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ISH-NEWS

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THE INDIAN SOCIETY FOR HYDRAULICS

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ANNOUNCEMENT FOR INTERNATIONAL CONFERENCE HYDRO 2023

Civil Engineering Department of the National Institute of Technology Warangal, under the aegis of the Indian Society for Hydraulics (ISH) is holding 28th International conference "HYDRO 2023 INTERNATIONAL" on Hydraulics, Water Resources, River and Coastal Engineering from December 21 to 23, 2023 at Warangal, India. The conference aims at providing a forum for dissemination of recent contributions from academicians, scientists, researchers, practitioners and consultants in the fields of hydraulics, hydrology, water resources, river and coastal Engineering.

The "HYDRO 2023 International Conference" represents a link in the chain of such "Hydro" conference organised annually in India over the 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, river 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.

a) Visit the webpage https://cms.nitw.ac.in/conference/hydro2023/.
b) Visit the webpage web : https://www.ish.net.in for brochure OR contact on email hydro2023@nitw.ac.in for any queries related to the conference.

ANNOUNCEMENTS FOR ANNUAL ISH AWARDS 2023

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 a senior 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 28th International Conference HYDRO 2023 at NIT Warangal, INDIA. The last date for receiving nominations is 30th Sept, 2023.

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 ₹ 10,000/- and a citation. **Nominations/proposals are invited from the ISH Life members.** Self-nominations are generally discouraged. The nominations should be submitted to the ISH Secretariat for further processing. The last date for receiving nominations is 30th Sept, 2023.

Nomination for Prof. R J Garde Young Researcher Award

ISH instituted this Award in memory of Late Prof. R.J. Garde with the deposit offered by his family and his students to promote young researchers in the field of Hydraulics and Hydrology. It shall be awarded in the form of a cash prize of ₹ 10000/-, a memento and a certificate. This year the award shall be presented during the International HYDRO Conference 2023 of the ISH to be held at NIT Warangal, INDIA. 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. Complete nomination proposal in single .pdf file shall submitted to the ISH Secretariat in the form of soft copy by 30th Sept, 2023. 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 is to be attached)
7. Certificate of age should also be attached
8. Any other relevant information.

Nomination for Best M Tech Thesis award in three categories, viz Hydraulics, Water Resources and Coastal Engineering & Best Ph D Thesis Award

The Indian Society for Hydraulics (ISH) has instituted Best M Tech Thesis awards in three categories viz. Hydraulics, Water Resources and Coastal Engineering, to encourage the young Indian students from recognized technical institutions. The Dissertation/Thesis must have been successfully defended during October 1st, 2022 to September 30th, 2023. The award will be in the form of a cash prize of ₹ 5,000/- for the M Tech dissertation on each of the above themes & a certificate. Also, apart from above, one PhD Thesis would be awarded, overall, in the areas of Hydraulics, Water Resources and Coastal Engineering having a cash prize of ₹ 10,000/- & a certificate. This year the award shall be presented during the upcoming International HYDRO Conference 2023 of ISH to be held at NIT Warangal. The recommendations should be submitted to this email **ish.academicaward@gmail.com only** through their respective supervisors for further processing. The award will be open for Indian nationals only. The last date for receiving nomination is September 30th, 2023.

The nomination should contain the following:

(i) A Nomination letter shall include brief (one para) CV of the candidate,

(ii) A Pdf file of the dissertation/thesis not exceeding 20 MB in size,

(iii) Any other recognition received for the dissertation/thesis like Papers published in journals based on the Thesis work included in SCOPUS (cite score), SCI/SCI(E) (Clarivate analytics); reputed International/ National conference proceedings, book chapters, transfer of technology, if happened,

(iv) Names and affiliations of the referees, who acted as examiners,

(v) The nominees are requested to submit the duly filled proforma enclosed at **Annexure-I** along with justification note as mentioned.

