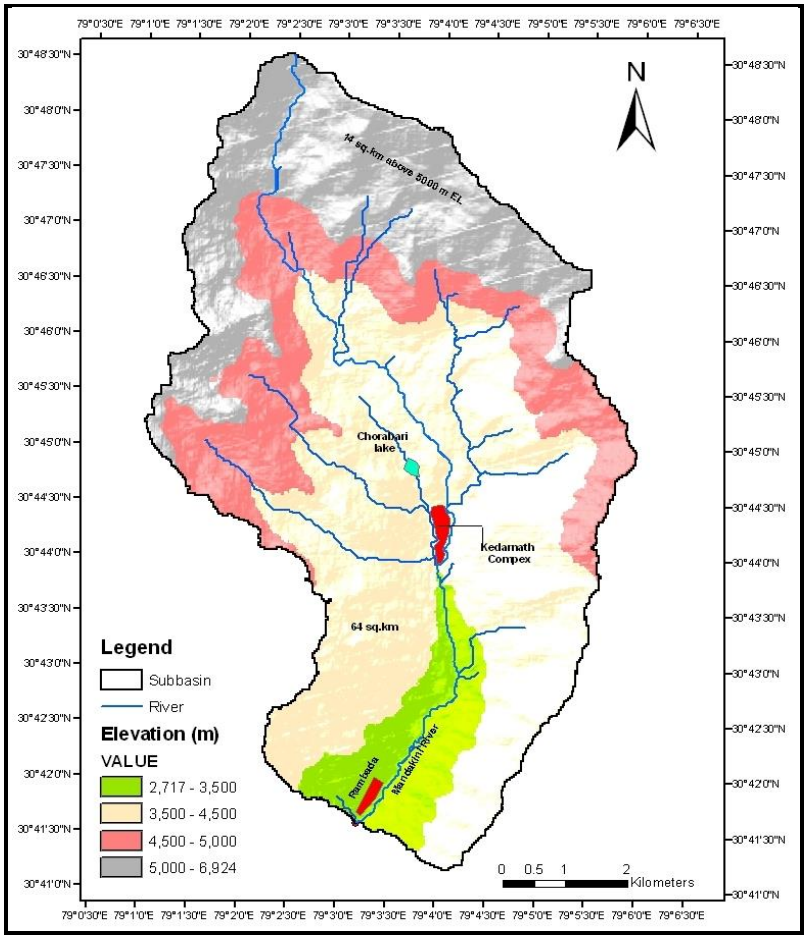

Fig.2: Drainage area map of Mandakini river upto Rambara

3.0 SIMULATION OF FLOODING EVENT OCCURRED ON 16TH JUNE 2013 AT 5:15 PM

To flooding event of 16th June 2015 has been analysed on HEC-HMS. Since the area is having very steep topography and small catchment (rainfed area of about 50 sq.km and time of concentration less than 1 hour), in such case kinematic wave flood model is ideally suited. The total rainfall during from 15th June 5:00 PM to 16th June 5:00 PM was about 325 mm as reported by WIHG observatory at Chorabarai glacier. The hourly distribution of rainfall could not be obtained. However, based on the various Self Recording Rain Gauges (SRRG) in Uttrakhand, IMD has suggested some suitable distribution for June -2013 rainfall in Uttarakhand. Though the same may not be strictly applicable for rainfall occurred near Kedarnath area, but in the absence of any other SRRG data the same has been adopted for the present analysis. As per IMD hourly distribution the maximum possible rainfall in one hour duration is about 41 mm.

The kinematic wave flood simulation results are shown in Fig.3. The flood peak estimated at Rambara is about 576 cumec. This flood peak passed Rambara with a shooting velocity of about 8.5 m/s resulting rise in water level by about 4.5 m. For about 50 sq.km rainfed catchment area the yield of catchment is about 11 cumec / sq.km, which is very high flood from all accounts. The time series of water level as obtained from MIKE11 simulation is plotted in Fig.4.

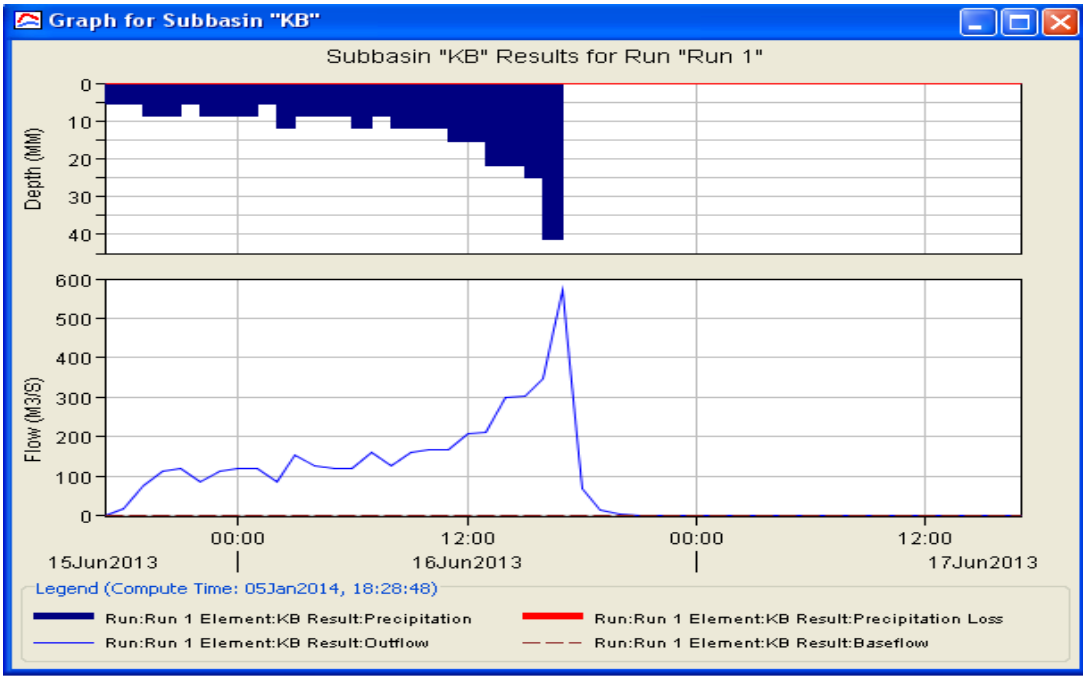

Fig. 3: Flood Hydrograph at Rambara due to 15 and 16th June 2013 rainfall

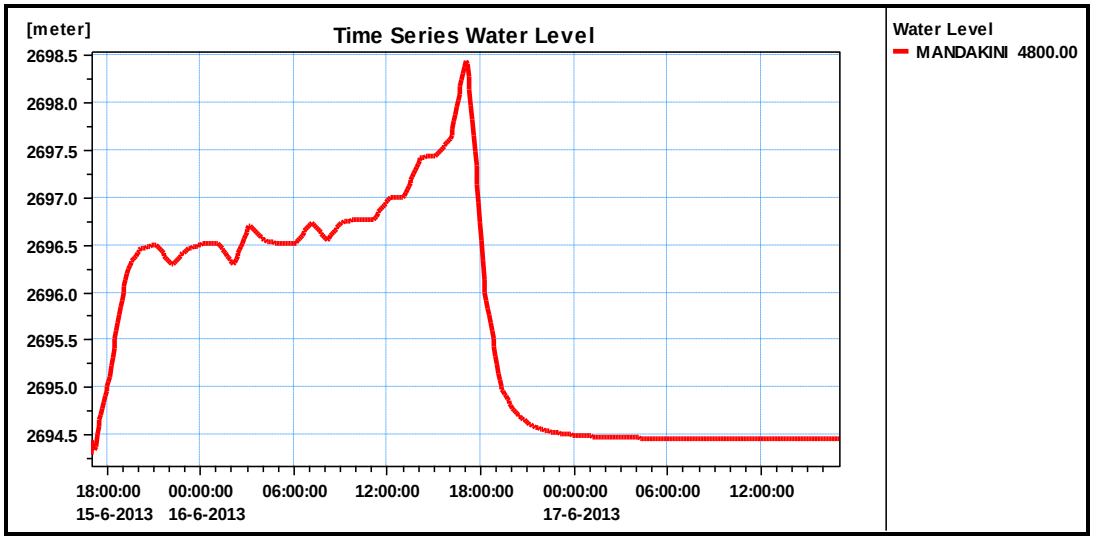

Fig. 4: Time series of water level at Rambara

4.0 SIMULATION OF CHORABARI LAKE OUTBURST FLOOD EVENT OCCURRED ON 17TH JUNE 2013 AT 6:15 AM

Chorabari lake outburst occurred in early morning of 17th June 2013. The lake was emptied in less than 15 minute resulting devastating flood in Kedarnath temple complex and huge loss of lives. The Chorabari lake was located at an elevation 3960 m, about 2.1 km upstream of Kedarnath temple complex. The Kedarnath temple complex and Chorabari lake location is shown in Figure-9. The breach location of moraine dam lake is shown in Figure-10. As per WIHG this lake was about 400 m long, 200 m wide and about 15-20 m deep. The Chorabari lake outburst event has been simulated using MIKE11 mathematical model. For the purpose of hydrodynamic routing the cross sections of river from lake location upto downstream of Kedarnath complex has been extracted from ASTER DEM. From the cartosat imagery available at Bhuvan it was possible to estimate the breach parameters for moraine dam. The breach parameter has been adopted as breach bottom width : 40 m, breach side slope : 0.75H:1V, breach development time: 10 minutes

The GLOF flood near Chorabari lake has been estimated about 1273 cumec. The same near Kedarnath comlex is about 1200 cumec. The velocity of flood peak has been found as 9.7 m/s. The GLOF hydrograph and velocity plot near Kedarnath complex is shown in Fig.5.

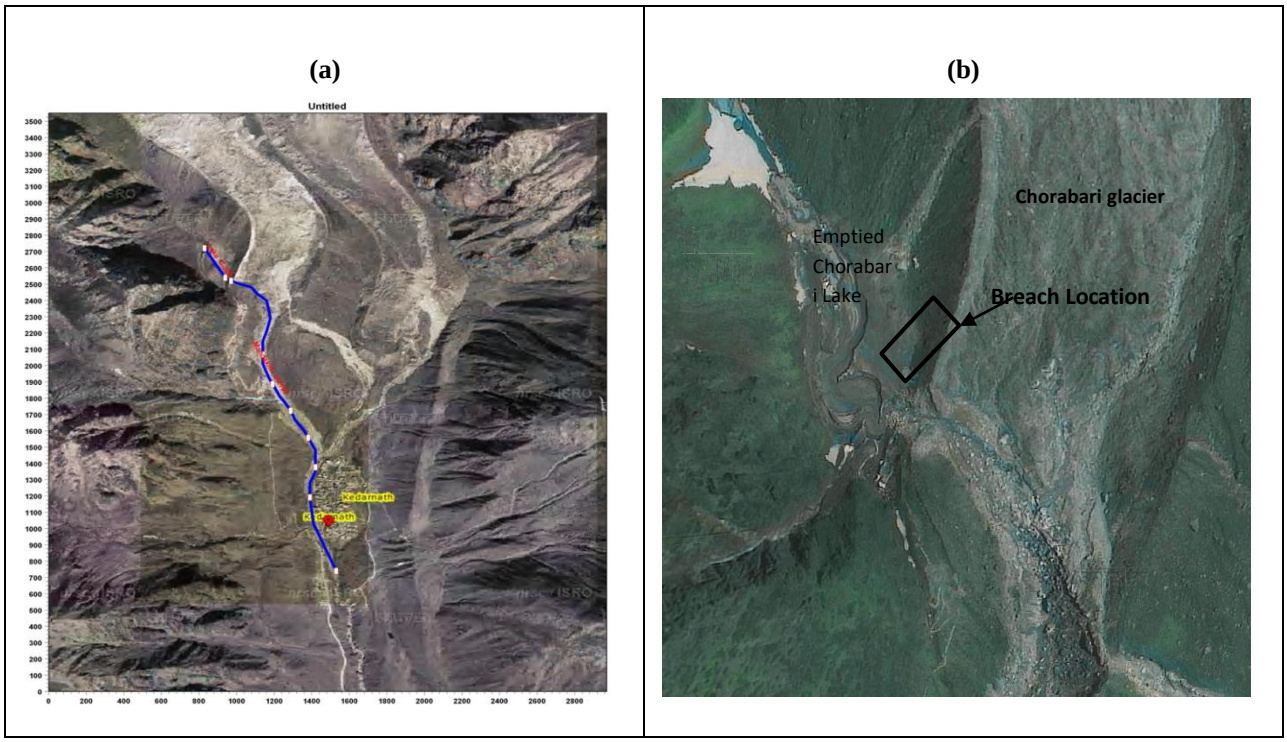

Fig. 5: Mike11 model set up for GLOF (a) and Cartosat imagery Chorabari lake (b)

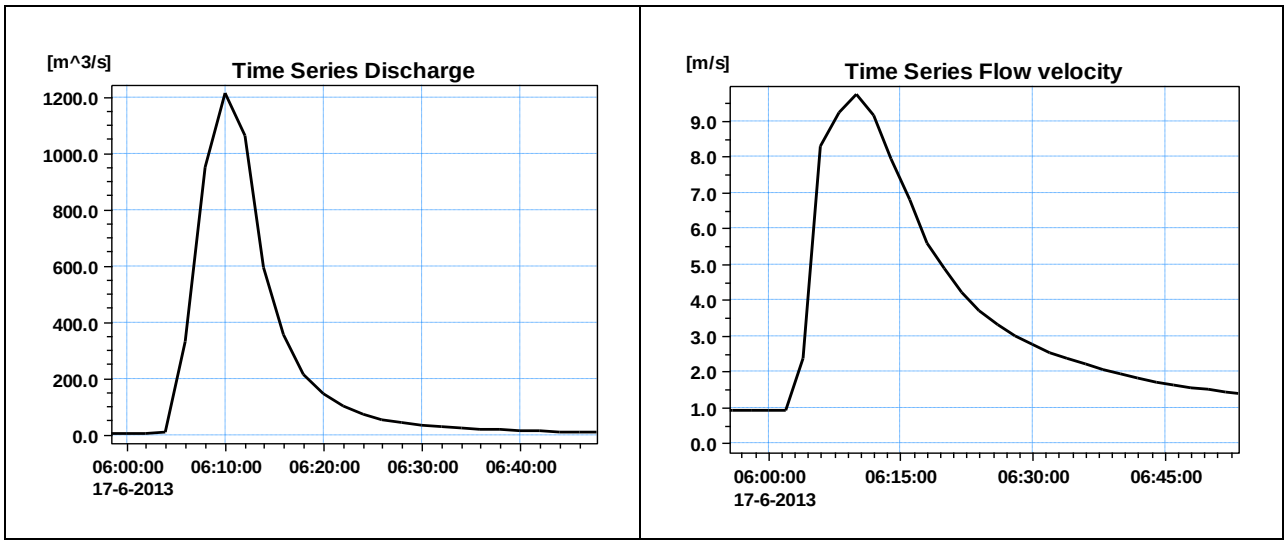

Figure-11: Discharge and velocity time series near Kedarnath complex due to Chorabari lake outburst

5.0 CONCLUSION

The slope of hills near Kedarnath area is about 30 degree from vertical resulting time of concentration of about 1 hr only. Due to saturated terrain condition because of continuous rain and small time of concentration only two hours consecutive rainfall of intensity about 40 mm/hr was sufficient to create flash flood of the order of 600 cumec. The average slope of the river from Kedarnath up to Rambara is about 160 m/km, which created a shooting flood wave of 4.5 m deep travelling with velocity of about 8.5 m/s, causing devastation of Rambara and some of the portions of Kedarnath on evening of 16th June 2013. The Chorabari lake outburst flood was about 1200 cumec, which caused sudden rise is water level by about 5 m near Kedarnath and 6 m near Rambara. This flood wave translated with a shooting velocity of about 9.5 m/s, resulting complete devastation of Kedarnath, Rambara and other locations.

Disclaimer: *The views expressed in the paper are purely personal and not necessarily the views of the organisation.*

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FLOOD ESTIMATE FOR DAM BREAK SCENARIO OF PHUKTAL LAND SLIDE DAM

N. N. RAI[1], O. P. GUPTA[2]

ABSTRACT

Blockage of rivers due to landslides in Himalayas and consequent formation of lakes behind landslide dams has been observed at a number of places in the recent past. These landslide dams pose a major threat of flash flood to downstream areas in event of their breaching. As landslide dams are quite porous, they are vulnerable to breach by cavity formation or overtopping. In past a number of flash flood events occurred due to breaching of landslide dams on river Parechu, Kurichhu etc. For an effective disaster management planning, it is essential to have proper estimate of lake volume behind landslide dam, possible dam break flood magnitude, its attenuation and travel time along the river reach. In majority of the cases getting the input data for dam break simulation is not possible. In the present paper methodology for extracting the desired input using the open source data, estimating the flood scenario due to possible breaching of landslide dams has been discussed. The methodology has been presented through a case study of Phutkal landslide dam, formed on river Phuktal in Kargil district of J&K during December 2014. For effective disaster management planning in the downstream reaches of Phuktal river in J&K, it was essential to estimate the possible rise in river water level in event of landslide dam breach and travel time of flood peak. The available input data was latitude, longitude of landslide dam site and fetch of the lake thus formed. Based on the latitude and longitude information of land slide dam formation and fetch of the lake, storage volume was estimated using HEC-RAS mathematical model. The dam break flood and propagation of flood wave in downstream valley was simulated using MIKE11 mathematical model to estimate the possible rise in river water level and its arrival time at salient locations. The study results were shared with relevant authorities responsible for disaster management planning.

Keywords *- Landslide dam; Dam break flood; Flood attenuation; Warning time; Disaster management*

1.0 EVENT BRIEF

A land slide dam was formed on river Phuktal between Shaday Sumdo and Shun probably on 31st December, 2014. Phuktal is a tributary of Zanskar river a north-flowing tributary of the Indus river in J&K state of India. The Zanskar mountain Range separates Zanskar from Ladakh. An aerial recce of the region by the a Committee formed by State Government revealed that a whole side of mountain soil had landed on the Phuktal river from Shaday Sumdo at a distance of

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5.5km from Marshun. The mound of earth was about 50 m high. As per the information available the accumulated water was frozen and had formed a temporary artificial lake extending about 5 km upstream. The latitude and longitude of land slide blockage was 33.289 ^{0} N and 77.295 ^{0} E respectively.

After receiving the above information necessary study was carried out by Central Water Commission to estimate the possible flood peak at different locations downstream of the land slide dam in the event of a dam break. The study results were shared with relevant authorities responsible for disaster management planning. A location map of land slide dam site is shown in Fig.1. A site photograph of land slide dam and lake formed behind the dam is shown in Fig.2.

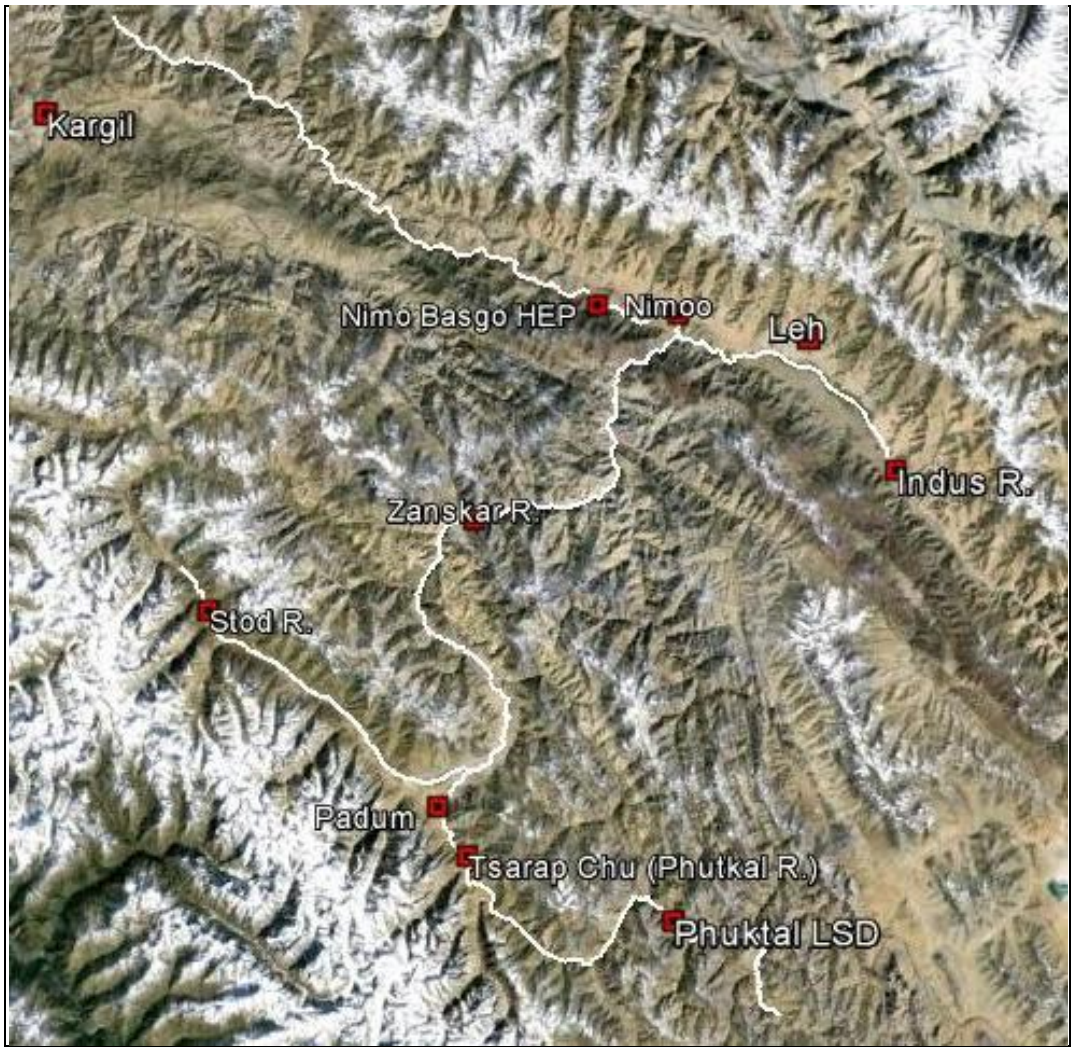

Fig. 1: Location of Phuktal land slide dam

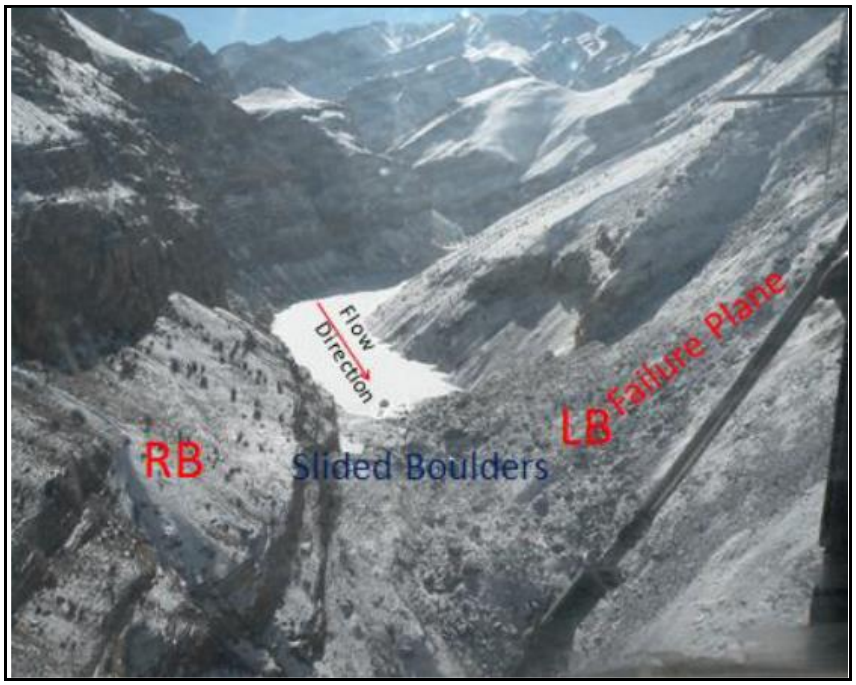

Fig. 2: Site photograph of land slide dam

2.0 DATA CONSTRAINTS

The available data were latitude and longitude of landslide dam, its aerial photograph and approximate height and fetch of the lake formed behind the land slide dam. In order to have a proper estimate of flood peak, its travel time and differential rise in river water level at different downstream locations in event of a possible dam break, the proper estimate of storage volume behind landslide dam, cross sections of river, catchment area of the river at landslide dam location.

3.0 METHODOLOGY ADOPTED TO FORMULATE THE DAM BREAK FLOOD FORECAST OF LAND SLIDE DAM

Location of landslide dam was marked on Google Earth. Drainage area and hypsometry of phuktal river at landslide dam and Zanskar river at its confluence with Indus river has been estimated by GIS processing of the SRTM DEM (Fig.3). Cross sections of river upstream of landslide dam and were extracted from ASTER DEM. From these cross sections the storage volume behind dam was estimated using open source software HEC-RAS. Dam break simulation and hydro dynamic channel routing of dam break flood has been carried on MIKE11 mathematical model to get flood peak, its travel time and possible additional rise in river water level at different downstream locations. For hydrodynamic channel routing cross sections of Phuktal and Zanskar rivers from landslide dam site upto Zanskar-Indus confluence were also extracted from ASTER DEM.

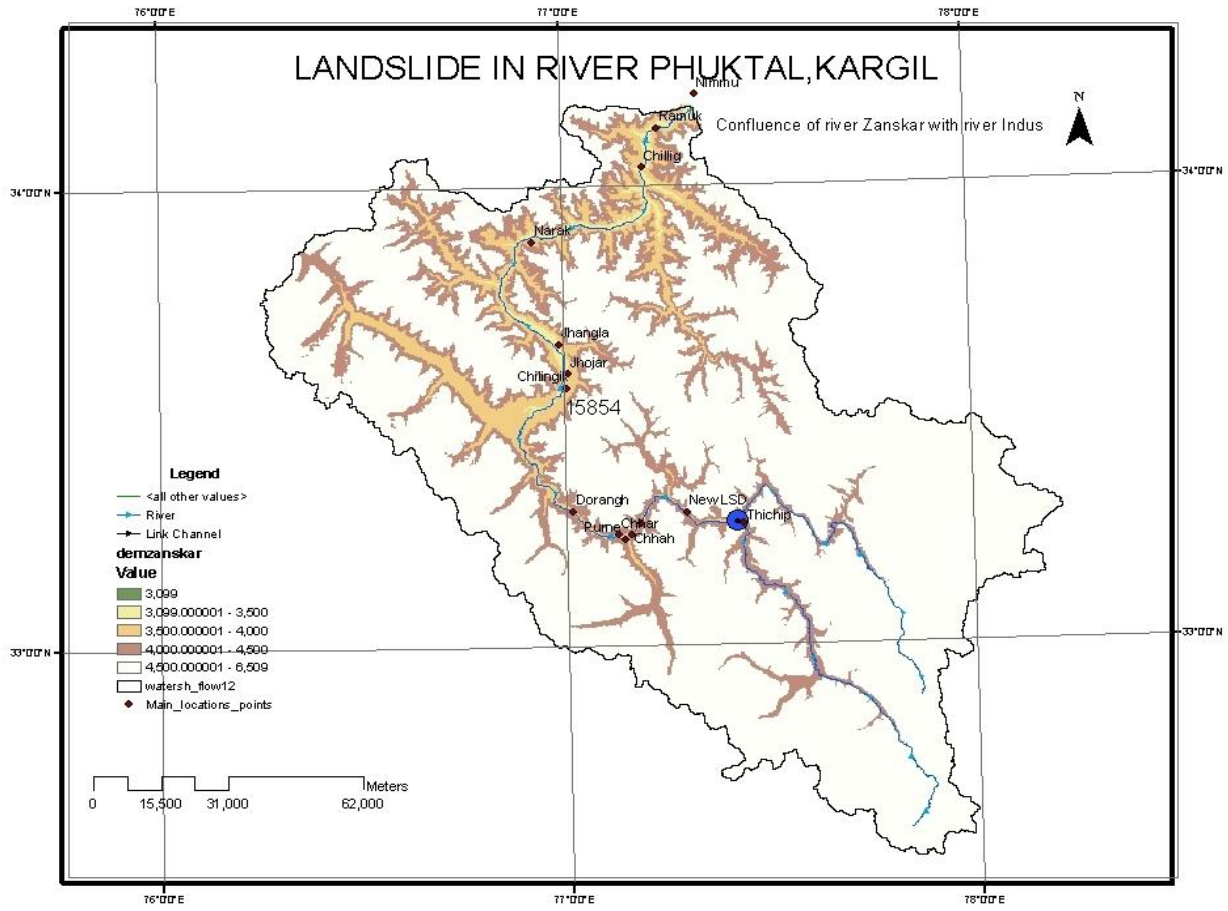

Fig. 3: Drainage area map of Phuktal/Zanskar rivers

The drainage area of Zanskar river up to its confluence with Indus is about 15854 sq.km. The catchment area of the Phuktal river at land slide dam location is about 5607 sq.km, out of which about 90% lies above the elevation band 4500 m (permanent snow line).

3.0 VOLUME ESTIMATE OF LAKE BEHIND LAND SLIDE DAM

The volume of the lake was estimated on HEC-RAS for 50 m depth of water near land slide dam. The estimated volume was about 24 million cubic meter. The volume estimate is given in Table-1. The bed profile of the river upstream of the land slide dam along with water surface profile is given in Fig.4.

Table-1: Estimated volume behind land slide dam for 50m depth of water near dam site

River Reach	Chainage (m) u/s of land slide dam	River bed elevation (m)	Water Surface Elev (m)	Volume (1000 m^3)	Surface area total (1000 m^2)
Phuktal	11000	3981.67	3982.52	23508.15	1078.79

Phuktal	10000	3980.33	3980.66	23504.41	1067.1
Phuktal	9000	3974.09	3976	23493.35	1051.59
Phuktal	8000	3970.65	3976	23191.88	964.27
Phuktal	7000	3960.81	3976	22461.42	841.56
Phuktal	6000	3948.18	3976	21170.79	745.56
Phuktal	5000	3932.81	3976	16763.27	572.01
Phuktal	4000	3928.49	3976	9345.12	309.95
Phuktal	3000	3926.4	3976		

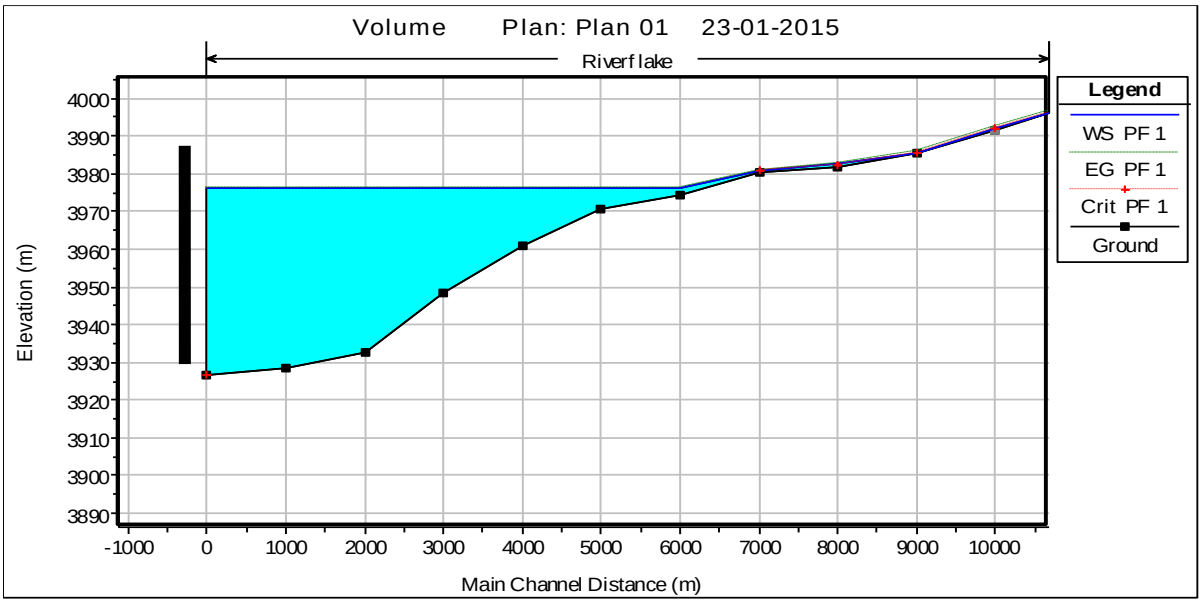

Fig. 4: Possible fetch of lake behind land slide dam for 50 m depth of water near dam site

4.0 DAM BREAK SIMULATION

For the estimated volume of 24 MCM the possible critical dam break scenario was simulated on MIKE11 to estimate the flood peak, its travel time and possible rise in river water level. For the simulation the initial condition flood in the river was adopted as 100 cumec. For the average breach width of 60m, breach depth of 40 m and breach development time of 2 hours the maximum discharge through the breach was estimated as 4865 cumec. The flood peak at

different locations along with additional rise in river water level in dam break scenario is given in Table-2.

