

# ISH-NEWS



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## THE INDIAN SOCIETY FOR HYDRAULICS

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### HYDRO 2019 International Conference



**Prof K.Shashikanth delivering vote of thanks during Valedictory Session (HYDRO-2019)**



**Jalvignyan Purskar – Satyajee Sinha and Amar Pal Singh**



**Jalvignyan Purskar – Shreenivas N Londhe and Shalaka Shah**



**Prof. U.C. Kothayari Best PhD Thesis Award – Dr. Poornima Unhikrishnan (IIT Bombay)**



**Prof. U.C. Kothayari Best M.Tech Thesis Award – Apoorva Kudale**



**Prof. U.C. Kothayari Best M.Tech Thesis Award – Vishakha D Regulwar**

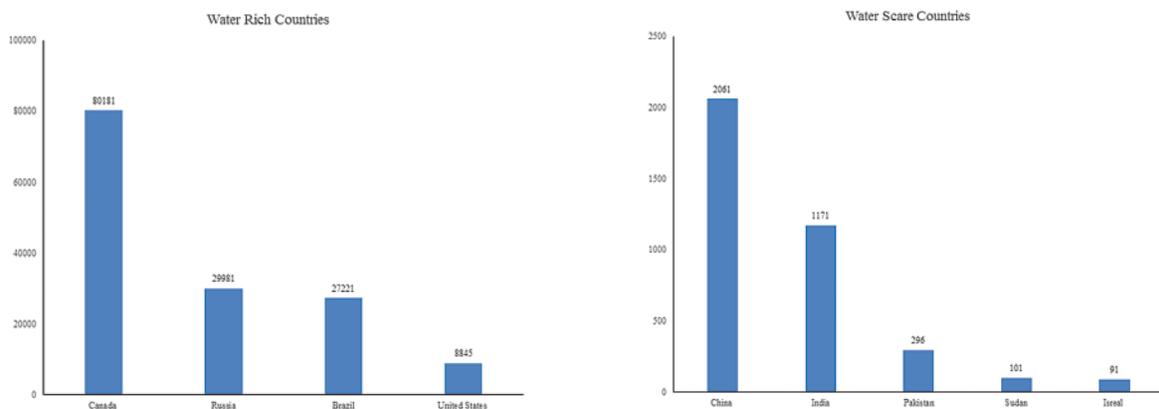
# CLOUD SEEDING AND ARTIFICIAL RAIN DURING MONSOON: A SOLUTION TO THE WATER SCARCITY IN FUTURE

**Kedar Sharma**

Department of Civil Engineering, J K LakshmiPat University, Jaipur, India.

**Introduction:** Many times, it is quoted that the next World War will be fought over water. In future, fresh or clean water will be one of the most vital resources for society. The water is used for the municipal purposes, agricultural and industrial activities. With rapid increase in population and changing lifestyle, a huge demand for fresh water will be created in future.

In general, the available fresh water on the globe is sufficient to meet the needs of all human beings. However, the distribution is uneven (Fig. 1). For example in 2014, the fresh water availability per person per year in water rich countries like Canada, Russia, Brazil and USA was 80181 m<sup>3</sup>, 29981 m<sup>3</sup>, 27221 m<sup>3</sup> and 8845 m<sup>3</sup>, respectively [1]. On the other hand, in water stressed countries like China, India, Pakistan, Sudan and Israel, it was 2061 m<sup>3</sup>, 1171 m<sup>3</sup>, 296 m<sup>3</sup>, 101 m<sup>3</sup> and 91 m<sup>3</sup>, respectively. This uneven distribution of water is also observed within the country or even within the states. For Instance, in India plenty of water is available in regions connected to Ganga and Brahmaputra basins, whereas water scarcity is being faced in parts of Rajasthan, Gujarat, Andhra Pradesh, Maharashtra, Karnataka, Telangana and Odisha. Some studies estimated that, fresh water availability per person per year may drop up to 450 m<sup>3</sup> in Rajasthan by the year 2050 [2].