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

Annexure – I

Format for evaluation of the ISH Best M Tech Thesis award in three categories, viz Hydraulics, Water Resources and Coastal Engineering & PhD Thesis Award (2022-23)

Instituted by the Indian Society of Hydraulics (ISH)

I. General Information

Name of the Student: ……

Name of the course: ……

Name and address of the Department/University/ Institute: ……

Place where the Project work was undertaken : ……

Duration of dissertation : ……Year & …… months

Starting date : …….. Completion date :……..

II. Name of the research guide(s) and affiliation(s): ……

III. Title of the dissertation :……

IV. Thematic area of the dissertation:

V. Evaluation Sheet :

No	# Criteria
1	Originality/Novelty
2	Structure and Quality of writing
3	Background, Literature review, Problem Definition and Objectives
4	New numerical and experimental Techniques developed
5	Presentation of results, discussion and overall conclusions
6	Significant outcome and scope of future work
7	Societal Importance
8	Publications/Patents/Copyrights (based on supporting documents)

 # Please justify point-wise the evaluation criteria given above in a separate one-page note for assessment by evaluation committee.

VI. Additional Comments (if any) :

VII. Name and Address, email / Contact No. of the – self & Nominator :

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Pumped Storage Hydroelectric Power Plants : Harnessing Energy for a Sustainable Future

By

Dr J D Agrawal, Fellow ISH and Professor,
Dr D Y Patil, Institute of Technology, Pimpri, Pune
jagottam.agrawal@dypvp.edu.in

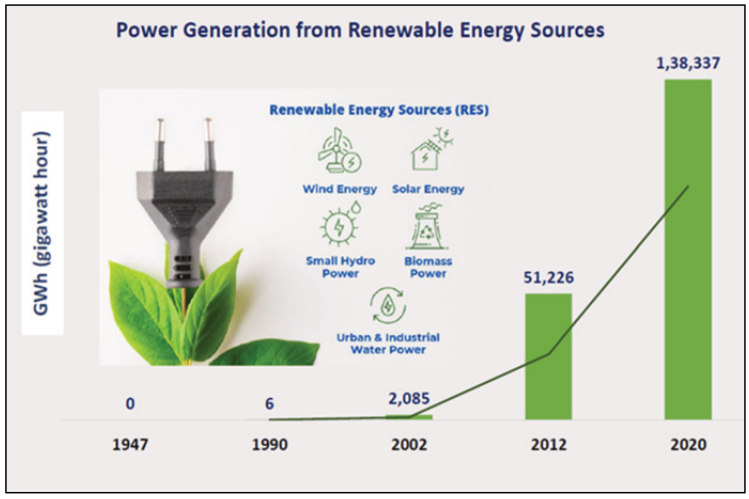
Introduction :

With a population of 1.3 billion, India has a massive demand for energy to fuel its rapidly growing economy. From a power deficit nation at the time of Independence, the efforts to make India energy-independent have continued for over seven decades. Power generation plays a fundamental role in modern society, providing the energy necessary to drive economic growth, support infrastructure, and enhance our quality of life. Today, we are a power surplus nation with a total installed electricity capacity of over four lakh MW. The installed capacity of power generation as on 31.05.2023 is as follows :

All India Installed Capacity of Power Generation (MW)

Sources	Thermal	Renewable Energy Sources	Nuclear	Total
Installed Capacity	2,37,269	1,73,619	6,780	4,17,668