Table-2: Estimated flood peak due to land slide dam breach and possible additional rise in water level at different locations of Phuktal river

Location (m) d/s of landslide dam	Initial flood in river (cumec)	Initial flood + landslide dam breach flood (cumec)	Flood peak due to breach of landslide dam (cumec)	Possible additional rise in water level due to land slide breach (m)	Flood Peak occurance time (date-hr:min)
LANDSLIDE DAM	0	4865	4865	10.50	00:00
PHUKTAL 17500.00 **(Phutkal Gompa)**	100	4423	4323	12.30	00:30
PHUKTAL 47500.00	100	3494	3394	6.40	01:30
PHUKTAL 75000.00	100	3204	3104	7.00	02:30
PHUKTAL 87500.00 **(Padum)**	100	2361	2261	4.20	03:30
PHUKTAL 112500.00	100	1918	1818	6.30	05:30
PHUKTAL 177500.00	100	1525	1425	6.00	08:20
PHUKTAL 197500.00 **(Nimoo)**	100	1451	1351	3.40	09:30

(Note: PHUKTAL 17500.00 denotes the location 17500 m downstream of landslide dam. Same way all other locations may please be read)

5.0 LANSLIDE DAM BREACH

NDMA in association with other agencies was able to develop a controlled breach section of size 2m x 2m on the top of the blockage in the middle of March 2015 in spite of permafrost conditions. Due to this controlled breaching section the possibility of further rise in lake water level was controlled up to a large extent. The land slide dam finally breached on 7th May around 9.30 AM. The breaching of dam was immediately detected with the help of Digital Water Level Recorder(DWLR) at Phuktal Gompa where abnormal rise in water level was recorded. Based on such reading, immediate warning was given to all concerned. At 8am, WL at Phuktal risen to 2.3m and at 10 AM, peak WL was around 10 m to 12m as reported by local people. Due to

regular monitoring and early system in place, there was no casualty. No loss of human lives and livestock has been reported. Only inevitable damage reported is to the low & small bridges and few small buildings near river bank, erosion of river banks. There was no damage to Nimoo Bazgo HEP except shutting down of plant for few days due to exceptionally high silt content which is natural in case of GLOF and land slide dam breach events.

6.0 DAMBREAK STUDY VIS A VIS ACTUAL FLOOD AT DIFFERENT LOCATIONS ADDITIONAL RISE IN WATER LEVEL

A comparison of simulated land slide dam break flood peak and its travel time with the actual occurred event has been presented in Fig.5. It can be seen that the simulated travel time is almost similar to actually recorded travel time. Regarding addition rise in water level the difference in water level was about 30 to 40 cm, which is because of the river cross sections which were extracted from ASTER DEM of 30 m x 30 m resolution. For the finer resolution DEM, perhaps the difference would have been further narrowed down.

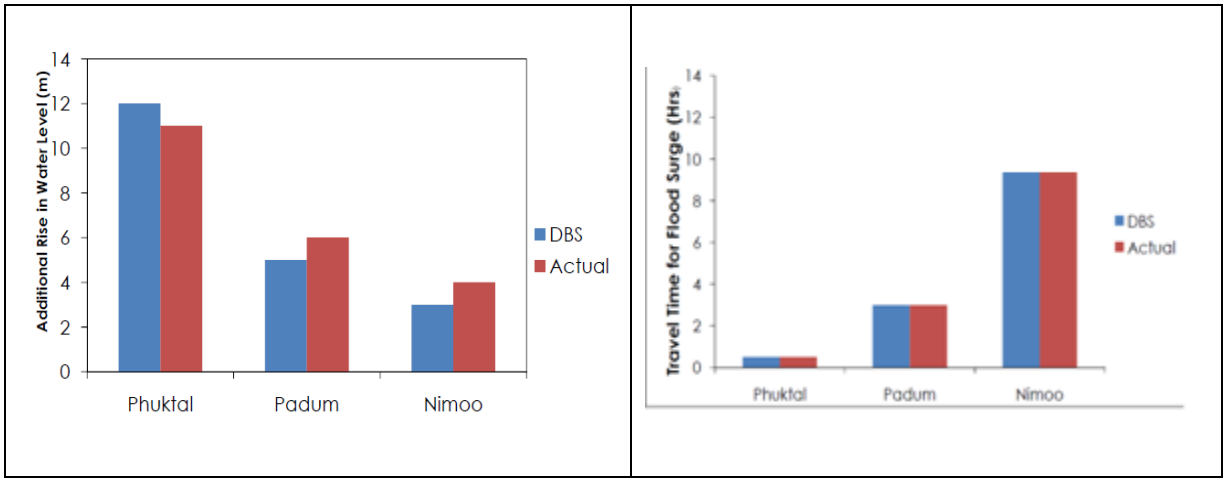

Fig 5: Comparison of simulated flood peak and its travel time with the actual event

7.0 CONCLUSION

In majority of the cases of land slide dam formations it may not be possible to get the data of lake volume and river cross sections, which are essential for hydrodynamic simulation. However, from the available open source DEM and modeling tools some of the important data can be extracted and used for hydrodynamic simulation to provide the desired input for disaster management planning. While providing the inputs regarding additional rise in river water level and warning time etc limitations of the data should be clearly mentioned in order to take some reasonable additional factor of safety in the estimate and consequent disaster management planning. In case of phuktal land slide dam, dam break simulation of land slide dam in advance, it was possible to estimate the flood peak and its arrival timings at different location of Phuktal, Zanskar and Indus rivers. The proper volume estimate of lake formed behind the land slide dam

and dam break simulation gave a fairly good idea of its hazard potential, which eventually provided essential input in formulation of disaster management strategies.

Disclaimer: *The views expressed in the paper are purely personal and not necessarily the views of the organisation.*

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NATIONAL HYDROLOGY PROJECT

PROJECT OBJECTIVE

National Hydrology Project (NHP), a Central Sector Scheme, is being implemented by DOWR, RD & GR on pan India basis with the support of the World Bank. The objective of the project is to improve the extent, quality, and accessibility of water resources information and to strengthen the capacity of targeted water resources professionals and management institutions in India.

PROJECT HIGHLIGHTS

In line with the defined objective, NHP is striving hard to bring transformation in the water resources sector as a whole. Moving away from the current system of decision making based on experience and judgements, improved water management is being attempted through introduction of informed decision making, relying on a host of modern analytical tools and loads of data from automated sensors on each component of the water cycle in real-time or near real-time. The same is being done in a collaborative mode by involvement of Central and State Government Organisations to ensure proper capacity building is there and the sense of ownership prevails among the Organisations referred as Implementing Agencies (IAs) of NHP. There are 48 IAs which are taking forward this initiative spanned over a period of 8 years (from 2016-17 to 2023-24).

Salient Features:

- Approved cost by the Cabinet: Rs. 3680 crore
- 100 % Grant in aid to the 48 Central and State Implementing Agencies
- Year of approval: 2016-17
- Loan support by the World Bank: 160 million US Dollars

- 48 Implementing Agencies (36 State & UT Agencies, 9 Central Agencies and 3 River Basin Authorities)

Central Water Commission (CWC) is one of the IA of NHP with Project Implementation Plan (PIP) of Rs 167.60 Crore.

PROJECT CONCEPT

- Modernizing water Resources Monitoring network
- Transforming Knowledge Access
- Development of Analytical Tools
- Modernizing Institutions and capacity building

PROJECT COMPONENTS

A. Water Resources Monitoring Systems: This includes establishment/ modernization of new and existing hydromet monitoring systems including meteorology, streamflow, ground water, water quality and water storage measurements, and construction of hydro-informatics centres. The major activities include establishment of real time data acquisition system (RTDAS), establishment/ strengthening of water quality laboratory, Supervisory Control and Data Acquisition (SCADA) systems for water infrastructure and Establishment of hydro-informatics centres.

B. Water Resources Information Systems: Component B will support the strengthening of national and sub-national water information centres with web-enabled WRISs through standardization of databases and products from various data sources/departments and make comprehensive, timely, and integrated water resources information available to decision makers for effective planning, decision making, and operations. The project will support development or strengthening of centres for web-based WRIS at the central, regional, river

basin, and state/UT levels. Some of the key activities under this component are:

(i) Strengthening of India Water Resources Information System (WRIS);
(ii) Upgradation of online Surface Water Information System (eSWIS)
(iii) Regional /State Water Resources Information System.

C. Water Resources Operations and Planning Systems: This component will support the development of interactive analytical tools and decision support platform that would integrate database, models and scenario manager for hydrological flood forecasting, integrated reservoir operations, and water resources accounting for improved operation, planning, and management of both surface water and ground water, based on basin approach. Component C has three subcomponents:

(i) Studies of basin-wise Extended Hydrological Prediction, Sedimentation transport in the river basin, streamflow forecasting, integrated reservoir operation systems, reservoir sedimentation studies and irrigation design and operations);

(ii) Purpose driven support; and

(iii) Piloting innovative knowledge products.

D. Institutional Capacity Enhancement: Component D aims to build capacity for knowledge-based water resources management.

It will support subcomponents in the establishment of (i) water resources knowledge centres, (ii) professional development, (iii) project management, and (iv) operational support.

BENEFICIARIES

- Central and state agencies responsible for surface water and/or ground water planning and management, including river basin organizations (RBOs)
- Other stakeholders including general public and farmers

INITIATIVES UNDER THIS PROJECT

1. Establishment of National Water Informatics Centre as a nation-wide repository of water resources data- Single window system for accessing water resources related information, analytical tools and knowledge products.
2. Modernisation of hydro-meteorological data acquisition system with thrust on real time data acquisition system (RTDAS).
3. Seamless sharing of hydro-meteorological data among all the Central and State Implementing agencies of National Hydrology Project so that data can be used by various organisation in development of analytical tools for informed decision making.
4. Capacity building of Water resources professionals of the states of India in using various analytical tools including mathematical models, remote sensing and GIS techniques, etc. as required for planning and management of water resources and dealing with extreme event management such as floods and droughts.
5. The project envisages to develop analytical tools which are required for basin level planning of water resources as well as to deal with extreme events.
6. To develop Integrated Water and Crop Information and Management system at National level for supporting water budgeting, crop planning, water security plans at micro level and management of water quality & pollution, drought management etc.

LIKELY IMPACT OF NHP

NHP is a project with scientific activities with long gestation period of 8 years. As such the impact on the ground would be visible in due course of time. However, a few visible impacts are as below:

- After commencement of NHP, almost all the Central and State Implementing Agencies have joined Centralised data base system (WIMS).
- More reliance on real time data acquisition and timely access of data to the stakeholders
- States are now more forthcoming in sharing their issues related to water resources with each other and with the Central Govt. to have scientific resolution. This change in Mind set and open data source will act as confidence building measure through enhanced public participation for sustainable development of water resources.
- Professionals trained under NHP are now forthcoming to discuss their issues with other states having similar problems ensuring cross learning.
- The importance of analytical tools in scientific decision making is now being well understood.
- The vision towards planning of water resources at basin level has started finding acceptance among the states after understanding the concepts of hydrology.

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MONSOON 2020 & FLOODING SITUATION

1 METEOROLOGICAL SITUATION

During 2020, the southwest monsoon performance was as given below:

- The seasonal (June - September) rainfall over the country as a whole was 109% of its Long Period Average (LPA) in 2020. It was the third highest after 112% of LPA in 1994 and 110 % of LPA in 2019.

- Seasonal rainfalls over Northwest India, Central India, South Peninsula and East & Northeast (E & NE) India were 86%, 115%, 129% and 107% of their respective LPA.

- Out of 36 meteorological subdivisions, 2 subdivisions (5% of the total area of the country) received large excess rainfall, 13 subdivisions (35% of the total area of the country) received excess rainfall, 16 subdivisions (45% of the total area of the country) received normal seasonal rainfall and 5 subdivisions (15% of the total area of the country) received deficient season rainfall during the season.

- Monthly rainfall over the country as a whole was 117% of LPA in June, 90% of LPA in July, 127% of LPA in August, and 105% of LPA in September.

- Southwest monsoon current reached south Andaman Sea and Nicobar Islands on 17th May, 2020 (5 days ahead of its normal date), but further advance was sluggish. It set in over Kerala on 1st June coinciding with its normal date for onset over Kerala; Monsoon covered the entire country on 26th June, 2020; 12 days before its normal date (8th July).

- Monsoon started withdrawing from western parts of northwest India on 28th September, 2020 against the normal date of 17th September, 2020 with a delay of around 11 days. The Southwest Monsoon withdrew from the entire country on 28th October, 2020.

- During the season, one Severe Cyclonic Storm “NISARGA” formed during 1st to 4th June. This year also witnessed absence of monsoon depression during the season.

- The forecast for monsoon onset over Kerala for this year was correct, which is the fifteenth consecutive correct forecast for the event (except for the year 2015) since issuing of forecast for the onset over Kerala started in 2005. The Forecasted date of onset of monsoon over Kerala was 5th June with a model error of ±4 days and realized date of onset of monsoon over Kerala was 1st June in this year.

- The forecasts for the rainfall over the country as a whole during the season, forecasts for the seasonal rainfall over three broad homogeneous geographical regions (Central India, Northeast India and South Peninsula) and forecast for August rainfall and for rainfall of second half of the monsoon season for the country as a whole were found to be underestimated with respect to the actual rainfall whereas the forecasts for the rainfall for the country as a whole during July and forecast for the seasonal rainfall for Northwest India were found to be overestimated as compared to the actual rainfall.

2 FLOOD SITUATION

Extreme flood situation was witnessed in 7 Flood Forecasting stations, Severe Flood situation was witnessed in 88 Flood Forecasting Stations and 34 Flood forecast stations witnessed Above Normal Flood Situation. No flood forecast were issued for 111 flood forecasting stations which include 69 level forecasting stations and 42 inflow forecasting stations. Out of the 130 reservoirs in the network, inflow forecasts were issued at 88 reservoirs and in 42 reservoirs the inflows did not exceed the criteria for issuing inflow forecasts. The highlight of this year flood was the Extreme Floods witnessed in Assam, Bihar, Chattisgarh, Uttar Pradesh, Uttarakhand, Madhya Pradesh, Maharashtra, Odisha, Andhra Pradesh, Tamilnadu, Telangana and Karnataka state. Few photographs depicting flood situations occurred in various stations are given below.

Bihar

River Burhi Gandak in Muzaffarpur district, Bihar Tuesday, July 21, 2020.

Chhattisgarh

Flood situation in Jangir-Champa during 29th August 2020

Karnataka

Kadabur village in Kalaburagi district was completely flooded in Bhima river during 18th October 2020.

3.0 FLOOD FORECASTING PERFORMANCE

During the year 2020, 11721 forecasts were issued out of which 11198 forecasts (95.54%) were found to be within the limits of accuracy. The number of level forecasts issued during the year 2020 were 8243 out of which 8133 (98.67%) was within the limit of accuracy of ±0.15 m. The number of inflow forecasts issued was 3478 out of which 3065 (88.13%) were within limits of accuracy of ±20%. CWC issued Daily Flood Situation Report cum Advisories (DFSITREPcA) during the monsoon season. This contains the usual daily rainfall situation, rainfall forecast for the next 5 days, daily flood bulletin for the day and the flood situation and advisories for the next few days, GIS based Map indicating the districts alerted/affected by flood and reservoirs having inflow forecasts. Further, the report was sent to all beneficiaries including State Governments through e-mail on a daily basis.

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COASTAL MANAGEMENT INFORMATION SYSTEM (CMIS)

1. BACKGROUND

All the maritime states are facing problems of coastal erosion in varying magnitude. Shoreline Change Atlas of the Indian coast prepared by Space Application Centre (SAC), ISRO and Central Water Commission published in 2014 (based on time frame 1989-91 and 2004-06) shows that around 45% of the coastline is under erosion. Out of these, 891 km of critically affected area has been protected and about 814 km are yet to be protected. Some of the general problems along the Indian Coast which require engineering intervention are erosion of the coast; flooding during storm surge; sand bar formation near mouth of inlets rivers and estuaries; silting up of entrance channels etc. Two major causes of sea erosion are (i) Natural Causes : Action of Waves, Winds, Tides, Near-shore currents, Storms, Vertical land movements (compaction), Sea Level Rise etc. (ii) Man-made Causes : construction of structures, mining of beach sand, dredging, or building of dams etc. Most of the time erosion is caused by combination of both above factors

2. PROBLEMS FACED IN IMPLEMENTATION OF COASTAL PROTECTION PROJECTS

As per allocation of business rule 1961, **Sea Erosion is one of the mandate** of DoWR, RD & GR under Ministry of Jal Shakti. For planning of coastal protection projects, the collection of systematic coastal data cannot be overemphasized. Identification of various coastal processes and causes of erosion is required for planning and design of Coastal Protection Works. Vast set of data on sediment transport, waves, tides, bathymetry, geological data, satellite imageries etc. is required to analyze the problem. However the site specific coastal data was not available or

was very limited with different agencies. Nearly all the States/UTs had no coastal data and coastal protections were done in an unscientific manner. Also most of the States had no dedicated specialized organization to tackle coastal erosion.

3. STATUS OF COASTAL DATA WITHIN THE COUNTRY

Data pertaining to Coastal Sector is collected/consolidated by various agencies viz INCOIS, NCCR, NIOT under Ministry of Earth Sciences (MoES), NIO under CSIR, NHO under MOD, MoEF, Space Application Centre under Dept. of Space and various States Govt./other agencies. Data collection is done by concerned agencies as per their mandate & requirement. There is lack of uniform data collection format and sharing within different agencies/stakeholders. Also, data is not directly usable for planning/design of coastal protection works.

4. WHY WE NEED CMIS

In view of lack of dedicated coastal data bank to tackle coastal erosion at National level/State level, Government of India, DoWR, RD & GR decided to create CMIS as one of the specific activities during 12th Plan under DWRIS Scheme. Under CMIS it was proposed to create an integrated data bank at National Level to tackle coastal erosion in a scientific manner and keeping in view the long term perspective and challenges of climate change. It should have all the consolidated coastal data on national level, including updated shoreline, effects of climate change, already protected areas, vulnerable areas, geological /geomorphologic characteristics of shoreline etc. Analysis of data would be used for identification of various coastal processes and causes of erosion which will be utilized for planning and design of Coastal Protection Works.

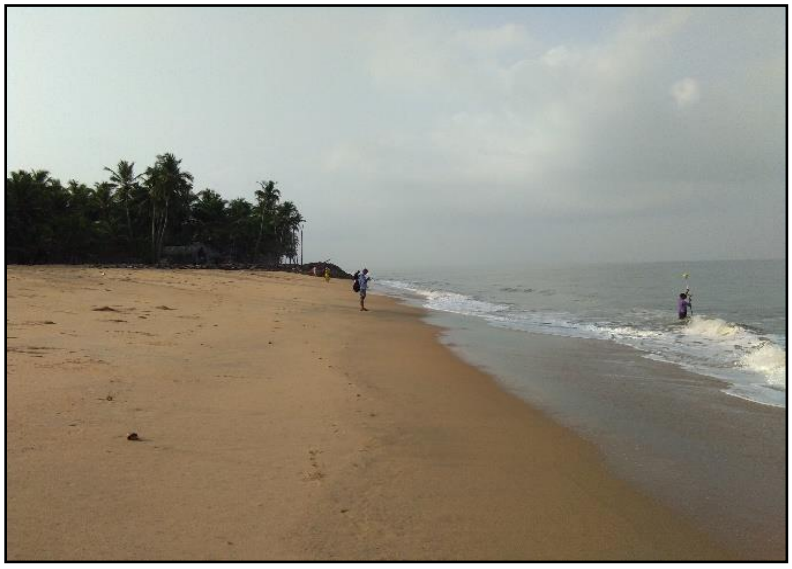
Consolidation of any existing data through a coordinated effort and further collection of the data for creating a Management Information System is planned under component CMIS. Such coordination work will be done through Coastal Protection Development Advisory Committee (CPDAC) - a high level body of experts in the field of coastal engineering, headed by

Member (RM), CWC with representatives of Coastal States/UTs and the related Central Ministry/Departments/Institutes as its members. CPDAC provides common platform to all stakeholders dealing with the subject matter to discuss and solve their coastal erosion problems.

5. DIFFERENCE BETWEEN DATA COLLECTED UNDER CMIS AND DATA COLLECTED BY OTHER AGENCIES

The prime objective of CMIS is to collect near shore parameters which will be used in the design, construction and maintenance of site specific coastal protection structures whereas other agencies collect ocean parameter as a whole. Under CMIS, it is planned to establish data collection set up at vulnerable reaches of the entire east and west coast whereas the other agencies are operating only at selected locations which do not merge with the objective of DoWR, RD & GR/CWC.

6. DEVELOPMENT OF CMIS



CWC has initiated development of "Coastal Management Information System (CMIS)" under the Plan Scheme "Development of Water Resources Information System (DWRIS)". The CMIS envisages setting up sites along the coast of the maritime States of India for collecting data of relevant coastal processes. Coastal Management Information System is a field of activity wherein the experience and expertise is needed. Hence, for implementation and creation of CMIS, CWC has suitably associated with the maritime State/UT Governments and Institutes/Agencies who possess similar expertise and experience. In order to hear the views of the maritime State/UT Governments and Expert Institutes/Agencies, a "One day Brainstorming Workshop on Implementation and Creation of Coastal Management Information System (CMIS)" was organized by CWC on 13th May, 2014 at CWC, New Delhi. During the discussions in the work-shop, the preferred implementation model for CMIS was decided to be through signing of a tripartite Memorandum of Understanding (MoU) wherein, CWC would be the

'Project Implementer', the expert agency would be the 'Project Executor' and the concerned State/ UT Government would be the 'Project Facilitator'.

7. MAIN ACTIVITIES OF CMIS

i. Research/Investigation & Preparatory Work for Site identification.

ii. Consultation with maritime States/Union Territories and relevant stakeholders and physical verification and finalization of potential sites.

iii. Data collection related to various natural phenomenon in Coastal Zone viz. Wave, Current, Wind, Tide Level, River discharge, Bathymetry, Beach observation, etc.

iv. Transmission of collected data to national data bank.

v. Analysis and processing of collected data for achieving the desired objective.

vi. Dissemination of data to Stake-holders through INDIA-WRIS Web-based application as an ongoing activity.

vii. Detailed examination of coastal erosion, sediment transportation, defining sediment cells etc.

viii. Capacity building by actual site visit, suitable manuals/guidelines, training, study tours, workshops, seminars etc.

8. DATA COLLECTION AND EQUIPMENTS

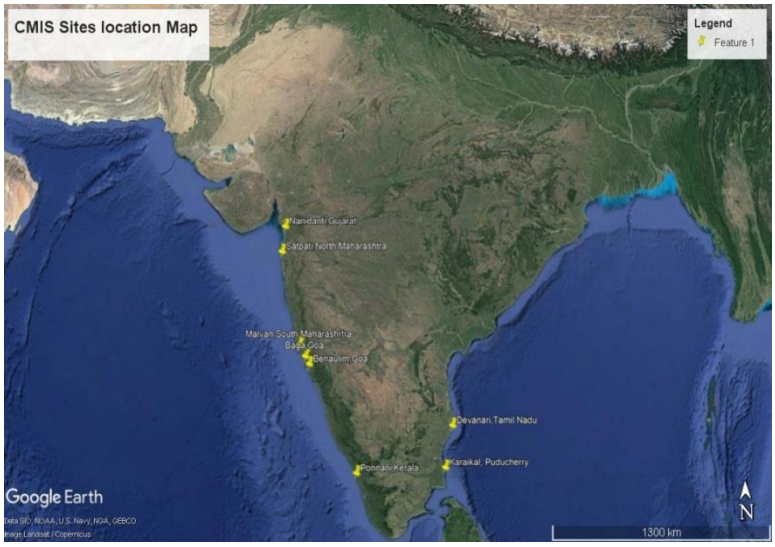
Data collection is most important activity in CMIS. CPDAC accepted nine Data-Types which need to be collected for assessing problem of coastal erosion and resultant action thereon. This has been outcome of efforts of sub-committee of CPDAC on Coastal Data Collection Compilation and Publication involving agencies such as CWC, NIO, Institutes from MoES, CESS, River Research Institute, Kolkata Port Trust, State Govt. etc.

Data related to Wave, Tide, Current, Wind, coastal sediment, beach profile, bathymetry, Riverine data, shoreline change are collected under CMIS. The various equipments used for collecting these parameters are given below in table;

Sl. No.	Data	Equipments	Frequency
1	Wave (Wave Height, Wave Direction, Wave Period and Wave length)	Directional Wave Recorder  Wave Rider Bouy 	Hourly
2	Current (Velocity and Direction)	Acoustic Doppler Current Profiler (ADCP) 	30 Minutes
3	Tide (Water level)	Tide Master 	30 Minutes
4	Bathymetry	Echo sounder 	Once during Pre Monsoon and once during Post Monsoon

5	Coastal Sediment	Grab Sampler 	Monthly
6	Wind (Velocity and Direction)	Automatic Weather Station (AWS) 	15-30 Minutes
7	Riverine Data (Discharge and Salinity)	Current Meter  CTD 	Thrice a day (during low tide, mid tide and high tide), twice in a month (Once during Spring Tide and Neap Tide), Once during Pre-Monsoon and Post Monsoon,Twice during Monsoon
8	Beach Profile	RTK GPS 	Monthly
9	Shoreline Change		

9. IMPLEMENTATION OF COASTAL MANAGEMENT INFORMATION SYSTEM IN MARITIME STATES/UTS



CWC started implementation of CMIS in Maritime States/ UTs through signing of a tripartite Memorandum of Understanding (MoU) wherein, CWC as 'Project Implementer', the expert agency as 'Project Executor' and the concerned State/ UT Government as 'Project Facilitator'. Presently establishment of three sites one each in the State of Kerala, Tamil Nadu and UT of Puduchery has been completed and establishment of five sites in the state of Goa, Maharashtra and Gujarat is going on under CMIS.

a) Implementation of CMIS in the State of Kerala, Tamil Nadu and Puducherry

A Memorandum of Understanding (MoU) was signed among CWC as project implementer, the Indian Institute of Technology, Madras as project executor and States of Tamil Nadu, Kerala and UT of Puducherry as project facilitator in October 2016 for establishment of one coastal data collection site each in Tamil Nadu, Kerala and UT of Puducherry. Establishment of three no. of coastal data collection sites (Devanari-Tamil Nadu, Karaikal-Puducherry and Ponnani-Kerala) has been completed in May 2021 and taken over by CWC. Coastal data collection activities are now being carried by Field office of CWC.

b) Implementation of CMIS in the State of Northern Maharashtra and Southern Gujarat

A MoU for implementation of Coastal Management Information System (CMIS) in Maharashtra (Northern Coast) and Gujarat (Southern coast) has been signed among CWC as Project Implementer, CWPRS, Pune as Project Executer and Govt. of Maharashtra and Govt of Gujarat as Project Facilitator in January 2019. Establishment of two no. of coastal data collection sites (Satpati-Maharashtra, Nanidanti Motidanti-Gujarat) is in progress under this project.

c) Implementation of CMIS in the State of Southern Maharashtra and Goa

A MoU for implementation of Coastal Management Information System (CMIS) in Maharashtra (Southern Coast) and Goa has been signed among CWC as Project Implementer, National Institute of Oceanography (NIO), Goa as Project Executer and Govt. of Maharashtra and Govt of Goa as Project Facilitator in March 2019. Establishment of three no. of coastal data collection sites (Tarkhali-Maharashtra, Benaulium-Goa, Baga-Goa) is in progress under this project.

10. WAY FOREWORD

Presently establishment of three sites has been completed and five sites is in progress. Further an expansion of sites is proposed in present plan period (2021-26) to establish a network of Coastal sites covering to most of maritime states.

The purpose of CMIS is not project specific but to create an integrated data bank to tackle coastal engineering problems along the vulnerable stretches of Indian coast in a scientific manner keeping in view the long term perspective and challenges of climate change including calculation of long term sediment transport fluxes on beaches, assessment of storm intensity and extreme events etc.. Ultimate user i.e. State/UTs are also involved in this activity and also for the future expansion activities of CMIS by CWC. Development of web based platform for data collected under CMIS is also under progress.

CMIS ACTIVITIES IN 2020

A) IIT Madras

Approval was received from DoWR, RD&GR for the project proposal of IIT Madras for extension of the implementation of Coastal Management Information System (CMIS) in the states of Tamil Nadu, Kerala and UT of Puducherry (CMIS) with an estimated cost of Rs. 4.143 crore for a period of one more year. Accordingly, a tripartite Memorandum of Understanding (MoU) was signed in January 2020 between CWC, IIT Madras and the respective states of Kerala, Tamil Nadu and Puducherry and an advance payment amounting to Rs 1.40 crore was made to IIT Madras in February 2020. 1st PMC meeting was held through VC on 21st December, 2020.

Site inspection of Shri R. K. Sinha, Member (RM), CWC, New Delhi at CMIS site Devaneri on 01/03/2020

Inspecting Automatic Weather Station installed at CMIS site Devaneri

B) CWPRS, Pune

Second PMC meeting was held via VC on 11.08.2020. An on-line training workshop was organized viz. Installation and Operation of Coastal Equipments which was organized in August 2020. Similarly, two Fields trainings were also organized during testing of equipments and their installation.

Beach Survey at Satpati Site

C) NIO, Goa

1st Project Monitoring Committee (PMC) meeting was held at NIO, Goa in January 2020. Second PMC meeting was held via VC on 16.06.2020. First Training in the form of Webinar was conducted by NIO, Goa on 25.09.2020.

CMIS Activities in 2021

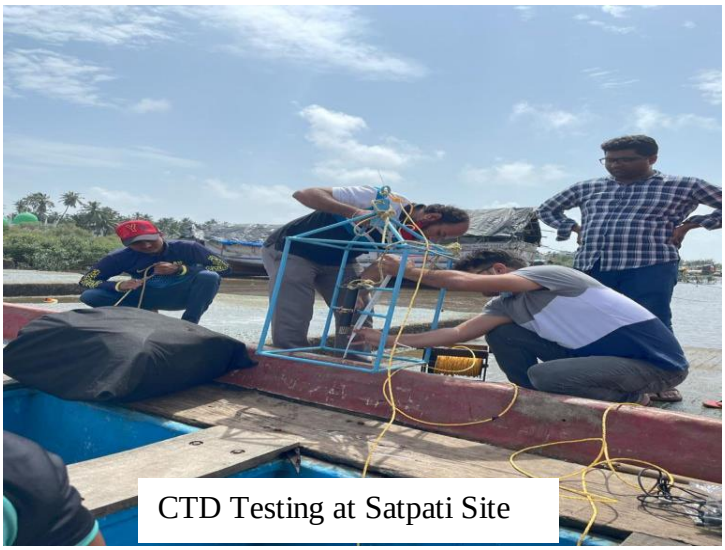
A) IIT Madras

Second PMC meeting was held through VC on 2nd March, 2021. One week online training on CMIS was conducted during January 2021. Amount paid by CWC in the second phase of CMIS was Rs.355 lakhs. Establishment of three nos. of coastal data collection sites (Devanari-Tamil Nadu, Karaikal-Puducherry and Ponnani-Kerala) have been completed. These three sites were taken over from the project executor, IITM, Chennai on 31.05.2021. Data collection has been started by CWC from the above sites in the month of June 2021.


Deployment of Directional Wave Recorder at Karaikal site

B) CWPRS, Pune

An on-line training workshop was organized viz. Role, Method and Importance of Coastal Data Collection for CMIS Activities in North Maharashtra and South Gujarat in February 2021. First year balance payment amounting to Rs.253.62 lakhs was made to CWPRS, Pune in the month of June 2021. Third PMC meeting for the implementation of CMIS in the State of Maharashtra and Gujarat was held through Video Conferencing on 04.06.2021. Procurement of most of the equipments have been completed and data collection has been started in this project.



CTD Testing at Satpati Site

C) NIO, Goa

Procurement of the most of the equipments is in progress in this project. Third PMC meeting was held via VC on 03.02.2021.

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WATER RESOURCES IN PARLIAMENT

LOK SABHA

INTER-LINKING OF GODAVARI-CAUVERY RIVERS

Draft Detailed Project Report (DPR) of Godavari-Cauvery link project consisting of three links viz; Godavari (Inchampalli/Janampet) – Krishna (Nagarjunasagar), Krishna (Nagarjunasagar) – Pennar (Somasila), Pennar (Somasila)-Cauvery (Grand Anicut) link projects has been completed by National Water Development Agency (NWDA) and circulated to party States in March 2019. Comments of some of the States have been received and the rest are awaited.

Ministry of Water Resources, River Development & Ganga Rejuvenation (now Jal Shakti) vide O.M. dated 13.04.2015 constituted a Task Force for Interlinking of Rivers (ILR). Twelve meetings of the Task Force have been held so far and the last meeting was held on 16.07.2020. At present there is no proposal under consideration for restructuring of NWDA and the Task Force for ILR. Any authority called National Inter-linking of Rivers Authority (NIRA) has not been constituted.

