THE DAMS NEWSLETTER

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Editor's letter

ICOLD in the 21st Century: Safety, Inclusion and Innovation

Devendra K. Sharma
ICOLD President
2025-2028

It is a great honour, responsibility and opportunity for me to be President of the International Commission on Large Dams (ICOLD/CIGB) which has served as an integral organisation for this sector since its founding in 1928. I am happy to share that 101 member countries proudly participate in ICOLD as its members. I am deeply honoured and humbled by the trust ICOLD General Assembly has placed in me to serve as President of the ICOLD. I have accepted this role with optimism, and a clear commitment to the mission of ICOLD. Since its inception, ICOLD has led the profession in ensuring that dams are built safely, efficiently, economically, and sustainably. To achieve this mission, professionals in ICOLD family have worked voluntarily and tirelessly. ICOLD is a global family of professionals working for cause of the profession.

Growing up in India a developing country, one of the world's oldest civilizations and a nation that today stands at the crossroads of rapid development and deep-rooted sustainability, I have seen first hand how water storage, sustainable power generation and distribution are the heartbeat/prime movers of economic growth and the aspirations of the population. I have dedicated my career to advancing dams construction, hydropower and energy infrastructure. I have had the privilege to serve in the water and energy sectors, for over 43 years where I have been associated with the planning, design and construction of dams and hydroelectric projects and policy pertaining to these projects.

At this crucial juncture in human history, we are confronting a planetary emergency. With extreme weather, and climate change becoming a reality, we are increasingly grappling with the challenges of dam safety, rehabilitation and improvement of aging dams, climate change, water insecurity and the energy transition. Spatial and temporal distribution of rainfall is undergoing dynamic change, annual water distribution in rivers is changing with reduction of lean period flows and needs of society are becoming complex. In view of these realities and uncertainties of climate change, job of professionals working for dams is becoming more and more critical. ICOLD has been setting standards, sharing best practices, and fostering dialogue through Symposiums and Congresses for the last 97 years and we will rise to take these challenges in our stride and address them wholeheartedly.

After my election as the President, during my speech in Chengdu on 20th May, 2025, I have outlined dam safety as one of my priorities. We need to work hard to make sure that accidents of dams are reduced to minimum. Incidents of dam failure endanger lives, economy, and the environment. Moreover, with every accident, the trust of the people in general and population living downstream of the dam gets eroded. Professionals working for dams and hydropower, need to have ultimate commitment to ensure dam safety for betterment of society.

During his acceptance speech following his election, as ICOLD President, 2025-2028

The likelihood of an event undermining the safety of a dam can be reduced through careful design, construction, and operation and maintenance. It is very important to learn from the past incidents and dam failures such that these are not repeated in the future. An actionable first step in this direction is to work with the National Committees of the ICOLD member countries who will be requested to provide a direct link to ICOLD database of the World Register of Dams on their website such that this knowledge platform is directly extended to all the members of ICOLD. Knowledge sharing will become essential as we rise to meet global challenges of dam safety and their complexity.

We must also work together to foster 'Gender Diversity and Inclusion' in ICOLD. At the moment, the gender ratio in ICOLD is rather lopsided. We need to work jointly to invite more diverse professionals to our annual conferences, and to nurture rising young talent so the next generation of ICOLD can also represent diversity of viewpoints and gender. My election to office is a promising signal that this esteemed organization is looking to welcome professionals from diverse backgrounds, and I hope we continue to make friends and include talent to enact our mandate. For long term sustainability of ICOLD, greater participation of Young Professionals in ICOLD activities is important. ICOLD Board will extend full support to boost the Young Professional Forum through their active engagements.

An Adhoc Committee has been constituted to assist ICOLD Board to promote inclusivity in ICOLD in order to ensure that most of the underrepresented national committees of the ICOLD member countries are in a position to participate in activities of ICOLD and are not held back due to financial constraints. ICOLD also will work to assist developing countries across the Global South to accelerating development and management of their water and hydropower resources including Pumped Storage Plants through professional assistance and capacity building by exchange of knowledge and passion for dam engineering.

For sustainability of ICOLD and also undertaking new initiatives, it is important that ICOLD has sufficient financial reserves to run its operations including expenses of the central office at least for two years. During the COVID-19 period, we have experienced the importance of financial reserves to run our activities. We will work with the National Committees to strength finances of the ICOLD by recovering the pending arrears and creation of a new National Committee in countries where the existing Committee has become non-functional.

Throughout the history, Dams have played a major progressive role by providing water and food security. Today their role has become even more important to provide energy transition for induction of intermittent renewable energy in the form of solar, wind and bio-mass into the grid. Energy storage in the form of water by construction of dams has become essential to combat the impacts of climate change and to ensure grid security and stability. ICOLD will actively take up with the National Committees to incorporate this role of dams in the policy framework in their countries.

ICOLD will try to advocate the role of dams and reservoirs in the energy transition and Climate Change adaptation during the COP meetings. I will do my best with my fellow ICOLD Board Members to ensure a bright future for ICOLD and to keep the ICOLD family honoured and bonded.

In the end, let me share with you that every year, ICOLD holds an Annual Meeting open to all having interest in development, construction, operation and maintenance and rehabilitation of dams. These Annual Meetings and International Symposium are essentials for better dams in our shared future. Let me invite you all to attend ICOLD 2026 in beautiful city of Guadalajara, Mexico, from 23- 29th May, 2026.

Devendra K. Sharma (in the middle), newly elected, with the current ICOLD President in Chengdu, Michel Lino (on his right) and six former ICOLD Presidents. From left to right: Anton Scheiss, Jia Jinsheng, Adama Nombre, Cassio Viotti, Kaare Hoeg, Michael Rogers.

I am excited to continue pushing our shared vision and work and reinvigorate the narrative on dams. We have to renew the world's trust in dams. In today's world, dams should not be perceived as an outdated relic, but have become a dynamic solution to the problems of water, food and energy security as well as energy transition. With the support of my colleagues in the ICOLD Board, I promise to live up to the trust of ICOLD family in implementing the above framework, delivering mandates in ICOLD and to keep the ICOLD flag flying higher and higher.