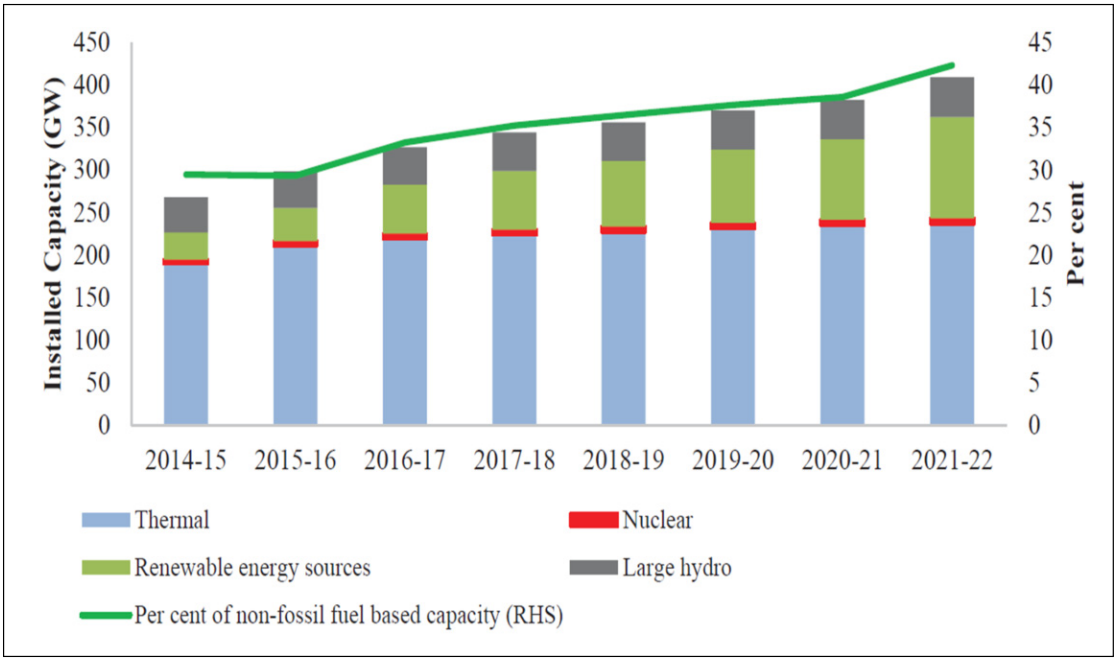
Keeping in mind the sustainable development goals, India's power generation mix is rapidly shifting towards a more significant share of renewable energy. Renewable energy percentage as compared to total energy generation has been continuously increasing as can be seen from the figure below. Today, India is the world's third largest producer of renewable energy with more than 40% of its installed electricity capacity coming from non-fossil fuel sources. The country's vision is to achieve Net Zero Emissions by 2070, in addition to attaining the short-term targets which include: Increasing renewables capacity to 500 GW by 2030, Meeting 50% of energy requirements from renewables, and reducing cumulative emissions by one billion tonnes by 2030.



Renewable energy resources presently account for about 41.56% of the total power generated. The percentage of renewable energy with respect to total power generation has been continuously increasing as can be seen from the graph below:

Challenges Posed by Renewable Energy Sources:

Renewable energy sources also called variable energy resources (VERs) are dependent on environmental conditions and therefore exhibit fluctuations in their output. Unlike traditional power generation sources, such as fossil fuels or nuclear energy, VERs are characterized by their intermittent nature, making their integration into the power grid a unique challenge. The variability of these energy resources poses challenges for grid operators and necessitates the development of strategies to manage fluctuations and ensure a reliable power supply.