EROSION ALONG TEESTA RIVER

Ministry of Road Transport and Highways has informed that damages have been reported along National Highway-10 (NH-10) at some places which is running parallel to Teesta River. These damages occur mainly during monsoon season primarily due to natural reasons such as surface runoff, improper drainage system and due to river water infiltration in the hill slope causing landslides, slope instability/ failure.

The schemes for flood control, anti-erosion works, river management, drainage development, flood proofing works, restoration of damaged flood management works are formulated and implemented by concerned States as per their priority. The Union Government supplements the efforts of the States by providing technical guidance and also promotional financial assistance for management of floods in critical areas. National Hydroelectric Power Corporation (NHPC), under Ministry of Power is maintaining two power stations at Teesta Low Dam-III and Teesta Low Dam-IV projects and has carried out protective measures like construction of concrete cladded wire crate works, gabion walls, catch water drains, breast walls, anchoring etc., as a part of exhaustive Reservoir Rim Treatment (RRT). NHPC regularly monitors the banks of reservoir and protection measures are provided in vulnerable areas.

FLOODING OF RAPTI RIVER

Central Water Commission (CWC) has 3 flood forecasting stations on river Rapti in Uttar Pradesh namely, Balrampur in Balrampur District, Bansi in Siddharth Nagar District and Birdghat in Gorakhpur District. In current year 'severe' flooding situations (river flowing above

danger level) have been witnessed in river Rapti during July-August. In previous years also varying degree of flooding had been observed in river Rapti. Flooding in Rapti river is generally due to heavy rainfall in its upper catchment in Nepal. CWC issues level forecasts in respect of above 3 stations with warning time of 24 hours to the concerned District Administration for taking flood mitigation measures. CWC compiles flood damage data for state as a whole which are supplied by the respective State Governments. The flood damage data for Uttar Pradesh for the period 2016-2018 is given below.

The flood management schemes are formulated and implemented by concerned State Governments as per their priority. The Union Government supplements the efforts of the States by providing technical guidance and promotional financial assistance for management of floods in critical areas. Irrigation and Water Resources Department, Government of Uttar Pradesh has informed that 101 number of embankments have been built with total length of 871.137 km on the banks of Rapti river in Balrampur, Siddharth Nagar, Gorakhpur, Sant Kabir Nagar and Deoria Districts for providing protection to 25,5610 hectares of land.

Management of floods due to heavy rainfall in the upper catchment areas which mainly lie in Nepal in rivers like Rapti has been a concern. The related issues are discussed in the existing Indo-Nepal bilateral three tier mechanisms comprising of (i) Joint Ministerial Level Commission on Water Resources (JMCWR) (ii) Joint Committee on Water Resources (JCWR) and (iii) Joint Standing Technical Committee (JSTC). Government of India is having regular dialogue with the Government of Nepal for construction of dams on these rivers for mutual benefit of the two countries which includes flood control. Broad outcomes of the dialogues mechanism are given below:

i) Pancheshwar Development Authority (PDA) has been set up jointly by India and Nepal for execution, operation and maintenance of the Pancheshwar Multipurpose Project on river Sarada. The DPR of the project has been prepared by M/s WAPCOS Limited.

ii) Survey and investigation including preparation of DPR of Sapta Kosi High Dam Project and Sun Kosi Storage-cum-Diversion scheme proposed in the Sapta Kosi basin in Nepal has been undertaken jointly by India and Nepal.

During 2016-17, ninety-nine (99) on-going Major/Medium irrigation projects (and 7 phases) in the country under Pradhan Mantri Krishi Sinchayee Yojana (PMKSY) - Accelerated Irrigation Benefits Programme (AIBP), have been prioritised in consultation with States for completion in phases. Saryu Nahar Priyojana (National Project) is one of the prioritized project in Uttar Pradesh. Construction of one barrage is envisaged across river Rapti in Saryu Nahar Priyojana. The ultimate irrigation potential of the project is 1312.00 th.ha. Out of which 630.30 th.ha. had been created by March, 2016. During 2016-2020, additional irrigation potential of 521.40 th.ha. has been created.

STATEMENT SHOWING FLOOD DAMAGES IN UTTAR PRADESH DURING 2016. 2017 and 2018

Sl. No.	Year	Area Affected (Mha)	Population Affected (Million)	Damages to Crops		Damage to Houses		Cattle Lost Nos.	Huma n Lives Lost Nos.	Damage to Public Utilities (Rs. Crore)	Total Damages Crops, Houses & Public Utilities (Rs. Crore)
				Area (Mha)	Value (Rs. Crore)	Nos.	Value (Rs. Crore)				
1	2	3	4	5	6	7	8	9	10	11	12
4	2016	0.569	2.032	0.277	123.776	35525	-	293	74	-	123.776
5	2017	0.437	2.923	0.396	308.053	26834	0.000	93	121	0.000	308.053
6	2018	0.445	0.592	0.383	230.364	28063	13.724	149	105	303.336	547.423

PIPED POTABLE WATER SCHEME

To instill the 'sense of ownership' among local community over in-village water supply infrastructure to be created under Jal Jeevan Mission (JJM), there is a provision of community contribution to the extent of 5% of the capital cost of 'only in-village water supply infrastructure' in case of North Eastern & Himalayan States, forested/ hilly areas, SC/ ST dominated villages and 10% in rest of the areas. After successful commissioning of the scheme, the community would be given back an amount to the tune of 10% of the total cost of in-village infrastructure.This would serve as a revolving fund to meet any unforeseen expenditure due to major break down, requiring emergency repair, thereby ensuring assured water supply to households.

Under JJM, local community is at the centre of the programme. There is a provision for preparation and finalization of Village Action Plan (VAP) indicating various works,like local drinking water source strengthening, in-village water supply infrastructure, grey-water management & reuse, operation & maintenance of these systems by dovetailing of funds which inter-alia includes 15th Finance Commission grants to PRIs, MGNREGS, Swachh Bharat Mission - Gramin, CAMPA fund, District Mineral Development Fund (DMDF), MP/ MLA Local Area Development Fund, CSR fund, voluntary contribution, etc.as well as community's own contribution. To ensure transparency and enable rural communities to take a well-informed decision,VAPs to be approved by Gram Sabha with the consent of 80% of the villagers present in the meeting. This provision aims at empowering the local communities to have a decision-making role so as to enable them to manage, operate and maintain the water supply system for assured potable water supply on long-term and regular basis. Gram Panchayat and/ or its sub-committee, i.e. Village Water & Sanitation Committee/ Paani Samiti/ User Group, etc. may exempt individual contribution from poor, infirm, divyangjan or widow with no source of steady income. Further, community contribution can be in the form of cash and/ or kind and/ or labour.

STATUS OF ATAL BHUJAL YOJANA

The Government is implementing Atal Bhujal Yojana (Atal Jal), a Rs.6000.00 Crore Central Sector Scheme, for sustainable management of ground water resources with community participation w.e.f. 1st April, 2020. The scheme is being implemented in identified water stressed areas of seven States viz. Gujarat, Haryana, Karnataka, Madhya Pradesh, Maharashtra, Rajasthan and Uttar Pradesh.

An amount of Rs.200.00 Crore has been allocated by the Ministry for the scheme during the financial year 2020-21 (which is subject to change depending upon the physical/financial progress), out of which Rs. 54.00 lakh has so far been utilized. Further, funds shall be allocated to States once preparatory activities for field implementation of the scheme are complete. The scheme is being supported by the World Bank, who is providing 50% (Rs.3000 Crore) of the total allocations. The scheme shall continue over a period of 05 years w.e.f. financial year 2020-21.

KRISHNA-MARATHWADA LIFT IRRIGATION SCHEME

The Water Resources Projects are planned, funded, executed and maintained by the State Governments themselves as per their own resources and priority. In order to supplement their efforts, Government of India provides technical and financial assistance to State Governments to encourage sustainable development and efficient management of water resources through various schemes and Programmes as per guidelines of such schemes. The proposal, in respect of above project, has not been received in CWC from the Government of Maharashtra. However, as informed by the State Government, Krishna-Marathwada Lift Irrigation Scheme (LIS) has been approved by the Government of Maharashtra in August, 2009 at Rs.4845.05 crore. The estimated cost of first phase of project is Rs.2349.10 crore. This project is planned to address water scarcity and drought in Osamanabad and Beed districts of Marathwada region. Expenditure on the project upto August, 2020 is reported to be Rs.1709.21 crore. The first phase of the scheme is planned for completion by March, 2023.

CLOSED IRRIGATION PROJECTS

The Water Resources Projects are planned, funded, executed and maintained by the State Governments themselves as per their own resources and priority. In order to supplement their efforts, Government of India provides technical and financial assistance to State Governments to encourage sustainable development and efficient management of water resources through various schemes and programmes such as Accelerated Irrigation Benefits Programme (AIBP) etc. under Pradhan Mantri Krishi Sinchayee Yojana (PMKSY) as per the guidelines of such schemes.

In the recent past no information has been received from the State Governments regarding closure of any existing Major & Medium Irrigation project for want of maintenance. However, during 2016-17, ninety nine (99) ongoing Major/Medium irrigation projects under AIBP, having potential of 76.03 lakh ha. have been identified in consultation with States, for completion in phases along with their Command Area Development & Water Management (CADWM) works under PMKSY-AIBP.

Seven prioritized projects out of above involve Extension Renovation and Modernization (ERM) works of canals. Since April, 2016, Central assistance (CA) of Rs.796.39 crore has been released for these projects and 1.14 lakh ha of potential has been created.

LIVE STORAGE STATUS OF RESERVOIRS

Central Water Commission monitors on weekly basis the live storage status of 123 reservoirs having cumulative storage capacity of 171.090 BCM (Billion Cubic Meter) which is

about 66.36% of 257.812 BCM, being the total storage capacity estimated to have been created in the country. The State/UT-wise current status, comparative position and other details, including of Tamil Nadu, are available at URL http://www.cwc.gov.in/reservoirs-storage-bulletin. As per reservoir storage bulletin dated 10.09.2020, live storage available in these reservoirs is 142.234 BCM. The total live storage available in six reservoirs being monitored in Tamil Nadu is 71% of total live storage capacity of these reservoirs as per bulletin dated 10.09.2020.

In Weekly Bulletins, Central Water Commission (CWC) furnishes the comparative status of current live storage in 123 reservoirs with last year live storage available for the corresponding period and the average of last l0 years live storage. As per the Weekly Bulletins issued by CWC, during January 2020 till date, percentage of current year's storage to that of last year has gone up to 155% percent as compared to that of 2019 during 16.01 .2020 to 13.02.2020, 27 .02.2020 to 09.07.2020 and on 23.07.2020.

States having highest live storage as per CWC bulletins are M.P., Karnataka, Gujarat, Maharashtra, Orissa, A.P. & Telangana and Himachal Pradesh as on 25.06.2020.

Water being a state subject, States have the primary responsibility to augment storage capacity of reservoirs either by building new storage structures or by enhancing the capacity of existing ones in their respective States. The role of Government of India is to provide technical and financial support to projects, as and when they are referred by States from time to time under various schemes of DoWR, RD & GR, Ministry of Jal Shakti.

During July 2019, Ministry of Jal Shakti launched Jal Shakti Abhiyan, an intensive time bound programme in mission mode, for promoting a water conservation campaign built on citizen participation to facilitate Rain Water Harvesting, Renovation of traditional water bodies, Watershed development, Afforestation and creating Public Awareness in around 1500 Blocks that are drought affected, water stressed or over-exploited falling in 256 districts of the country. Further, Atal Bhujal Yojana (ATAL JAL), a loan assistance scheme from World Bank for facilitating sustainable ground water management, is being taken up in 8353 water stressed Gram Panchayats of Haryana, Gujarat, Karnataka, Madhya Pradesh, Maharashtra, Rajasthan and Uttar Pradesh.

FLOODS IN STATES

Floods are natural calamity that India faces almost every year, in varying degrees of magnitude, leading to a loss of lives and property. The occurrence floods can be attributed to various factors, including wide variations in rainfall both in time and space with frequent departures from the normal pattern, inadequate carrying capacities of rivers, river bank erosion and silting of river beds, landslides, poor natural drainage in flood prone areas, snowmelt and glacial lake out-bursts.

National Water Mission (NWM) of Ministry of Jal Shakti has initiated “Catch the Rain” campaign in order to promote creation of Rain Water Harvesting Structures (RWHS) suitable to the climatic conditions and sub-soil strata to store rain water. Drives to make water harvesting pits, rooftop RWHS and check dams; removal of encroachments and de-silting of tanks to

increase their storage capacity; removal of obstructions in the channels which bring water to them from the catchment areas; repairs to traditional water harvesting structures like step- wells and using defunct bore-wells and old wells to put the water back to aquifers etc, are some of the activities suggested to be taken up with peoples' active participation under this campaign.

Central Ground Water Board is implementing a nationwide programme of "National Aquifer Mapping and Management (NAQUIM)" for mapping of aquifers (Water bearing formations), their characterization and development of aquifer management plans to facilitate sustainable development of ground water resources. Aquifer maps and management plans have been shared with the respective State Government agencies. Public Interaction Programs are being organised at grass root level for disseminating the tenets of the Aquifer Management Plans for the benefit of the stakeholders.

To promote recharge of ground water, Ministry of Housing & Urban Affairs has formulated guidelines for the States to adopt measures suitable to local conditions. Adequate focus has been given on requirement of rainwater harvesting and water conservation measures in Model Building Bye Laws (MBBL), 2016 and Urban and Regional Development Plan Formulation and Implementation (URDPFI) Guidelines, 2014.

ADVANCED TECHONOLOGIES FOR FLOOD FORECASTING

As per the view expressed by the experts, floods are natural phenomena except the situations involving failure of flood control structures or faulty regulation of reservoirs; and permanent immunity against floods is not techno-economically feasible. However, impacts of floods & erosion can be mitigated to a certain degree by adopting appropriate structural and nonstructural measures. For the state of Assam, a total of 141 projects costing Rs 2383.11 Cr were approved during XI (100 projects costing Rs 996.14 Cr) Plan and XII (41 projects costing Rs 1386.97 Cr) Plan. Out of these 141 projects, 103 projects were completed during XI and XII Plan. A Central Assistance of Rs 813.75 Cr was released during XI(Rs 748.86 Crore) and XII(Rs 64.89 Cr) Plan. Further a Central assistance of Rs 472.64 Cr during the year 2017-20 has been released. Thus, since start of XI Plan, total Central Assistance released is Rs 1286.39 Cr till date. For the district of Majuli, erosion protection works in different phases has been executed by the Brahmaputra Board.

Further, with the financial assistance of Rs.207cr from MoDONER another scheme "Protection of Majuli Island from flood and erosion" as per recommendations of Technical Advisory Committee of Brahmaputra Board at an estimated cost of Rs.233.57crores" is being executed by Brahmaputra Board.

In Addition to above, the Water Resources Department, Assam has also taken up erosion management schemes in the districts of Lakhimpur,Majuli & Diburgarh.

Central Water Commission has installed 54 stations working on Satellite Based Automatic Data Acquisition System in various river basins in Assam. The Water Resources Department, Assam also has a plan to install Real Time Data Acquisition System (RTDS) under National Hydrology project. This will help in acquisition of real time Hydro Meteorological Data from the proposed stations all over the State of Assam. These stations provide near real time

hydro meteorological data such as Water level, Precipitation (Rainfall) etc. This caters to the need of flood forecasting in Brahmaputra & other rivers in Assam.

KHADAKPURNA MAJOR IRRRIGATION PROJECT

As reported by the Government of Maharashtra (GoM), the date of commencement of construction work of Khadakpurna Major Irrigation project was March, 1994. This project was initially approved for Rs.79.55 crore by the Govt. of Maharashtra. Latest estimated cost of the project is Rs.1374.60 crore.

The expenditure on the project upto August, 2020 is reported to be Rs.1363.24 crore. All irrigation potential related works are reported to be completed. Lining work of main canals is planned for completion by March, 2021.

DECREASING WATER LEVEL IN DAMS

Levels of water in dams fluctuate depending on rainfall in the catchment, upstream abstraction and downstream release. Central Water Commission (CWC) is monitoring live storage status of 123 reservoirs of the country on weekly basis and is issuing weekly bulletins every Thursday. The total live storage capacity of these 123 reservoirs is 171.090 BCM (Billion Cubic Meter) which is about 66.36% of the live storage capacity of 257.812 BCM, estimated to have been created in the country. As per reservoir storage bulletin dated 10.09.2020, live storage available in these reservoirs is 142.234 BCM, which is 83% of total live storage capacity of these reservoirs. The average of last 10 years live storage was 120.667 BCM. Thus, the live storage available in 123 reservoirs as per 10.09.2020 Bulletin is 118% of storage of average of last ten years.

As per analysis of maximum live storage attained in 123 reservoirs under CWC monitoring during last five Water Years, there is no visible trend of continuous decrease in water level of dams across the country.

INTER-LINKING OF MAHANADI RIVER

The National Perspective Plan (NPP) was prepared by the then Ministry of Irrigation (now Ministry of Jal Shakti) in August 1980 for water resources development through inter basin transfer of water, for transferring water from water surplus basins to water-deficit basins. Under the NPP, the National Water Development Agency (NWDA) has identified 30 links (16 under Peninsular Component and 14 under Himalayan Component) for preparation of Feasibility Reports (FRs). The Pre-Feasibility Reports (PFRs) of the all 30 links have been prepared and circulated to the concerned State Governments. Out of the 14 link projects identified under the Himalayan rivers Development Component, the following 3 link projects in series have been proposed to divert the waters of Himalayan rivers to Mahanadi and further south:

i) Manas-Sankosh-Teesta-Ganga (MSTG) link project.
ii) Ganga(Farakka)-Damodar-Subernarekha(GDS) link project
iii) Subernarekha-Mahanadi(SM) link project

The PFR of above links have already been prepared and circulated to the concerned State Governments. The draft FR of MSTG link project with alternate alignment studies, draft FR of GDS link project and the draft FR of SM link project have been prepared. The finalisation of FRs of GDS link project and the SM link project are linked with the finalization of FR of the MSTG link project.

CLEANING OF DAHA RIVER

Daha River originates from kuchaikote near Gopalganj in Bihar and traverses through Siwan district and finally discharges to river Ghaghara. The total length of the river is 96 km and the distance it travels after passing through Siwan town is about 24 km before discharging to Ghaghara River. The river further traverses another 42 km through Ghaghara River to meet river Ganga downstream of Chapra town. From the Namami Gange projects are concerned, the initial focus has been on main stem towns of river Ganga and to tributaries which are bringing high pollution load to river Ganga. As of now, Daha River has not been notified by Central Pollution Control Board (CPCB) as a polluted stretch.

As informed by Water Resources Department, Government of Bihar, at present, no scheme has been proposed for cleaning, desilting and deepening of Daha River in Siwan district.

National Mission for Clean Ganga (NMCG) has not received any proposal from State Government of Bihar regarding "the water conservation project and sewer line work" under Namami Gange Programme in Siwan district of Bihar.

DRYING UP OF RIVERS

There are two types of rivers in the country; (1) perennial rivers and (2) Non-perennial rivers. In perennial rivers, water remains available throughout the year, while non-perenial rivers are rain fed rivers in which water flows only during the rainfall period. The flow in the rivers is dynamic and depends on many parameters such as rainfall, its distribution and intensity in the catchment, catchment characteristics and withdrawals/ utilisation of water in the basin. Central Water Commission (CWC) monitors important rivers in the country. Considering annual average flow of last 20 years of terminal sites of important rivers, no appreciable increasing/decreasing trend in total water availability has been observed. Government has taken water conservation initiatives especially under Jal Shakti Abhiyan through the process of rain water harvesting.

Discharge of untreated and partly treated sewage and industrial effluent along with dumping of solid waste are the major reasons for pollution in rivers. It is the primary responsibility of the State Governments / Union territories to provide necessary sewerage infrastructure, treat and thereafter discharge the sewage into water bodies & rivers and keep them clean. Similarly, the States / ULBs are to provide facilities for proper collection; transportation and management of solid waste and prevent it from polluting rivers & water bodies etc.

River cleaning is a continuous process and the Central Government is supplementing the efforts of State Governments and Union Territories in river rejuvenation through programmes like "Namami Gange" and "National River Conservation Plan".

State Governments, apart from their own budgetary allocation, are also accessing financial assistance for creation of sewerage infrastructure, including Sewage Treatment Plants (STPs), in various cities/towns under Atal Mission for Rejuvenation and Urban Transformation (AMRUT) and Smart Cities Mission of Ministry of Housing & Urban Affairs.

Besides, CPCB had issued direction on 21.04.2015 to the State Pollution Control Boards (SPCBs)/Pollution Control Committees (PCCs) under the Water (Prevention and Control of Pollution) Act, 1974 for proper collection, transportation and treatment of sewage generated in urban areas in their respective States. CPCB also issued directions on 09.10.2015 to Local Authorities under Environment (Protection) Act, 1986 to local authorities of metropoliten cities, State capitals and towns along Ganga to ensure proper treatment and disposal of sewage in accordance with the stipulated standards.

Further, Central Pollution Control Board (CPCB), State Pollution Control Boards (SPCBs)/Pollution Control Committees (PCCs) monitor industries with respect to effluent discharge standards and take action for non-compliance under provisions of Environment (Protection) Act, 1986 and Water (Prevention and Control of Pollution) Act, 1974.

DRINKING WATER SUPPLY THROUGH TAPS

Government of India, in partnership with States, has launched Jal Jeevan Mission (JJM), which aims at providing potable water of prescribed quality at service level of 55 litre per capita per day (lpcd) to every rural household through Functional Household Tap Connection (FHTC) by 2024with an outlay of Rs. 3.60 lakh Crore out of which central share is Rs. 2.08 lakh Crore.

After the launch of JJM, a conference of Minister in-charge of rural water supply of various States was held in New Delhi followed by five regional workshops to discuss the modalities of the implementation of the Mission. Moreover, in consultation with State Governments & other stakeholders in water sector, Operational Guidelines for the implementation of the Mission has been released on 25.12.2019.

In 2019-20, a budgetary allocation of Rs.10,000.66 Crore has been made and as on 11.03.2020, an amount of Rs. 9,542.89 Crore has been released to the States/ UTs .

As reported by States/ UTs as on 01.04.2019, country had about 17.87 Crore rural households out of which around 3.27 Crore rural households were with tap connections and around 14.60 Crore rural households were to be provided with tap connections.

IRRIGATION POTENTIAL

Out of 16 National Projects, five projects namely Polavaram Irrigation Project (Andhra Pradesh), Saryu Nahar Pariyojana (Uttar Pradesh), Gosikhurd Irrigation Project (Maharashtra), Teesta Barrage Project (West Bengal) & Shahpurkandi Dam Project (Punjab) have been taken up for execution after the concerned State Governments obtained the necessary approvals as per the guidelines of the scheme. Details of potential created and utilized in the five national projects under implementation as per the latest information received from CWC/State Government/available in Department are as under:

Project Ultimate	Potential (Th. Ha.)	Potential Created (Th. Ha.)	Utilization (Th. Ha.)
Saryu Nahar	1404	1096	615.84*
Gosikhurd	250.8	103.203	58.224
Polavaram	291	121	118
Shahpurkandi	37.17	-	-
Teesta	527	197	104

*cropped area as per the study conducted by BISAG.

Saryu Nahar Pariyojna and Gosikhurd Irrigation Project with target Culturable Command Area (CCA) of 4.80 LHa and 1.76 LHa respectively have been included under CADWM programme under Pradhan Mantri Krishi Sinchayee Yojana – Har Khet Ko Pani (PMKSY-HKKP). Works of Teesta Barrage project are at standstill due to issues related to Land Acquisition (LA) and the State has not sent any proposal for CAD works. As informed by the State Government, tenders have been called for Detailed Project Report (DPR) of CAD works for Polavaram project. Further, the Government of Jammu & Kashmir has been requested to plan and implement requisite infrastructure and CAD works in paripassu manner separately in additional command proposed to be irrigated with the water from Shahpurkandi Dam Project.

NAQUIM

Central Ground Water Board (CGWB) is implementing National Aquifer Mapping and Management program (NAQUIM), which envisages mapping of aquifers (water bearing formations), their characterization and development of Aquifer Management Plans to facilitate sustainable management of Ground Water Resources.

So far aquifer maps and management plans for about 11.8 lakh sq.km. have been prepared for areas spread over various parts of the country.

As per information received from Ministry of Housing & Urban Affairs, the Model Building Bye Laws (MBBL), 2016, has been issued for guidance of the States/UTs which has a chapter on 'Rainwater Harvesting'. The provisions of this chapter are applicable to all the buildings. 33 States / UTs have adopted the rainwater harvesting provisions. The implementation of the rainwater harvesting policy comes within the purview of the State Government/Urban Local Body / Urban Development Authority. Further, as per MBBL- 2016, provision of rainwater harvesting is applicable to all residential plots above 100 sq.m.

In order to regulate the Over-exploitation and consequent depletion of ground water, the Ministry has circulated a Model Bill to all the States/UTs to enable them to enact suitable ground water legislation for regulation of its development, which includes provision of rain water harvesting. So far, 15 States/UTs have adopted and implemented the ground water legislation on the lines of Model Bill.

AMENDMENT TO ISRWD ACT

The Parliament has enacted Inter-State River Water Disputes (ISRWD) Act, 1956 for adjudication of disputes relating to waters of inter-State rivers and river valley thereof. A Bill

namely, Inter-State River Water Disputes (Amendment) Bill, 2019 has been passed by Lok Sabha on 31.07.2019. The Bill seeks to streamline the adjudication of inter-State river water disputes and make the present legal and institutional architecture robust by amending the existing ISRWD Act, 1956. The proposed Bill seeks to provide for a single permanent Tribunal instead of multiple Tribunals. Enactment of the ISRWD (Amendments) Bill will facilitate faster adjudication of water disputes. The Central Government has, so far, set up 09 tribunals to settle water disputes among the States under the ISRWD Act, 1956.

The Central Government constituted the Mahadayi Water Disputes Tribunal (MWDT) by Notification dated 16th November, 2010 under Section 4 of the Inter-State River Water Disputes Act, 1956 for adjudication of the water disputes relating to the inter-State river Mahadayi, and the river valley thereof. The MWDT submitted its report under Section 5(2) of the ISRWD Act, 1956 to the Central Government on 14.08.2018.

The Central Government has notified the Award and Final Decision of the MWDT given on 14.08.2018 in the Gazette of India vide notification No. S.O. 888(E). dated 27.02.2020.

The Hon'ble Chief Minister of Karnataka vide letters dated 28.10.2019 and 06.08.2019 requested the Central Government to publish the decision of the MWDT given under Section 5(2) of the ISRWD Act, 1956 in the Official Gazette of India. Also, the Hon'ble Minister for Water Resources, Government of Karnataka vide letter dated 25.02.2020 requested the Central Government for notification of the decision/final order of the MWDT.

As per the information furnished by Government of Karnataka, two Dams, one across Kalasa Nala and another across Banduri Nala, tributaries of Mahadayi river have been proposed to divert water to Malaprabha river for meeting drinking water supply of Hubli-Dharwad twin cities, Kundagol town, en route villages, etc.

REJUVENATION OF TAMIRABARANI RIVER

It is the responsibility of the State Governments/ concerned local bodies to set-up proper facilities for collection, transportation and treatment of sewage, for abatement of pollution of rivers and other water bodies. The Ministry has been supplementing the efforts of the State Governments in abatement of pollution in identified polluted stretches of rivers under the NRCP, on cost sharing basis between the Central and State Governments. River Tamirabarani in Tamil Nadu has been included under the National River Conservation Plan (NRCP). This river gets contaminated due to discharge of untreated sewage. For this, Pollution abatement works at Tirunelveli town in Tamil Nadu was sanctioned at a cost of Rs.5492.90 lakhs including a sewage treatment plant (STP) of 24.20 mld capacity.

In compliance to Hon'ble NGT Orders dated 20.09.2018, 19.12.2018 and 08.04.2019 in OA No. 673/2018 to bring all polluted river stretches to at least bathing standard, River Rejuvenation Committee constituted by Tamil Nadu State has prepared action plan for river Tamirabarani.

Central Pollution Control Board (CPCB) and Tamil Nadu Pollution Control Board (TNPCB) regularly monitor industries with respect to effluent discharge standards and take action for non- compliance under provisions of Environment (Protection) Act, 1986 and Water

(Prevention and Control of Pollution) Act, 1974. As per Tamil Nadu Pollution Control Board (TNPCB) River Tamirabarani is 128 km long and traverses through two districts namely Tiruneveli and Thoothukudi. One industrial unit in Tiruneveli District namely M/s Madura Coats Private Limited is utilising its treated effluent for greenery development inside the premises and not discharging into river Tamirabarani w.e.f. 04.02.2019. In the District of Thoothukudi, there is no discharge of industrial effluent into the river Tamirabarani.

DEVELOPMENT OF RIVER BANKS

Flood management schemes are formulated and implemented by concerned State Governments as per their priority. The Union Government supplements the efforts of the States by providing technical guidance and promotional financial assistance for management of floods in critical areas. Government of India launched "Flood Management Programme (FMP)" during XI Plan period for providing central assistance to the State Governments for taking up works related to river management, flood control, anti- erosion, drainage development, flood proofing works, restoration of damaged flood management works and anti-sea erosion works which was continued during XII Plan. Subsequent to XII Plan a scheme viz. "Flood Management and Border Areas Programme (FMBAP)" with an outlay of Rs.3342 crores is under implementation for the period 2017-18 to 2019-20. FMBAP Scheme is a merger of two ongoing Schemes of this Ministry during XII Plan viz. Flood Management Programme (FMP) and River Management Activities and Works related to Border Areas (RMBA). Central Assistance amounting to Rs.1263.42 crores has been released to State Government of Assam under FMP component till date. Further, Water Resource Department, Government of Assam has informed that measures like breach closing, restoration of damaged embankments, etc. are carried after conducting surveys during and after floods.

CONSUMPTION OF WATER RESOURCES

The Twelfth Five Year Plan (2012-17) document indicates that agriculture consumes around 80% of India's available water resources. As per the Dynamic Ground Water Resources Assessment of the country, conducted jointly by Central Ground Water Board (CGWB) and State Governments in 2017, about 89% of the total ground water extracted is used for agricultural activities.

Water being a State subject, measures for management of water resources is primarily taken by respective State Governments. Central Government supplements the efforts of the State Governments by providing technical and financial assistance through various schemes and programmes. Central Government has taken various steps for sustainable management of ground water in the country.

Jal Shakti Abhiyan (JSA), a campaign for water conservation and water security, was launched by Ministry of Jal Shakti. During the campaign, officers, groundwater experts and scientists from the Government of India worked together with State and district officials in India's most water-stressed districts for water conservation and water resources management.

Atal Bhujal Yojana (ABHY), a Rs.6000 crore scheme with World Bank funding, for sustainable management of ground water with community participation has recently launched by

Hon'ble Prime Minister of India. The identified over-exploited and water stressed areas for the implementation of the scheme fall in the States of Gujarat, Haryana, Karnataka, Madhya Pradesh, Maharashtra, Rajasthan and Uttar Pradesh.

Other important measures taken by the Central Government towards sustainable management of ground water in the country are given at the following URL: http://mowr.gov.in/sites/default/files/Steps_to_control_water_depletion_Jun2019.pdf.

As per the 2017 Dynamic Ground Water Resources assessment of the country, out of 8 assessment units in Himachal Pradesh, 4 , 1 and 3 units have been categorized as 'Over-exploited', Semi-critical and Safe respectively. Out of 18 assessment units in Uttrakhand, 5 units have been categorized as Semi-critical and rest 13 units have been categorized as Safe. In Jammu and Kashmir and North Eastern States, all the assessment units have been categorized as Safe. Further, as informed by the Wadia Institute of Himalayan Geology, an autonomous research institute under the Ministry of Science and Technology, a number of springs have either dried up or are on the verge of drying in Himalayan region.

Government of India has launched Atal Mission for Rejuvenation and Urban Transformation (AMRUT) in select 500 cities across the country for a period of five years i.e. from 2015-16 to 2019-20 with focus on development of basic civic amenities in the Mission cities. Under the water supply component of the Mission, projects related to rain water harvesting, rejuvenation of water bodies specifically for drinking water supply, recharging of ground water, etc., can be taken up by the States/UTs to enhance water supply in the Mission cities.

To enable every household in the country to have potable water at service level of 55 litre per capita per day (lpcd) through Functional Household Tap Connection (FHTC) by 2024, Government of India, in partnership with the states, has launched Jal Jeevan Mission (JJM).

PER CAPITA WATER AVAILABILITY

Water availability per person is dependent on population of the country and for India, per capita water availability in the country is reducing due to increase in population. The average annual per capita water availability in the years 2001 and 2011 was assessed as 1816 cubic meters and 1545 cubic meters respectively which may further reduce to 1486 cubic meters in the year 2021.

Water being a State subject, steps for augmentation, conservation and efficient management of water resources are primarily undertaken by the respective State Governments. In order to supplement the efforts of the State Governments, Central Government provides technical and financial assistance to them through various schemes and programmes. Ministry of Jal Shakti launched Jal Shakti Abhiyan (JSA), a campaign for water conservation and water security, in water-stressed districts of the country.