QUESTIONS TO ...
...OUR TWO NEW VICE-PRESIDENTS

Luis Guillermo Mas Vellacich

You have been elected Vice President of ICOLD for the Americas, can you introduce yourself in a few words?

My name is Luis Vellacich, a 50-year-old Civil Engineer, educated at the National University of Asunción in 1999, and specialized in dam safety at the Federal University of Bahia in 2015. I have worked in civil construction since the beginning of my professional career, having served as Resident Engineer during the construction of the Aguapey Dam, part of the Yacyretá Hydroelectric Complex. Since 2010, I have been part of the Dam Safety team at ITAIPU Binational, and since 2020 I have been the Superintendent of this area.

What would you like to accomplish during your three-year term?

The greatest challenge I will face during this period will be to work towards improving dam safety standards across the Americas, ensuring that most of the countries comprising this region gain access to ICOLD and its guidelines.

What does it mean to you to join the board of ICOLD?

For all the professionals who are part of this great family, being part of the ICOLD board means great pride but at the same time entails a great responsibility, as we represent not only our country but also the entire continent. In my particular case, this position on the board is key to advancing in my country with the task of raising awareness about the importance of having specific legislation for Dam Safety, understanding that We are in development and that hydropower is our main source of energy, and that the future holds the construction of new dam projects for us.

Harisson Mutikanga

What does your election as Vice President of ICOLD for Africa mean to you?

Being elected Vice President of ICOLD for Africa is both an honor and a responsibility. The role aims to strengthen Africa's voice within ICOLD, advocate for greater African participation in technical committees, and ensure priorities like climate resilience, capacity building, and sustainable infrastructure are addressed. The Wadi Derna dam failure in Libya (2023) highlights the urgent need to reassess aging dam infrastructure amid climate extremes. The Vice President plans to work with National Committees to promote dam safety reviews and use platforms like Hydropower & Dams Africa 2025 to foster dialogue, collaboration, and proactive measures for safe and resilient dams.

Can you introduce yourself in a few words?I

I'm a civil engineer with 30+ years of experience in water and energy utility management and currently serves as CEO of Uganda Electricity Generation Company Limited (UEGCL), overseeing major hydropower projects. I hold degrees from Makerere University (Uganda), IHE Delft, and Delft University of Technology (Netherlands). In addition to executive duties, I am also an active researcher and I have published on water resources and hydropower infrastructure. I am Vice President and founding member of UCOLD, serve on Uganda's Engineers Registration Board, and advocate for safety, innovation, and human capital development, mentoring young African engineers. I am also a member of Rotary International, promoting humanitarian and environmental initiatives.

How do you think ICOLD should evolve in the coming years?

ICOLD should position itself as a global leader in climate resilience and sustainability by:

- Updating Technical Standards: Continuously develop and disseminate guidance that addresses emerging climate risks and ageing infrastructure, with a focus on supporting vulnerable countries.
- Building Future Capacity: Invest in training and mentoring the next generation of dam professionals to ensure long-term safety and innovation.
- Strengthening Global Collaboration: Promote structured peer-to-peer partnerships among National Committees, encouraging mentorship and knowledge transfer through formal agreements (e.g., CDA–UCOLD, CHINCOLD–UCOLD).

93rd General Assembly

The General Assembly was held on 20 May 2025 in Chengdu.

Key decisions

- Devendra Kumar Sharma (India), elected as New ICOLD President (Mandate 2025-2028)
- Luis Guillermo Vellacich Mas (Paraguay) elected as New ICOLD Vice-President for the America Zone (Mandate 2025-2028)
- Harrison Mutikanga (Uganda) elected as New ICOLD Vice-President for the Africa Zone (Mandate 2025-2028)
- Jordan is elected as a New Member Country.
- 5 Countries without a National Committee have been excluded.
- 2 new bulletins were adopted (Bulletin 207: Extreme flood estimation and associated uncertainty and Bulletin 208: Integrating dams with the environment – Case studies involving planning, construction and operation of dams demonstrating environmental and socio-economic benefits). Preprint versions are available for members on our website.
- Creation of the Ad Hoc Committee on the Amendments of the Constitution and By-Laws.

The ICOLD Board is committed to fostering an inclusive global dam engineering community and supports the establishment of a permanent Gender Diversity and Inclusion Forum. The Board and the Secretary General will actively promote equitable participation, fair representation, and inclusive leadership opportunities for all, regardless of gender, across all ICOLD activities, events, and decision-making processes.

Honorary members

3 members have been awarded

Dr. George Annandale

He is a civil engineer with 50+ years of experience in water resources. He created the Erodibility Index Method, wrote several books, and won major awards for his work on dams and climate change.

Dr Noriaki Hashimoto

He is a Veteran civil engineer with 43 years at Kansai Electric Power, led major hydro projects in Asia, earned a PhD from Kyoto University, and played key roles in international dam conferences and seismic regulation collaborations.

Prof. Zhang Chuhan

He is a Tsinghua University professor and CAS member. He is a pioneer in dam seismic safety. Over 60 years, he led disaster response during major Chinese earthquakes and evaluated over 30 high dams. He founded a key research group, mentored 50+ students, and advanced global collaboration in hydraulic engineering.

President & Vice-Presidents awarded

Michel Lino (President)

Joaquim Pimenta de Avila

Devendra K. Sharma

Quentin Shaw

Dean D. Durkee

Enrique Cifres

ICOLD Congress 2025: The largest grand event in dam society was successfully held in Chengdu in May 2025

The 28th International Commission on Large Dams (ICOLD) Congress and 93rd Annual Meeting was held from May 16 to 23, 2025 in Chengdu, China. As the largest grand event in dam society, it attracted 2,444 delegates from 85 countries and regions. The number of participating countries and attendees reached an all-time high. This event focused on the theme "Common Challenges, Shared Future, Better Dams" and a rich technical agenda was arranged, including 6 plenary session, 38 sub topic sessions, 36 ICOLD Technical Committee (TC) workshops and TC meetings, and 14 CHINCOLD workshops, etc.. The combination of the Congress, International Symposium, workshops, exhibition and study tours interprets "better dams" as safer, smarter and more eco-friendly dams.