**Fig. 1: Fresh water availability per person per year (m<sup>3</sup>)**

The amount of available water resources, within the boundaries of a city is limited, however, there is population increase due to availability of employment, mode of transportation, medical and educational facilities etc. Thus, demand as well as scarcity of water resources is increasing in cities. Bangalore, Chennai, Shimla and Jaipur are the best examples, where the population has increased many folds in comparison to their initial planned capacity.

Climate change is also a major challenge in water resources management. Temperature rise, deviation from normal rainfall and long span of drought years are predicted by various researches [3].

Problems related to the availability of water have been a topic of research for several years. General methods suggested by scientists and researchers to solve the water scarcity problem are rainwater harvesting, water reuse, artificial rain and other water conservation practices. Every method has its advantages and disadvantages. Some of them are skill intensive processes whereas the others are money intensive processes.

**Artificial Rainfall:** Recently, artificial rain or cloud seeding which is based on weather modification is seeking the attention of researchers [4]. The aim of this process is to change the amount of precipitation. This is achieved by dispersing some chemical substances into the air that serve as cloud condensation or ice nuclei, which alter the microphysical processes within the cloud. The most common chemicals used for cloud seeding include silver iodide, potassium iodide and dry ice (solid CO<sub>2</sub>). The major challenges for artificial rain are availability of suitable type of clouds, suitable method for launching the chemicals and the economy involved in the whole process.

Based on cloud availability and rainfall patterns, the land mass on earth can be classified into three major regions namely, areas with negligible rainfall (deserts), areas with plenty of rain fall (e.g. North Eastern regions and Western Ghats of India) and regions having rainfall nearly sufficient to fulfil the requirements.

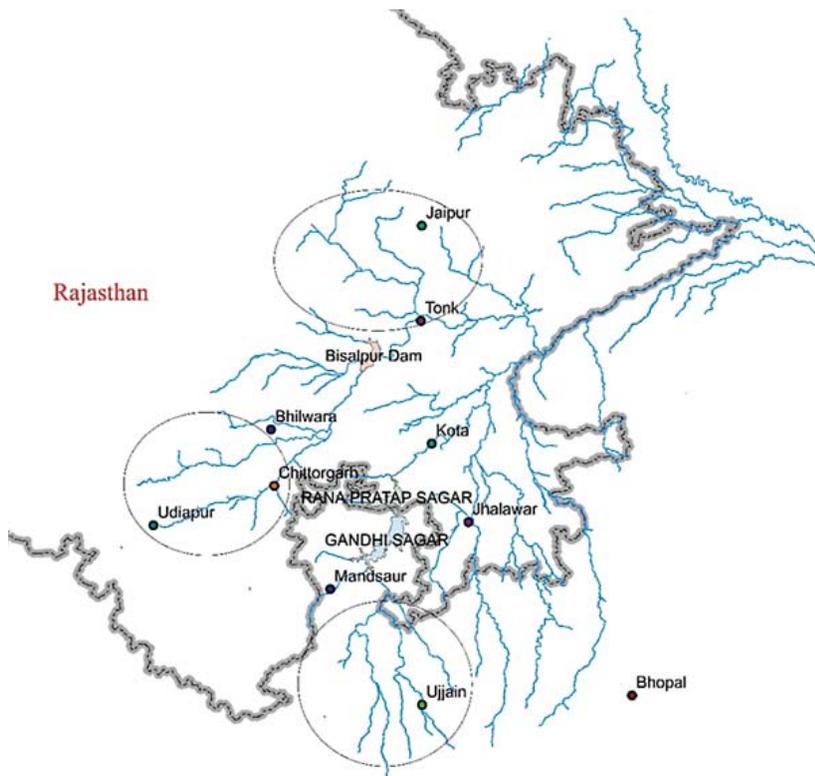
*Till now, cloud seeding has been generally used only in drought or pollution affected areas. In drought affected areas, it provides minimum amount of water to meet the municipal requirements. In highly polluted areas, as a result of rainfall, the pollutants settle down on the earth surface thereby reducing the level of pollution.*