Central Government has formulated a National Perspective Plan (NPP) for Water Resources Development which envisages transfer of water from water surplus basins to water deficit basins to improve availability of water.

Government of India has launched Atal Mission for Rejuvenation and Urban Transformation (AMRUT) in select 500 cities across the country with focus on development of basic civic amenities in the Mission cities. Under the Mission, projects related to rain water harvesting, rejuvenation of water bodies specifically for drinking water supply, recharging of ground water, etc., can be taken up by the States/UTs to enhance water supply in the Mission cities.

The Government of India has launched Jal Jeevan Mission (JJM), which aims at providing functional household tap connections to every rural household by 2024 at the service level of 55 litre per capita per day. Government of India has approved Atal Bhujal Yojna (Atal Jal), a Central Sector Scheme of estimated cost of Rs.6000 crore, for sustainable management of ground water resources with community participation in water stressed blocks of Gujarat, Haryana, Karnataka, Madhya Pradesh, Maharashtra, Rajasthan and Uttar Pradesh.

Some initiatives/measures taken by Central Government to control water depletion and promote rain water harvesting / conservation are available at the URL: http://mowr.gov.in/sites/default/files/Steps_to_control_water_depletion_Jun2019.pdf

INITIATIVES TO RECHARGE GROUND WATER

Water being a State subject, initiatives on sustainable water management including conservation and water harvesting in the Country is primarily States' responsibility. However, the important measures taken by the Central Government for conservation, management of ground water and effective implementation of rain water harvesting in the country are at the following URL:
http://mowr.gov.in/sites/default/files/Steps_to_control_water_depletion_Jun2019.pdf.

Further, a number of States have done notable work in the field of water conservation/harvesting. Of these, mention can be made of 'Mukhyamantri Jal Swavlamban Abhiyan' in Rajasthan, 'Jalyukt Shibar' in Maharashtra, 'Sujalam Sufalam Abhiyan' in Gujarat, 'Mission Kakatiya' in Telangana, Neeru Chettu' in Andhra Pradesh, Jal Jeevan Hariyali in Bihar, 'Jal Hi Jeevan' in Haryana among others.

As per information received from Ministry of Housing & Urban Affairs, the Model Building Bye Laws, 2016, has been issued for guidance of the States/UTs which has a chapter on 'Rainwater Harvesting'. The provisions of this chapter are applicable to all the buildings. 33 States / UTs have adopted the rainwater harvesting provisions. The implementation of the rainwater harvesting policy comes within the purview of the State Government/Urban Local Body / Urban Development Authority.

In order to regulate the Over-exploitation and consequent depletion of ground water, the Ministry has circulated a Model Bill to all the States/UTs to enable them to enact suitable ground water legislation for regulation of its development, which includes provision of rain water harvesting. So far, 15 States/UTs have adopted and implemented the ground water legislation on the lines of Model Bill.

As per information received from Ministry of Rural Development, under Mahatma Gandhi National Rural Employment Guarantee Act (MGNREGA) provisions vide Schedule-1, section 4(3), Para 4.(1) 'Category: A: Public works relating to Natural Resource Management Para: (i)', water conservation and water harvesting structures to augment and improve ground water like underground dykes, earthen dams, stop dams, check dams, percolation tanks with special focus on recharging ground water including drinking water sources are permissible activities.

The expenditure on Water conservation & Water Harvesting related works under MGNREGA during last 5 years as uploaded by the States/UTs are as under:

Water conservation & Water Harvesting related works	
Years	Expenditure in Crore (Rs.)
2018-19	10328.5
2017-18	6843.085
2016-17	7943.917
2015-16	5621.353
2014-15	4722.494

REHABILITATION OF FAMILIES DISPLACED DUE TO IRRIGATION PROJECTS

The Water Resources Projects are planned, funded, executed and maintained by the concerned State Governments themselves as per their own resources and priority. The land acquisition (LA) and Rehabilitation and Resettlement (R&R) works of such projects are also carried out by the concerned State Governments. In order to supplement their efforts, Government of India provides technical and financial assistance to encourage sustainable development and efficient management of water resources through various schemes and programmes.

Polavaram Irrigation Project (PIP), declared as National Project under Section 90 of Andhra Pradesh Re-organisation Act-2014, is being implemented through an Authority [Polavaram Project Authority (PPA)] constituted by this Ministry. The works of Rehabilitation and Resettlement (R&R) are being carried out by the State Government.

Further, as informed by the PPA/ State Government, the Government of Andhra Pradesh has set up district level grievance cell for sorting out grievances of displaced people, if any. (Special) Commissioner (R&R), Government of Andhra Pradesh is the Appellate Authority at State level to dispose off any appeal against the decision(s) of district level grievance cell. This mechanism is aligned with Right to Fair Compensation and Transparency in Land Acquisition, Rehabilitation & Resettlement Act, 2013. Further, Ministry of Water Resources, River Development & Ganga Rejuvenation has also constituted a Monitoring Committee with Secretary, Ministry of Tribal Affairs as its Chairperson on 12th Sep, 2017 to oversee the implementation of LA and R&R works.

There are 1,05,601 Project Displaced Families (PDFs) due to construction of Polavaram Project and R&R of 3922 PDFs have been completed.

The total number of representations received by PPA during the last three years was 1302. The same have been forwarded to the O/o (Special) Commissioner (R&R), Water Resources Department, GoAP for further necessary action in the matter.

NEW PROGRAMMES UNDER AIBP

Pradhan Mantri Krishi Sinchayee Yojana (PMKSY) was launched during the year 2015-16 and Accelerated Irrigation Benefits Programme (AIBP)became part of it. During 2016-17, ninety-nine (99) on- going Major/Medium Irrigation (MMI) projects (and 7 phases) under PMKSY-Accelerated Irrigation Benefits Programme (AIBP) have been prioritized in consultation with States for completion in phases along with their Command Area Development & Water Management (CADWM) works.

Funding mechanism through NABARD has also been approved by the Government for both Central and State Share. Four of the prioritized projects are in the State of Uttar Pradesh (UP) namely Bansagar Canal, Saryu Nahar, Madhya Ganga Canal Phase-II and Arjun Sahayak. Out of these four prioritized projects, the Madhya Ganga Canal project benefits the districts of Western Uttar Pradesh.

Total CA of Rs.1006.07 crore and State Share (SS) of Rs.4111.61 crore (including CA: Rs. 36.610 cr and SS: Rs.1299.910 crore for Madhya Ganga Canal Phase-II project) has been provided for the above four prioritized projects of UP since April, 2016 (so far). The Ultimate Irrigation Potential of these projects is 1653.05 th ha (including 146.53 th ha of Madhya Ganga Canal Phase –II project, out of which, an irrigation potential of 721.92 th ha (including 41.32 th ha of Madhya Ganga Canal Phase-II project) was created up to March, 2016. An additional potential of 513.41th ha (including 17.68 th ha of Madhya Ganga Canal Phase –II project) has been reported to be created during 2016-2019 through these projects.

Bansagar Canal project has been reported complete/almost complete and rest of the three prioritized projects of UP are scheduled for completion by March, 2021.

BARRAGES ON MAHANADI RIVER

Pre Feasibility Report of five projects of Chhattisgarh namely Upper Sikasar Reservoir Project, Kharung-Ahiran Link Project , Dandpani Tank Project, Shekharpur Major Tank Project and Pairi High Dam Project were received for techno economic appraisal. Mahanadi Water Dispute Tribunal (MWDT) has been constituted on 12.3.2018 to adjudicate and settle the dispute on Mahanadi river water between Odisha and Chhattisgarh. Award of the Tribunal is awaited. Right now, there is no agreement between two states for these projects. Further, consent of MWDT for these projects was also not available. Hence, These projects have not been concurred/cleared.

LAW FOR RAIN WATER HARVESTING

As per information received from Ministry of Housing & Urban Affairs, the Model Building Bye Laws, 2016, has been issued for guidance of the States/UTs which has a chapter on ‘Rainwater Harvesting’. 33 States/UTs have adopted the rainwater harvesting provisions. The provisions of this chapter are applicable to all the buildings. The implementation of the rainwater

harvesting policy comes within the purview of the State Government/Urban Local Body / Urban Development Authority. As per Model Building Bye Laws- 2016, provision of rainwater harvesting is applicable to all residential plots above 100 sq.m.

In order to regulate the Over-exploitation and consequent depletion of ground water, the Ministry has circulated a Model Bill to all the States/UTs to enable them to enact suitable ground water legislation for regulation of its development, which includes provision of rain water harvesting. So far, 15 States/UTs have adopted and implemented the ground water legislation on the lines of Model Bill. Central Ground Water Authority (CGWA) has been constituted under Section 3(3) of the 'Environment (Protection) Act, 1986' for the purpose of regulation and control of ground water development and management in the Country.

CGWA is regulating ground water withdrawal by industries / infrastructure/ mining projects in the country for which guidelines/ criteria have been framed which includes rainwater harvesting as one of the provisions while issuing No Objection Certificate.

Water being a State subject, initiatives on water management including conservation and water harvesting in the Country is primarily States' responsibility. However, the important measures taken by the Central Government for conservation, management of ground water and effective implementation of rain water harvesting in the country are at the following URL: http://mowr.gov.in/sites/default/files/Steps_to_control_water_depletion_Jun2019.pdf.

RIVERBED ENCROACHMENT

Protection of river beds and removal of encroachment from them are the responsibilities of the respective State Governments/ Union Territories. However, as per the Guidelines for the scheme of Repair, Renovation and Restoration (RRR) of water bodies under Pradhan Mantri Krishi Sinchai Yojna (PMKSY) / Har Khet ko Pani (HKKP), State Government/UT is to take necessary steps for declaring the water body boundary through a Government order and ensure removal of encroachments in the water body spread area/water body boundary. This is a prerequisite before the State /UTs submit the proposal seeking release of 2nd instalment of central grant under the RRR.

Cleaning and rejuvenation of river is a continuous process and Central Government is supplementing the efforts of the State Governments and Union Territories in addressing the challenges of pollution of rivers by providing financial and technical assistance through schemes like National River Conservation Plan (NRCP) and Namami Gange. The NRCP has so far covered polluted stretches of 34 rivers in 77 towns spread over 16 States in the country with a sanctioned cost of Rs. 5870.54 crore. Under Namami Gange, the rejuvenation of Ganga and its tributaries have been taken up. So far, a total 310 projects have been sanctioned at an estimated cost of Rs.28790.66 crore under Namami Gange. Of these, 116 projects have been completed and made operational.

In addition, sewerage infrastructure is created under programs like Atal Mission For Rejuvenation & Urban Transformation (AMRUT) and Smart Cities Mission of Ministry of Housing & Urban Affairs.

Under the Namami Gange Programme for rejuvenation of River Ganga and its tributaries, and NRCP, allocation of funds during last 3 year is as under:

Rs. in crore

Programme	Fund Allocation		
	2016-17	2017-18	2018-19
Namami Gange	1,675.00	3,023.42	2,370.00
NRCP	101.00	173.50	150.50

Ramzan River in Kishanganj, Bihar falls within the Ganga River Basin system. Clearance of encroachment of river bed and adjoining areas is an administrative matter and the responsibility of the Department concerned in the State Government. Further, to curb encroachments along the rivers, Flood Plain Zoning Bill was prepared by CWC in 1975 and circulated to all the State Governments. Till date, only the states of Uttarakhand, Manipur and Rajasthan have taken steps for implementation of the Bill.

JURISDICTION OVER DAM SAFETY

The safety of the dams is the prime responsibility of the State Governments and the dam owners. The Dam Safety Bill (DSB), 2019 proposes an institutional framework and provisions for prevention of dam failure related disaster through proper surveillance, inspection, operation and maintenance of dams in India. The proposed DSB, 2019 in no way seeks to alter or dilute States' established ownership of dams or their day-to-day roles in the operation and management of dams. Rather, the provisions of the Bill are directed essentially at the empowerment of the States' own dam safety institutional set-up.

The DSB, 2019 has proposed constitution of a National Committee on Dam Safety consisting of upto 21 members which includes upto seven representatives of the State Governments as Members of the Committee.

The Water Resources Projects are planned, funded, executed and maintained by the concerned State Governments as per their own resources and priority. The land acquisition (LA) and Rehabilitation and Resettlement (R & R) works of such projects are also carried out by the concerned State Governments. As per the Schedule-I of proposed DSB, 2019, the National Committee on Dam Safety (NCDS) shall also explore compensation by means of insurance coverage for the people affected by dam failures.

INDIRAMMA FLOOD FLOW CANAL

During 2016-17, eleven ongoing projects of Telangana including Indiramma Flood Flow Canal Project were prioritized under Pradhan Mantri Krishi Sinchayee Yojana - Accelerated Irrigation Benefits Programme (PMKSY-AIBP) in consultation with the State for completion in phases. Funding mechanism through NABARD has been approved by the Government for both Central and State Share. Ultimate Irrigation Potential (UIP) of Indiramma Flood Flow Canal Project under AIBP is 40,000 ha.

As per approved scheme, entire eligible Central Assistance (CA) for Indiramma Flood Flow Canal project amounting to Rs.382.40 crore has been released up to March, 2016 and it is not eligible for further CA.

As per information available, total expenditure incurred on this project during the last three years and current year (reported so far) are as under:

S.No.	Project	Expenditure (Rs. in crore)			
		2016-17	2017-18	2018-19	2019-20 (till date)
1.	Indiramma Flood Flow Canal	415.56	252.33	82.88	40.00

As informed by the State Government, Indiramma Flood Flow Canal project is planned to be completed by June, 2021.

INTER-LINKING OF CAUVERI-VAIGAI-GUNDAR RIVERS

The Feasibility Report of the Cauvery – Vaigai – Gundar link project was prepared by National Water Development Agency (NWDA) in the year 2004 and circulated to the concerned States. Cauvery- Vaigai-Gundar link project is the last link project under Mahanadi-Godavari-Krishna-Pennar-Cauvery- Vaigai-Gundar link system under Peninsular Component of National Perspective Plan. The feasibility of Cauvery – Vaigai – Gundar link project depends on the waters to be brought by preceding upper links from Mahanadi & Godavari rivers. No funds have been allocated / utilized for execution of this project.

Hon'ble Chief Minister of Tamil Nadu has requested the Central Government to accord in-principle approval for the Cauvery-Gundar link project.

EASTERN RAJASTHAN CANAL PROJECT

The Water Resources Projects are planned, funded, executed and maintained by the State Governments themselves as per their own resources and priorities. In order to supplement the efforts of the State Governments, Government of India provides technical and financial assistance to encourage sustainable development and efficient management of water resources through various schemes and programmes.

The Eastern Rajasthan Canal Project (ERCP) has been planned by the Government of Rajasthan to provide water for drinking, irrigation and industrial needs in 13 districts of Eastern Rajasthan (namely Alwar, Bharatpur, Dholpur, Karauli, Sawai- Madhopur, Dausa, Jaipur, Ajmer, Tonk, Bundi, Kota, Baran , Jhalawar) and enroute towns, villages as well as nearby command areas.

The project has been planned at 50% dependable yield. Central Water Commission (CWC) has suggested that either the project planning may be revised based on the 75% dependability figures as per the established procedure and guidelines or the State Government should obtain "No Objection" from the Government of Madhya Pradesh in this regard.

Meanwhile, the proposal to integrate ERCP with the remaining part of PKC (Parbati-Kalisindh-Chambal) Link was discussed in the 11th meeting of Task Force for inter-linking of Rivers (ILR) held on 18.10.2019. It was decided after deliberation that the Chairman, Task Force for ILR may initiate discussion with Rajasthan and Madhya Pradesh in this regard.

Chairman, Task Force for ILR convened a meeting in this regard on 28.11.2019. The officials of the Governments of Rajasthan and Madhya Pradesh participated in this meeting. After deliberation, it was decided that Pre-Feasibility Report (PFR) in this regard may be prepared by NWDA. The target date for the completion of PFR is March, 2020.

NORTH KOEL PROJECT

The Department of Water Resources, RD & GR has taken up the long pending project for completion of balance works of North Koel Reservoir Project, Bihar and Jharkhand. The Union Cabinet approved the proposal in August 2017 for an estimated cost of Rs.2391.37 crores (6th Revised Cost Estimate @ Price Level 2016) for completion of the balance works of the North Koel Reservoir Project. The estimated cost includes expenditure already incurred Rs.769.09 Cr. as on 31.03.2016 and cost of balance works as Rs.1622.27 Cr.

Stage-I clearance and Stage-II clearance of Ministry of Environment, Forest & Climate Change (MoEF & CC), Government of India were granted on 23.02.2018 and 27.11.2018 respectively.

As per Cabinet Approval, the completion period is 30 months from the award of work.

RAJYA SABHA

REJUVENATION OF TRADITIONAL WATER BODIES

Pradhan Mantri Krishi Sinchayee Yojana (PMKSY) was launched in 2015-16 with an aim to enhance physical access of water on farm and expand cultivable area under assured irrigation, improve on farm water use efficiency, introduce sustainable water conservation practices etc. Har Khet Ko Pani (HKKP) is one of the component of PMKSY. The scheme of Repair, Renovation and Restoration (RRR) of Water Bodies has become a part of PMKSY (HKKP).

The Repair, Renovation and Restoration (RRR) of Water Bodies Scheme aims at restoring irrigation potential by improvement and restoration of water bodies along with other multiple objectives such as enhancing the tank storage capacity, ground water recharge, increased availability of drinking water, improvement of catchment of tank commands etc.

Under the Repair, Renovation and Restoration (RRR) of Water Bodies scheme, since XIIth plan onwards, 2219 water bodies have been taken up with an estimated cost of Rs. 1910 crore. Central Assistance (CA) of Rs. 433 crore has been released to various states upto March, 2020. Further, 1465 water bodies have been completed upto March, 2020 as reported by states. Target irrigation potential restoration of these schemes is 1.888 Lakh Ha and out of this, 1.319 Lakh Ha is reported to be restored till March, 2020.

MAKING PANCHGANGA POLLUTION-FREE UNDER NRCP

It is the responsibility of States/Union Territories (UTs) and local bodies to ensure required treatment of sewage and industrial effluent, before discharge into recipient water bodies to prevent and control of pollution therein. This Ministry has been supplementing efforts of the States/UTs by providing financial and technical assistance in abatement of pollution in identified stretches of rivers (excluding river Ganga and its tributaries), through the Centrally Sponsored Scheme of National River Conservation Plan (NRCP) on cost sharing basis. The objective of NRCP is to improve water quality of rivers to the prescribed standards with the implementation of pollution abatement schemes in towns along identified polluted river stretches, which included river Panchganga in Maharashtra.

NRCP presently covers polluted stretches on 34 rivers in 77 towns spread over 16 States in the country with total sanctioned cost of the projects as Rs.5870.54 crore. Out of Central share, funds amounting to Rs.2530.63 crore have been released to the States for implementation of pollution abatement schemes, and sewage treatment capacity of 2522.03 mld (million litres per day) has been created so far.

The project for pollution abatement of river Panchganga at Kolhapur was sanctioned under NRCP in August, 2009 at a cost of Rs.74.29 crore. The project involved one STP of 76 mld capacity at Kasba Bawada, which has since been commissioned along with the required sewerage infrastructure.

Proposals for pollution abatement works in identified towns along polluted river stretches are received from the States/UTs from time to time for consideration under the NRCP. These mainly include sewer network, interception & diversion, sewage treatment plants, etc. Proposals are sanctioned based on their prioritization, conformity with the NRCP guidelines, availability of Plan funds, etc.

FLOOD FORECASTING MECHANISM

Central Water Commission (CWC) issue flood forecasts as a non-structural measure of flood management, to concerned State Governments depending on the requisition from them at identified locations. CWC also issues inflow forecasts to identified reservoirs for proper reservoir regulation. At present, CWC is issuing flood forecasts at 328 locations (198 level forecast + 130 inflow forecast stations) in various parts of the country for taking proper mitigation measures by respective State Governments. While level forecast is being issued for important locations along the river, the inflow forecast is being issued for the dams/reservoirs. The steps taken to further strengthen the flood early warning system are as under:

1.) **Expansion of Flood Forecasting Network**

Presently, CWC's flood forecasting network has been expanded to 328 flood forecast stations covering 23 States & 2 UTs in 20 river basins.

2.) **Modernisation of Data Collection**

The hydro-meteorological data collection and transmission is being modernised through the use of satellite based automatic data acquisition system.

3.) Modernization of Flood Forecast Formulation

CWC is formulating three day advisories of flood using satellite based real time rainfall estimates and three day rainfall forecast through Numerical Weather Prediction models being shared by IMD in a seamless fashion. Mathematical model has been used for formulation of advisories and these advisories are shared with stakeholders using website http://120.57.32.251.

Besides this, CWC is also providing inundation forecast through this platform using two-dimensional models for main Brahmaputra and the same is also shared with beneficiaries through this website.

4.) Modernization of dissemination of flood forecasts

Dissemination of flood forecasts have also been modernised by having a dedicated website: http://india-water.gov.in/. The flood information is also loaded on Facebook Page, Twitter of CWC Flood Forecast dissemination system. Daily Flood Situation Report cum Advisories are also shared with all stakeholders as well as general public using social media platforms and dedicated Whatsapp groups.

CWC has signed an MoU with M/s Google Inc. for using their vast repository of high resolution Digital Elevation Models to send alerts regarding inundation through Google Platform using the flood forecasts issued by CWC.

Central Water Commission (CWC) is providing all flood related information to concerned States including Daily Flood Bulletins, Flood Forecast, Daily Situation Reports cum Advisories etc. Before the commencement of flood season, regional level stakeholder consultations are done and contact details of concerned nodal officers are updated and exchanged between various stakeholders. Separate Whatsapp groups are created for passing on flood information from respective Divisional Flood Control Room (DFCR) of CWC to the concerned stakeholders including State Government Departments, Project Authorities as well as local State Disaster Response Force (SDRF) and National Disaster Response Force (NDRF) battalions. Hence, almost all flood related information reaches the concerned stakeholders almost immediately as soon as forecasts are formulated.

Furthermore, Department of Water Resources, River Development & Ganga Rejuvenation, Ministry of Jal Shakti vide Order dated 09.08.2020 has stipulated that "whenever a decision is taken by a State/UT/ Dam Authority to release water from the reservoirs within its limits, an immediate intimation has to be issued to the State/UT/ Dam Authority which are adjacent to the said State or are likely to be affected by the release of water from the reservoirs".

CONSIDERATION OF SRI KALESHWARAM LIFT IRRIGATION PROJECT AS NATIONAL PROJECT

Water Resources Projects are planned, funded, executed and maintained by the State Governments themselves as per their own resources and priorities. In order to supplement the efforts of the State Governments, Government of India provides technical and financial assistance to encourage sustainable development and efficient management of water resources

through various schemes and programmes such as Accelerated Irrigation Benefits Programme (AIBP) etc. under Pradhan Mantri Krishi Sinchayee Yojana (PMKSY) as per the guidelines of such schemes.

The Polavaram Irrigation Project (PIP) has been declared a National Project under Section 90 (1) of Andhra Pradesh Reorganisation Act 2014.

Inclusion of a project for funding under scheme of PMKSY-AIBP/National Projects is dependent upon appraisal/acceptance of its Detailed Project Report (DPR) by Advisory Committee of DoWR, RD & GR from techno-economic angle; various statutory clearances; investment clearance; fulfillment of criteria laid down in the guidelines of the scheme; availability of funds; scope of the Scheme; etc.

DPR of Kaleshwaram Project has been accepted by Advisory Committee of the then MoWR, RD & GR (now DoWR, RD & GR, Ministry of Jal Shakti) in June, 2018 for an estimated cost of Rs. 80190.46 Cr at 2015-16 Price Level. However, Project Authorities have not submitted compliance in respect of observations of Central Water Commission on Investment Clearance proposal of this project.

PREVENTION OF FLOOD FROM GLACIAL LAKES

As per study of glacial lakes published in journal 'Nature and Climate Change' the lakes formed by melting of glaciers worldwide have increased by 53% in numbers, 51% in area based on remote sensing assessments and around 48% in volume using empirical scaling relations between the period 1990 and 2018.

Flood management schemes for flood control are formulated and implemented by concerned States as per their priority. The Union Government supplements the efforts of the States by providing technical guidance and promotional financial assistance for management of floods in critical areas. Government of India launched Flood Management Programme (FMP) during XI Plan for providing financial assistance to the State Governments for taking up works related to river management, flood control, anti-erosion, drainage development, flood proofing works, restoration of damaged flood management works and anti-sea erosion works which was continued during XII Plan and further extended up to March 2021 as a component under Flood Management and Border Areas Programme (FMBAP). So far central assistance amounting to Rs.6409.96 Crores Rs. Has been released to States/UTs under this Programme.

COMPLETION OF AIBP PROJECTS

During 2016-17, ninety-nine (99) on-going Major/Medium irrigation projects under Pradhan Mantri Krishi Sinchayee Yojana - Accelerated Irrigation Benefits Programme (PMKSY-AIBP), have been prioritized in consultation with States, for completion in phases along with their Command Area Development & Water Management (CADWM) works. Out of these, AIBP works of 31 projects have been completed up to June 2018 and another 13 projects have been completed since June, 2018 onwards as per information provided by the concerned States. The State wise List of the projects completed after June, 2018 is given below.

As per provisional figures reported by concerned States so far, works related to 193 SMI schemes and 120 RRR of water bodies has been completed during 2019-20.

The First Census of Water Bodies has been launched in the States/UTs in convergence with Sixth Minor Irrigation Census. The Water Bodies Census inter-alia collects information on all important aspects on the subject including their size, condition, status of encroachments, use, storage capacity, status of filling up of storage etc. After completing all the preparatory works like development of questionnaire, guidelines, data entry software, mobile application for capturing latitude, longitude, photograph of the water body and training of manpower, the fieldwork of the First Census of Water Bodies has been taken up by the States/ UTs.

"COMPLETION OF AIBP PROJECTS"

1	Assam	Champamati
2	Karnataka	Karanja
3	Madhya Pradesh	Bargi Diversion Project Phase – I (km. 16 to km 63)
4		Mahi Project
5		Mahan Project
6	Maharashtra	Upper Kundalika
7		Lower Dudhna
8		Khadakpurna
9		Dhom Balaakwadi
10	Manipur	Dolaithabi Barrage
11	Odisha	RET irrigation
12		Telengiri
13		Lower Indra (KBK)

DAM REHABILITATION PROGARMME

The Screening Committee of Department of Economic Affairs, Ministry of Finance, Government of India approved the proposal of Dam Rehabilitation and Improvement Programme (DRIP) Phase II and Phase III on 15th November 2018 for rehabilitation of dams with loan assistance from World Bank in the various States including the state of Andhra Pradesh subject to readiness of the States/ Implementing agencies.

Review and consultation meetings have been held with all the interested States/ Implementing agencies including the State of Andhra Pradesh on 18th March 2019, 12th September 2019 and 25th February 2020 in New Delhi to apprise them about procedural mechanism and various Readiness Criteria stipulated by the World Bank and Department of Economic Affairs, Ministry of Finance, Government of India.

DESILTATION OF DAMODAR RIVER

Erosion and deposition of silt is a natural process in alluvial rivers. Rivers pickup, carry and drop silt load as per their regime conditions i.e. discharge in the river, river slope, morphology, nature of silt etc. The issue of desilting of rivers has been considered by Government since long and in this context a multi-disciplinary Committee headed by Former Chairman, Central Water Commission in 2002 (Mittal Committee) has opined that large scale desilting of rivers in general is not feasible technically due to several reasons like non-sustainability, non-availability of vast land required for the disposal of dredged material etc.

The measures for flood management including desilting of rivers are formulated and implemented by the State Government as per their priority. Government of India supplements the efforts of State Government by providing technical advise and promotional financial assistance for critical areas.

State Government of West Bengal has informed that desiltation of Mundeswari river for a stretch of 14 km in Hooghly district is part of recently launched (February 2020) World Bank funded "West Bengal major Irrigation & Flood Management Project" and this is expected to improve the drainage of the flood prone Lower Damodar Valley of Hooghly and Howdah Districts.

Central water Commission is presently maintaining a network of 16 flood forecasting stations in West Bengal out of which 12 are level forecast stations in villages and towns along the river banks including Ganga / Damodar and 4 are inflow forecasting stations.

The State Government undertakes relief measures in the wake of natural disasters from State Disaster Response Funds (SDRF) placed at their disposal in accordance with approved norms of Government of India. Additional assistance is provided from National Disaster Response Funds (NDRF) as per established procedure. Providing relief assistance and its distribution to farmers is the responsibility of State Government from the SDRF.

DIVERSION OF GODAVARI RIVER WATER TO SRISAILAM AND NAGARJUNA SAGAR IN AP

Govt of India received a request from the Hon'ble Chief Minister, Andhra Pradesh in August 2019 for exploring ways to divert water from Godavari Basin to Krishna Basin to help drought affected Rayalaseema, Prakasham and Nelllore Districts and support for the Godavari - Krishna linkage.

The National Water Development Agency (NWDA) has prepared a draft Detail Project Report(DPR) envisaging transfer of water from Godavari to Krishna, Krishna to Pennar and Pennar to Cauvery and circulated to all the concerned States in March 2019 for furnishing their views. Godavari-Cauvery link (comprising of 3 links namely Godavari (Inchampalli/Janampet) - Krishna (Nagarjunasagar), Krishna (Nagarjunasagar) – Pennar (Somasila) & Pennar (Somasila) – Cauvery (Grand Anicut) link projects envisages diversion of 7000 MCM (247 TMC) of unutilised water in Indravati sub basin of Godavari basin to meet the enroute requirement between Godavari and Cauvery. The link project will provide annual irrigation varying from 3.45 to 5.04 lakh ha in Prakasam, Nellore, Krishna, Guntur and Chittoor districts of Andhra

Pradesh including stabilisation of existing command areas under Nagarjunasagar Left and Right Bank Canals. The stage of implementation of a project would be reached after its DPR is prepared with consensus of concerned States and the requisite statutory clearances are obtained.

HYDROLOGICAL BOUNDARIES FOR BETTER WATER MANAGEMENT

The National Water Policy (2012) states that Integrated Water Resources Management (IWRM) taking river basin / sub-basin as a unit should be the main principle for planning, development and management of water resources and recommends comprehensive legislation for optimum development of inter-state rivers and river valleys taking basin/sub-basin as unit.

The Ministry of Jal Shakti has drafted River Basin Management Bill. The draft River Basin Management Bill proposes optimum development of inter-State rivers by facilitating inter-state coordination ensuring scientific planning of land and water resources taking basin/sub-basin as unit with unified perspectives of water in all its forms (including soil moisture, ground and surface water) and ensuring comprehensive and balanced development of both catchment and command areas.

TRANSFER OF WATER FROM HIMALAYAN RIVERS TO MAHANADI

The National Perspective Plan (NPP) was prepared by the then Ministry of Irrigation (now Ministry of Jal Shakti) in August 1980 for water resources development through inter basin transfer of water, for transferring water from water surplus basins to water-deficit basins. Under the NPP, the National Water Development Agency (NWDA) has identified 30 links (16 under Peninsular Component and 14 under Himalayan Component) for preparation of Feasibility Reports (FRs). The Pre-Feasibility Reports (PFRs) of the all 30 links have been prepared and circulated to the concerned State Governments. Out of the 14 link projects identified under the Himalayan rivers Development Component, the following 3 link projects in series have been proposed to divert the waters of Himalayan rivers to Mahanadi and further south:

i) Manas-Sankosh-Teesta-Ganga (MSTG) link project.
ii) Ganga(Farakka)-Damodar-Subernarekha(GDS) link project
iii) Subernarekha-Mahanadi(SM) link project

The PFR of above links have already been prepared and circulated to the concerned State Governments. The PFR of SM link project has been circulated to the concerned State Governments including State of Odisha. The draft FR of MSTG link project with alternate alignment studies, draft FR of GDS link project and the draft FR of SM link project have also been prepared.

As per PFR of MSTG link, it is proposed to divert a quantum of 43,208 MCM (including the contribution of enroute major streams between Manas and Teesta like Aie, Torsa, Raidak and Jaldhaka) through the link canal. After meeting the enroute requirements for irrigation, domestic & industrial needs of this link project as well as that of Ganga-Damodar-Subernarekha(G-D-S) and Subernarakha-Mahanadi(S-M) link projects, a quantum of 13,965 MCM of water will be

brought to Mahanadi basin for further diversion to south through the nine link system proposed under Peninsular component of NPP.

NATIONAL STATUS TO PRANAHITA CHEVELLA LIFT IRRIGATION PROJECT

Detailed Project Report (DPR) of Dr B.R.Ambedakar Pranahita – Chevella Project was submitted to the Central Water Commission (CWC) in October, 2010 for techno- economic appraisal. Later, DPR of Kaleshwaram Project was submitted by Project Authorities during Feb.,2017 where it is mentioned that the said project was divided into two components viz., Kaleshwaram Project and Dr B.R.Ambedakar Pranahita Project (Adilabad).