The 93rd Annual Meeting of ICOLD started on May 16, preceded by four short courses on May 15 and followed by 23 workshops proposed by ICOLD Technical Committees. On May 17, 28 ICOLD Technical Committees held their TC meetings, attracting over 600 delegates to attend onsite and online.

The International Symposium organized by Chinese National Committee on Large Dams (CHINCOLD) was held on May 19. The theme video "Better Dams" was played at the opening ceremony, elaborating on the development process of dams in China, transformation of concepts, and understanding of better dams considering the needs of social economic development. ICOLD President Mr. Michel Lino, Vice Minister of Water Resources of P. R. China Mr. Wang Bao'en, CHINCOLD President Dr. Jiao Yong and invited guests delivered opening speeches, followed by a plenary session of 5 keynote presentations.

Opening Speakers of International Symposium on "Common Challenges, Shared Future, Better Dams"

Keynote session
Moderated by Dr.Jia Jinsheng (Hon. President of ICOLD) and Ms. Lisa Bensasson (Vice President of ICOLD)

China's dam construction in the age of intelligence
Dr. Zhong Denghua, Academician of Chinese Academy of Engineering

Global perspectives of dam safety in the USA
Mr. Michael Rogers, Hon. President of ICOLD

Risk-informed approach for safe dam management
Prof. Suzanne Lacass, Technical Director of NGI

Development and practices of reservoir water-sediment regulation Technology in China
Dr. Hu Chunhong, Academician of Chinese Academy of Engineering

Facing the future: challenges and opportunities in building better dams and storage
Mr. Marcus Wishart, World Bank's Lead Water Resource Specialist

5 parallel sessions were arranged focusing on the following technical topics:

- T1: Precautionary management of dams and river basin under climate change
- T2: Multifunctional development of dams and reservoirs
- T3: Technologies for dam design and construction under complex (extreme) conditions
- T4: Digital technology applied in dams and digital river basins
- T5: The role of dams in achieving the goal of reducing carbon dioxide emissions

420 papers from 39 countries have been accepted, among which 78 papers have been selected to deliver oral presentations and 94 papers for poster.

The 28th ICOLD Congress started on May 21, lasting 3 days. ICOLD President Mr. Michel Lino, Governor of the People's Government of Sichuan Province Ms. Shi Xiaolin, CHINCOLD President Dr. Jiao Yong and invited guests, including Chair of IHA Mr. Anton Louis Olivier, President of ICID Mr. Marco Arcieri, President of WWC Mr. Loic Fauchon and Representative of IME Mr. Enrique CIFRES, delivered opening speech. In his opening speech, Mr. Michel Lino emphasized the importance of water storage facilities and pointed out that extreme weather brought about by climate change poses unprecedented challenges to reservoir dams. He proposed to further improve dam planning, design, construction, and operation, enhancing resilience, to make dams more sustainable infrastructures and contribute to sustainable development. The Minister of Ministry of Water Resources, P. R. China, Mr. Li Guoying made the keynote presentation. He introduced the progress and practice of safety management, ecological protection, and intelligent technology development of reservoir dams throughout their entire life cycle in China, advocated that the global dam society work together to build safer dams, smarter and more-ecological dams, to increase management efficiency to ensure high-level safety of dams and river basin.

Opening speech by ICOLD President Mr. Michel Lino

Keynote by the Minister of Ministry of Water Resources, P. R. China, Mr. Li Guoying

During the Opening Ceremony, the Chengdu Declaration on Dams and Reservoirs for Energy transition and Adaptation to Climate Change was officially issued by ICOLD, and endorsed by International Hydropower Association (IHA), IEA Hydro, International Commission on Irrigation and Drainage (ICID), World Water Council (WWC), and Institut Méditérranéen de l'Eau (IME). The World Declaration emphasizes, meeting the climate change induced rising demands for water supply, addressing the heightened risks of extreme flood and drought events and balancing the intermittent renewable energy sources call for safer, smarter and more ecofriendly dams towards a significant increase in global water storage capacity and hydropower generation. (find a copy of the Chengdu Declaration page 16-17) or online: https://www.icold-cigb.org/GB/icold/world_declarations.asp

Michel Lino, President of ICOLD, and the representatives of the International Organizations who endorsed it.

THE CONGRESS

The 4 questions of the Congress included:

- Q108: Dams and reservoirs for climate change adaptation
- Q109: Dams and levees fit for the future
- Q110: Safety of dams and levees facing extreme hydrological events
- Q111: Earthquake performance and safety of dams.

102 oral presentations, including 4 General Reports, were arranged. These questions sparked vigorous discussions and debates among participants, highlighted the state-of-the-art technologies through experience and typical case sharing from different countries. (more info on the 4 General Reports on p. 10-13)


Q108: Mr. Luc Deroo (France)


Q109: Dr. Li Shuguang (China)


Q110: Mr. Enrique Cifres (Spain)

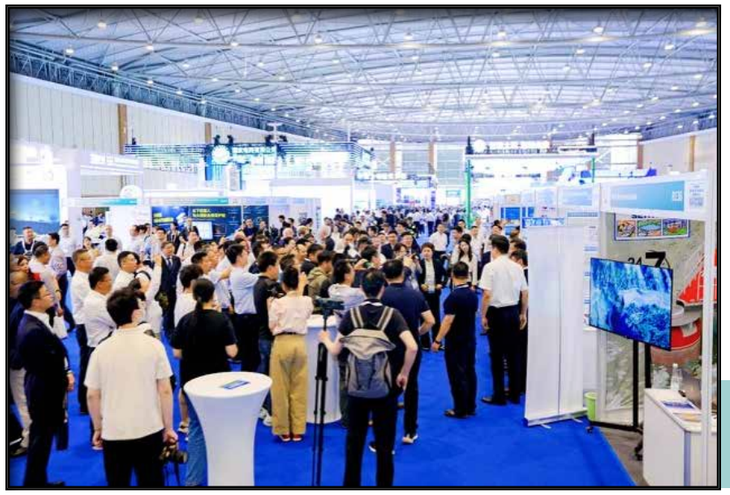

Q111: Trevor Matuschka (New Zealand)

General reporters of 4 Questions of Congress

During the Congress, the Minister Mr. Li Guoying officially met with Board of ICOLD, reviewing the cooperation between the two sides in the past and proposing that the Ministry of Water Resources, P.R. China would promote the implementation of the just released World Declaration and further strengthen cooperation with ICOLD in the field of water related issues.