*Can this technique be used to cause artificial rain during monsoon itself in the area which experiences just sufficient average rainfall and located in the upstream side of a water scarce region?*

Cloud Seeding technique can increase the total rainfall in a particular region. For example, the Malwa region of Madhya Pradesh (Indore, Ujjain, Mandsaur) and Mewar region of Rajasthan (Udiapur, Chittorgarh and Rajsamand) observe an average rainfall in the range between 700 – 900 mm per year (Fig. 2). In the downstream side, the average rainfall decreases and is observed in the range between 400 - 600 mm. There are a few major reservoirs in these basins for irrigation and municipal purposes viz., Gandhi Sagar Dam, Rana Pratap Sagar Dam on Chambal River and Bisalpur Dam on Banas River. Due to various reasons, some of these reservoirs do not get filled up to their maximum capacity (e.g. during last 50 years, Gandhi Sagar Dam got completely filled only for 5-7 times; Bisalpur Dam filled up to full capacity for 4 times in last 16 years [5, 6]). Either natural or by cloud seeding during monsoon itself, if upstream areas of these reservoir observes rainfall in the range of 900 to 1200 mm and 700 to 900 mm it will ensure maximum reservoir level in Gandhi Sagar and Bisalpur Dam, respectively. Reservoirs filled with its full capacity will ensure optimum utilization of associated services. For example, a fully filled Bisalpur Dam can supply drinking water to villages and cities in Ajmer, Jaipur and Tonk districts. Good rainfall (either natural or by cloud seeding during monsoon itself) will ensure not only the full utilization of water storage in these large reservoirs, but also the maximum levels in medium or minor reservoirs in upper Chambal and upper Banas Basin.

The main concern in creating artificial rain is its cost, which depends on the extent of area it has to cover. Recently, several state governments in India, have planned very expensive inter basin water transfer projects [7, 8, 9]. In Narmada – Malwa link Project, Madhya Pradesh government plans to transfer water from Narmada River to upper Chambal Basin [5]. The total expense on electricity is in the range between 300 - 400 crore rupees. Artificial rain during monsoon season can be a viable option in such areas. Moreover, it can be a cost-effective process if compared to the operation and maintenance of equipment utilized in water lifting projects.

The second concern is the impact of artificial rainfall on the rainfall pattern in the other regions. It might be possible that artificial rain in one region will disturb the rainfall pattern of other areas. As per author's knowledge, there has been no study regarding the impact of artificial rainfall on the rainfall pattern of other regions. In comparison to traditional artificial rainfall concept, in which the cloud seeding is preferred in severe drought years, it is suggested that artificial rainfall may be attempted during monsoon period itself. It will increase the rainfall by some percentage.



**Fig. 2: Area considered for the proposed idea**

## Conclusion

*The concept of cloud seeding and artificial rain during monsoon in the areas of average rainfall is presented. Instead of applying the cloud seeding during drought year, if this technology is used in years of normal rainfall, it will provide surplus water in the water bodies of that region and downstream region. With increasing threat of climate change, this practice will reduce the impact of droughts in various river basins and ensure sufficient water for municipal and irrigation purposes as well as it will serve as weapon against climate change.*

## References

- [1] <https://www.indexmundi.com/facts/indicators/ER.H2O.INTR.PC/rankings>
- [2] <http://water.rajasthan.gov.in/content/water/en/waterresourcesdepartment/rulespoliciesandacts/vision2045.html>
- [3] Ojha, R., Nagesh Kumar, D., Sharma, A., and Mehrotra, R. (2013). Assessing severe drought and wet events over India in a future climate using a nested bias-correction approach. *ASCE J. of Hydrologic Engineering*, 18 (7) 760-772.
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- [9] Joshi, H., Jadeja, R., Shah M., Bhadiyadra, V. and Padhiyar, N. (2018). “Impact assessment of SAUNI yojna by river interlinking in Saurashtra region”. *Int. J. of Technical Innovation in Modern Engineering & Science* Vol 4(12), p. 234-241.