Kaleshwaram Project has been accepted by Advisory Committee of the then MoWR, RD & GR (now DoWR, RD& GR, Ministry of Jal Shakti)in June, 2018 for an estimated cost of Rs. 80190.46 Cr. However, Project Authorities have not submitted compliance in respect of observations on Investment Clearance proposal of this project submitted by them. Further, DPR in respect of Dr B. R. Ambedakar Pranahita Project (Adilabad) has not been presented to CWC for techno-economic appraisal.

Inclusion of projects for funding under Scheme of National Project is dependent upon various statutory clearances, investment clearance, fulfillment of criteria laid down in the guidelines of the scheme, availability of funds, scope of the scheme etc.

COMPOSITE WATER MANAGEMENT INDEX

Andhra Pradesh has consistently remained amongst top performers in the three years of Composite Water Management Index (FY 15-16, 16-17 & 17-18). Over the course of 3 years, Andhra Pradesh made a jump of 8.12 points and ranked a close second in the latest round of CWMI (i.e. CWMI 2.0, released on 23.08.2019 by NITI Aayog). Composite Water Management Index (CWMI) Report of the NITI Aayog is available on its website (https://niti.gov.in/sites/default/files/2019-08/CWMI-2.0-latest.pdf).

The Composite Water Management Index (CWMI) is an important tool to assess and improve the performance of States/ Union Territories in efficient management of water resources. This has been done through an elaborate water data collection exercise in partnership with Ministry of Water Resources, Ministry of Drinking Water & Sanitation and all the States / Union Territories. The index provides useful information for the States and also for the concerned Central Ministries/Departments enabling them to formulate and implement suitable strategies for better management of water resources. The Index was quite successful in sensitizing the states about the impending water scarcity in the Nation.

Government of Andhra Pradesh has informed that it is taking up water grid project for providing drinking water to rural household through piped network by establishing Andhra Pradesh Drinking Water Supply Corporation (APDWSC) to oversee the supply of drinking water to each household by 2022. Under the water grid system, water from rivers and canals would be sent to reservoirs which would then supply it to households. The estimated cost of the project is Rs.46,675 crore of which Rs.37,475 crore is to be invested in the first phase. The Government of Andhra Pradesh has further informed that it is executing this project under the umbrella of the Jal

Jeevan Mission and MGNREGS and also partnering with the Asian Development Bank for the initial funding.

IRRIGATION PROJECTS IN DROUGHT PRONE AREAS

A Special Package for completion of 8 Major/Medium Irrigation (MMI) and 83 Surface Minor Irrigation (SMI) projects benefiting Vidarbha, Marathwada and other chronically drought prone areas of rest of Maharashtra having estimated balance cost of Rs.13651.61 crore (as on 01.04.2018) has been approved during 2018-19. Central Assistance (CA) component amounts to Rs.3831.41 crore. The targeted additional potential through these projects is 3.77 LHa. as on 1.04.2018.

CA of Rs.500 crore and Rs.300 crore has been released to the Government of Maharashtra under this package during 2018-19 and 2019-20 (so far) respectively. Potential of 15,435 ha. has been created through the projects during 2018-2019. Nine SMI projects out of above have been reported to be completed.

The Special Package was approved for completion of above Projects benefitting drought prone areas in Vidarbha and Marathwada and rest of Maharashtra.

Further, during 2016-17, Ninety-Nine (99) on-going Major/Medium irrigation projects (and 7 phases)in the country (including 59 projects benefitting drought prone areas) under PMKSY-AIBP having ultimate irrigation potential of 76.03 lakh hectare and balance cost of Rs.77595 crore [Central Assistance (CA) component of Rs.31342 crore] estimated at that time, have been prioritized in consultation with States for completion in phases along with their Command Area Development & Water Management (CADWM) works. Funding mechanism through NABARD has also been approved by the Government for both Central and State Share.

Funds are also provided to various States under Surface Minor Irrigation (SMI) and Repair, Renovation and Restoration (RRR) of Water Bodies Schemes under PMKSY as per their guidelines.

STATUS OF WATER USERS ASSOCIATIONS

Central Government's Command Area Development and Water Management (CADWM) Programme aims at strengthening of Participatory Irrigation Management (PIM) in canal irrigated command through creation of empowered Water Users Association (WUAs). As per information made available by State Governments from time to time, about 85,000 WUAs have been created in the country. The CADWM Programme is presently restricted to 99 Prioritized AIBP Projects, targeting creation of about 14,700 WUAs of which about 8,330 WUAs have been crated till date.

During 1998, Central Government brought out and circulated a model act to be adopted by the State Legislatures for enacting new irrigation acts/amending existing irrigation acts providing for creation of farmers organizations at different levels of irrigation systems. So far, 17 States (namely, Andhra Pradesh, Assam, Chhattisgarh, Bihar, Goa, Gujarat, Jharkhand, Karnataka, Kerala, Madhya Pradesh, Maharashtra, Nagaland, Orissa, Rajasthan, Sikkim, Tamil Nadu and Uttar Pradesh) have enacted the exclusive legislation for involvement of farmers in

irrigation management through creation of Water Users' Association (WUAs), Distributory Committees and Project Committees. WUAs have been formed by most of the States either through enactment of new irrigation acts, or other applicable acts such as Cooperative Societies Act etc. From July, 2016, greater emphasis has been given for creation and capacity building of WUAs under the CADWM Programme for 99 Prioritized AIBP Projects by making it mandatory for the State Governments to handover completed assets to the concerned WUAs.

The Non-Structural Intervention of CADWM Programme aims at strengthening of Participatory Irrigation Management (PIM) through creation of Water User Association (WUAs) and their capacity building by way of trainings and field demonstrations. Empowerment of WUAs is further facilitated through release of functional grants and infrastructure grants, and such provisions as financial autonomy for collection of irrigation service charges etc. The programme aims at creation of empowered WUAs which can take-over the control of CADWM assets for their sustainable operations and maintenances. The programme has provisions for hand-holding support to be given by social facilitators /NGOs which can facilitate capacity building of WUAs, lead to improved interactions among WUA members as well as with officials of Government Departments, and also promote cooperative farming. During the current fiscal year (2019-20), a total of Rs.164.01 crore has been released as Central Assistance for 4 projects under the on-going CADWM Programme for both structural and non-structural components including financial grants to be given to the targeted WUAs.

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AROUND THE STATES

ANDHRA PRADESH

NRCP IN ANDHRA PRADESH

As per Central Pollution Control Board (CPCB) report of 2018, following five river stretches of Priority IV & V in the State of Andhra Pradesh have been found to be polluted:

River	Stretch	Priority
Kundu	Nandyal to Madduru	IV
Tungabhadra	Manthralayam to Bavapuram	IV
Godavari	Rayanpeta to Rajahmundry	V
Krishna	Amravathi to Hamsala Deevi	V
Nagavali	Along Thotapalli	V

Cleaning of river is a continuous process and Government of India is supplementing the efforts of the State Governments in addressing the challenges of pollution of rivers by providing financial and technical assistance. Under the National River Conservation Plan (NRCP), project proposals are received from the State Government from time to time for taking up pollution abatement works in towns along various rivers, and are considered for financial assistance on a cost sharing basis subject to their conformity with the scheme guidelines, pollution status, prioritizations, appraisal by independent institutions and availability of Plan funds. In respect of the State of Andhra Pradesh, pollution abatement works have been sanctioned for River Godavari at Rajahmundry at the total cost of Rs. 21.78 crore which interalia, includes construction of a 30 mld Sewage Treatment Plant (STP).

BIHAR

CONSTRUCTION OF DAMS IN BIHAR

Water Resources Projects are planned, funded, executed and maintained by the State Governments themselves as per their own resources and priorities. In order to supplement the efforts of the State Governments, Government of India provides technical and financial assistance to encourage sustainable development and efficient management of water resources through various schemes and programmes such as Accelerated Irrigation Benefits Programme (AIBP) etc. under Pradhan Mantri Krishi Sinchayee Yojana (PMKSY) as per the guidelines of such schemes.

As intimated by the Central Water Commission (CWC), no Major and Medium Irrigation Project proposal including construction of dams in Mithila Region/ Darbhanga district of Bihar has been received from the State Govt during last five years. However, it received a proposal of Dagmara Hydro Electric Project from Central Electricity Authority (CEA) on 12th June, 2020 for clearance from inter- state aspects. The same was accepted by CWC on 24th June, 2020. The project is a Run of the River scheme with installed capacity of 130.1 MW and envisages constructions of concrete barrage and earthen dam across Kosi River in Mithila region of Bihar.

CHHATTISGARH

CONSTRUCTION OF CANALS IN CHHATTISGARH

The works related to water resources development and management are planned, funded, executed and maintained by the State Governments themselves as per their own resources and priorities. In order to supplement the efforts of the State Governments, Government of India provides technical and financial assistance to State Governments to encourage sustainable development and efficient management of water resources through various schemes / programmes, such as Accelerated Irrigation Benefit Programme (AIBP), Command Area Development and Water Management (CADWM), Surface Minor Irrigation (SMI) and Repair Renovation and Restoration (RRR) of Water Bodies under Pradhan Mantri Krishi Sinchayee Yojana (PMKSY). Under the PMKSY since July 2016, ninety-nine (99) AIBP projects have been prioritized in 18 states (including 3 projects of Chhattisgarh) with a dedicated funding mechanism for mission mode completion. Central Assistance of Rs.34.63 Cr. has been released from year 2016-17 till Feb., 2020 under PMKSY-AIBP for 3 Major / Medium projects of Chhattisgarh State.

From July 2016, the CADWM Programme has been restricted to 99 prioritized AIBP projects. Out of 99 prioritized projects, depending on the requirements of the State Governments, 88 projects spread over 18 states (including 3 projects of Chhattisgarh) have been included for CADWM programme so far. Central Assistance of Rs. 21.71 Cr. has been released from year 2016-17 till Feb., 2020 under PMKSY- CADWM Programme for 3 projects of Chhattisgarh State.

One cluster of 147 SMI schemes from the state of Chhattisgarh was included in FY 2013-14 for the release of Central Assistance (CA) under the Surface Minor Irrigation (SMI) scheme of PMKSY. Estimated cost of the scheme is Rs.722.17 crore with a planned potential creation of 50513 hectare. So far, Rs.200.37 crore has been released as Central Assistance (CA) and total expenditure of Rs.641.00 crore has been incurred on the scheme upto March, 2019 as reported by the state.

As per information made available by the State of Chhattisgarh, in all such cases where forest land is affected in construction of canals the forest cases are prepared as per the laid-down norms of forest department and necessary clearance is obtained from MOEF & CC, Government of India.

HARYANA

WATER CRISIS IN HARYANA

To address the water shortage in Haryana particularly in Bhiwani, Mahendragarh, Charkhi Dadri and Nuh districts, the State Government is working to improve the Western Jamuna Canal (WJC) System to carry its design discharge during monsoon as the capacity of the channel has reduced due to continuous running over the years and the Lift irrigation system by replacing/renovating various pumps, motors etc. for supply of water to southern Haryana. A

Mewat Canal Feeder has also been proposed to supply drinking water to Mewat Area. Further, Government of India has launched Jal Jeevan Mission (JJM) with an outlay of Rs. 3.60 lakh crore, which aims at providing Functional Household Tap Connections to every rural household by 2024 at the service level of 55 litre per capita per day (Ipcd). Government of India has also launched Jal Shakti Abhiyan (JSA), a campaign for water conservation and water security in 256 water- stressed districts of the country.

Under National Perspective Plan (NPP), the Yamuna-Rajasthan link project of Himalayan Component will provide an annual irrigation of 0.435 lakh ha in Bhiwani district of Haryana. National Water Development Agency has completed the Pre-Feasibility and draft Feasibility Reports of this link project.

JHARKHAND

PIPED WATER SUPPLY IN JHARKHAND

To enable every rural household in the country, including those in villages of Jharkhand, to have potable water at service level of 55 litre per capita per day (lpcd) through Functional Household Tap Connection (FHTC) by 2024, Government of India, in partnership with the States, has launched Jal Jeevan Mission (JJM) with an outlay of Rs. 3.60 lakh Crore out of which central share is Rs. 2.08 lakh Crore.

After the launch of JJM, a conference of Minister in-charge of rural water supply of various States was held in New Delhi followed by five regional workshops to discuss the modalities of the implementation of the Mission. Moreover, in consultation with State Governments & other stakeholders in water sector, Operational Guidelines for the implementation of the Mission has been released on 25.12.2019. In 2019-20, a budgetary allocation of Rs.10,000.66 Crore has been made and as on 11.03.2020, an amount of Rs. 9,542.89 Crore has been released to the States/ UTs.

Water being a State subject, powers to plan, design, approve and implement rural water supply projects including identification of sources are vested with respective States. Under JJM, States have been advised to take up the sustainability measures aimed at augmentation of sources of drinking water in convergence with Central Government schemes like Mahatma Gandhi Rural Employment Guarantee Scheme (MGNREGS), Integrated Watershed Management Progamme (IWMP), Finance Commission Grants to Panchayati Raj Institutions,etc.

Further, Jal Shakti Abhiyan (JSA), a time-bound, mission-mode water conservation campaign was also launched in 256 water stressed districts across the country with the aim to promote water conservation and water resource management by focusing on accelerated implementation of five target interventions, viz., water conservation & rain water harvesting, renovation of traditional and other water bodies/ tanks, reuse and recharge of bore wells, watershed development and intensive afforestation.

MEGA IRRIGATION PROJECTS UNDER CONSTRUCTION IN JHARKHAND

Water resources projects are planned, funded, executed and maintained by the State Governments themselves as per their own resources and priorities. In order to supplement the

efforts of the State Governments, Government of India provides technical and financial assistance to encourage sustainable development and efficient management of water resources through various schemes and programmes such as Accelerated Irrigation Benefits Programme (AIBP) etc. under Pradhan Mantri Krishi Sinchayee Yojana (PMKSY) as per the guidelines of such schemes

Subarnarekha Multipurpose project benefitting East & West Singhbhum and Saraikela Kharsawan districts of Jharkhand Stateis one of the 99 prioritized projects of the country under PMKSY-AIBP. Total Central Assistance (CA) of Rs. 1889.61 Cr (including Rs.305.88 Cr during 2018-19) has been provided for this project since it was included under AIBP. Additionally, State has also availed Rs. 518 Cr as State Share under Long Term Irrigation Fund from NABARD during 2016-2019. The delay in completion of this project is mainly due to slow progress in Land Acquisition and Rehabilitation & Resettlement.

Further, Government of India has approved a sum of Rs.1622.27 crore for completion of balance works of North Koel Reservoir Project benefitting Palamau and Garhwa districts of Jharkhand, out of which Rs.1378.61 crore is to be borne by the Central Government. This project was started in 1972. However, it could not progress further after 1993 due to objections raised by the Forest Department. In October, 2019, Forest Department, Government of Jharkhand has granted clearance to the project. Total CA of Rs. 659.70 Cr has been released/ sanctioned for this project till Dec, 2019.

KERALA

WATER SCARCITY IN KERALA 17.09.2020

Despite adequate rainfall, Kerala generally faces water scarcity from February to May in some parts of the mid land and high land areas where the terrain is highly undulating. The groundwater stored during monsoon season is generally lost as base flow at a faster rate in high gradient areas. Further, because of high gradient and low thickness of aquifers, there is limited scope of artificial recharge/rainwater harvesting in these areas.

Water being a State subject, initiatives on water management including rainwater harvesting in the Country is primarily States' responsibility. Further, Kerala has taken up 'Ente Kulam', a water conservation initiative that includes revival of water bodies.

In addition, domestic well recharge through rooftop rainwater recharge is being promoted under the "Haritha Keral Mission" by involving the gram panchayats. In addition, 12 million rainfall conservation/recharge structures were constructed under Mahatma Gandhi National Rural Employment Guarantee Scheme.

As per information received from Ministry of Housing & Urban Affairs, the Model Building Bye Laws, 2016, has been issued for guidance of the States/UTs which has a chapter on 'Rainwater Harvesting'. 33 States/UTs including Kerala have incorporated the rainwater harvesting provisions. Provision of rainwater harvesting is applicable to all residential plots above 200 sqm and all residential buildings above 100 sqm.

Water being a State subject, efforts to initiate suitable demand side and supply side interventions including preserving the open wells and its water quality is primarily States' responsibility. However, steps taken by the Central Government for sustainable water management are at the following URL: http://mowr.gov.in/sites/default/files/Steps_to_control_water_depletion_Jun2019.pdf.

THANNEER MUKKAM BUND IN KERALA

The investment clearance of Modernisation of Thaneermukkom Barrage was accorded by Investment Clearance Committee of this Ministry in its 5th meeting held on 10.02.2017 and no funds have been provided by the Central Government, as this project has not been included for funding under any scheme of Ministry of Jal Shakti. However, State Government has accorded Administrative Sanction for an amount Rs.255.335 Crores and Technical Sanction of Rs.183.0 Crores for improving the efficiency of Thottappally Spillways and Leading Channel and State Government has informed that electrical works, mechanical works and 95% of civil works have been completed.

The State Government of Kerala has informed that this work is included in the Kuttanadu Package and is expected to be completed within six months after High Court of Kerala pronounces its judgement in Writ Petition (c) 41853/18.

KARNATAKA

STATUS OF IRRIGATION PROJECTS IN KARNATAKA

During 2016-17, five ongoing projects of Karnataka including Upper Tunga and Sri Rameshwara Irrigation Projects were prioritized under Pradhan Mantri Krishi Sinchayee Yojana - Accelerated Irrigation Benefits Programme (PMKSY-AIBP) scheme in consultation with the State for completion in phases. Funding mechanism through NABARD has been approved by the Government for both Central and State Share. Ultimate Irrigation Potential (UIP) of these projects is 80494 ha & 13800 ha respectively.

As per approved PMKSY-AIBP scheme, eligible Central Assistance (CA) of Rs 62.74 Cr was released to Sri Rameshwara Irrigation Project up to March, 2016. Further, AIBP components of Sri Rameshwara Irrigation Project is reported complete in Sep, 2018. Expenditure incurred on this project from 2016-17 to 2018-2019 is reported to be Rs 41.99 Cr.

In respect of Upper Tunga Irrigation Project, Central Assistance (CA) of Rs. 226.24 Cr was released up to March, 2016. Details of CA released for this project and total expenditure incurred on this project during the last three years and current year are as under:

Year	Central Assistance (Rs in Cr)	Expenditure (Rs in Cr)
2016-17	108.88	253.73
2017-18	75.16	113.97
2018-19	-	167.55
2019-20 (Upto Dec, 2019)	-	122.46

MAHARASHTRA

AIBP IN MAHARASHTRA

During 2016-17, ninety-nine (99) on-going Major/Medium irrigation projects (and 7 phases) in the country including 26 Projects of Maharashtra under Pradhan Mantri Krishi Sinchayee Yojana (PMKSY) - Accelerated Irrigation Benefits Programme (AIBP) have been prioritised in consultation with States for completion in phases. The Central Assistance (CA) for projects under PMKSY-AIBP is released from time to time as and when eligible proposals are received from the State Governments. During 2016-17 to 2019-20, CA and State Share of Rs. 1562.104 crore and Rs.10244.42 crore respectively has been released through NABARD for the PMKSY-AIBP projects of Maharashtra as per guidelines of scheme. Further, during 2020-21, CA of Rs.188.44 crore has been released for seven (7) projects and State share of Rs.564.30 crore has been released for six (6) projects of Maharashtra as per the eligibility and guidelines of the scheme. Nine (9) prioritised projects of Maharashtra have been completed. Further, the Govt. of Maharashtra has submitted proposals for another three (3) projects namely Sangola Branch Canal, Lower Dudhana and Krishna Koyana LIS as per the information provided by Central Water Commission (CWC). The release of CA for the aforementioned projects is dependent upon fulfillment of criteria laid down in the guidelines/ eligibility in this regard.

FHTC IN MAHARASHTRA

As reported by the State, after revalidation of baseline data, as on 14.09.2020, about 45.22% (64.37 lakh) rural households have tap water connection in Maharashtra whereasin Latur district, about57.18% (2.17 lakh) rural households have tap water connection.

To enable every rural household in the country to have potable water through Functional Household Tap Connection (FHTC) by 2024, Government of India is implementing Jal Jeevan Mission (JJM)-Har Ghar Jal in partnership with States.Further, to complete the work in a timebound manner, following action has been taken:

i.) Every State/ UT has been advised to prepare 'State Action Plan', including year-wise plan for providing tap water connections;

ii.) Govt. of India holds regular review meetings with all States & UTs for expediting the implementation including joint review by Union Minister with Chief Ministers of States;

iii.) Central financial assistance, to all eligible States/ UTs, is being provided as per the operational guidelines for the implementation of Jal Jeevan Mission;

iv.) In consonance with 73rd Amendment of Constitution of India and to instill the sense of ownership among villagers, Gram Panchayat or its sub-committee/ user group i.e. Village Water and Sanitation Committee (VWSC), Paani Samiti, etc. are to plan, implement, manage, operate and maintain in-village water supply system. Thus, Jal Jeevan Mission is a demand-driven, decentralized, community-managed programme.

PMKSY IN MAHARASHTRA

The Water Resources Projects are planned, funded, executed and maintained by the State Governments themselves as per their own resources and priority. In order to supplement their

efforts, Government of India provides technical and financial assistance to State Governments to encourage sustainable development and efficient management of water resources through various schemes and programmes such as Accelerated Irrigation Benefits Programme (AIBP) etc. under Pradhan Mantri Krishi Sinchayee Yojana (PMKSY) as per the guidelines of the scheme.

Krishna-Marathwada Krishi Sinchayee Yojana is not part of the PMKSY-AIBP and is being implemented by the State Government through their own budget.

During 2016-17, 26 ongoing Major/Medium Irrigation (MMI) projects of Maharashtra under PMKSY-AIBP having estimated balance cost of Rs.21400 crore [Central Assistance (CA) component Rs.3024 crore] as on 1.4.2016 have been prioritized in consultation with State for completion in phases. Funding mechanism through NABARD has also been approved by the Government for both Central and State Share.

The funds are released for projects on receipt of eligible proposals from the State Government from time to time. Since April, 2016, total CA of Rs.1562.10 crore and State Share of Rs.10244.42 crore has been released to the Government of Maharashtra for these projects through NABARD.

RAJASTHAN

PMKSY IN RAJASTHAN

Details of projects under Pradhan Mantri Krishi Sinchayee Yojana (PMKSY) benefitting Banswara and Dungarpur district along with Central Assistance (CA) provided to state of Rajasthan are as under:

Under Repair, Renovation and Restoration (RRR) of Water Bodies component of Pradhan Mantri Krishi Sinchayee Yojana (PMKSY), two clusters of water bodies comprising 32 (including 10 in Banswara) and 36 (including 4 in Banswara) water bodies have been taken up in the state of Rajasthan with an estimated cost of Rs.187.81 crore. Total CA of Rs.62.19 crore has been released to the State for these clusters of water bodies (including 14 water bodies in Banswara) so far.

Under PMKSY-Per Drop More Crop (PDMC) (Micro Irrigation) component of Pradhan Mantri Krishi Sinchayee Yojana (PMKSY), an area of 246635 ha has been covered in Rajasthan (including an area of 3608 ha and 1166 ha in the districts of Banswara and Dungarpur respectively). Since April, 2015, total CA of Rs.623.33 crore has been released so far to the State Government for the entire state including area covered in Banswara and Dungarpur districts.

Further, under PMKSY-Watershed Development Component (WDC) component of PMKSY Department of Land Resources has sanctioned 1025 projects in the State of Rajasthan out of which 4 projects (0.23 L Ha)and 22 projects (1.23 L Ha) have been sanctioned in Banswara and Dungarpur districts respectively. Till date, Rs 2534.70 crore has been released as CA to the State Government for all the WD projects including that in Banswara and Dungarpur districts.

PROPOSAL FOR SUPPLY OF WATER FROM YAMUNA CANAL FOR RAJASTHAN

The Detailed Project Report (DPR) on "Transfer of Rajasthan"s share in Yamuna Water at Tajewala Headworks to Churu and Jhunjhunu Districts of Rajasthan by underground conveyance system" for an estimated cost of Rs.23966 crore was received in Central Water Commission (CWC) in February, 2019. The project envisages provision of drinking water to Jhunjhunu and Sikar Districts and irrigation benefits to 35000 Ha area in Churu and 70000 Ha area in Jhunjhunu Districts. The project entails transfer of Rajasthan share of 1917 cusecs of water allocation at Tajewala Headworks during July-October as decided by Upper Yamuna River Board (UYRB) in its 22nd meeting held on 21st December, 2001 for its utilisation for drinking & irrigation purposes in Churu, Jhunjhunu and Sikar districts of Rajasthan through approximately 265 Km long underground water conveyance system.

Rajasthan had earlier submitted a Feasibility Report to Central Water Commission (CWC) on "Transfer of Rajasthan"s share in Yamuna water from Tajewala Head, Haryana to Rajasthan and its utilization in Jhunjhunu and Churu Districts of Rajasthan" in October 2017 at an estimated cost of Rs. 20249 crore. The report was examined in CWC and 'in-principle consent' for preparation of Detailed Project Report (DPR) of the project was conveyed to the State Government in February, 2018 after recommendation of the Screening Committee of CWC, subject to certain conditions.

The DPR is being examined in consultation with State Government for various technical aspects including hydrology, irrigation planning, inter-State matter, Design and power requirement in CWC and Central Electricity Authority (CEA). The observations of CWC and CEA have been communicated to the State Government for compliance at various stages. On satisfactory compliance of observations by the State Government, the project proposal will be considered by the Advisory Committee of Department of Water Resources, River Development & Ganga Rejuvenation for acceptance.

TAMIL NADU

WATER STORAGE FACILITIES IN TAMIL NADU

Water being a state subject, planning, execution, operation and maintenance of water storage facilities including repairing and strengthening of dams, embankments and canals are carried out by the State Governments from their own resources and as per their own requirements and priority of works. In order to supplement the efforts of the State Governments, Government of India provides technical and financial assistance to State Governments to encourage sustainable development and efficient management of water resources through various schemes/programmes such as Accelerated Irrigation Benefit Programme (AIBP) under PMKSY (Pradhan Mantri Krishi Sinchai Yojana). Central Water Commission maintains National Register of Large Dam (NRLD) , a compilation of the large dams in the country prepared as per information received from the State Government / Authority concerned at http://cwc.gov.in/sites/default/files/nrld06042019.pdf. Latest edition of NRLD was published in June 2019. As per NRLD June, 2019, Tamil Nadu has 118 completed large dams. Further, 44 large dams have been constructed throughout the country since 2014.

During 2016-17, ninety nine (99) ongoing Major/Medium irrigation projects (and seven phases) under PMKSY-AIBP have been prioritized in consultation with States for completion in phases, along with their Command Area Development & Water Management (CADWM) works. Funding mechanism through NABARD has been approved by the Government for both Central and State Share. Details of State and Project wise funds allocated are given at http://pmksy-mowr.nic.in/aibp-mis/ReleaseOrder-Reports.aspx.

No Project of Tamil Nadu is part of the above. Govt. of India is implementing the Dam Rehabilitation and Improvement Project (DRIP) with loan assistance from the World Bank with provision for rehabilitation of 198 dam projects located in seven States i.e. Jharkhand (3), Karnataka (22), Kerala (28), Madhya Pradesh (25), Odisha (26), Tamil Nadu (89) and Uttarakhand (5) with 10 Implementing Agencies at the revised cost of INR 3466 Crore and scheduled closure of June 2020. The funding is loan assistance from World Bank disbursed on quarterly basis to States, which is required to be re-paid back by respecting States as per agreed terms and condition of loan by Government of India and DRIP partner agencies.Further details are given at https://www.damsafety.in/index.php?lang=en&page=Dashboard_On_Going&origin=front-end&tp=1.

CONSTRUCTION OF CHECK DAMS IN TAMIL NADU

As per information received from Tamil Nadu Water Supply and Drainage Board (TWS&DB), Government of Tamil Nadu, they have made survey in Nagapattinam district of Tamil Nadu to construct check dams to store water during rainy season for drinking water & agriculture purposes.

Due to existing terrain conditions, check dams could not be constructed in Nagapattinam district. Further, they have constructed 119 Recharge Shafts, 10 Recharge Pits and 91 recharge trench to augment ground water level.

In addition, as per the information provided by Ministry of Rural Development, Mahatma Gandhi National Rural Employment Guarantee Act, 2005 (MGNREGA) is a demand driven wage employment programme with bottom up approach in planning of works. As per the Schedule I of Mahatma Gandhi NREGA Para 4 (1), I. Category : A : Public works relating to Natural Resource Management (i) Water Conservation and water harvesting structures to augment and improve ground water like underground dykes, earthen dams, stop dams, check dams with focus on recharging ground water including drinking water sources are permissible activity.

Construction of check dams was taken up under MGNREGA in Nagapattinum district of Tamil Nadu since inception. As per the information uploaded by the State Government of Tamil Nadu in the Management Information System (MIS), the details are given as under:

Works of Check Dams since inception (as on 28th February, 2020)			
Ongoing		**Completed**	
Number of works	Expenditure in lakhs	Number of works	Expenditure in lakhs
16	85.7	443	1803

TELANGANA

SHORTAGE OF WATER IN TELANGANA

The average annual water availability of any region or country is largely dependent upon hydro-meteorological and geological factors. However, water availability per person is dependent on population of the country and for India, per capita water availability in the country is reducing due to increase in population. Due to high temporal and spatial variation of precipitation, the water availability in many regions of the country is below the national average and may be facing water stress / scarce conditions.

As per the assessment jointly carried out by Central Ground Water Board and the State Government for 2017, out of total 584 Mandals in the Telangana state, 70 Mandals (12% of the total Mandals) have been categorized as 'Over-exploited', where 'Annual Ground Water Extraction' is more that 'Annual Extractable Ground Water Resource'.

The Government of Telangana has informed that the available inflows have been effectively & efficiently utilized for both Irrigation and drinking water needs for the last five years i.e., 2014-15 to 2019-20.

Water Resources projects are planned, funded, executed and maintained by the state governments themselves as per their own resources and priorities. In order to supplement the efforts of the state governments, Government of India provides technical and financial assistance to encourage sustainable development and efficient management of water resources through various schemes and programmes. During 2016-17, eleven ongoing projects of Telangana were prioritized under Pradhan Mantri Krishi Sinchayee Yojana - Accelerated Irrigation Benefits Programme (PMKSY-AIBP) in consultation with the State for completion in phases. Against the eligible balance amount of Central Assistance (CA) of Rs.1129.693 Cr., for these prioritized projects, CA of Rs. 777.03 Cr. has been released/sanctioned since April, 2016. All the eleven projects have been included under Command Area Development & Water Management (CADWM) programme.

During 2016-17, eleven ongoing projects of Telangana were prioritized under Pradhan Mantri Krishi Sinchayee Yojana - Accelerated Irrigation Benefits Programme (PMKSY-AIBP) in consultation with the State for completion in phases. Against the eligible balance amount of Central Assistance (CA) of Rs.1129.693 Cr., for these prioritized projects, CA of Rs. 777.03 Cr. has been released/sanctioned since April, 2016. All the eleven projects have been included under Command Area Development & Water Management (CADWM) programme. During 2016-19, central share of Rs. 36.34 crore has been released to Telangana for CADWM works of these projects. So far, no central assistance proposal has been submitted by State of Telangana for the 2019-20.

Ministry of Housing and Urban Affairs is implementing Atal Mission for Rejuvenation and Urban Transformation (AMRUT) in 500 cities with mission components such as water supply, storm water drainage, etc. In the State of Telangana, projects under AMRUT are being implemented in 12 cities, namely, Adilabad, Greater Hyderabad Municipal Corporation (GHMC), Karimnagar, Khammam, Mahbubnagar, Miryalaguda, Nalgonda, Nizamabad,

Ramagundam, Siddipet, Suryapet and Warangal. Out of these, water supply projects have been taken up in 10 cities. So far, a central assistance of Rs.662.37 crores has been provided to the State of Telangana under AMRUT.

WEST BENGAL

ALLOCATION OF FUND FOR KALEGHAI KAPALESHWARI BAGHAI RIVER PROJECT

Kaliaghai-Kapaleshwari-Baghai Scheme of West Bengal was accorded investment clearance by the erstwhile Planning Commission in March 2010 for an estimated cost of Rs.650.38 crore. 1st Phase of the scheme for the estimated cost of Rs.325.20 crore only for works to be executed by State Government during XI Plan was included under Flood Management Programme (FMP) in July 2010 and Central Assistance has been provided to the scheme as per extant guidelines.

The funding pattern of the project was initially 75% : 25% (Central Share: State Share) and subsequently revised to 50% : 50% (Central Share : State Share) as per Department of Expenditure, Ministry of Finance letter dated 28.10.2015. So far Rs.170.273 crore has been released by this Ministry in five instalments as central share to Kaliaghai-Kapaleshwari-Baghai Project under FMP. As informed by State Government of West Bengal, the total funds utilized till 28.01.2020 in the Project amounts to Rs. 348.01 crores.
(f) 1st Phase of the scheme with an estimated cost of Rs.325.20 crore as included under FMP has been completed as per the progress submitted by State Government of West Bengal.