THE EXHIBITION

79 exhibitors from China, France, USA, Japan, German, Switzerland, Italy, UK, Canada and Korea, Rep, Iran, etc. participated in the exhibition. Equipment, technologies, typical cases, etc. were exhibited, including intelligent construction, operation and maintenance technologies, inspection robot and unmanned boat, termite detection and capture, seepage detection and repair, etc.



STUDY TOURS

Beyond technical sessions, 2 pre-study tour lines and 5 post-study tour lines have been arranged for delegates to visit various projects in China, including Three Gorges (Gravity dam, H=181m, with largest installed capacity in the world), Jinping I (arch dam, H=305m), Shuangjiangkou (rockfill dam with clay core, H=315m, under construction), Xiaolangdi (rockfill dam with a inclined wall, H=160m), and Liyang PSP etc.. 160 overseas delegates have attended study tours. 2 technical visit lines to Dujiangyan Project and Zipingpu, Lijiayan CFRDs respectively on 20 May have attracted 187 delegates to attend.

The series visit fostered in-depth exchanges, as delegates actively engaged in discussing technical details, sharing experiences, and exploring potential collaboration opportunities.

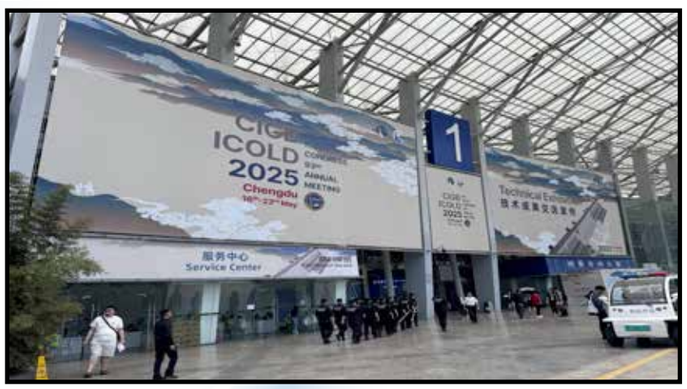
SOCIAL ACTIVITIES

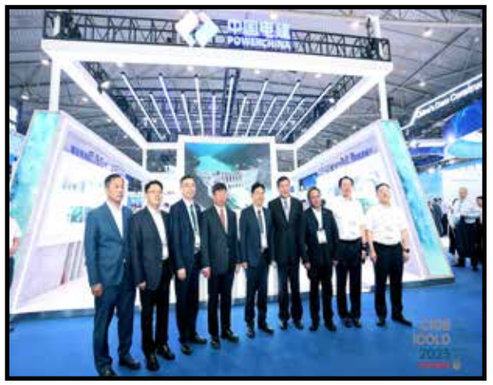
Social events constituted another vital dimension of the Congress, serving as vibrant platforms for delegates to network, socialize, and build lasting connections. It included a welcoming reception, a farewell dinner, a cultural excursion to Jinsha Site Museum, and guided city tours of Chengdu. These gatherings not only enriched the Congress experience but also strengthened interpersonal bonds, laying groundwork for future collaborations that extend far beyond the event itself.

CONCLUSION

After 25 years since the 20th ICOLD Congress and 68th Annual Meeting was held in Beijing, China in 2000, the 28th ICOLD Congress has returned to China. Over more than two decades, China has undergone a remarkable journey of exponential growth, with its dam construction and management sector standing out as a paragon of innovation and advancement, which has been intertwined with the wisdom of global dam society. The Congress, drawing delegates from around the world and making it a heartfelt reunion served as a powerful catalyst to tighten the bonds among ICOLD family, creating an unparalleled platform for in-depth interactions. It demonstrated the strength of the ICOLD family and its commitment to promoting excellence and innovation in dam engineering.

Mix of photos Of Chengdu 2025





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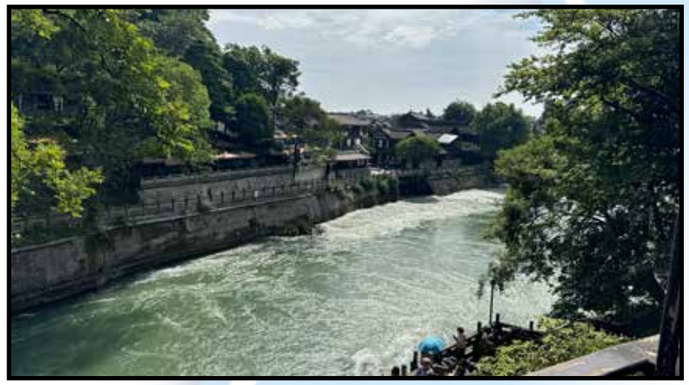
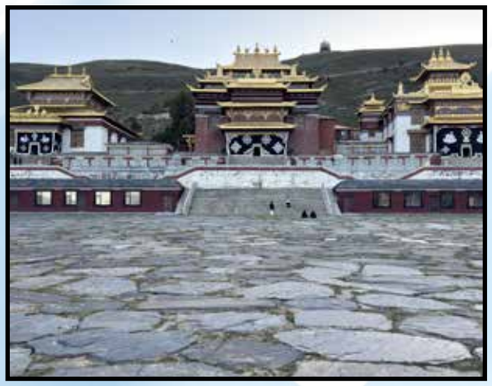
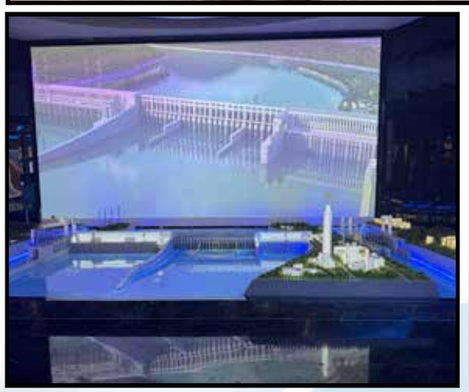