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## **ANNOUNCEMENTS FOR ANNUAL ISH AWARDS 2020**

### **Nomination for S.N.Gupta Memorial Lecture**

Prof. Vijaykumar Gupta of Colorado University, Boulder (USA) has donated a sum of Rs. 2.5 lakhs towards hosting a memorial lecture in the field of Hydraulics and Hydrological Engineering in the name of his father, late Shri S.N.Gupta, former Secretary, CBIP and Director of U.P. Irrigation Research Institute, Roorkee. The lecture series was started from the year 2003. Nominations are invited for delivering the lecture in this series. This award is given alternatively to a young scientist/academician/researcher below 45 years and a senior scientist/academician/researcher. This year it is the turn of young scientist/academician/researcher.

The nomination letter should contain information about his expertise of the topic on which he will speak. Self nominations are generally discouraged. The lecture would be held during International Conference HYDRO 2020 at Department of Civil Engineering, NIT Rourkela, Odisha. The last date for receiving nominations is 30<sup>th</sup> Sept, 2020.

### **Nomination for ISH R J Garde Life Time Achievement Award**

The Indian Society for Hydraulics has instituted Life-Time Achievement Award for Hydraulic Engineer / Scientist from India who has contributed significantly in the field of hydraulic engineering and water resources. The award consists of Rs. 10,000/- and a citation. Nominations/proposals are invited from the ISH Life members. Self nominations are generally discouraged. The last date for receiving nominations is 30<sup>th</sup> Sept, 2020.

### **Nomination for Prof. R J Garde Young Researcher Award**

ISH constituted this Award in memory of Late Prof. R.J.Garde with the deposit offered by his family and his students to promote the young researchers in the field of Hydraulics and Hydrology. It shall be awarded in the form of a cash prize of Rs. 10000/-, a memento and a certificate. This year the award shall be presented during the International HYDRO Conference 2020 of the ISH to be held at Department of Civil Engineering, NIT Rourkela, Odisha. The nominations should be submitted to the ISH Secretariat for further processing. The award shall be given to young engineers, scientists and researchers who have not completed 45 years of age. The award will be open to Indian Nationals only. The award shall be given mainly for the work done in India in the area of Water Resources Engineering in general and Hydraulic Engineering in particular. ONE complete nomination package (Only one file please) should be submitted to the ISH in the form of soft copy by 30<sup>th</sup> Sept, 2020. The following information must be included in the nomination.

1. Name of the Candidate with complete postal address and mobile number, E-mail, date of birth, age, on last date of nomination
2. Letter of nomination including a statement of not more than 500 words of the Significant Contributions and / or national/international impact and future potential.
3. Two letters of recommendation
4. Chronology of education
5. Chronology of jobs held
6. Complete list of referred publications in journals and conferences (Scanned copies of the first page of five most recent Journal publications are to be attached)
7. Certificate of age should also be attached
8. Any other relevant information

### **Nomination for Prof. U.C.Kothyari Best M Tech & Ph D thesis Award**

ISH Constituted this Award from the year 2013 to encourage the young Indian students of recognized educational institutions in the area of Water Resources Engineering in general and Hydraulic Engineering in

particular (Water Resources, Environment, Coastal Engineering). The Dissertation/Thesis must have been successfully defended during September 30, 2018 to August 31, 2020. The award will be in the form of a cash prize of Rs. 5,000/- for the M Tech dissertation and Rs. 10,000/- for the Ph D thesis and a certificate. This year the award shall be presented during the International HYDRO Conference 2020 of the ISH to be held at Department of Civil Engineering, NIT Rourkela, Odisha. The nomination should be forwarded jointly by the candidate and the thesis supervisor from a recognized educational institution to the ISH Secretariat for further processing. The award shall be given to young engineering, scientific or research students of Indian nationals. The last date for receiving nomination is 30th Sept, 2020. The nomination should be sent as an email attachment to the Secretary, ISH at the following Email address: [ish\\_office@rediffmail.com](mailto:ish_office@rediffmail.com), hard copies are not necessary.