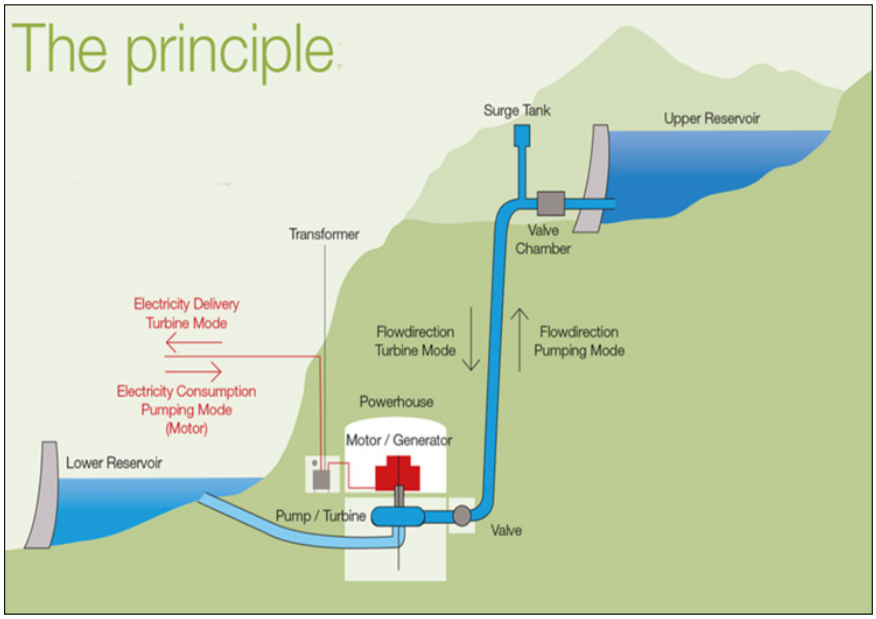
At present, Variable Renewable Energy Sources (VRE) such as wind and solar are being connected to the grid at a rapid pace owing to their low cost of installation and the thrust on sustainable & green energy. The energy supply from VREs can't be regulated fully since they are dependent on the time of the day, different seasons, and the vagaries of weather. Hence, there is an ever-increasing demand for Flexible Energy Generation and Storage Assets. Pumped Storage Power plants (PSP) are best suited in the present scenario for addressing this demand. PSPs are also known as **'the Water Battery'**, which is an ideal complement to modern clean energy systems. In the quest for clean and renewable energy sources, pumped storage hydroelectric power plants have emerged as an innovative solution. As the demand for electricity continues to rise and the need to reduce carbon emissions becomes more urgent, these power plants offer a viable and sustainable alternative. The losses in the pumping process make PSPs a net energy consumer, but it earns revenue by selling more electricity during periods of peak demand, when the tariffs are the highest. This paper explores the concept, advantages, challenges associated, and present status in India with pumped storage hydroelectric power plants highlighting their potential to revolutionize the energy landscape.

Understanding Pumped Storage Hydroelectric Power Plants:

Pumped storage hydropower (PSH) is a type of hydroelectric energy storage. It is a configuration of two water reservoirs at different elevations that can generate power as water moves down from higher level reservoir to lower-level reservoir passing through a turbine. The system also requires power as it pumps water back into the upper reservoir (recharge). PSH acts similarly to a giant battery, because it can store power and then release it when needed.

Pumped storage hydroelectric power plants utilize gravitational potential energy to generate electricity. The basic principle involves two reservoirs located at different elevations. During periods of excess electricity generation, such as during off-peak hours or high renewable energy output, the surplus energy is used to pump water from the lower reservoir to the upper reservoir. When electricity demand is high, water is released from the upper reservoir, flowing through turbines to generate electricity, before being stored again in the lower reservoir.

PSPs provide the necessary scale of storage and have a long service life of more than 40-50 years. This is much more than any other energy storage technology presently available. This also results in a low cost of delivered energy over the life of the projects. They are non-polluting and are more environmentally friendly. Pumped Storage Projects account for over 95 percent of installed global energy storage capacity, well ahead of lithium-ion, other battery types, compressed air and flywheels. It is estimated that pumped hydro projects worldwide store up to 9,000 gigawatt hours (GWh) of electricity worldwide.



Advantages of Pumped Storage Hydroelectric Power Plants :

Energy Storage : PSPs are used for peaking operation and improves the reliability of the power system. While battery storage solutions are still evolving and are required for short duration storage needs in grid management, PSPs are a natural enabler for integrating greater amounts of wind and solar power. PSPs act as large-scale energy storage systems, allowing excess electricity to be stored for later use. This feature enhances grid stability, mitigates intermittent renewable energy supply, and enables load balancing, ultimately promoting a reliable and efficient energy system. PHS has a round trip efficiency of 70-80% (meaning 20-30% of electricity is lost), depending upon the distance and gradient separating upper and lower reservoirs.

Grid Flexibility : These power plants provide grid operators with the flexibility to respond to sudden changes in demand or supply. By ramping up or reducing electricity production within few seconds / minutes through these PSP's. They contribute to grid stability and help maintain a constant power supply, even during peak demand periods or when renewable energy sources experience fluctuations.