Chengdu Declaration on

Dams and Reservoirs for Energy transition and Adaptation to Climate Change

Approved on 3rd October 2024,
at the 92nd ICOLD Annual Meeting in New Delhi
by the International Commission on Large Dams (ICOLD)

In addressing the multifaceted challenges posed by climate change the role of dams and reservoirs is indispensable. Water storage is pivotal in providing food security, flood control, resilience to droughts and generation of low carbon energy, which is a critical component of our efforts to address climate change and energy transition. Meeting the climate change induced rising demands for water supply, addressing the heightened risks of extreme flood and drought events and balancing the intermittent renewable energy sources call for safer, smarter and more eco-friendly dams towards a significant increase in global water storage capacity and hydropower generation.

A changing world

Population growth. The world's population has skyrocketed from around one and a half billion in the early 20th century to nearly 8 billion today. It is expected to grow to around 10.4 billion by 2100. This steady rise in population directly impacts global need for water.

Global water demand has reached 4,600 km3 per year and is expected to increase by 20% to 30% by 2050. Currently, roughly 70% of total water use worldwide irrigates 20% of total cultivated land which produces 40% of total produce. Feeding a population of around 9.7 billion by 2050 and 10.4 billion by 2100 is a fundamental yet most challenging task. Climate change adversely affects water demand jeopardizing food security.

Unless more fresh water is stored by 2050, 3.6 to 4.6 billion people worldwide, and approximately 1 in 4 children, will be living in water stress areas. If all identified future dams were constructed and contribute to irrigation along with other uses, they would secure food for more than 600 million additional people. More dams are needed for providing global water and food security.

Climate change. Human activities, mainly through greenhouse gas emissions, have unequivocally caused global warming, with global surface temperature reaching an increase of 1.1°C above 1850-1900 levels in the past decade (2011-2020). Historical and current greenhouse gas emissions continue to rise, stemming from unsustainable fossil fuel energy, land-use changes, lifestyles and global consumption patterns.

The IPCC AR6 report has issued alarming forecasts on global climate change, warning of increasing temperatures, extreme weather events and rising sea levels. The uncertainty in spatial and temporal distribution of water resources is highlighted as a critical impact. Changes in precipitation patterns, increased evaporation rates and melting glaciers are expected to exacerbate water scarcity in many regions. The timing, duration, and intensity of climate crisis occurrences remain uncertain.

Clean energy transition is the top priority for meeting COP commitments, since energy is the main source of carbon emissions. According to the International Energy Agency (IEA), total global electricity generation in 2050 will be 2.5 times the current level. To achieve the goal of reaching carbon neutrality by the middle of the present century, the share of renewable energy in primary energy consumption must increase significantly. To achieve 100% carbon free electricity generation by the middle of the present century, coal, oil and gas units' capacity will need to be reduced globally at a rate of 100 GW per year. This requires complete transformation of energy production and consumption.

Hydropower is the solution. Hydropower schemes, including pumped storage plants, through low-carbon dispatchable technologies, need to step in as 'guardians of the electricity grid' for energy transition. Dams having reservoirs with long duration energy storage are the lead provider of grid flexibility and will be the backbone of reliable, safe, and decarbonized power systems. To achieve the energy transition goal, currently installed hydropower capacity has to be doubled for net zero scenarios by the middle of the present century.

Extreme events aggravated by Climate Change call for more water storage capacity in reservoirs towards a climate-resilient water supply, food, and agricultural production and environmental protection. Additional freeboard for flood control in existing and future reservoirs is required to assure higher safety levels, thus losing useful volumes of water for other uses. Ecological flows, reducing climate impacts on downstream river reaches and deltas, ecosystems and biodiversity, require additional regulated water volumes, against aggravating irregularity and uncertainty of inflows and competing water uses. Larger volumes of water storage are required to manage inland water resources in the context of climate induced water scarcity, severe droughts and increasing vital water needs of a growing population. More water storage in large reservoirs is a solution towards climate change resilience to water-related hazards, to be considered in integrated river basin management along with other options.

Maintenance and rehabilitation of existing dams, including increasing their capacity, efficiency and safety is paramount. The new conditions imposed by climate change and the demographic growth pose major challenges to the safety management of existing dams. ICOLD is committed to strengthening and improving dam safety management, rehabilitation and refurbishment, to enhancing dam and levees resilience and ensuring the safe, sustainable, reliable and environmentally friendly operation and maintenance of more than 62,000 large dams supporting human needs worldwide.

Role of Dams and Reservoirs for Energy Transition

Dams, as part of hydro-storage schemes, make energy transition viable. The penetration of intermittent renewables and the withdrawal of thermal plants cause greater complexity in the operation of the electricity system, resulting in spills and rapid variations in generation and frequency. By storing and releasing water, hydropower can ramp up and down quickly and precisely especially with artificial intelligent operation technologies, improving regulation of the response to frequency variations as needed for rapid adaptation of high voltage grid networks. Energy storage in form of water is inescapable for renewables to replace fossil fuel sources and a key to meet the climate commitments.

Pumped storage plants allow displacement of energy from off-peak to peak hours by pumping water from lower to an upper reservoir. Off-river, closed system, pumped storage plants do not depend on hydrology of the site and are versatile in terms of their location. Reversible pumped storage plants can employ existing reservoirs, preserving flood control functions and energy transport infrastructure, to minimize environmental impact. They can synergize non-consumptive uses with current uses thereby minimizing generation as well as operation and maintenance (O&M) costs.