It should contain the following:

- (i) A cover letter that should include one-paragraph CV of the candidate and supervisor,
- (ii) Pdf file of the dissertation/thesis not exceeding 10 MB in size,
- (iii) Any other recognition received for the dissertation/thesis, Journal papers published based on the work, transfer of technology, if happened,
- (iv) Names and affiliations of the referees, who acted as examiners,
- (v) Copies of the examiners' reports, if possible – not mandatory.

ISH assures full confidentiality/copyright of the dissertation/thesis, which will be used only for the purpose of deciding the awards.

## Announcement for International Conference HYDRO 2020

Department of Civil Engineering, NIT Rourkela, Odisha and The Indian Society for Hydraulics (ISH) are jointly hosting 'International Conference HYDRO 2020' on Hydraulics, Water Resources and Coastal Engineering, December 16-18, 2020 at Department of Civil Engineering, National Institute of Technology, Rourkela, Odisha.

The "HYDRO 2020 International Conference" represents a link in the chain of such "Hydro" conference organised annually in India over a period of last two decades under the auspices of The Indian Society for Hydraulics. The conference would provide a forum for presentation and exchange of knowledge and research experience gained in the field of hydraulics, water resources, and coastal engineering by scientists, academicians, practicing engineers and consultants.

Extended versions of the selected papers presented in the conference may be published in ISH Journal of Hydraulic Engineering, Taylor & Francis, UK.

Following e-mail and web pages provide more details of the conference.

Email : [kishanjit@gmail.com](mailto:kishanjit@gmail.com) web: <http://www.ish.net.in>

### ISH LIFE MEMBERSHIP JANUARY – JUNE 2020

S.No	ISH LM NO	Name	S.No	ISH LM NO	Name
1.	1497	Ms. Laxmipriya Mohanty	10.	1506	Dr Sudip Basack
2.	1498	Dr. Gottipati V.K.S. Vara Prasad	11.	1507	Ms. Pooja Shrivastava
3.	1499	Mr. Sandeep Kinge,	12.	1508	Mr. Mohammed Mustafa SH
4.	1500	Mr. Yernagula Rajesh	13.	1509	Mr. Pradeepkumar M. Hodlur
5.	1501	Ms. Yasalapu Bhuvaneshwari Devi	14.	1510	Ms. Priyanka Garsole
6.	1502	Mr. Kalaivannan. R	15.	1511	Dr. Sanjay Shekar N C
7.	1503	Mr. Diravia Balan. S	16.	1512	Mr. Sahil Sanjeev Salvi
8.	1504	Mr. Vikas Gupta	17.	1513	Ms. Madhavi Gajre
9.	1505	Mr. Parag Dilip Mahajan			

## MEMBERS IN NEWS

### CONTRIBUTION OF Dr (Mrs.) V V Bhosekar, DIRECTOR, CWPRS



**Dr (Mrs.) V V Bhosekar**, Director of Central Water and Power Research Station, retired on 30.06.2020 after rendering 38 years of service. She obtained her Bachelor's degree and Master of Engineering (by Research) in Civil Engineering from College of Engineering, Pune. Later she completed her MS from University of Minnesota, USA and PhD from IIT Bombay. She joined the Research Station on 2.8.1982 as Research Assistant in High Head Structures Division and rose up to the position of Director.