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NEWS

Release only treated water into Sutlej, drains: NGT

On the concluding day of its two-day visit, the state monitoring committee of the National Green Tribunal (NGT) directed officials to ensure that no untreated water was allowed to flow into the Sutlej and drains. The NGT has fixed a deadline of March 31, 2021, to overcome the problem of polluted water in Fazilka district.

The panel constituting Justice Jasbir Singh (retd), Chief Secretary SC Aggarwal (retd), technical expert member Babu Ram and environmentalist Balbir Singh Seechewal assessed the remedial measures being taken to improve the waste water management in the five districts of the Malwa belt.

After presiding over the meeting, Justice Jasbir Singh said, "We shall try to ensure clean water supply in the drains within the stipulated period for which the deadlines for different departments were fixed today." He warned the officials that as per the NGT provisions, a fine up to Rs 5 lakh could be imposed on the department which failed to deliver within the time frame. He said 14 sewage treatment plants (STPs) were working in five districts and 11 more were under construction. He said untreated water of Ferozepur, Moga, Faridkot and Muktsar districts was flowing into the drains which terminate in Fazilka due to natural gradient. This water was unfit for even irrigation.

To a query, Justice Jasbir Singh said they had no record that how many industrial units were discharging polluted water into the drains and Sutlej.

Claiming the STPs were the major source of pollution, he said residents had been facing the problem since 1974. The panel would submit the report before the deadline, assured Justice Jasbir Singh.

Mukhtiar Singh, resident of Teja Rohela village, said their village was worst affected as 65 children were suffering from mental retardation and other deformities. Mukhtiar Singh accompanied by a few mentally ill children met the panel members.

Balbir Singh Seechewal said the polluted water would harm several coming generations if a solution was not found immediately.

The DCs of five districts, including Fazilka Deputy Commissioner-cum-nodal officer Manpreet Singh Chhatwal, executive officers of 26 councils, officials of the PPCB, Agriculture Department, Water Supply and Sewerage Board, Soil Testing and Conservation Department, participated in the review meeting.

The Fazilka DC said the district had received a grant of Rs 80 lakh from the state government to set up water treatment plants in border villages.

In July 2019, a local farmer Vikram Ahuja had filed a petition in the NGT seeking its intervention to get rid of the problem of polluted water in Fazilka drains citing reason that the water had turned unfit for human consumption and for irrigation purposes for different reasons.

The Tribune
08.01.2020

Water level rise in Ganga-Brahmaputra delta could reach 85-140 cm by 2100

Water level rise in the Ganga-Brahmaputra-Meghna delta could reach 85 to 140 cm by 2100, found researchers in a latest study amid rising concerns over the effects of climate change in the world's largest delta regions.

Situated north of Bay of Bengal, the Ganga-Brahmaputra-Meghna delta covering two-thirds of Bangladesh and part of West Bengal, India is the largest and most densely populated deltas in the world. It is also one of the most vulnerable to climate-driven sea-level rise and monsoon flooding presenting a major challenge for climate change adaptation of its 200 million inhabitants.

Sunderbans, world's largest Mangrove forest is a key area in the region.

Researchers from France and Bangladesh who carried out the study found that between 1968 and 2012, the water level in the delta increased faster by 3 mm/year on average, slightly more than global mean sea level (~2 mm/year) during the same period. And, 2005 onwards, the water level rise was faster towards the west of the delta.

They also estimated the contribution of land subsidence (the gradual sinking of the earth's surface to the rise of water level) which can exacerbate the effects of sea-level rise and found that maximum land subsidence in the delta during 1993 and 2012 was between 1 and 7 mm/year.

"If subsidence continues at the same rate through the century, the water-level rise, could reach 85 to 140 cm, by 2100 compared to the period 1986-2005. This is double the rise previously projected under a greenhouse gas emission mitigation scenario in UN's Inter-governmental Panel of Climate Change (IPCC) report," warns the study.

The findings published in journal PNAS, could help improve forecasts of water level in the region, home to 200 million people and lead to future impact studies and possible adaptation plans in wake of the rising impacts of climate change.

Researchers also explain that the fluctuations in the water-level each year were strongly modulated by the ocean phenomenon called the El Niño Southern Oscillation (ENSO) and Indian Ocean Dipole (IOD) variability'. "Water level was lower than average by 30 to 60 cm during co-occurrent El Niño and positive IOD events and higher-than-average water level, by 16 to 35 cm, during La Niña years," stated the study.

The study was conducted by analyzing monthly readings from 101 gauges measuring water and sea levels across the delta. The data was then aggregated over geographical areas to obtain region-level estimates of water-level rise.

The Mint
09.01.2020

Drop in Punjab's ground water level sounds alarm

Agricultural experts in Punjab are a worried lot over the latest water indices showing the state will have a net groundwater availability of -14.58 billion cubic metre (BCM) within the next 25 years and even the domestic and industrial water supply will shrink from 1.22 BMC.

"The rate at which the ground water is shrinking is shocking," says eminent agriculture expert Sucha Singh Gill of IIM, Ahmedabad.

"Against net ground water availability of only 21.58 BCM, Punjab is consuming much more at 35.78 BCM," he says.

Gill argues for solutions, one of which is crop diversification.

"That's the only way that groundwater reserves can be saved. For that to happen, the state would have to prescribe Minimum Support Price (MSP) and procurement guarantee for other crops." he says.

Experts also suggest that the subsidies for free power to tube wells should be curbed and farmers who have in excess of 5 acres and those in constitutional posts should not be provided subsidies.

"Free power has meant drawal of underground water 24X7 without individual consequences. This profligate action should stop," they argue pointing to the fact that 95% of all water in Punjab is used in agriculture and most wasted.

The government has already passed the Punjab Water Resources (Management and Regulation) Bill 2020 to make way for creation of Punjab Water Regulation and Development Authority to manage the critical water resources.

The authority will be responsible for management, conversion and distribution of water resources in a judicious, equitable and sustainable manner. It is empowered to issue directions and guidelines, issue tariff orders specifying the charges to be imposed by entities supplying water for domestic, commercial or industrial use.

In another positive step, the state has also contracted the National Water Company of Israel M/s Mekorot, for the formulation of a Water Conservation and Management Master Plan (WCMMP). Yet, it's the vexatious and long-pending issue of the Satluj Yamuna Link project that has raised concerns.

With Haryana and Punjab not budging from their stand on SYL, the share of water for either state, is yet to be determined. Punjab says it has no water to give to the neighbouring state even as Haryana insists on its share.

In 2004, Punjab Assembly had enacted the Punjab Termination of Agreements Act annulling all inter-state agreements signed by state relating to sharing of the Ravi and Beas water, including the December 1981 tripartite agreement.

The same year, the Centre sought the SC's opinion on the validity of the act by making a presidential reference.

The New Indian Express
27.01.2020

Four hydro projects violate Ganga flow norms: Central Water Commission

Over a year after the government made it mandatory for hydro power projects on the upper reaches of the river Ganga's tributaries to release minimum quantities of water through the year, 4 of the 11 projects are flouting norms, says a report by the Central Water Commission (CWC).

The ecological flow, or e-flow notification as it is called, specifies that the upper stretches of the Ganga — from its origins in the glaciers and until Haridwar — would have to maintain: 20% of the monthly average flow of the preceding 10-days between November and March, which is the dry season; 25% of the average during the 'lean season' of October, April and May; and 30% of monthly average during the monsoon months of June-September.

The CWC is tasked with measuring the flow and ensuring that plants comply with the law. The non-compliant ones are: Maneri Bhali Phase 2 ,Vishnuprayag Hydroelectric project, Srinagar Hydroelectric

project and the Pashulok barrage project. The Vishnuprayag and Srinagar projects are on the Alaknanda river, the Maneri Bhali on the Bhagirathi and the Pashulok is on the Ganga main stream.

Moves court

Power company GVK, which runs the Srinagar project, has challenged the e-flow notification in the Uttarakhand High court.

"After monsoon period many of the projects are not meeting the mandated e-flows," the CWC report says.

The Centre's e-flow notification came into effect last October and gave companies three years to modify their design plans, if required, to ensure that a minimum amount of water flowed during all seasons. Power producers generally hoard water to create reserves to increase power production.

Deadline advanced

In September 2019, the government advanced this deadline, from October 2021 to December 2019. This was after the CWC undertook field visits to hydro power sites and reported that most of the power projects could begin implementing the norms right away and didn't need three years.

D.P. Mathuria, a senior official in the National Mission for Clean Ganga, said the government would be sending notices to the offending companies. Violating the e-flow norms can mean closure of the project or a hefty fine but the government isn't contemplating such action yet.

The Hindu
31.01.2020

For water conservation, Ladakh to hold ice stupa competition

An ice stupa building competition is being held in Ladakh for the second consecutive year. Ice stupas are a unique way of conserving natural water. The number of ice stupas will be higher this year then the last year. Around 25 ice stupas are being built this year in various villages. Last year, only 12 ice stupas were built. With no farming activities in the winter in Ladakh, the water remains unutilised. When the farmers need water in the sowing season in the spring, the region faces a water crisis as the discharge from glaciers remains low.

The competition, which is being organised by the Himalayan Institute of Alternative Ladakh, is held at this time of the winter when the climatic conditions are harsh. The participants take the advantage of the prevailing sub-zero temperature in the region for natural formation of ice and conserve the running water of village streams which remains mostly unutilised in the extreme cold except for drinking and washing.

The natural formation of ice with the help of gravitational forces is a prototype of the Buddhist stupa. This new concept of making artificial glaciers was introduced in Ladakh by environmentalist and Ramon Magsaysay awardee Sonam Wangchuk.

Competition coordinator Deskit Angmo said: "The competition is being held to promote better impact at the village level and scale up the ice stupa method of water resource management of the villages." She said the number of participants was increasing. "We have received a large number of applications, but due to the shortage of material caused by untimely closure of roads, only a few of them can participate," Angmo said. She said: "Twelve ice stupas were built during the competition last year, but

this year, 25 stupas are being built. At Ganglas village near Leh town, 10 ice stupas are being built with two main objectives: Of participation in the competition and to organise an ice climbing festival to generate income for the participants."

The ice stupa building was started in 2013 by Sonam Wangchuk at Phyang village so as to promote it in every village of Ladakh which faces severe water crisis. The competition among the interested villagers is being held since 2019. The building of ice stupas started in mid-December last year and will end in the last week of March. The participants had to undergo a day-long workshop to familiarise themselves with the techniques of building ice stupas.

The Tribune
31.01.2020

'Reports that India trying to breach Indus Water Treaty false and far from reality'

India on Wednesday dismissed reports in Pakistani media that it was trying to breach the Indus Waters Treaty, terming them "false" and "far from reality". Commissioner (Indus) in the Jal Shakti Ministry P K Saxena said the reports were an attempt by Pakistan to divert the attention of its public from the "real issues of gross mismanagement" of water resources. "The reports of India's attempt of breach of Indus Waters Treaty has been rejected as false and far from reality. The building of perception that the water scarcity in Pakistan is because of India, bears no relation whatsoever to the reality on the ground," Saxena told PTI.

The reports state that following the abrogation of provisions of Article 370, the Indian government has stepped up efforts to breach the Indus Water Treaty (IWT) to pave the way for construction of dams on the water flowing into Pakistan. The reports also stated that Indian diplomats have started quietly lobbying like-minded UN members. They claimed that Delhi is circulating a draft stating that it needs to act on several options, including construction of new dams in its territory, to counter environmental impacts of climate change, including fog, in its neighbouring countries. According to the Indus Water Treaty between New Delhi and Islamabad, the usage of water of the Indus and its five tributaries flowing from India to Pakistan have been divided. Ravi, Beas and Sutlej are eastern flowing rivers, while Indus, Jhelum and Chenab flow towards the west. It is India's right to design the projects on western rivers within the limiting conditions imposed by the treaty, Saxena said. Of the total 168 million acre feet (MAF), India's share of water from these three rivers is 33 MAF, which is nearly 20 per cent. India uses nearly 93-94 per cent of its share under the Indus Water Treaty. The rest of the water remains unutilised and goes to Pakistan.

Millennium Post
05.02.2020

Centre: Punjab overexploiting groundwater resources

Overexploitation of groun-dwater in the region is the highest in the country, with Punjab topping the list of states extracting a lot more water than it should. While the national average of extracting groundwater is 63 per cent of the annual extractable resources, it is as high as 166 per cent in Punjab.

The annual extractable groundwater resource of Punjab is 21.58 billion cubic metres (BCM) where as the current annual extraction is 35.78 BCM, according to data released by the Ministry of Jal Shakti on February 10. Irrigation accounts for over 96 per cent of groundwater use in Punjab, with domestic consumption being about 1 BCM and industrial use 0.20 BCM.

The annual recharge of groundwater in the state is 23.93 BCM out of which about 73 per cent is during the monsoon season. Recharge from rains during this reason accounts for only 5.54 BCM while 11.83 BCM is from other sources.

Punjab is followed by Rajasthan and Haryana, where the extraction is 140 per cent and 137 per cent more than the extractable resources. On the other hand, Sikkim, Arunachal Pradesh and Nagaland draw the least amount of water in percentage terms, with the extraction in these states being less than one per cent of the extractable resources.

Prof SS Johl, an eminent agricultural economist, said, "Over 75 per cent of crop area in Punjab depends upon groundwater for irrigation and use of canal water remains low. Recharge of groundwater is also inadequate as rivers and seasonal rivulets have been dammed."

Blaming government policies for the current situation, he added that there was neither any effort by farmers to conserve water or any incentives for them to switch over to other methods of irrigation.

A pre-monsoon survey in 2019 carried out by the Central Ground Water Board revealed that of 245 wells analysed, water level had fallen in 69 per cent when compared with the mean pre-monsoon levels. The drop in the level; was between 0-2 m in most of the wells while in five it was between 2-4 m and above four m in two wells.

According to a CGWB official the wheat and paddy cropping pattern in Punjab has led to manifold increase in demand for water. About 90 per cent of the state's area is underlain by quaternary alluvial deposits that are important sources of abundant and dependable groundwater supplies which are being exploited.

The Tribune
13.02.2020

How solarisation of irrigation can conserve groundwater and provide income to farmers

Pravinbhai Punjabhai Parmar, 30, says his cooperative has sold 2.40 lakh units (kWh) of solar electricity to a Gujarat state utility since May 2016, and earned Rs 14.35 lakh. It has also sold irrigation worth Rs 16 lakh to fellow farmers who do not have tubewells. The nine members of the cooperative together own 38 bighas (8.5 hectares), and not only reduced their cost of irrigation in averted diesel use but also got a neat stream of revenue to supplement their meagre income—about Rs 1.5 lakh annually, each—growing paddy, millet, wheat, and tomato.

Parma, 30, is secretary of the Dhundi Saur Urja Utpadak Sahakari Mandali (or Dhundi Solar Energy Producers Cooperative). It is based in Kheda, whose milk producers' union, named after the district, became a model for cooperative dairying under the Amul brand. Dhundi has inspired similar cooperatives under the state government's Suryashakti Kisan Yojana (SKY), launched in June 2018 to get 12,300 famers linked to 137 farm feeders to switch to solar irrigation. It has also become the template for one of three components of the central government's Kusum scheme.

Dhundi has 50 pumps. Except one, which is electrified, the rest run on diesel as their owners were unable to comply with the procedures for obtaining grid connections. It takes five litres of diesel, or Rs 350, to irrigate a bigha. Wheat needs five irrigations, bajra seven, and tomato more. A pump needs 20 units of solar electricity to water a bigha. The opportunity cost of those 20 units, or the price the members of the cooperative would have fetched if they had sold those units to the utility, would have been Rs 92.6 or Rs 64.80. The difference is because of the buyback rate. The Gujarat utility, which signed the power

purchase agreement, in May 2016, with the first set of six members, offered Rs 4.63 a unit for 25 years. In August 2017, it offered the next set of three members a rate of Rs 3.24 a unit for the same duration. If the farmers had operated electric pumps, the utility would have charged them 60 paise for a unit of power that costs it eight to ten times more, says Tushaar Shah, who headed the team at the International Water Management Institute (IWMI) working on this model, helped set up the cooperative, and arranged the power purchase agreements.

Getting a bunch of farmers to install solar pumps was quite a task for IWMI, which is headquartered in Sri Lanka. It is part of an international consortium of agricultural research institutions called CGIAR, two of which ushered in the Green Revolution in wheat and rice. IWMI's mandate is to develop solutions for sustainable use of water in agriculture. Early in the last decade, IWMI and its senior fellow, Shah, had advocated the separation of the grid supplying three-phase electricity to irrigation pumps from the one lighting up homes. The farm grid would provide limited hours of subsidised three-phase electricity during the day and at night alternately every week. The home grid would have uninterrupted power for lighting. Gujarat adopted the model, and called it Jyotirgram. Limiting the duration of supply would not only reduce the power subsidy bill but also help conserve groundwater.

Parmar and his neighbours had seen solar lamps, but were unsure of solar pumps working reliably and consistency. But, IWMI sweetened the deal with generous contributions from the Tata group and a CGIAR research programme on climate change. The farmers invested Rs 8.40 lakh in nine pumps of 52.5 hp, and solar panels that can produce 71.4 units of electricity at peak capacity on clear, sunny days. They got a system worth Rs 68.24 lakh, including a microgrid of 4.2 km and a 100 kVa transformer. In addition, for two years, IWMI paid them an extra Rs 2.50 a unit as green energy and groundwater conservation bonus.

Water buyers, who don't own tubewells, also gained. The solar pump owners charged Rs 250 an hour, a steep discount of 50%. (They charge Rs 300 now). About 10 diesel pumps in the vicinity of the solar pumps became uncompetitive and quit the market. The cooperative's members still made more money at Rs 12.5 a unit than they would have if they had sold that power to the utility. Groundwater depletion is not issue in the village because the aquifers are recharged by the Mahi river canal.

Shah says the power purchase arrangement is vital to conserving groundwater. Otherwise, farmers will keep their pumps running as there is no operating cost. They will overwater their crops, or grow crops that need more water.

Under Gujarat's SKY programme, farmers pay just 5% of the capital cost. The remaining 60% is subsidised equally by the central and state governments. Another 35% is a loan contracted from Nabard, the agricultural refinance bank, by the state government on behalf of the farmers at low interest rates. A 25-year power purchase agreement is signed if more than 70% of farmers connected to a feeder form a cooperative and switch to solar. For the first seven years, they are paid Rs 7 per unit, of which the state government retains Rs 3.5 for seven years to repay the loan. Thereafter, farmers are paid Rs 3.5 per unit of electricity supplied.

Farmers have an incentive to opt for SKY because they are assured of 12 hours of uninterrupted power. (The rest get eight hours of it). The grid evacuates all the power, while the farmers draw from it. This helps in running the pumps in the morning and the evenings, when solar voltage is low. The farmers are paid (or billed) for net usage.

So far, 3,100 tubewells connected to 76 feeders in Gujarat have been solarised. (Gujarat has 9,500 farm feeders, and 1.6 million tubewells). They have generated 62.6 million units of power, and consumed 23.4 million units.

There are 10 million diesel pumps in the country. There is a long waitlist to electrify them. There are 20 million electric pumps as well, accounting for 17% of the country's annual electricity consumption. Solarisation will reduce the subsidy bill, and also provide income to farmers. The finance minister has set a target of solarising 2 million diesel pumps, and 1.5 million electric pumps.

Sanjio Phadnis, senior manager at Jain Irrigation, which claims an installed base of 30,000 pumps, says a solar pump costs Rs 1-1.25 lakh per horsepower. A 5 hp pump would cost between Rs 5 and Rs 6.25 lakh (those of lesser efficiency cost about Rs 90,000 per hp). Diesel pumps are cheaper, but solar pumps can match the cost in five years if running and maintenance costs are considered.

The generous terms of the Centre's scheme could give impetus to solarisation. Despite 60% subsidy from the Rajasthan government, smallholder farmers are not enthused about solar pumps, says Padam Jain, who was engaged in organising about 15,000 of them in Bundi district through Srijan, an NGO. The 5 hp solar pump he installed in 2017 has given near trouble-free service, he says. He could not install an electric pump because of the long wait time. But, grid power is erratic and keeps farmers awake at night every alternate week. Rajasthan enjoys about 325 clear sunny days a year. A power buyback arrangement should encourage farmers to opt for solarisation.

Costs are dropping because of acute competition for government orders. Dinesh Patidar of Pithampur (MP)-based Shakti Pumps (which has an installed base of 1.5 lakh pumps) says, for the Maharashtra tender, rates as low as Rs 2.3 lakh for 5 hp pumps were quoted. Suppliers counted on economies of scale and a steep reduction in the cost of installation and servicing.

Shah says it costs the Gujarat government about Rs 55,000 per electrified tubewell in annual subsidy. The subsidy would be higher in Punjab, where power is supplied free to farmers, and groundwater usage is more. He says the buyback rates should be in the range of Rs 5-6 a unit, including a bonus for saving groundwater. That will give farmers an incentive to install micro irrigation systems as well. But, the poor financial health of many distribution companies, and the weak demand for electricity owing to a slowing economy are worries.

The Financial Express
19.02.2020

Punjab will not share river water even if we have to sacrifice our lives

In an apparent reference to the Sutlej-Yamuna Link (SYL) canal dispute with Haryana, Punjab Chief Minister Amarinder Singh on Wednesday said his state will not share river water, "even if we have to sacrifice our lives". Winding up the discussion on the governor's address in the ongoing budget session here, he said the state does not have surplus water and, in line with internationally accepted riparian principles, will not allow transfer of water from the basin to non-basin areas. "We have said that we do not have water," Singh said in the House. He said those who want water from Punjab are not ready to share the water available with them.

Expressing concern over the depleting groundwater table, the chief minister pointed out that the level of rivers in the state had reduced from 17 million acre feet (MAF) to less than 13 MAF. "Even if we have to sacrifice our lives, we will not give water to other states," Singh asserted. He said his government has made every possible effort to achieve this and shall continue to work for protecting the water rights of Punjab to ensure the livelihood of Punjab farmers and landless farm labourers. Punjab has been demanding reassessment of the water volume of the Ravi-Beas river, while Haryana seeking completion of the SYL canal to get its share of the river water.

The Supreme Court in September last year had given four months to the Centre, Punjab and Haryana to find an amicable solution to the SYL canal issue. Referring to the various measures taken by his government for saving precious water resources, the chief minister said apart from enactment of the Punjab Water Resources (Management and Regulation) Act 2020, the government had also piloted a unique project called 'Pani Bachao, Paisa Kamao', aimed at incentivising farmers to save water and earn money by consuming lesser ground water. Underlining his government's commitment to transparency in governance and accountability in public services, the chief minister informed the House that his government had decided to enact a new Lokpal legislation, likely to be tabled in the House soon. Coming down heavily on the opposition for "spreading lies", Singh said free electricity would not be withdrawn from the farmers at any cost till his government was in power.

Millennium Post
26.02.2020

Water insecurity rising in Hindu Kush Himalayan region: Study

Interlinkages of water availability, water supply systems, rapid urbanisation, and consequent increase in water demand (both daily and seasonal) are leading to increasing water insecurity in towns in the HKH region.

Rapidly changing climate and inadequate urban planning is causing water insecurity in the Hindu Kush Himalayan (HKH) region, a new study said on Sunday.

The study covering 13 towns across four countries – Bangladesh, India, Nepal, and Pakistan shows that the interlinkages of water availability, water supply systems, rapid urbanisation, and consequent increase in water demand (both daily and seasonal) are leading to increasing water insecurity in towns in the HKH region.

“This water insecurity is attributed to poor water governance, lack of urban planning, poor tourism management during peak season, and climate-related risks and challenges,” said the study conducted by the International Centre for Integrated Mountain Development (ICIMOD), an intergovernmental knowledge and learning centre, based in Kathmandu, working on behalf of the people of the HKH region.

The study said that communities are coping through short-term strategies such as groundwater extraction, which is proving to be unsustainable. “There is a lack of long-term strategies for water sustainability in urban centres, and this requires the special attention of planners and local governments,” it said.

“Urbanisation has pulled people from rural areas in the HKH region into nearby urban centres. Although only three per cent of the total HKH population lives in larger cities and 8 per cent in smaller towns, projections show that more than 50 per cent of the population will be living in cities by 2050,” it said. This will naturally place tremendous stress on water availability, it added.

The study shows that the water demand–supply gap in eight of the surveyed towns is 20-70 per cent.
“There is a high dependence on springs (ranging between 50 and 100 per cent) for water supply in three-fourths of the urban areas. Under current trends, the demand–supply gap may double by 2050,” the study said.

Hindustan Times
01.03.2020

Centre working on exclusive body for river-linking projects

The Central government is working on the establishment of an exclusive body to implement projects for linking rivers.

To be called the National Interlinking of Rivers Authority (NIRA), the proposed body is expected to take up both inter-State and intra-State projects. It will also make arrangements for generating up funds, internally and externally.

An official of the National Water Development Agency (NWDA), which is responsible for the formulation of proposals of the linking of rivers, said an updated draft Cabinet note has been circulated to other Ministries in the Central government. On receipt of comments, the note will be finalised by the Ministry of Jal Shakti and sent to the Union Cabinet for approval.

'No specific timeline'

The proposal for an apex body on river linking has been under discussion for the past 18 months. However, the official said that as of now, no specific timeline has been determined for the constitution of the Authority. Also, the earlier idea of framing a Bill, envisaging the creation of the NIRA, is not being pursued now.

The subject of establishment of the Authority was discussed at the last meeting of the Special Committee on Inter-Linking of Rivers (ILR) last week in New Delhi. Headed by Union Minister of Jal Shakti Gajendra Singh Shekhawat, the panel includes Irrigation or Water Resources Ministers and Secretaries of States. Since its formation, the Committee has held 17 meetings.

It is being assisted by a Task Force for ILR, which is a committee of experts essentially drawn from the Jal Shakti Ministry, Central Water Commission and the NWDA.

A Tamil Nadu government official said the Centre has not yet shared with States details regarding the new body though it has conveyed to them that it is planning to have an implementation agency for ILR projects.

Once approved, the projects will be pursued as national projects, wherein the Centre will absorb 90% of the cost and the States concerned the rest.

As of now, six ILR projects — the Ken-Betwa, Damanganga- Pinjal, Par-Tapi-Narmada, Manas-Sankosh-Teesta-Ganga, Mahanadi-Godavari and Godavari-Cauvery (Grand Anicut) — have been under examination of the authorities. With regard to the peninsular rivers, the Centre has chosen to focus on the Godavari-Cauvery link than the earlier proposal to link the Mahanadi-Godavari-Krishna-Pennar-Cauvery rivers. The latter has eluded consensus given reservations from Odisha, officials said.

In view of Tamil Nadu's not-so-happy experience with its neighbours in getting its due share of water, it has been particular that either the Centre or any of its agencies execute the Godavari-Cauvery link project and look after operation.

The Hindu
04.03.2020

Haryana, Punjab refuse to budge on SYL: Govt to RS

The government informed the Rajya Sabha today that in a follow-up to the Supreme Court's directive, it tried to mediate between the governments of Haryana and Punjab to thrash out a mutually acceptable solution to the ticklish Sutlej-Yamuna Link (SYL) canal issue, but failed.

Responding to a supplementary by Congress member Kumari Selja, Union Jal Shakti Minister Gajendra Singh Shekhawat said the two states refused to arrive on a "middle ground".

"We have apprised the Supreme Court, which had asked the Centre to explore for a middle ground between the two states," Shekhawat said.

The minister's statement was in response to a pointed question by Selja as to what steps the government was taking with regard to the SYL canal, which was meant to provide water to presently parched areas of south Haryana, where ground water had depleted.

He said that the National Green Tribunal had ordered that drinking water supply should be provided to a village in Rewari district in the matter of Raghunath Singh versus Union of India and others. As reported by the Public Health Engineering Department, Haryana, drinking water supply had been provided to Chirhara village in Rewari district through a tube well installed near the Jalalpur distributor, the minister stated.

He said the Central Ground Water Board and State Ground Water Department had jointly carried out estimation of the Dynamic Ground Water Resources of India. As per the assessment, total annual ground water recharge of Rewari district had been assessed to be 42,7000 hectare metre (ham) and annual extractable ground water resources 38,430 ham.

The total current annual ground water extraction was 35,079 ham -- 29,559 ham for irrigation, 5,156 ham for domestic use and 364 ham for industrial use.

The Tribune
17.03.2020

Lockdown does what decades of schemes couldn't: Clean Ganga

Data from the Central Pollution Control Board (CPCB) shows that the water quality of the river has improved considerably during the lockdown, notably in industrial towns through which it passes. The nationwide 21-day lockdown to combat the spread of the coronavirus disease (Covid-19) is doing what ambitious schemes could not do over the decades—cleaning the Ganga.

Since 1986, when the Ganga Action Plan was conceived, the Central government has pumped in about Rs 5000 crore to clean a river considered holy by hundreds of millions of Indians, but with little impact.

Now, real time data from the Central Pollution Control Board (CPCB) shows that the water quality of the river has improved considerably during the lockdown, notably in industrial towns through which it passes. The deserted ghats also tell a whole new story as the river flows silently -- and bare, with no signs of bodies, human waste, old clothes or general garbage.

Pandit Narendra Tripathi, who attended to thronging pilgrims in Varanasi before the lockdown said: "On an average, 3000 to 4000 devotees take a dip in the river. Now they are home." Besides, funeral pyres at

the Manikarnika Ghat in Varanasi are not burning 24X7; many believe cremation here assures salvation to the dead.

Gulshan Kapoor, managing trustee, Baba Mahashamshan Nath Mandir, Manikarnika Ghat said: “Earlier, on average 80 to 100 bodies reached the ghat daily for their last rites. Ever since the lock-down has been enforced, the number has gone down to 15 -20.”

Experts say that if not for the presence of natural bacteria in the river, the water at this point of time is good enough to be consumed. such that it could be consumed. And after a long time, the river water has finally become fit for bathing, they add.

Kalika Singh, the regional officer at Uttar Pradesh Pollution Control Board at Varanasi, says the water has improved in terms of both colour and quality.

“The dissolved oxygen level upstream is 8.7mg per litre and it is 8.1 mg per litre downstream, which is good enough for bathing,” he says. It is widely accepted that healthy water has a dissolved oxygen level of at least 7 mg/litre, although CPCB’s bar is marginally lower.

CPCB has three real time monitoring stations in Kanpur. One is upstream of the Ganga Barrage, the second, downstream of the barrage, and the third is at Shuklagunj. The CPCB monitors a range of parameters : dissolved oxygen (it should be more than 6 mg per litre), biochemical oxygen demand (BOD, less than 3 mg/ litre), ph (range between 6.5 and 8.5), ammonia (less than 1.2 mg/litre). The monitoring station located upstream reported on March 28 that the dissolved oxygen level was 8 mg/litre, BOD was 2.1 mg/litre, ph was 7.90 and ammonia, 0.49 mg/litre. At station number two downstream, dissolved oxygen level was 7.90 mg/litre, BOD, 1.21 mg/litre, ph, 7.91 and ammonia, 1.1 mg/litre. The third station reported a dissolved oxygen level of 8.51 mg/litre, BOD, 2.1 mg/litre, ph, 7.68 and ammonia, 0.79 mg/litre. The chemical oxygen demand was less than nine at all the three monitoring points. It should be less than 10 mg per litre.

CPCB officials say the water quality has seen a significant improvement, particularly in industrial towns along the river, including Kanpur. The city has a cluster of industries along the river. The leather industry, with nearly 400 units, is one. The river had been reduced to a dumping ground for industrial and domestic waste. According to a CPCB survey in 2013, Kanpur was home to 475 of the 764 grossly polluting industries around the river.

While 400 tanning units were assessed to be contributing 50 MLD (million litres per day) of hazardous waste in the river, seven drains, including the biggest Sisamau nullah, were carrying 140 MLD of domestic waste straight into the river.

The biggest success under Namami Gange project came when the Sisamau drain was tapped and its waste flow diverted.

Prime Minister Narendra Modi lauded the achievement when he held the first ever meeting of the National Ganga Council in Kanpur in December 2019.

PK Mishra , a professor at the department of chemical engineering at the Indian Institute of Techonology-Banaras Hindu University, says: “30% of the total BOD load is due to industries along the river Ganga, which amounts to 130 to 150 tons per day. The total effluent dumped into the Ganga is around 6500 to 6700 MLD (in) its UP stretch and onwards. Around 10% is toxic load from industries, which is equal to approximately 700 MLD. Since all the major grossly polluting industries are closed due to the lockdown,

this toxic load is not entering the river now. As a result, one-third of the pollution load has been minimised. The only load now is due to sewage from major cities."

Experts say the improvement in the Ganga's water during the lockdown is a sign that the river can recover. Rama Rauta, former member of National Ganga River Basin Authority, says the data is encouraging. "This proves that dams and industries are the biggest enemy of the purity of the river water. If free flow of water in Ganga is restored and industrial pollution is checked, 75% of the river water will turn into "quality water" for human consumption," she says.