Uncertainty. Hydropower asset owners and managers, as well as other stakeholders, make financial and economic decisions based on the projected value of their production assets. Multiple factors delay decisions and implementation of these much-needed facilities. Hindering the desired acceleration of development of new hydro as well as pumped storage schemes are the uncertainty of financial sustainability of the investment, the lack or ambiguity of regulatory framework for energy storage, pricing, and lagging administrative procedures for permitting and granting concessions. A clear, consistent regulatory framework, and administrative reforms to simplify and expedite procedures for granting concessions are essential to achieve the required hydropower development pace.

Role of Dams and Reservoirs in Climate Change Adaptation

Dams and extreme events

Floods cause huge financial losses, environmental catastrophes, and fatalities. Climate change is expected to increase the frequency and intensity of floods in the coming decades in many regions worldwide. Storage reservoirs mitigate the risk of flooding and reduce the frequency and extent of inundations. Early warning systems and land management with non-structural measures reinforce and enhance the key role of dams and levees in flood control.

Higher dam safety standards are demanded by society due to uncertainty in the frequency and intensity of floods in climate change conditions, land use changes and larger population exposure downstream. These require enhanced design of new dams increased dam quality through artificial intelligent construction, and continuous efforts to upgrade dam resilience operation both for existing and new dams.

Drought events are also expected to occur more frequently and are likely to be more persistent and geographically widespread. Annual and interannual storage and proper reservoir management along with other measures at the river basin scale are required to mitigate droughts' effects on human uses and the aquatic ecosystems. Thus, reservoirs provide resilience, addressing environment vulnerability against droughts. Artificial reservoirs often developing into valuable wetlands host important wildlife and support biodiversity.

River basins with large reservoir regulations are often more adaptable to temporal and spatial changes in water resources, making them less vulnerable to climate change. Creating new storage by constructing sustainable dams is important since around 0.8% of storage capacity is being lost annually due to reservoir sedimentation. The rate of sedimentation is expected to rise in many areas where erodibility will worsen under climate change, unless reservoir management and watershed measures are implemented.

Integrated river basin management

More reservoir volume is needed for integrated water resources management, especially in the light of climate change. Annual and interannual storages are required to ensure climate-resilient water supply for irrigation and food security, safe drinking water, energy generation, flood regulation, droughts mitigation, and other uses. The volume of water stored in reservoirs must increase to meet traditional needs and climate change challenges.

Multipurpose dam projects support holistic river basin management and sustainable development. They allow for downstream ecological releases, and shape flood regimes allowing risk mitigation across river systems, floodplains, deltas and coastal areas. To address climate-related reduction in mean annual flow or increased hydrologic variability and heightened risk and uncertainty, reservoir storage capacity increase must be considered as a major option and smart operation be adopted. Overall, dams make an important structural component within integrated river basin planning and management aligning with techno-economic and environmental considerations.

Dams for water supply and irrigation

Dams provide a reliable source of raw water which is treated and supplied to towns, cities, large metropolitan areas and megacities concentrating more and more population. Reservoirs supplying drinking water systems provide enhanced resilience against drought through annual and interannual storage.

Increased temperature due to global warming raises water demand for crops, while food security of a growing population also requires more production, with expected reduction of rainfed crops.

An increasing proportion of irrigated land will need new regulating infrastructure including dams, and water conservation to attend to this unavoidable function.

Dams and the environment

Carbon footprints and ecological impacts of dams need to be managed. Habitat loss, methane emission from reservoirs, disruption of river ecosystems, relocation of communities, etc. should be evaluated and properly addressed in Environmental Impact Assessment and Environmental Management Plans. Despite certain adverse impacts, overall, dams and their reservoirs are an important tool, alongside other measures, for energy transition and climate change adaptation. It is noted that hydropower has one of the lowest carbon intensity factors of all electric power generation technologies.

ICOLD strongly recommends the following actions:

i) **Development of storage capacity worldwide**: Per capita storage capacity has been steadily declining since the 1980s due to population growth, sedimentation in reservoirs, and a decline in dam construction pace. New storage is needed for energy transition and to maintain the traditional benefits of dams under the new challenging conditions shaped by climate change.

ii) **Acceleration of hydroelectric development**: Policy makers and civil society to focus on sustainable pumped storage, storage based hydro-schemes, to balance growth and energy transition towards the net zero pathway.

iii) **Development of hydroelectric potential, especially in developing world**, in regions where only 10 to 30 percent of hydroelectric potential has been harnessed, demands significant efforts, commitment and cooperation amongst main stakeholders such as international organizations, governments, relevant institutions, NGOs, and civil society.

iv) **Introduction of energy storage as a new official use of reservoirs** in water acts and permitting regulations, to facilitate effective energy transition and modern water management adapted to current needs.

v) **Establishment of a clear and stable regulatory framework for energy storage** that includes additional tariffs for energy storage. Urgent policy reforms are needed to enable energy transition, and to ensure equity in energy access, guaranteeing the financial feasibility of storage-based hydropower and pumped storage projects, as keys for the energy transition commitment.

vi) **Administrative reforms** to be carried out urgently to simplify and expedite procedures for granting concessions for new hydroelectric and pumped storage projects, especially concerning environmental authorization and grid access. Concessional financing needed to boost long duration energy storage in reservoirs. Mandates and targets for development of dams and hydropower have to be clearly defined.

vii) **Highlighting the positive environmental impacts of dam and reservoir projects** contributing to water needs and energy transition, recognizing that in many cases, the positive impacts can outweigh other negative impacts.

viii) **Strengthening dam safety management** through rehabilitation and upgrading, including surveillance, real time flow forecast and early warning systems to enhance resilience, optimized reservoir management operation, smart regulation, and capacity building, in face of extreme events exacerbated by climate change.

ix) **Promoting sustainable water and sediment management** is essential to preserve the functions of dams and reservoirs, considering techno-economical, environmental and/or regulatory constraints.

x) **Promoting research and development** into new technologies that facilitate climate change mitigation and adaptation efforts. This includes exploring the implementation of hybrid hydro-battery systems, virtual power plants, automated data systems using artificial intelligence, and comprehensive information system architecture, as well as advanced materials for sustainable dam construction and rehabilitation.

"Storing Water, Secures the Future. Dams and Reservoirs Empower a Resilient World. Adaptation to Climate Change needs Safe and Sustainable Dams".