Her area of expertise is hydraulic modelling of Reservoir and Appurtenant Structures comprising Spillways & Energy dissipators, Sediment management structures, Canal Automation and Control Structures & Water Conductor Systems using both physical and mathematical models. She has worked on more than 50 major dam projects and has 38 years of experience in the field of hydraulic modeling using both physical and mathematical modeling techniques. She has worked on several projects of National and International importance such as Sardar Sarovar, Salal, Chamara Stage-I, II and III, Koyna, Polavaram, Subansiri, Teesta Stage IV, V, Teesta Low Dam Project-II and IV; Kurichu, Mangdechhu and Punatsangchu (Bhutan) and Salma dam project (Afghanistan). She was Project Coordinator for the National Hydrology Project and Dam Rehabilitation and Improvement Program.

Besides client sponsored projects she has worked on basic research projects for "Design of aerators for orifice spillways" and "Hydraulic design of orifice spillways". She has published 7 Technical Memoranda. She is working as Chairperson, ISO TC113/ SC 6 on "Sedimentation". She was a Member of Dams and Spillways Sectional Committee, WRD 9 and Chairman of committee 'Hydrometry WRD 1' of Bureau of Indian Standards. She has also worked as Member of Dam Design Review Panel of Subansiri Lower Project, ArP/Assam. She has published 127 technical papers in National and International Journals/conferences and contributed in more than 100 technical reports. She was Former Member-Secretary of Indian National Committee on Hydraulics (INCH). She is Life Member of Institution of Engineers. She is the founder member of The Indian Society for Hydraulics (ISH), former editor of ISH Journal and President of Indian Society for Hydraulics (2018-2020). ISH wishes her a healthy, successful and peaceful retired life.

## Review of the Book on Fluid Mechanics : Problem Solving Using MATLAB

By

**Komaragiri Srinivasa Raju and Dasika Nagesh Kumar**

<https://www.phindia.com/Books/BookDetail/9789389347623/fluid-mechanics-kumar-raju>

Fluid mechanics is an essential subject for many science and engineering students. Surprisingly, there are a considerable number of books on Fluid Mechanics. Some of these books offer a sound understanding of fundamental principles, whereas some books cover many applied problems based on these. The book on Fluid Mechanics by Prof. Srinivasa Raju, Department of Civil Engineering, BITS Pilani Hyderabad Campus, Hyderabad and Prof. Nagesh Kumar, Department of Civil Engineering, Indian Institute of Science, Bangalore is the first book of its kind, which not only integrates the fundamentals with applied problems but provides a much-needed thrust on problem-solving. MATLAB codes are developed for all the solved problems in the book. Twelve videos (which is placed along with MATLAB codes at learning centre section of Prentice Hall of India web site) provide a better understanding of the developed codes.

The problems discussed at the end of each chapter have been very carefully formulated and provide solutions to the field problems incorporated by engineers. The distinguishing feature of this book is that all numerical problems in all the chapters have been solved using MATLAB in the very user-friendly manner

There is a balanced coverage of several topics, and the users can develop the skill to compute various quantities of interest including forces in bends as well as on bluff bodies, losses in flow transmission through pipes and in the boundary layer, shear stress, boundary layer including displacement, energy and momentum thickness. Graphical display of flow nets will create more interest in learning the topics like potential flow including velocity potential and stream function. Efficient solution for problems demanding iterative procedures is possible only with a book of this kind. Some important topics like network analysis using Hardy-Cross Method and Gradually Varied Flow (GVF) profile computations can also be documented and basic properties of fluids can be listed in appendix in the upcoming editions of the book so that its utility can be further enhanced.