Renewable Integration : Pumped storage plants play a crucial role in integrating intermittent renewable energy sources, such as solar and wind, into the grid. They can absorb excess electricity during periods of high generation and release it when renewable sources are unable to meet demand, thereby reducing the need for fossil fuel-based backup power plants.

Environmental Benefits : PSPs have minimal impact on the environment in their vicinity as they are mainly envisaged on the existing Hydro Electric Projects, reservoirs, or as off-the-river projects. All components of PSPs are connected, operated, and maintained in an environmentally friendly manner. There are no residual environmental impacts in the case of PSPs. The assessment of the storage technologies should be based on life cycle cost including the cost of decommissioning. Pumped storage plants produce electricity without direct greenhouse gas emissions. As a clean energy solution, they contribute to reducing carbon footprints, combatting climate change, and improving air quality compared to traditional fossil fuel-based power generation.

Atmanirbhar Bharat : The guidelines for the development of storage systems should be synchronized with the vision of Atmanirbhar Bharat. The PSPs primarily use indigenous technologies and domestically produced materials. Most of the electrical & mechanical parts of PSPs are also made in India. Other alternate solutions to storage such as batteries are heavily import-dependent especially given the current holding of lithium reserves at the global level. The increasing demand for storage poses a major challenge to the energy security of our country.

Challenges and Considerations:

Geographical Constraints : Pumped storage plants require specific geographical characteristics, including suitable topography and access to adequate water sources. Identifying appropriate locations can be challenging, limiting the widespread implementation of such power plants.

High Initial Costs : The construction and installation of pumped storage plants involve substantial upfront investments. The expenses include building reservoirs, tunnels, and powerhouses, as well as installing turbines and transmission infrastructure. However, the long-term benefits and potential revenue streams justify these costs.

Environmental Impact : While pumped storage plants are relatively clean during their operation phase, their construction may cause environmental disruptions. Careful planning and assessment are necessary to minimize adverse effects on ecosystems, water resources, and local communities.

Present Status

Status of pumped storage development in India as on 31.10 2022 is as follows:

Sr. No.	Project Name	Capacity	Total (MW)
1	Nagarjuna Sagar, Telangana	7x100.80	705.60
2	Srisailam LBPH,Telangana	6x150	900
3	Kadamparai, Tamil Nadu	4x100	400
4	Bhira, Maharashtra	1x150	150
5	Ghatgar, Maharashtra	2x125	250
6	Purulia, West Bengal	4x225	900
		Sub Total	3,305.6 MW
7	Projects which are not working in pumping mode		4,785.6 MW
8	Projects under construction		2,700 MW
9	One reservoir existing and one to be constructed		6,420 MW
10	Projects where survey and investigation has been done and to be taken up		15,360 MW

Conclusion:

Pumped storage hydroelectric power plants represent a promising solution for achieving a sustainable energy future. By enabling efficient energy storage, grid flexibility, and integration of renewable sources, these power plants contribute to the decarbonization of electricity generation. Despite the challenges associated with their implementation, the benefits outweigh the drawbacks. With proper planning and strategic deployment, pumped storage hydroelectric power plants can play a pivotal role in transitioning towards a cleaner and more resilient energy system, helping us meet the challenges of the future while reducing our environmental impact.

Recently Govt. of Maharashtra has signed an MoU for creation of three pumped storage hydropower projects of 5700 MW capacity with an investment of ₹ Rs 27,000 crores during June 2023. These project sites are Karjat (3000MW), Raigarh (1200MW) and Junar (1500 MW).

Government of India has issued “Draft guidelines to promote development of Pump Storage Projects (PSP) in the country” vide Letter No F. No. 15-141912022-H-II (Part) Dated: 15th February, 2023.

Note : All the data in the above writeup have been taken from Central Electricity Authority (CEA) website.