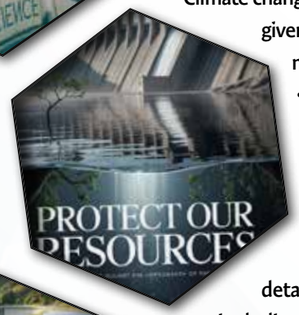
Issued on 21st May 2025 in Chengdu, by the:
International Commission on Large Dams

Endorsed by the:
International Hydropower Association
International Energy Agency
International Commission on Irrigation and Drainage
World Water Council
Institut Méditérranéen de l'Eau

ICOLD 2025 Proceedings: Questions overview

Summary of "Question 108: Dams and reservoirs for climate change adaptation" General Report.

Our reservoirs contribute to societal adaptation in a context marked by the growing share of intermittent energy sources and increased climate variability (droughts, floods). However, their adaptability to future climate conditions must be assessed—meaning their ability to continue delivering the expected services. Their robustness in future climates must also be evaluated to ensure their capacity to withstand new hazards.



Past solutions are not necessarily the right ones today: a "good dam project" from 20 years ago may no longer be a "good project" now, given the challenges imposed by climate change and the sustainability requirements for dam projects. There are no universal solutions: the driver of change is global, but climate variations and adaptation strategies differ significantly from one country to another.

In each country or region, resources, needs, and hazards must be reassessed over appropriate time horizons (2050, 2100, and beyond) to identify suitable adaptation measures. Demand-side actions are critical: reducing consumption, improving water-use efficiency, and implementing better water-sharing rules. Existing reservoirs should be optimized—for example, shifting their primary role from power generation to water supply or biodiversity enhancement—and operational rules should be adapted based on improved forecasting (e.g., snowpack, soil moisture). Interconnecting reservoirs and transferring water between regions can also help balance resources. In many parts of the world, new storage capacities will be required to support water supply, provide energy flexibility, and strengthen crisis resilience. However, such projects must be sustainable. Risks such as insufficient inflows, rapid sedimentation, and adverse social or environmental impacts must be carefully assessed to avoid maladaptation.

The General Report provides insights on these topics, addressing the following points:

- Challenges of adapting to climate change: a reminder of what climate change entails and the uncertainties involved. Climate change is already underway, and examples are given of its consequences and of adaptation measures taken in various countries.
- General principles for adaptation: despite uncertainties, it is possible to define general principles for climate change adaptation. Two key principles stand out: reducing vulnerability and introducing flexibility. The report details these principles for different uses, including water storage, hydropower, flood mitigation, and biodiversity enhancement measures.
- Governance – making the right decisions: the challenges associated with dams, reservoirs, and levees are diverse, and decisions have long-term implications (benefits and impacts can last for centuries). How can the right choices be made? How should current costs be weighed against future benefits? The report proposes possible approaches.
- Technical solutions: this section addresses technical issues, some of which are relatively new, related to emerging types of infrastructure that appear well-suited to the challenges of climate change adaptation: off-river storage, pumped-storage power plants, and hydro-solar integration. It also examines innovative concepts such as aquifer storage and underground dams, offshore dams, and sea barriers, with key technical considerations discussed.

This General Report was prepared from around twenty contributions from national committees, as well as personal communications from some thirty experts specifically consulted for this purpose. It thus reflects a wide range of perspectives, resulting in a synthesis and recommendations that I hope will be concrete and useful.

Luc Deroo
General Reporter, Q. 108

Summary of "Question 109: Dams and levees fit for the future" General Report.

Question 109 includes six themes as follows:

1. Managing strategies for aging dams and levees,
2. Safety during construction and rehabilitation,
3. Special case for small dams and levees,
4. Impact of new contracting practices on dam safety,
5. Increasingly difficult sites - dams and their new challenges,
6. Need for global capacity building.

Totally 51 reports from 20 countries belonging to five continents have been received. 10 and 35 reports contribute to Theme 1 and 2 respectively, while 3/5/1 reports contribute to Theme 3/5/6, respectively. No report addresses specifically to Theme 4.

The general report covers all the 51 reports and highlights the latest developments across the five addressed themes.

In Chapter 3, the common features of fit-for-the-future dams and levees are firstly introduced through the acronym P-I-E-R-C-E-S, which stands for the seven characteristics: Safety, Resilience, Intelligence, Eco-friendliness, Economy, Compliance, and Participation. Secondly current managing strategies and related case studies from European, American and Asian countries for aging dams and levees are outlined.

Chapter 4 constitutes the core part of the report and presents recent advancements worldwide in new dam construction techniques, monitoring and analysis methods, and rehabilitation technologies for aging dams, based on an overview of the 35 reports. Section 4.1 introduces innovations in foundation-supporting techniques (4.1.1), new types of dams such as Cemented Soil Dams and Cemented Sand and Gravel Dams (CSGRD) (4.1.2), new dam construction materials like expansive low-heat Portland cement and its application in the Wudongde and Baihetan dams (4.1.3), and intelligent technologies used in dam construction (4.1.4). Section 4.2 explores monitoring and analytical methods for high concrete arch dams and erosion-affected embankments. Section 4.3 provides case studies on the rehabilitation of masonry dams, concrete dams, and asphalt-lined dams that are around 100 years old.

Progress in the design, maintenance, and safety assessment of small dams and levees, as well as dam construction experiences in difficult locations, is discussed in Chapters 5 and 6 respectively. If you are interested in how transboundary water projects can be developed, Chapter 7 offers some suggestions and solutions.

Shuguang LI
General Reporter Q. 109

ICOLD 2025 Proceedings: Questions overview

Summary of "Question 110 – Safety of dams and levees facing extreme hydrological events" General Report:

Last May, in China, the General Report o n Hydrological Extremes — a challenge further intensified by climate change, was released, as a warning on the real challenges dam community must face from right now.

The recent flash floods in Valencia, November 2024, have reignited the debate on the need for a comprehensive approach under a new paradigm, inevitably placing this issue at the forefront of discussions. Just a year earlier, the disaster occurred elsewhere in the Mediterranean, in Derna, Libya, including the break of two dams, cause also a real extreme flood.