**Prof. C.S.P. Ojha**

Civil Engineering Department, IIT Roorkee

Date: 12.08.2020

THE INDIAN SOCIETY FOR HYDRAULICS											
(FIXED DEPOSIT AND SAVING BANK COMPARATIVE BALANCE STATEMENT)											
As on 13-Dec-2019						As on 30-Jun-2020					
Canara Bank(S.B A/c No. 25801010000822) Customer ID 30433962						Canara Bank(S.B A/c No. 25801010000822) Customer ID 30433962					
Rs ₹ 1,092,697						Rs. ₹ 1,009,503					
Sr. No.	Name of Bank	Date of Deposit	Date of Maturity	Amount Rs.	Rate of Interest	Sr. No.	Name of Bank	Date of Deposit	Date of Maturity	Amount Rs.	Rate of Interest
1	Canara Bank, Khadakwasla, P.O. R.S., Pune - 411024 (9 FDs)	27-Aug-18	26-Aug-21	800000	6.20%	1	Canara Bank, Khadakwasla, P.O. R.S., Pune - 411024 (9 FDs)	27-Aug-18	26-Aug-21	800000	6.20%
		08-May-19	08-May-22	1413862	6.00%			08-May-19	08-May-22	1413862	6.00%
		02-Jul-19	02-Jul-22	784373	6.60%			02-Jul-19	02-Jul-22	784373	6.60%
		07-Mar-17	07-Mar-22	307723	6.90%			07-Mar-17	07-Mar-22	307723	6.90%
		07-Mar-17	07-Mar-22	228914	6.90%			07-Mar-17	07-Mar-22	228914	6.90%
		09-Mar-17	09-Mar-20	300000	6.90%			09-Mar-20	09-Mar-23	361080	6.25%
		09-Mar-17	09-Mar-20	400000	6.90%			09-Mar-20	09-Mar-23	481441	6.25%
		09-Mar-17	09-Mar-20	700000	6.90%			09-Mar-20	09-Mar-23	842524	6.25%
		30-May-17	30-May-20	400000	6.70%			30-May-20	30-May-23	478995	5.70%
Total FD amount with Canara Bank ₹ 5,334,872						Total FD amount with Canara Bank ₹ 5,698,912					
Grand Total ₹ 6,427,569						Grand Total ₹ 6,708,415					
(Rupees Sixty four lakh twenty seven thousand & five hundred and sixty nine only)						(Rupees Sixty seven lakh eight thousand four hundred and fifteen only)					

## FORTHCOMING CONFERENCES / SEMINARS

Sr.No.	Name of Conference	Date	Venue and contact details
1	HYDRO 2020-International Conference (Hydraulics, Water Resources and Coastal Engineering)	16 <sup>th</sup> -18 <sup>th</sup> Dec, 2020	NIT Rourkela, <a href="https://www.hydro2020.org">https://www.hydro2020.org</a> , <a href="http://ish.net.in/">http://ish.net.in/</a>
2	The 14th Conference on hydroinformatics	11 <sup>th</sup> -15 <sup>th</sup> Jan, 2021	Mexico, <a href="http://www.hic2020.org">www.hic2020.org</a>
3	6th IAHR Europe congress Hydro-Environment Research and Engineering Noframes No Borders	15 <sup>th</sup> -18 <sup>th</sup> Feb, 2021	Warsaw Poland <a href="https://iahr2020.pl/">https://iahr2020.pl/</a>
4	Workshop on Advanced measurement Techniques and Experimental Research - W.A.T.E.R.2020	22 <sup>nd</sup> -26 <sup>th</sup> Feb, 2021	Bolzano-Bozen, Italy <a href="https://water2020.events.unibz.it/">https://water2020.events.unibz.it/</a>
5	30 <sup>th</sup> Symposium on Hydraulic Machinery and Systems	21 <sup>st</sup> -26 <sup>th</sup> Mar, 2021	Lausanne, Switzerland <a href="https://iahr2020.epfl.ch/">https://iahr2020.epfl.ch/</a>
6	XXIX Latin American Hydraulic Congress,	12 <sup>th</sup> -16 <sup>th</sup> Apr, 2021	Acapulco, Mexico <a href="http://congresolatamiahr.com/">http://congresolatamiahr.com/</a>

### BOOK - POST

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