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List of New ISH Life Members Joined from Jun 2022 to July 2023

Sr. No.	ISH Life Membership No.	Name	Institute / Location
1	1584	**Nishank Agrawal**	Shiv Nadar University, Uttar Pradesh
2	1585	**Dr. Ellora Padhi**	Shiv Nadar institution of Eminence, Uttar Pradesh
3	1586	**Dr. Ashutosh Sharma**	Departmnet of Hydrology, Indian Institute of Technology Roorkee, Roorkee, Uttarakhand
4	1587	**Dr. Har Amrit Singh Sandhu**	Deptt. Of Civil Engg, Punjab Engineering College, Chandigarh
5	1588	**Kislay Kumar**	NIT Raipur, Raipur, Chhattisgarh
6	1589	**Dr. Vikas Kumar Vidyarthi**	Department of Civil Engineering , NIT Raipur, Raipur, Chhatisgarsh 492010
7	1590	**Mohit Kumar**	Civil Engineering Deptt. Punjab Engineering College, Chandigarh
8	1591	**Dr. Vijay K G**	Departmnet of Ocean Engineering, IIT Madras, Tamil Nadu
9	1592	**Dr. Ajay Kumar Thawait**	MANIT, Bhopal
10	1593	**Rajesh Murlidhar More**	Nashik, Maharashtra
11	1594	**Nav Kumar Mahato**	Dhanbad, Jharkhand
12	1595	**Lalitesh Sinha**	Indore (M.P)
13	1596	**Sushmitha G. S.**	Vidvardhaka College of Engineering Gokulam Civil Engg Department, Mysuru, Karnataka
14	1597	**Dr. Vimal Chandra Sharma**	Telangana State
15	1598	**Tanushree Sinha**	Indore, M.P
16	1599	**Dr. Mohammad Saud Afzal**	IIT Kharagpur Campus, Kharagpur, West Bengal
17	1600	**Dr. R. Manjula**	Department of Civil Engg. National Institute of Technology, Tiruchirappalli
18	1601	**Mr. Tejas Bansode**	Satara, Maharashtra
19	1602	**Dr. Praveen K. M.**	CWPRS, Khadakwasla, Pune
20	1603	**Dr. Mahesh Patel**	Deptarment of Civil Engg, NIT Jalandhar Campus, NIT Jalandhar, Punjab

FORTHCOMING CONFERENCES / SEMINARS

Sr No	Name of conference	Date	Venue and Contact Details
1	4th IAHR Asian Working Group Symposium on Hydraulic Machinery and Systems	12-16 August, 2023	Kashgar, China, www.iahr2023asia.tsinghua.edu.cn
2	40th IAHR World Congress "Rivers - connecting Mountains and Coasts"	21-25 August, 2023	Vienna, Austria, https://rivers.boku.ac.at/iahr/
3	15th International Symposium on River Sedimentation (ISRS)	5-8 September, 2023	Florence, Italy, https://www.isrs2022.it/
4	13th Symposium on River, Coastal and Estuarine Morphodynamics RCEM 2023	25-28 September, 2023	Illinois, USA, https://rcem.cee.illinois.edu/
5	The 3rd International Symposium on Sustainable Urban Drainage	19-22 October, 2023	Zhejiang , China, http://sud.nbu.edu.cn/
6	1st IAHR and 4th CAE International Conference on Global Water Security and Sustainable Development	30 October - 1 November, 2023	Nanjing, China, https://icgws2023.iahr.org/en/web/index/
7	SimHydro 2023	8-10 November, 2023	EDF LAB Chatou, France https://simhydro.eu/
8	The 3rd International Symposium of Water Disaster Mitigation and Water Environment Regulation (WDWE2023)	15-17 November, 2023	China, http://www.wdwe2023.com/
9	7th Symposium on Sustainable Systems	29 November - 1 December, 2023	Brazil, https://www.7sss.com.br/submissao-artigo/
10	HYDRO 2023 - 28th International Conference on Hydraulics, Water Resources and River Engineering	21-23 December, 2023	NIT Warangal, Telangana, India https://cms.nitw.ac.in/conference/hydro2023/

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The Indian Society for Hydraulics
as a body accepts no responsibility for the statements made by individuals.

Amit Kulhare, Secretary,
on behalf of the Indian Society for Hydraulics,
Phone No. 020-24103483

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Central Water & Power Research Station (CW&PRS),
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