Santosh Nigam, 27, who lives a few metres from the river bed in Kanpur's Parmat, one of busiest and revered ghats, is elated. "I have never seen the river looking so clean," he says. "It is beautiful."

Hindustan Times
04.04.2020

Dissolved oxygen content up from 8% to 56.5% in UP stretch of river Yamuna

The water quality in the stretch of river Yamuna that passes through Uttar Pradesh has improved considerably, thanks to the lockdown that has closed industries and kept people away from the river.

A report on water quality of river Yamuna, prepared by the Uttar Pradesh Pollution Control Board (UPPCB), said the dissolved oxygen (DO) level in the river has gone up in the range 8% to 56.5% during the lockdown period at six locations -- upstream, Vrindavan (39.6%), downstream, Vrindavan (38.46%), upstream, Mathura (48.3%), downstream, Mathura (56.5%), upstream, Kailashghat in Agra (12.5%) and downstream at Taj Mahal, Agra (8.0%) -- when compared to the pre-lockdown period.

According to UPPCB officials, the study took into account the pre-lockdown period (as on March 7, 2020) and lockdown period (as on April 8, 2020).

"To assess river health, we need to study f three parameters – DO, BOD and total coliform. It is required that BOD should be low and DO higher. If DO is low, then the aquatic life will not be able to survive. Likewise, contaminants in form of total coliform should also be low in order for improved water quality," Utsav Sharma, regional manager, UPPCB, said.

A periodic report released in January 2020 by the UPPCB states that the DO level ranged between 1.5 milligrams/litre (mg/l) and 4.8mg/l at the 14 sampling points, starting at Okhla Barrage and ending at Firozabad in Uttar Pradesh.

In contrast, officials during the latest study found that on April 8 (during the lockdown period), the values of DO were considerably higher than on normal days and ranged between 5.4mg/l and 7.4mg/l at the six locations. On March 3 (pre-lockdown), the DO values ranged between 4.6mg/l and 5.6mg/l at these locations.

The biochemical oxygen demand (BOD) -- the amount of dissolved oxygen needed for organisms to break down organic material present in water -- also came down and was in the range of 17.6% to 23.1% during the lockdown period.

Another parameter of river water quality is the total coliform content. If the total coliform bacteria are found in a water sample, it indicates surface contamination has reached the water. The UPPCB study indicated that the total coliform content declined in the range 12.9% to 38.6% during the lockdown period, when compared to the pre-lockdown period.

"The decrease in total coliform in April 2020, as compared to that in March 2020 at all (six) locations indicates that the improvement in the water quality is principally due to dilution as a result of increase in water flow," the report said.

According to UPPCB, the average discharge of water in river Yamuna from the Gokul Barrage during the pre-lockdown period (March 5 to March 7, 2020) was about 3,120.70 cusecs. But it was 7,938.3 cusecs during the lockdown period (April 6 to April 8, 2020), an increase of about 154.4%.

Experts said the data gathered during the lockdown period will provide a useful baseline for further studies.

"The lockdown was unprecedented. The data will give us a useful insight on the effect of pollution on the river's health. Until now, our focus was more on treatment of sewage/drains etc. But during the lockdown, the drains/sewage are still discharging into the river, but industrial discharge is minimal. Now we will know how much industrial/commercial activities impact the river. Since the industrial activity is significantly reduced, in the future, we need to focus on the removal of all such sources of pollution," Manoj Misra, convener, Yamuna Jiye Abhiyan, said.

"Near Okhla, there is reduced DO level but it increases near cities such as Vrindavan and Mathura. That is because for this 150km stretch of the river, there are no major cities along it. So the river gets a period of relief. The lockdown period study will also help us know the level of flow needed to maintain the health of Yamuna," Misra said.

However, UPPCB officials said during the lockdown, the water quality of the river at all the locations was found under category 'D' which is useful for 'propagation of wild life and fisheries', still a far cry from category A, or fit for drinking after treatment.

"A study of tributaries of river Yamuna is also being done for the pre-lockdown and lockdown period," an official of UPPCB, on condition of anonymity said.

Hindustan Times
21.04.2020

We have 56% more water in reservoirs than we had last year: Gajendra Singh Shekhawat

Jal Shakti Minister **Gajendra Singh Shekhawat** *speaks to* **Nistula Hebbar** *on how India is placed in terms of water availability as* COVID-19 *underlines the necessity of piped drinking water supply and the situation in his home State Rajasthan which remains worrisome....*

Under a lockdown with summer approaching and with the injunction of constant hand washing as a preventative for the spread of COVID-19, how is India placed in terms of just water availability.

The plentiful rains last year and heavy snowfall in the Himalayan States have ensured that in terms of just volumes, we are pretty well off this year. I did a review of 132 reservoirs under the Central government, which are out of the 5,000 total reservoirs but which provide two thirds of the total supply of water across the country. I'm happy to say we have 56% more water than we had last year in the reservoirs, which is 47% higher than the average for the last 10 years. So in terms of reservoirs etc. we have no worries. This year too we have been told that monsoon will be plentiful.

Water is a State subject, what has been the feedback from the States?

Every summer there is always an issue with regard to availability etc. This year, because the COVID-19 crisis lockdown has entailed that people stay at home, it is even more important to ensure supply. The first thing I did is to hold review meetings with water Ministers of all States and asked them to ensure that there is enough drinking water during the lockdown and the weeks ahead. We have gone over the reservoir situation and of water works. There is enough water to get us through this period, both for drinking and irrigation.

The Jal Jeevan Mission was launched last year and there is a time-table to its implementation, how has COVID-19 affected that process?

The Jal Jeevan Mission was launched by hon'ble Prime Minister in September last year and yes, it is a time-bound programme, with its urgency underlined by the fact that COVID-19 is accompanied by lockdowns and the emphasis on hand-washing as a preventative. We have been creative in terms of trying to reach some of our goals despite the lockdown disruption. For example, we have asked all our engineers to complete the drafting and on paper preparatory work for the project. We have divided the mission works into those where only retrofitting is required, those where existing water bodies need to be harnessed and green field works. This has been done so that whatever can be done is finished in time. The importance of the Mission cannot be emphasised enough under the present circumstances and we are determined that our promise of piped drinking water to every home be fulfilled in the time-frame suggested earlier.

Your home State Rajasthan and particularly your constituency Jodhpur have been badly afflicted by COVID-19. What kind of information are you getting, since you haven't been able to visit?

Jodhpur has been badly affected and most of the cases there are because of the Tableeghi Jamaat preachers and the mishandling of the situation. My constituency also includes Chief Minister Ashok Gehlot's Assembly seat and the curfew or lockdown imposed there was handled very badly and very leniently. We have one example of Bhilwara where things were handled well, but we cant ignore what is happening in Jodhpur and Jaipur, where the administration is not able to get a handle on things.

The Hindu
28.04.2020

Water control meters must for buildings in Karnataka

The Bangalore Water Supply and Sewerage Board (BWSSB) has made the installation of automatic water level control systems on buildings mandatory to ensure judicious use of water. In a new set of regulations notified this week, owners of buildings with three or more houses will also have to install internal meters to assess water usage.

The Bangalore Water Supply (Amendment) Regulations, 2020 notified on May 7 will be applicable to apartments as well. "Every owner or occupier of a building shall install automatic water level control system or any other suitable devices to prevent the overflow of water, automatically from the overhead tanks," the water utility said in the regulations. Owners of houses will be penalised if they don't follow the rules, attracting a penalty of Rs 1,000 and Rs 100 per day till the system is installed. Action will be taken to cut off water connection until the parameters are satisfied. Internal meters must be installed by every owner or occupier of a building with more than 2,400 sq ft area having three or more houses. Any new building with an area exceeding 1,200 sq ft and having three or more houses in the plan will need to have an internal meter "for judicious consumption of water".

Deccan Herald
09.05.2020

Administrative approval for Navali dam DPR

Following a Cabinet decision, the Water Resources Department has granted administrative approval to prepare a Detailed Project Report (DPR) for Navali Balancing Reservoir.

Water Resource Minister Ramesh Jarkiholi said that silt accumulation has reduced the storage capacity of Tungabhadra dam by 31 TMC, and the balancing reservoir would help in optimising the use of water. Jarkiholi said that the government has worked out a new strategy to address the storage problems of Tungabhadra reservoir caused by silt accumulation. While the total storage of the dam was 130 TMC of water, silt accumulation has reduced its capacity by 31 TMC of water. Balancing reservoir at Navali will ensure optimum utilisation of water. Directions have been issued to release Rs 14.30 crore towards preparation of the DPR. Desiltation of the TB dam has been pending for many years and the government has taken up this cause to help farmers, he added.

Deccan Herald
17.05.2020

Mission Bhagiratha ends drinking water woes of Telangana

Giving utmost attention to provide better infrastructure to the people, the State government is paying particular attention to providing drinking water, roads, electricity, housing and other facilities to improve standard of living of the common man. While about 23,968 habitats are now connected to the bulk water supply network under Mission Bhagiratha, about 2.83 lakh double bedroom houses aimed to provide shelter to the poor are in various stages of construction.

Access to drinking water has been a much-sought after need in several villages of Telangana region during decades of rule in undivided Andhra Pradesh. While several habitations especially tribal and remote areas had no access to drinking water, many other areas received contaminated water hospitalising those who consumed it. The woes of flouride-affected areas in erstwhile Nalgonda district, are a well-known fact for the entire world.

In a bid to put an end to these woes and ensure clean drinking water connection to every household, the ambitious Mission Bhagiratha was launched in the State. With an estimated cost of Rs 43,791 crore, Mission Bhagiratha project has been divided into 26 main segments, with 67 intake wells, 153 water purifying plants and more than 1.4 lakh km of pipelines. Through 35,514 over-head reservoirs, tapped water connections are being provided to every household across the State.

Bulk water connections have been already given to 23,947 of 23,968 habitations in the State by December last year. About 53.51 lakh households of total 55.62 lakh households in the 23,947 habitations are fitted with taps where 38 lakh households in 17,311 habitations are receiving tapped drinking water. Witnessing the success of Mission Bhagiratha, about 11 States are planning to replicate the scheme.

As per a study conducted Indian Natural Resource, Economic and Management (INREM) Foundation, no flouride case was reported in the erstwhile Nalgonda district in the last six years following implementation of Mission Bhagiratha scheme. Out of 80 tmc of processed drinking water, about 8 tmc is being supplied for industrial needs under the scheme.

Telangana Today
02.06.2020

Cyclone Nisarga kills 4 in Maharashtra

75,940 people living near the seashore and landslide prone areas were shifted to safer places. Mumbai and its surrounding areas heaved a huge sigh of relief as the cyclonic storm 'Nisarga' passed through without causing much damage on Wednesday.

Though coastal parts of the state were lashed by heavy rains and gusty winds, Maharashtra remained largely unscathed with no major untoward incident reported. However, over four people died in four cyclone-related incidents in Pune, Raigad and Palghar district.

Two men died after an electric pole and a tree fell on them in Alibaug district while two others died in Pune after a wall of their house collapsed.

Cyclone Nisarga made landfall at the coastal town of Alibaug in Raigad district, about 100 kms from south of Mumbai, at around 1 pm with wind speeds of up to 120 kmph. It later moved up and hit the coastal districts of Mumbai, Thane, Raigad and Palghar with winds of up to 100 kmph to 110 kmph. Heavy rainfall was also reported in North Maharashtra and Pune.

As many as 75,940 people living near the seashore and landslide prone areas in Mumbai were shifted to safer places by the Brihanmumbai Municipal Corporation (BMC). Milind Borikar, the collector of Mumbai Suburban, said that with the help of the civic body, they have evacuated 12,000 people from coastline areas of Mumbai suburbs, land sliding areas and hilly areas to BMC schools. The civic body is also providing food and water to them.

The flight operations at Chhatrapati Shivaji Maharaj International Airport in Mumbai were kept shut till 7pm in view of the landfall of cyclone and they restarted at 6pm. The decision to temporarily shut the airport was taken after a FedEx flight from Bengaluru made a runway excursion while landing. "In consultation with AAI, considering the strong crosswinds, it has been decided that no arrivals and departures will take place between 14.30-19.00 hours," an official statement from the Mumbai International Airport Ltd (MIAL) said.

Trees were uprooted across Mumbai with around 117 tree falling incidents reported due to heavy rains and gusty winds. Vehicular movement on the Bandra-Worli Sea Link was also suspended. As part of the safety measure, the wild animals at the Byculla zoo were shifted to holding areas.

Three members of a family were injured when cement blocks fell on their shanty from an under-construction building in Santacruz in Mumbai due to gusty winds. Three shanties were damaged in the incident that took place around 11.30 am in Dawari Nagar in Santacruz. The injured have been identified as Viraj Paste (15), Santosh Paste (43) and Sanjay Paste (45).

In Raigad too, many trees and electricity poles were uprooted. An official from Disaster Management Unit said that more than ten people were injured in Raigad district and near Ratnagiri and Raigad border area. District collector Nidhi Choudhary said, "Due to the impact of the gusting winds, many trees and electric poles fell down in Shrivardhan as well as in Alibaug. 13,541 people have been shifted to safer places."

A senior officer of Mantralaya, who is closely monitoring the situation, told The Asian Age, "Roofs of PDS godown were blown in Raigad district. Supply of Electricity was disrupted owing to electricity supply wires getting snapped. As many as 7,003 fisherman boats were moved to a safe place. Sixteen NDRF teams and six SDRF teams are working round the clock in the state".

Revenue Minister Balasaheb Thorat said that the cyclone is moving towards Karjat. The most affected areas are Murud and Shrivardhan in Raigad district. Panchnama is being conducted and the administration is working with its complete strength to restore normalcy.

Deccan chronicle
04.06.2020

7 lakes, dams in Mumbai have water for just 42 days

The seven lakes and dams that are the source of drinking water in Mumbai have a stock that would last for just 42 days, Hindustan Times reported. As the city has not seen significant rainfall in the lakes' catchment areas yet, there has been no surge in water levels even with the first month of monsoon nearing its end. But the civic agency's officials have assured that as a bountiful monsoon is expected, the water would be replenished soon. The current water stock is just 10.68% of the total stock. On Sunday, the water stock that is useful in all seven lakes was at 1.54 lakh litres. The total storage capacity is 14.47 lakh litres.

During the same time in 2019, the seven lakes – Upper Vaitarna, Middle Vaitarna, Modak Sagar, Tansa, Bhatsa, Vihar, and Tulsi – together had 82,829 litres of water. But this year's level is less than 13.09% which was seen in 2018 in the same duration, the report said. Notably, Brihanmumbai Municipal Corporation had in 2018, had ordered a 10% water cut across the city.

Authorities have, however, said that so far, no such move has been planned. "This year, the India Meteorological Department (IMD) has predicted normal rainfall in Mumbai. So far the rainfall in Upper Vaitarna and Middle Vaitarna and some other dams are better than last year," P Velrasu, additional municipal commissioner (Hydraulic department) told HT. He added that there is no reason to worry yet. According to the BMC's report accessed by the publication, at Modak Sagar, 25% of water stock is available, Tansa possessed 11.37%, Middle Vaitarna 14.23%, Bhatsa 9.72%, Vihar 22.27% and Tulsi has 30.64% of useful water level. However, upper Vaitarna had run out of the useful water stock. These lakes are situated in Thane and Palghar districts and their catchment areas are located in Nashik, Thane and Palghar districts.

Deccan chronicle
23.06.2020

Parts of northeast India receive extremely heavy rains, says IMD

Heavy rains are expected in Bihar, eastern Uttar Pradesh, sub-Himalayan West Bengal and Sikkim during the next five days. Widespread rainfall is also expected over Madhya Pradesh for the next five days and over Chhattisgarh and the Vidarbha region on Monday and Tuesday. Many parts of northeast India such as Assam, Sikkim, Meghalaya, Bihar and sub-Himalayan West Bengal have reported incessant rains – measuring above 20 centimetres (cm) in a day – since last Friday, triggering floods.

“Assam is reporting floods. Bihar is also in a flood-like situation. Cherrapunji, which is known to receive a lot of rainfall around this time of the year, has recorded up to 55 cm in a day. This pattern of continuous heavy rains will gradually reduce from Tuesday. While from Thursday, torrential rains will increase in central India and over the north-west parts of the country from next Sunday, ” said Dr. Mrutunjay Mohapatra, director-general, India Meteorological Department (IMD).

The eastern-end of the monsoon trough continues to run along the Himalayan foothills with the convergence of strong southerly and south-westerly winds from the Bay of Bengal over the north-east and eastern India.

This is likely to cause widespread and very heavy rain in many parts of north-east India in the next four-five days. There may be extremely heavy rain, measuring over 20 cm in a day, in the next 24 hours, according to IMD.

Heavy rains are expected in Bihar, eastern Uttar Pradesh, sub-Himalayan West Bengal and Sikkim during the next five days. Widespread rainfall is also expected over Madhya Pradesh for the next five days and over Chhattisgarh and the Vidarbha region on Monday and Tuesday.

There will be widespread rains in the west coast also this week, IMD said in its bulletin.

However, rains will be subdued over north-west India and the western Himalayas.

The Central Water Commission (CWC) has warned of an above-normal flood-like situation in Dharamtul, Brahmaputra, Dhubri, Goalpara and other parts of flood-prone Assam.

A severe flood-like situation is also likely in Assam's Kopili and Kamrup.

The restoration operations at Baghjan gas well in Upper Assam's Tinsukia district, which reported a blowout – an uncontrolled release of gas and oil – on May 27 and later caught fire on June 9,were hampered last week for at least three days because of inundation of low-lying areas, while the well continues to leak gas and oil condensate, according to an Oil India Limited (OIL) spokesperson.

From June 1 to 28, Sikkim and sub-Himalayan West Bengal have received 56% rainfall, Bihar received 92% of excess rains, and Assam and Meghalaya received an excess of 34% of rains.

Monsoon this time covered the entire country on June 26 – a good 12 days in advance.

Usually, monsoon covers the country by July 8. But from last Friday an intense monsoon phase in the north-east and eastern India started.

Monsoon rains in the country are 20% excess of the long-period average (LPA) as of Sunday -- 36% excess over central India; 8% excess over north-west India; 4% excess over southern peninsula and 20% excess over eastern and north-east India.

LPA is the average of rainfall received in the area over a 50-year period between 1961 and 2010, which is 88.06 cm.

IMD has predicted a normal monsoon this year at 102% of LPA.

A good monsoon, which accounts for 70% of India's annual rainfall, is critical to the fortunes of the agricultural sector on which at least 700 million people are dependent for a livelihood. The monsoon is crucial for the yield of rice, wheat, sugarcane, and oilseeds in a country, where farming accounts for about 15% of the economy but employs over half of its population.

Hindustan Times
29.06.2020

June records 'excess' rainfall, good precipitation like in July (Millennium Post, 02.07.2020)

The month of June ended with "excess" rainfall, the India Meteorological Department (IMD) said on Tuesday, forecasting a good precipitation in July. According to the IMD data, the overall rainfall in June was 118 per cent of the Long Period Average (LPA), which is considered excess rainfall. It was also the wettest June in the last 12 years, the IMD said. The LPA rainfall of the season over the country as a whole for the period 1961-2010 is 88 centimetres. Rainfall in the range of 90-96 per cent is considered "below normal", and that in the range of 96-104 per cent is considered normal.

Precipitation in the range of 104 -110 per cent of the LPA is considered "above normal", while beyond 110 per cent is considered excess" rainfall. The June rainfall in the Central India subdivision of the IMD, which covers the regions of Goa, Konkan, Maharashtra, Madhya Pradesh and Chhattisgarh, was 131 per cent of the LPA. In the East and northeast subdivision, the rainfall was 116 per cent of the LPA. Assam has witnessed floods, while Bihar has also received excess rainfall. However, the rainfall over this region will reduce over the next 5-10 days, IMD director general Mrutunjay Mohapatra said. The Northwest India subdivision comprises the north Indian states. The rainfall here was 104 per cent of the LPA, while in the South Peninsula, it was 108 per cent of the LPA. The IMD has predicted 103 per cent rainfall of the LPA for July. July is expected to have good rainfall, Mohapatra said. He added that there are two cyclonic circulations, one near the Gujarat coast and other over east-central India, which will bring good rains over central and southern India over the next 5-10 days, Mohapatra added.

Millennium Post
02.07.2020

Assam floods: 6 dead, over 8 lakh affected as situation worsens

On Friday, four more districts in Assam were flooded taking the number of affected districts to 21 out of the 33 districts in the state. Three more people were killed taking the total to 6 deaths.

According to a report by Assam State Disaster Management Authority (ASDMA), over 8.69 lakh people in 1,556 villages of 68 revenue circles have been affected by the second wave of flooding in the state this year. The Brahmaputra river - one of the largest rivers in the world that cuts through Assam's biggest city Guwahati - and five other rivers are flowing above the danger mark, officials said. Ferry services across Assam were stopped on Friday after the weather office forecast more rain this weekend.

The affected districts are Dhemaji, Lakhimpur, Biswanath, Sonitpur,Darrand, Baksa, Barpeta, Nalbari, Chirang, Bongaigaon, Kokrajhar, Goalpara, Morigaon, Hojai, Nagaon, Golaghat, Majuli, Jorhat, Dibrugarh, Tinsukia and Sibasagar. Officials said over 27,000 hectares of farmland are under floodwater and over 7,000 people have been evacuated to 68 relief camps across the state.

Millennium Post
02.07.2020

Despite flood, Kharif crops' plantation grows by 18%

Despite floods in 11 States that displaced over 70 lakh population and damaged lakhs of hectare of crops during this monsoon year, the Ministry of Agriculture's data on Friday showed that there is an increase of over 18 percent in kharif crops' plantation on 800 lakh hectares as compared to 675 lakh hectares last year till date. The sowing of pulses have been recorded 24 percent more while it is 18 percent more for rice cultivation so far.

Officials of the agriculture ministry said that the higher acreage coverage also reflected that there is no impact of coronavirus infections and nationwide lockdown for kharif crops plantation.

According to agriculture ministry's data, 220.24 lakh hectare area is covered under rice plantation as compared to 187.70 lakh hectare, which is an increase of 32.54 lakh hectare areas during the corresponding period of last year.

The maximum sowing is reported from Uttar Pradesh (6.50 lakh hectare), Jharkhand (6.10 lakh hectare), Madhya Pradesh (5.98 lakh hectare), Bihar (5.66 lakh hectare), Chhattisgarh (3.57 lakh hectare), West Bengal (2.80 lakh hectare), Telangana (2.50 lakh hectare), Assam (1.63 lakh hectare) and Gujarat (1.33 lakh hectare). This despite Assam, Bihar and West Bengal are reeling under severe floods this monsoon. Punjab, Tamil Nadu, Kerala and Tripura have reported less rice plantation so far.

About 99.71 lakh hectare has been covered under pulses plantation as compared to 79.30 lakh hectare during the corresponding period of last year, an increase of 24 percent or an increase of 20.41 lakh hectare area. The maximum areas have been reported from Maharashtra (5.32 lakh hectare), Karnataka (4.01 lakh hectare), Madhya Pradesh (3.11 lakh hectare), Rajasthan (2.13 lakh hectare), Jharkhand (1.62 lakh hectare) and Telangana (1.09 lakh hectare).

As per the ministry's data, about 137.13 lakh hectare area coverage under coarse cereals as compared to 120.30 lakh hectare while about 166.36 lakh hectare area coverage under oilseeds as compared to 133.56 lakh hectare during the corresponding period of last year.

According to the Ministry of Home Affairs data, heavy rains in Assam, Bihar, West Bengal and some other states have led to a severe flood situation resulting in deaths and displacement of people. In Assam, the CWC data says12 stations reported Severe Flood Situation and nine reported Above Normal Flood Situation. River Brahmaputra is in a Severe Flood Situation all along its course from Dibrugarh to Dhubri except in Guwahati where it is flowing in Above Normal Flood situation with a rising trend. According to CWC data, Bihar is the worst-affected state due to the flood situation. It said of 33 stations reporting Severe Flood Situation in the country, 14 are in Bihar.

The Pioneer
25.07.2020

Krishna River Board allocates water to Telugu States

The Krishna River Management Board (KRMB) on Wednesday allocated 37.67 tmc to Telangana and 17 tmc to Andhra Pradesh from the Krishna river under the Srisalam and Nagarjuna Sagar projects. The water allocations are inclusive of utilisations already made by both the States from June 1 onwards.

As on Sunday, the net available water storage above the Minimum Drawdown Level (MDDL) is 110.44 tmc in both the projects i.e. 29.67 tmc in the Srisalam project and 80.76 tmc in the Nagarjuna Sagar project. The project chief engineers have been entrusted with the responsibility of meeting the requirements of both the States, and actual water delivered to each State is to be reported to the KRMB as a joint statement.

The Telangana government requested to consider savings and carryover storage in the water year 2019-20 and issue orders for the usage of 7.74 tmc to meet requirements of Telangana upto August 2020 as part of allocations made in the previous water year. However, the Andhra Pradesh government did not agree and insisted that water year closes by May 31 and the allocated water cannot be carried forward into the new

water year, which starts on June 1 every year. The KRMB member secretary suggested that the issue may be discussed at a separate meeting of the three-member committee.

Telangana Today
05.08.2020

PM Modi reviews flood situation in 6 states, preparedness to tackle south-west monsoon

Prime Minister Narendra Modi on Monday held a meeting via video conferencing with the chief ministers and ministers of six states – Kerala, Karnataka, Assam, Bihar, Uttar Pradesh and Maharashtra - to review the flood situation there.

The meeting, which was attended by the chief ministers of Kerala, Assam, Bihar, Uttar Pradesh, Maharashtra and the Karnataka home minister, also reviewed the preparedness to deal with the south-west monsoon. The chief ministers complimented the efforts of central agencies including NDRF teams for their timely deployment and rescue efforts, said news agency ANI quoting the Prime Minister's Office. The Prime Minister emphasised on better coordination between all central and state agencies to have a permanent system for forecasting of floods and extensive use of innovative technologies for improving forecast and warning system, according to the PMO.

Continuing heavy rainfall over the last few days have affected lakhs of people, resulting in loss of life and disruption of normal life.

In Kerala, a landslide occurred in Idukki district following heavy rainfall last week in which 49 people have died so far. The National Disaster Response Force is battling rain, slush, mush and rocky terrain in rescue operations at the site. India Meteorological Department (IMD) has issued orange alert in for Alappuzha, Ernakulam, Kottayam, Idukki, Kozhikode, Wayanad, Kannur and Kasargod districts today..

In neighbouring Karnataka, several parts of Malnad, coastal and interior Karnataka and Kodagu district have been affected by torrential rains causing flood-like situation and landslides. The state has so far incurred a loss to the tune of Rs 3,500-4,00 crore as a result of rains and floods, revenue minister R Ashoka said on Monday. During the meeting with the prime minister, Karnataka home minister Basavaraj Bommai sought Rs 4,000 crore financial help from the Centre to tackle the situation. He also sought immediate release of the next instalment of SDRF fund of Rs 395 crore.

In Bihar, around 74 lakh people in 16 districts have been affected by the flood situation while the deaths caused due to rain-related incidents stand at 23, according to PTI. Chief Minister Nitish Kumar raised the issue of Nepal's non-cooperation in flood management at Monday's meeting with PM Modi and sought Centre's intervention in the matter, the agency added.

Hindustan Times
10.08.2020

4.35 lakh cusecs discharged from the Godavari into sea

Nearly 4.35 lakh cusecs were discharged from the Godavari into the Bay of Bengal and more than 50,000 cusecs from the Krishna which received rain in the lower reaches though 233.87 tmcft are required to fill up two major reservoirs on the river. While Srisailam on the Krishna had a flood cushion of 72.75 tmcft, Nagarjuna Sagar needed 161.12 tmcft to get filled up.

Srisailam level up

The Srisailam reservoir, common to Andhra Pradesh and Telangana, recorded an inflow of 90,115 cusecs and discharged 34,692 cusecs to Nagarjuna Sagar downstream. More of the inflows to Srisailam are from the Tungabhadra (discharge of Tungabhadra reservoir 66,721 cusecs) instead of the Krishna (discharge of Jurala 28,240 cusecs).Requiring over 160 tmcft to fill up Nagarjuna Sagar, only 9,148 cusecs were released after power generation.

The 50,000 cusecs being received by the Prakasam barrage, the last reservoir on the Krishna, are from Muniyeru, Wyra and Kataleru rivulets.

The Irrigation authorities had to raise 60 crest gates of the Prakasam barrage by one foot to release the surplus 53,333 cusecs downstream at 9 a.m. on Monday.

Minister for Water Resources Devineni Umamaheswara Rao, who visited the barrage, said all the 24 pumps of the Pattiseema Lift Irrigation Scheme, that were transferring 8,500 cusecs from the Godavari Basin to the Krishna Basin, had been switched off in the wake of the flood in the rivulets that joined the Krishna below the Pulichintala reservoir. He said because of the Pattiseema Scheme water could be supplied for the irrigation of 8 lakh acres in the Krishna delta from June 19 itself. He said the State government was going to construct another barrage at Vaikunthapuram downstream Vijayawada.

The Hindu
14.08.2020

Punjab should honour Supreme Court verdict on SYL, says Haryana CM Khattar

Chief Minister Manohar Lal Khattar on Tuesday strongly advocated that the Supreme Court verdict on the Sutlej-Yamuna Link (SYL) canal should be implemented and that construction of the canal should be completed soon. He made these comments during a meeting with his Punjab counterpart Capt Amarinder Singh and Union Jal Shakti Minister Gajendra Singh Shekhawat.

On the Punjab's claim about the less availability of water, Khattar said the construction of the SYL canal and the water availability were unconnected. "Water shall be allocated on the pro-rata basis depending on the availability of water as provided in the 1981 agreement. In fact, in its judgment of January, 15, 2002, the Supreme Court had clearly mentioned that the decision of the apex court is to complete the construction of the canal," Khattar said.

He also argued there was clear evidence that surplus, unchannelised waters of the Ravi, Sutlej and Beas rivers had been flowing to Pakistan for the past 10 years, resulting in a waste of the national resource. "The Central Water Commission (CWC) has quantified this flow from the Ravi at 0.58 MAF (million acre feet), advocating the construction of a second Ravi-Beas link at Dharamkot. Surplus water can be harnessed for starved areas of south Haryana and for recharge groundwater."

Khattar further said Haryana was open to dialogue on the matter, but with a clear condition that the construction of the SYL canal must be completed as per the SC verdict. Not doing so, he said, would be a gross injustice to the people of water-deprived areas of Haryana.

Union Jal Shakti Minister Shekhawat said infrastructure and carrier capacity in the shape of the SYL canal had to be created to harness allocated share of Haryana as per the availability of water and harness water flowing to Pakistan, especially during the monsoon. On the demand for the Yamuna waters made by the Punjab CM, Shekhawat said that matter was not relevant, as an agreement on the sharing of

Yamuna waters had already been finalised in the 1994 agreement signed among Haryana, Himachal, Uttar Pradesh, Rajasthan and Delhi.

The Tribune
18.08.2020

India's August rain highest in 44 years with 25% excess

Several parts of India, particularly central and some parts of western India including Gujarat and Rajasthan, recorded excess rain during the first three weeks of August.

This August recorded the highest rain—24% excess—for the first time since 1983, when 24% excess rain was recorded. In 1926, 33% excess rain was recorded in August.

Several parts of India, particularly central and some parts of western India including Gujarat and Rajasthan, recorded excess rain during the first three weeks of August. The week ending August 12 saw 13% excess, the week ending August 19 saw 42% excess, and the week ending August 26 saw 41% excess rain. IMD, in its weekly weather update Friday, said there will be above average rain at least until September 3. Rainfall could reduce thereafter as no low-pressure area is likely to form over the Bay of Bengal until around September 10. Five low pressure areas have already formed in August, bringing extensive and heavy rain to east, central and west India. Low pressure areas are the main rain bearing systems during the monsoon. In the week ending August 26, for example, Hairamgarh in central India recorded 23 cm; Jodia in Gujarat recorded 34 cm; Bhungra in Rajasthan recorded 36 cm, all in the extremely heavy rain category (over 20 cm).

There is a well-marked low-pressure area over north Chhattisgarh and the adjoining east Madhya Pradesh. It is very likely to move west-north-westwards across north Madhya Pradesh and south Uttar Pradesh during the next two days and weaken gradually, IMD said in its Friday morning bulletin.

The western end of the monsoon trough (line of low pressure) is near its normal position (Ganganagar to Bay of Bengal) and the eastern end to the south of its normal position. The western end is likely to remain in its normal position during the next two days and shift northwards to the foothills of Himalayas thereafter for the subsequent four or five days. "The convergence of strong lower level south-westerly winds from Arabian Sea and easterly winds from Bay of Bengal is very likely over the plains of Northwest India during next 2-3 days," the bulletin read.

Due to these favourable conditions, very heavy rain is likely over Vidarbha and Chhattisgarh on August 28; over west Madhya Pradesh on 28 and 29; over Gujarat and Konkan and Goa on August 29. Widespread and extremely heavy rain are very likely over east Madhya Pradesh on August 28. Widespread and heavy rain is also likely over northwest India including Punjab, Haryana, Uttar Pradesh and Delhi on August 28 and 29, the bulletin read. IMD scientists warned of mudslides and flooding in parts of central India as the soil is already saturated there.

Overall monsoon rain is 8% excess with 23% excess rain over the south peninsula; 16% excess over central India; 12% deficient over northwest India and 4% excess over east and northeast India.

Hindustan Times
29.08.2020

Water projects worth Rs.10 K cr sanctioned for Bundelkhand

New Delhi: Prime Minister Narendra Modi on Saturday said the government is committed to the development of drought-prone Bundelkhand region and around 500 projects worth over Rs 10,000 crore

have been sanctioned for improving water availability. Observing that the benefit of water from three rivers, Ken, Betwa and Yamuna, was not reaching the Bundelkhand region, Modi said the proposed Ken-Betwa river linking project has the potential to change the fortune of the area and the Centre is in discussion with both Uttar Pradesh and Madhya Pradesh on this issue. He was addressing after the virtual inauguration of college and administration buildings of Jhansi-based Rani Lakshmi Bai Central Agricultural University.

"Both the Centre and the UP government are committed towards development of Bundelkhand region and restore its historic identity and past glory," Modi said. The prime minister mentioned that before the 2019 general polls, he had promised to improve water availability in the Bundelkhand region in the next five years and several initiatives have been taken in that regard. "Due to their blessings, 'Har Ghar Jal Abhiyan' (Tap water to every rural household) is working at a fast pace. Construction of water bodies and laying of pipelines in all districts are underway. The government has already sanctioned over Rs 10,000 crore for 500 water projects for this purpose," he said.

Of these, the work on projects worth nearly Rs 3,000 crore has commenced in the last two months. "When these projects get completed, lakhs of families in this region will directly benefit," he said, adding that the government has also begun work on increasing the groundwater level in this region under groundwater management scheme. Noting that the region was not getting the benefit of water despite three rivers, Modi said: "To change this situation, the Centre is working continuously. The Ken-Betwa River Link project has the potential to change the fortune of this region." On this issue, the Centre is in discussion with two states. "I am sure, once the Bundelkhand region gets enough water, then life here will change fully," he added.

Besides water projects, Modi said thousands of crores worth of projects are being implemented in this region, including Bundelkhand Expressway and Defence Corridor, that will create job opportunities. "The day is not far, Jhansi and adjacent areas which were famous for valour will make India Aatmanirbhar (self-reliant) in defence security," he said. Stating that the region is known for "facing challenges" since the past, the prime minister said the people out here are bravely challenging the COVID-19 pandemic and even the government has made all efforts to minimise the hardships faced by the poor during this crisis.

The government is providing free ration, gas and depositing thousands of crores in women's Jan Dhan bank accounts across the country, including Bundelkhand region, he said. "Around 10 lakh poor women in Bundelkhand region have been provided with free gas cylinder. Deposited thousands of crores in lakhs of Jan Dhan accounts of women," he said and added that about Rs 700 crore has been spent so far under the Garib Kalyan Rojgar Abhiyan in Uttar Pradesh alone. He said that lakhs of workers are getting jobs due to this initiative. Even many new ponds were being constructed and the old ones were being revived under this scheme, he added.

Millennium Post
30.08.2020

Monsoon pattern may see rapid shift

The pattern of monsoon rainfall in India may see a major shift by the end of this century with southern India likely to register the most increase in extreme rainfall , researchers from the Indian Institute of Technology (IIT), Kharagpur, in West Bengal, have found.

The researchers also expect rainfall to increase in the Arabian Sea and south-Asian countries, including Myanmar, Thailand and Malaysia.

"In the worst-case scenario of climate change, rainfall could increase by 2.7 mm per day in north India with the Himalayan foothills expected to receive the heaviest rain. In south India, rainfall could increase by 18.5 mm per day with the Western Ghats expected to be affected the most," said Rajib Maity, a professor of civil engineering at IIT Kharagpur, who led the study.

The scenario could play out towards the end of the century, between 2071 and 2100. The researchers analysed data of Indian Summer Monsoon precipitation for close to five decades (1971 – 2017), considering the period between 1930 and 1970 as the base.

In meteorological terms, fifty years, the time it will take for the change to manifest itself, isn't much. And the change itself, could have a significant bearing on cropping patterns in a country where much of the agriculture is still rain-fed.

"South Asia, as we know, despite advances in irrigation systems, is highly dependent on the monsoons. Results of this study will be useful to the designers of water infrastructure and agricultural communities, especially in the southern parts of India and Himalayan foothills, to prompt a possible change in design criteria and agricultural practices including cropping pattern," Virendra Tewari, director of IIT Kharagpur said, in a statement issued by the institute.

The results have been published in the Scientific Reports journal brought out by Nature publishing group.

"Our analysis shows a change in the direction of the southwest monsoon winds blowing towards the east over the Indian Ocean. This directional change will intensify the already observed precipitation contrast in future between South and North India, and cause more extreme precipitation events in countries such as Myanmar, Thailand and Malaysia" Maity added.

The researchers said that the Indian Ocean Dipole – popularly referred to as the 'Indian Nino' because of its similarity to its Pacific equivalent – is intensifying which could lead to increase in rainfall activity throughout India.

The Indian Ocean Dipole refers to the difference in sea-surface temperatures in opposite parts of the Indian Ocean which, in turn, affects rainfall patterns.

"The possibility of such a shift can't be ruled out but such projections need more research and analysis as the association between the Indian Ocean Dipole and monsoon is still not well defined," said R Krishnan, executive director, Centre for Climate Change Studies at the Indian Institute of Tropical Meteorology (IITM).

To be sure, over the years, a significant correlation has been established between the Indian Ocean Dipole and the monsoon.

IITM, in various studies, has documented the change in monsoon rainfall pattern and increase in extreme rainfall events since 1871. It has found that the period between 1981 and 2016 witnessed higher frequency of extreme rain during monsoon months. Studies by then IITM professor, M Rajeevan, now secretary ministry of earth sciences, have shown that monsoon rain has increased in western parts of India, namely Rajasthan and Gujarat and has declined in Central and north-western India.

Hindustan Times
04.09.2020

Aravallis have lost over 200 water bodies in 30 yrs to encroachment

In less than 30 years, illegal encroachment and mining have reduced the number of natural and man-made water bodies in the Aravallis here from 265 to less than 50, internal documents of the South Haryana Forest Department have revealed. The documents, accessed by Millennium Post, show that the number of water bodies was reduced to less than 120 in 2000 and that 500 acres of forest land which housed these water bodies had been lost to encroachment or mining over the last few decades. In fact, the South Haryana Forest Department has now started planning to revive 42 natural and man-made water bodies in the Aravllis in a desperate bid to save the forested region's green cover and wildlife population. However, while the plans have been initiated, the forest department had also planned to build over 250 check dams to store rainwater in the Aravallis which is yet to materialise. According to officials from the forest department, over 3,000 saplings die every year in the Aravallis because of inadequate water. And with no watering holes in the forest, chances of wildlife straying into residential and human territory increases which, in turn, leads to a higher risk of mishaps putting both the animals and humans in danger. Most of the pits that have been dug up for meeting drinking water requirements of the wild animals are being filled by officials through the pipeline water due to a lack of natural resources. Top officials of the wildlife department acknowledge that the lack of tankers and scarcity of water have made filling manmade ponds a challenge.

Once a source of a natural aquifer, what has worsened the situation further is that over 500 illegal borewells have come up near the Aravallis to extract the groundwater unlawfully. Already facing a shortage of water during summer months, large scale illegal extraction of groundwater in the areas near Aravallis like Ghata, Sikanderpur, Chakkarpur and Wazirabad have led to groundwater dipping to as low 50 to 60 metres. "As the city has grown, the Aravallis have faced the brunt of urbanisation. A large number of water bodies today have been lost. We are however in the process to make sure that we revive the water bodies and improve the situation," said an official from the South Haryana Forest Department. Not only in Gurugram but the situation in Faridabad has been dire for the water bodies. It is important to note that water bodies at Surajkund, Damdama and Badkhal are some of the famous tourist spots in Haryana. In 2004, due to excessive mining, these water bodies began to dry up forcing the Supreme Court to intervene and subsequently direct the erstwhile Haryana Government to improve the situation.

Millennium Post
09.09.2020

May take decades to clean Ganga water, say experts

Namami Gange, the Central government's ambitious project to clean the Ganga, seems to have delivered modest results, with the quality of river water from Rudraparayag in Uttarakhand to Uluberia in West Bengal having improved between 2014 and 2019, according to Jal Shakti ministry data, but experts say it will take decades before the water becomes fit for human consumption.

The dissolved oxygen level, or the amount of oxygen available to living aquatic organisms, has improved at 27 locations and the biochemical oxygen demand (BOD), the amount of oxygen consumed by bacteria while they decompose organic matter, and faecal coliform (FC) content, a measure of the suitability of water for consumption, has improved at 42 and 21 locations, respectively.

The information was provided by the Jal Shakti ministry in response to a query by Kochi-based RTI applicant, K Govindan Nampoothiry. The ministry has provided the annual average of Ganga water quality on these three parameters, thereby discounting seasonal variations.

After coming to power in May 2014, the National Democratic Alliance (NDA) government the following month launched the Namami Ganga project with the objectives of reducing river pollution, and promoting its conservation and rejuvenation.

Higher dissolved oxygen (the national standard is 5 milligrams per litre or more) shows whether water can sustain aquatic life. A lower BOD (the national standard is 3 milligrams per litre or less) shows there is less bacteria and other microorganisms in water. The faecal coliform (national standard less is than 2,500 coliform in 100 ml of water) indicates the amount of sewage in water.

Jal Shakti ministry data shows that in past six years, the water quality of the river on these three parameters has improved marginally at most locations and at this pace, the authorities would take decades to make the river's water fit for human consumption, experts said.

"The progress so far has been slow. In six years, if Ganga's water quality has improved by just 10-15%, it would take decades to clean the Ganga," said BD Joshi, founder of the Indian Academy of Environmental Sciences, who has worked on the river for more than four decades.

The Central government had initially fixed 2019 as the deadline to clean the river, but extended it to 2022 as the Namami Ganga Project (NGP) took off slowly. As of August 1, only 29% of the 154 sewage projects taken up had been completed. For the projects, the ministry has allocated ₹23,120 crore, according to government documents.

A ministry official privy to the information about Namami Ganga said sewerage infrastructure projects were coming up in eight states — Uttarakhand, Uttar Pradesh, Bihar, Jharkhand, West Bengal, Haryana, Delhi and Himachal Pradesh — through which the 2,525-km river flows. The 97 towns located on the main stem of the Ganga generate 2,953 million litres a day (MLD) of sewage. The available treatment capacity is only 1,794 MLD.

The RTI reply showed the maximum improvement in Ganga water quality has taken place in the hills of Uttarakhand, primarily due to efforts made to contain the flow of human and animal sewage. Another reason for this could be that unlike in the plains, the flow of industrial waste in the hill is much less.

"We have minimized flow of human sewage by building sewage treatment plants in towns and toilets for all those living close to river Ganga. Work is on for zero sewage into river Ganga in the state," said Uttarakhand environment minister Harak Singh Rawat.

The reply showed that as the river flows into the pilgrim centre of Haridwar in Uttarakhand, the water quality deteriorated and further fell in the downstream in the industrial town of Kanpur, where industrial waste still flows into the river.

The water quality between Haridwar and Kanpur improved between 2014 and 2019 by 8-10%.

The water quality was slightly better in Chapra and Patna because of the fresh flow of water from Ganga tributaries in Bihar such as Kosi and Gandak. But it again fell as the river entered West Bengal. The water quality in Bihar and West Bengal has improved by almost 30% between 2014 and 2019.

Himanshu Thakkar, coordinator of the South Asia Network of Dams, Rivers and People (SANDRP), said a bigger issue than improvement in water quality is the flow of the river.

"If the flow of the river improves in all seasons, the water quality will improve significantly. But the reality is that the flow is decreasing and it will have huge implications for people living in the Ganga river basin even if water quality improves," he said.

Thakkar acknowledged that work has happened in building sewage and industrial affluent treatment plans. "The state pollution control boards need to ensure that plants don't give false reports and work at their maximum capacity," he said.

Hindustan Times
17.09.2020

Odisha seeks Rs. 1,100 cr central aid for flood damage

The Odisha government Thursday sought assistance of Rs 1,100 crore from the Centre to deal with the aftermath of the recent floods in the state. The aid amount was calculated after a preliminary assessment of damage to crops, houses and other properties.

As per government numbers, about 2.25 lakh hectares of agricultural land have suffered damage due to the floods in the last week of August. About 1,20,000 houses, as well as embankments, roads, and public infrastructure, have also been affected.

The floods hit nearly 14 lakh people from over 6,000 villages of 19 districts. These numbers were presented at a high-level meeting chaired by state Chief Secretary Asit Tripathy.

A central team, which was on a two-day visit to the state to assess the damage caused due to floods, agreed to consider supporting the state in terms of response as well as mitigation measures such as strengthening of infrastructure and properties.

The team, led by Praveen Vashista, Joint Secretary in the Ministry of Home Affairs, visited flood-hit areas of Bhadrak, Kendrapada, Jajpur and Puri. "In the meeting, we have emphasised that there is a need for long-term measures to mitigate such floods in the future, including strong embankments and power infrastructure. Our major areas of concern were damage to agricultural and horticulture crops apart from property damage," a senior official said.

According to Special Relief Commissioner Pradeep Jena, high floods took place in five major systems of Subarnarekha, Baitarani, Brahmani, Budhabalanga and Mahanadi, necessitating relocation of over 1.73 lakh people.

The Indian Express
18.09.2020

Heavy rains lash Kerala, orange alert in ten districts

Heavy rains continued to lash Kerala on Monday with the IMD issuing an orange alert for 10 districts after a low pressure area had formed over the North East Bay of Bengal and neighbourhood.

The districts of Kottayam, Ernakulam, Idukki, Thrissur, Palakkad, Malappuram, Kozhikode, Wayanad, Kannur and Kasaragod have been issued Orange alert. The Kundala, Kallarkutti, Malankara and Ponmudi dam shutters have been opened resulting in water rise in Periyar, Muthirapuzha and Muvattupuzha rivers.

"There was one death reported from Thiruvananthapuram on Sunday. The death occured after the person came in contact with a live electric wire which got snapped due to heavy rain and wind," a State Disaster Management Authority official told PTI. "We have also received information about one death from Kasaragod on Monday morning, but yet to receive the details officially," the official added.

A weather bulletin said that a low pressure area has formed over Northeast Bay of Bengal and neighborhood on Sunday morning and is likely to move west-northwest during the next 2-3 days.

The Idukki reservoir is at 80 per cent of its storage capacity as on Monday morning, district officials said.

Hosdurg in Kasaragod received 9 cm of rainfall, as per the latest bulletin on the IMD website, while Vythiri in Wayanad district received 9.4 cm, Munnar and Peerumedu in Idukki received over 7 cm of rain, while Nedumangadu in Thiruvananthapuram also received 7 cms of rain. At least eight houses have been destroyed in yesterday's rain in Kasaragod district. The state has received an average of 7 cm of rainfall in the last 24 hours.

The IMD had issued a red alert for Idukki, Thrissur, Palakkad, Malappuram, Kozhikode, Wayanad, Kannur and Kasaragod districts for Sunday. A red alert is sounded for rainfall of over 20 cm while an orange alert is for 6 cm to 20 cm of rain.

Three units of the National Disaster Response Force have reached Kerala on Sunday and have been deployed in Wayanad,Malappuram and Thrissur districts. Already there are two teams in Idukki and Kozhikode districts. Fishermen have been warned not to put out to sea as strong winds with speed reaching 45-55 kmph are likely to prevail along and off Kerala, Karnataka coasts and over Lakshadweep area. A landslide triggered by heavy rains in the hilly district of Idukki on August 7 had flattened a row of dwelling units of tea estate workers at Pettimudi in Rajamalai claiming 66 lives.

The Indian express
21.09.2020

In a first, dolphin safaris start at 6 places in Ganga

In a move aimed at preserving Ganga ecology as well as promoting tourism in the region, a first-of-its-kind dolphin safaris were started at six places in the country, including near Haiderpur Wetland in Ganga in Bijnor, on Monday. On the occasion which coincided with the Gangetic Dolphin Day, National Mission for Clean Ganga (NMCG) launched the 'Dolphin Jalaj Safari' at six locations, including Bijnor, Brijghat, Prayagraj and Varanasi in Uttar Pradesh, Kahalgaon (Bihar) and Bandel (West Bengal).

In Bijnor, NMCG director general Rajeev Ranjan Mishra said, "This is a unique initiative to integrate Gangetic dolphin and Ganga conservation with local livelihoods which is in line with the concept of Arth Ganga." The 'Ganga Praharis' - trained volunteers from among the local community working for cleanliness of Ganga - will take tourists at these sites on boat rides to view dolphins in the Ganga.

The Times of India
06.10.2020

Chennai all set to get full quota of Krishna water

Chennai can breathe easy as the Kandaleru reservoir in Nellore district of Andhra Pradesh, which augments the drinking water supply to the metropolis, has attained a record storage of 52.94 tmcft for the first time since the launch of the Telugu Ganga canal system in 1996.

Tamil Nadu can expect to get its full quota of Krishna water this year as the storage in the reservoir is expected to go up further in the coming weeks to reach closer to its full capacity of 68.05 tmcft.

"We will maintain the storage at 60 tmcft, leaving a flood cushion of about 8 tmcft, to ensure the safety of the reservoir," Telugu Ganga project Chief Engineer C. Harinarayana Reddy said while overseeing the water release to meet the needs of, among other cities, Tirupati and Chennai.

It was in the year 2010 that the reservoir had a relatively comfortable storage of 50.65 tmcft against the full capacity of 68.05 tmcft.

Once the farm season begins in November, the water realised from Kandaleru by Tamil Nadu will come down a bit to about 600 cusecs from the present 800 cusecs, after accounting for evaporation losses and seepage.

"Going by the present trend, we are in a position to continue the water release to Chennai till March 2021," Mr. Harinarayana Reddy indicated.

The Hindu
11.10.2020

CWC to study sediment deposition in reservoirs

The Central Water Commission (CWC) will undertake sedimentation studies at major reservoirs across the country to assess the change in their storage capacity as well as to determine their life expectancy.

According to sources, a list of 32 reservoirs in different states, including those situated in North India, has been drawn up where the level of sedimentation and its effects will be examined. Funding for the project has been received from the World Bank.

Sedimentation is the process where loose soil, silt, rock and debris flow in with the water that enters reservoirs and deposit on the bed. The level of sedimentation depends upon the terrain, geology and environmental conditions of the area through which the feeding rivers and tributaries flow. Sedimentation, according to sources, is unavoidable and over a period of time, reduces the storage capacity of the reservoirs. This has detrimental effects on the dam's intended benefits such are provision of water for drinking and irrigation, flood control and power generation.Large-scale deforestation, unscientific agricultural practices, industrial processes and anthropogenic activities in the catchment areas tend to increase in silt load in rivers and aggravates sedimentation of reservoirs.

Citing the example of the Bhakra Dam on the Sutlej in Himachal, an official said over the past about 50 years, the designed capacity of the dam's reservoir may have reduced by almost 25 per cent due to deposit of silt.

Sources said the surveys would be carried out through integrated hydrographic and integrated bathymetric systems that include employment of drones and use of artificial intelligence.

What is sedimentation

- Sedimentation is the process where loose soil, silt, rock and debris flow in with the water that enters reservoirs and deposit on the bed. The level of sedimentation depends upon the geology of the area through which rivers flow.

- Citing the example of the Bhakra Dam on the Sutlej in Himachal, an official said over the past about 50 years, the designed capacity of the dam's reservoir may have reduced by almost 25 per cent due to deposit of silt.

The Tribune
25.10.2020

Delhi, Jaipur among 26 cities facing grave water risk: Study

Delhi, Ludhiana, Chandigarh, Jaipur, Amritsar and 26 other Indian cities could face a very high water risk in the next few decades according to the Worldwide Fund for Nature's Water Risk Filter released on Monday. WWF's new water risk scenarios estimate that hundreds of millions of people in cities across the globe could face dramatically increased water risks – unless urgent action is taken to mitigate and adapt to climate change.

The filter is a tool to various risks including physical scarcity of water due to say aridity; water depletion; pollution etc, fragmentation of river ecosystems; projections for flooding, regulatory and policy risks, climate change etc. Overall, the entire India is at high risk due to various factors as per the assessment's mapping. By 2050, many parts of India including north, west and peninsular India are likely to experience extreme water risk.

WWF Water Risk Filter's country profile for India states that major environmental problems like deforestation; soil erosion; overgrazing; desertification; air pollution from industrial effluents and vehicle emissions; water pollution from raw sewage and runoff of agricultural pesticides impact water quality in India.

Sejal Worah, Programme Director, WWF India, said "The future of India's environment lies in its cities. As India rapidly urbanises, cities will be at the forefront both for India's growth and for sustainability. For cities to break away from the current vicious loop of flooding and water scarcity, nature-based solutions like restoration of urban watersheds and wetlands could offer solutions. This is our chance to re-evolve and re-imagine what the future of the cities could be."

"Although in their upper reaches most rivers are of good quality, the importance of water use for cities, agriculture and industries, and the lack of wastewater treatment plants in the middle and lower reaches of most rivers, cause a major degradation of surface water quality," the country profile states.

According to the scenarios in the WWF Water Risk Filter, 100 cities that are expected to suffer the greatest rise in water risk by 2050 are home to at least 350 million people as well as nationally and globally important economies. Populations in areas of high-water risk could rise from 17% in 2020 to 51% by 2050. China accounts for almost half of the cities at high water risk. Beijing, Jakarta, Johannesburg, Istanbul, Hong Kong, Mecca and Rio de Janeiro are also in the list.

"Indian cities are at very high water risk because in the landscape planning high rises and industries but there is no holistic planning. Ecological factors are not properly considered during city planning. So the water catchments and flow lines change due to urbanisation. There is a very fragile equilibrium which has to be maintained. This is particularly true for new cities that are coming up with little planning," said Shashank Shekhar, assistant professor, department of geology, Delhi University.

Hindustan Times
03.11.2020

Chhattisgarh cancels Rs. 10,000-crore work orders under Jal Jeevan Mission

FOUR MONTHS after floating an Expression of Interest (EoI) and subsequent allotment of work orders to the tune of Rs 10,000 crore, the Chhattisgarh government has suddenly cancelled it following complaints of irregularities. The state Cabinet decided to cancel the entire allotment process three days after a Chief Secretary-led committee was tasked with studying these complaints.

"The Cabinet has decided to cancel the entire tender life mission (EOI) and take action as directed by the Government of India," an October 26 statement from the government said. On October 23, representatives of local contractors had approached the Chief Minister's Office, claiming more work had been allotted to "outsiders", following which Chief Minister Bhupesh Baghel announced the setting up of a three-member committee chaired by the Chief Secretary.

Of the over 1,300 companies which were allotted works, 13 companies were awarded work orders worth over Rs 100 crore each. The three biggest orders were to Jain Irrigation (Rs 933.34 crore), JMC Projects (Rs 722.78 crore) and Patel Engineering (Rs 606.81 crore).

When asked about the Chhattisgarh government decision to cancel the tenders under Jal Jeevan Mission, Union Jal Shakti Minister Gajendra Singh Shekhawat said, "Water being the state subject, the planning, implementation, operation and maintenance is to be done by the state. So, it is primarily, and ultimately state subject; they will have to take care of their spending, working, implementation and maintenance."

Under the Jal Jeewan Mission, more than 41 lakh rural families in the state were to get Functional Household Tap Connection till September 2023. In Chhattisgarh, only 10 per cent of the rural families in the state have a household tap connection as per government records. Over 20 lakh connections were to be built in 2020-2021, sources in the state government said.

The works allotted to ensure 100 per cent tap connections included building water tanks, laying pipelines, civil works, tap connection, water purification, pumping equipment, and fluoride removal, in more than 8,000 gram panchayats, amounting to Rs 10,515.9 crore.

In a recent mid-term review of the Jal Jeewan mission in the state, the Union Ministry of Jal Shakti had said Chhattisgarh was allocated Rs 445.52 crore in 2020-21 Further, under 15th Finance Commission Grants to rural local bodies, it was allocated Rs 1,454 crore in 2020-21, 50 per cent of which is mandatorily to be utilised on drinking water supply and sanitation activities.

The Opposition BJP has accused the state government of trying to "siphon" funds earmarked for the mission. BJP leader Chandrakant Sahu wrote to Shekhawat requesting that funds be handed over to gram panchayat bodies. Leader of Opposition Dharamlal Kaushik has demanded action against the perpetrators of "irregularities" that led to cancellation of the tender.

Indian Express
04.11.2020

Centre okays 210 MW power project on Sutlej in Himachal The Tribune 04.11.2020

The Union Government today approved the 210 MW Luhri Stage-I hydroelectric project on the Sutlej in Himachal Pradesh with an approved investment of Rs 1,810.56 crore. Satluj Jal Vidyut Nigam Limited (SJVNL) would implement it on the Build-Own-Operate-Maintain (BOOM) basis in the next five years.The decision was taken at a meeting of the Cabinet Committee on Economic Affairs (CCEA) chaired by Prime Minister Narendra Modi.

Union Information and Broadcasting Minister Prakash Javadekar said that the project is located on the Sutlej in Shimla and Kullu districts of Himachal Pradesh and on completion, it would generate 758.20 million units of electricity annually.

The minister said that the SJVNL had been assigned the project on the BOOM basis, as the company had signed a memorandum of understanding (MoU) with the Himachal Pradesh Government during the Rising Himachal Global Investors' Meet in 2019. "Both Union Government and Himachal Government will offer active support to the project with the former providing a grant of Rs 66.19 crore for the enabling infrastructure," he added.

The Tribune
04.11.2020

For potable water in every home, Centre sends teams to Bengal, AP

The Union Jal Shakti Ministry has dispatched expert teams in two opposition-ruled states of West Bengal and Andhra Pradesh to provide assistance to realise the Centre's goal of "Har Ghar Jal" under its flagship Jal Jeevan Mission (JJM).

Call for "Har Ghar Jal" was made by Prime Minister Narendra Modi.

Although the Ministry officials say the sending of the teams is apolitical, two states are on BJP radar for its expansion. Political observers see this more than coincidence, especially with regard the timing.

In West Bengal, the BJP is on expansion spree, to the extent of it winning 18 of the 42 Lok Sabha seats in the state in the 2019 General Election and emerging as principal challenger to the ruling TMC while decimating the dominant Left Front and the Congress.

Assembly elections in Bengal are due next year and the BJP will go full tilt to emerge victorious. In Andhra Pradesh, the BJP is said to be preparing the ground for a surge, just like it did in recent Hyderabad Municipal Corporation election in Telangana, which was carved out of it (Andhra Pradesh). It emerged as the main Opposition, marginalising the regional player TDP, and the Congress in the process.

"The team is visiting different parts of West Bengal and interacting with field-level officials involved with implementation of water supply schemes as well as gram pradhans and members of gram panchayats," the Jal Shakti Ministry said.

The team is also holding meetings with the Chairperson of the District Water and Sanitation Mission/District Collector to brief them about the progress and seek their intervention for speedy implementation of the programme.

During 2020-21, fund allocation to West Bengal has increased to Rs 1,610.76 crore. With an opening balance of Rs 1,146.58 crore, the state has an assured availability of Rs 2,760.76 crore of Central share funds. During 2020-21, along with state share, Rs 5,770 crore is available under the JJM to provide household tap connections in West Bengal.

The Tribune
06.12.2020

Nearly half of droughts in India may have been influenced by North Atlantic air currents: Study

Nearly half of the droughts that occurred during the Indian summer monsoon season in the past century may have been driven by atmospheric disturbances from the North Atlantic region, finds a new study. The study was carried out by researchers at the Centre for Atmospheric and Oceanic Sciences (CAOS), Indian Institute of Science (IISc), and it has been published in the research journal, 'Science'. More than a billion people depend on the annual Indian summer monsoon, which brings copious rain to large swathes of the country between June and September. When it fails, and most of the country plunges into drought, the usual suspect is El Nino, a recurring climate event during which abnormally warm equatorial Pacific waters pull moisture-laden clouds away from the Indian subcontinent, according to the study. But 10 out of 23 droughts that India faced in the past century have occurred during years when El Nino was absent.

What, then, could have caused these droughts?

The IISc study said that these droughts were a consequence of a sudden and steep drop in rainfall in late August. This drop was linked to an atmospheric disturbance in the midlatitude region over the North Atlantic Ocean, creating a pattern of atmospheric currents that swoop in over the subcontinent and "derail" the monsoon, Bengaluru-based IISc said. "As early as the 1980s, people have looked at these droughts individually. But they have not collated and pooled them together, and deduced that these droughts may all have a different type of evolution than El Nino droughts, as well as a common cause, which is this midlatitude influence," V Venugopal, Associate Professor at CAOS and one of the senior authors of the paper, was quoted as saying in an IISc statement.

The research team looked closely at daily rainfall during both El Nino and non-El Nino drought years, and noticed stark differences in their patterns between June and September, the statement said. The droughts that happen during an El Nino year follow a standard pattern. The rainfall deficit - departure from a long-term average - sets in early around mid-June and becomes progressively worse. By mid-August, the deficit spreads across the country and there is no going back from a drought, it said. Surprisingly, the droughts during the non-El Nino years, when analysed together, also seemed to follow a common pattern, the study noted.

First, there was a moderate slump in June. Then, during mid-July to mid-August - the peak of the season - the monsoon showed signs of recovery and the rainfall amount increased. However, around the third week of August, there was a sudden steep decline in rainfall, which resulted in drought conditions, it found. "The question was: Why does the break occur this late in August? said Jai Sukhatme, Associate Professor at CAOS and another author. "We tried to see if we could trace it back to a forcing agent or system that influences the behaviour over India. We looked at the winds that were prevalent in these non-El Nino drought years."

That was when the researchers noticed an unusual atmospheric disturbance in the midlatitudes. It emerged from winds in the upper atmosphere interacting with a deep cyclonic circulation above abnormally cold North Atlantic waters. The resulting wave of air currents, called a Rossby wave, curved down from the North Atlantic - squeezed in by the Tibetan plateau - and hit the Indian subcontinent around mid- August, suppressing rainfall and throwing off the monsoon that was trying to recover from the June slump. The wave's usual course is to go from west to east, but not towards the equator, explains Sukhatme. "This inward curving was the peculiar thing that we noticed during these particular years." The findings underscore the importance of also considering influences on the Indian monsoon from outside the tropics, which current forecast models focus heavily on. "The Indian Ocean and Pacific Ocean seem to be at the forefront of all discussions surrounding Indian monsoon droughts," said Venugopal. "It is perhaps time to

focus just as much on midlatitude influences, which might aid in getting a better handle on enhanced predictability of monsoon variability."

Millennium Post
12.12.2020

IIT-M study of water flow in the Adyar river to prevent flooding

The Indian Institute of Technology, Madras, researchers and students braved cyclone Nivar to collect real-time data on Adyar river discharge which could help prevent floods in Chennai.

Led by Balaji Narasimhan of the Department of Civil Engineering, IIT-M, two teams equipped with Acoustic Current Profiler, measured river currents and flow depths across the width of the river to get the integrated flow rate.

During the floods of 2015, such critical ground truth data and a reservoir inflow forecasting system through numerical models could have helped mitigate the impact. The catchments of Somangalam, Manimangalam, Adhanur and Guduvanchery in Chennai with a large network of tanks received a record amount of rainfall during the monsoon of December 2015.

K Phanindra Reddy, Commissioner, Revenue Administration, Disaster Management and Mitigation, Government of Tamil Nadu, said that the data collected during this field campaign by IIT Madras in close coordination with Tamil Nadu State Disaster Management Authority (TNSDMA) would be very useful to operationalise the Real Time Flood Forecasting and Spatial Decision Support System being coordinated by TNUIFLS under World Bank assisted Tamil Nadu Sustainable Urban Development Project.

Narasimhan said, “As part of a robust flood management, rating curves at critical sections of the rivers are especially important to understand the volumetric flow rate for different flow depths. Once a rating curve is developed, an integrated network of water level sensors could be used to monitor the river discharges remotely and automatically at these critical river stretches.

Some preliminary model runs showed that the catchments alone could have contributed to up to 70 to 80 per cent of flood flows realised in Adyar river. Unlike the Chembarambakkam reservoir with flood gates to regulate the water level, the control measures available in the tanks in this part of the catchment was almost nil in 2015. Realising this lacuna, the State Public Works Department has begun installing sluice gates in many of the small tanks to regulate the water levels prior to the incoming floods, the release said.

Although Chennai did not encounter large scale flooding during Cyclone Nivar, certain localities in the city experienced some flooding and water logging. The data collected during the field campaign, which continued till December 11, could give insights into the hydrological behaviour of this catchment and find remedies to mitigate future floods.

Narasimhan said even more critical is, the collected data would be useful to manage and moderate the reservoir releases from Chembarambakkam, giving sufficient lead time for officials from TNSDMA to issue warnings to the public in low-lying regions and coordinate flood mitigation and relief measures.

Business Line
21.12.2020

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