This challenge calls for a firm commitment to strengthening and improving the safety management of existing dams, including their rehabilitation and modernization, to enhance resilience and ensure safe operation—particularly in the face of extreme events driven by climate change. This is clearly stated in the World Declaration on Dams, Energy Transition, and Climate Change Adaptation (Chengdu, 2025).

Thirteen countries have contributed their papers, all of them of a high level, including invited presentations from Spain, Indonesia and France. The three classic pillars in the fight against floods have been covered: structural measures, enhancing the role of dams, and the need to adapt their spillways to climate change, early warning and emergency management measures and land management preventing "hazard creeping".

However, public involvement in management lagged behind, despite the recommendations of the Rio Summit and Agenda 21, as some may recall.

The good news is the attitude shown, especially by young people who will one day lead society, setting an example of solidarity and social resilience, shown clearly in Valencia. Now, in addition to the other three traditional pillars of management, it is time to develop the fourth pillar: citizen participation, incorporating the principle—explicitly recognized in ICOLD's World Declaration on Dam Safety (2019)—that zero risk does not exist and the new paradigma: "let's work with the society".

Given the wide range of ideas—some taken from dam community's past experience, others innovative and drawn from other fields— a clear consensus emerges: there is much work ahead. Structural and non-structural measures must be implemented with the involvement of multiple stakeholders.

To keep over sixty thousand large dams under operation —ensuring public safety, mitigating residual risk worsened by climate change, and sustaining human welfare—a major financial effort is needed. Society must commit to well-funded, long-term programs without delay or excuses.

Let's not wait for disaster after disaster to revive this social mandate.

Enrique Cifres
General Reporter Q. 110

Summary of "Question 111 – Earthquake Performance and Safety of Dams" General Report:

The General Report for ICOLD Question 111, presented at the 2025 Chengdu Congress, addresses the seismic performance and safety of dams, encompassing seismic analysis and design, operation, monitoring, and post-earthquake evaluation. Authored by Trevor Matuschka from New Zealand, the report reflects evolving understanding since the last major review (Q.83 in Montreal in 2003), highlighting that earthquakes pose multiple hazards for dams including ground shaking, fault rupture, and mass movements.

Although a significant number of dams were damaged during strong earthquakes within the last 20 years, the great majority performed well. However, the earthquake safety of large storage dams is important because:

- Earthquake-related dam failures are rare but highly consequential due to their potentially devastating effects on people, property, infrastructure, environment, and historical and cultural sites.

- Strong earthquakes are unpredictable and generally there is no warning, so the dams must be safe against earthquakes, which includes the control and operation of the reservoir after an earthquake.

The report synthesizes insights from 52 papers across 18 countries, grouped under five themes: seismic monitoring, feedback from past failures, multi-hazard considerations, seismic design and performance criteria, and safety evaluation of critical dam components.

Key developments include the recognition of seismic hazard as a multi-hazard, development of improved seismic design standards, and advances in numerical modelling and dynamic testing. Significant earthquakes since 2003 - such as Wenchuan (2008) in China, Tohoku (2011) in Japan, and Kahramanmaras (2023) in Turkiye) - have yielded critical lessons about dam performance, seismic failure modes, and the importance of the periodic seismic safety evaluation of existing dams.

ICOLD Bulletins (notably 137, 148, and 166) have shaped modern guidelines on reservoir-triggered seismicity, seismic design and safety criteria, and post-earthquake inspection. Bulletin 148, in particular, defines safety evaluation earthquakes (SEE), operating basis earthquakes (OBE), and design basis earthquakes (DBE), establishing risk-based seismic criteria.

The report emphasizes the importance of periodic safety reviews, especially for older dams built before modern seismic standards, and the adoption of intelligent monitoring systems and rigorous emergency planning. Looking ahead, priorities include the monitoring and observations of the seismic performance of dams during earthquakes, consideration of all earthquake related hazards, the adoption of design concepts and defensive measures to mitigate potential damage, improving materials knowledge, advancements in numerical modelling, and ensuring tailings dams meet the same safety standards as water dams.

Overall, the report reinforces the need for continuous improvement in the seismic safety across the dam lifecycle, which, besides the dam body includes all safety-critical elements of large storage dams.

Trevor Matuschka
General Reporter Q. 111

ICOLD Incident Database: Launch of a on-line "demonstrator "

By Frédéric Laugier
Dam Safety Expert - EDF Hydro
French Committee on Dams & Reservoirs

One PILLAR of the 2019 Icold World Declaration on Dam Safety underlines that :

- "Sharing lessons learned benefits the entire industry, making all dams safer"
- ".. sharing lessons from dam incidents and failures is crucial to improve state-of-the-art practices".

Knowing and understanding dam incidents (and the associated failure mechanisms and scenarios) allow an improvement of Dam Engineering and Operation practices. It includes Design, Construction, Operation, Rehabilitations and Maintenance issues.

This awareness is also a major part of dam safety culture for all dam stakeholders. Dam incident information are also essential input data for conducting dam risk analysis, which become more and more required in the context of dam safety management.

In addition, it is crucial to avoid fake news or false information about dam incidents. Icold, because of its nature and core missions, has a major role to play, to properly inform dam stakeholders on dam incidents days, months or years after their occurrence.

REMINDER – WHAT IS A DAM INCIDENT ?

Generally, ICOLD identifies two types of incident :

- Dam Failure: Sudden and uncontrolled release of impounded water or by a total loss of integrity. Recent example : Xe Nam Noy (Laos, 2018) or Derna dams failure (Libya, 2023).
- Dam Accident: Lesser catastrophic type of incident defined by malfunction or abnormality outside the design assumptions and parameters which adversely affect a dam's primary function of impounding water. Recent examples: Oroville (USA, 2017) or Toddbrook (UK, 2019).

A BIT OF ICOLD INCIDENT COLLECTION HISTORY

So far, there was no really up-to-date available dam incident database through ICOLD website or documentation.

In the past, ICOLD produced, roughly once per decade, essential documents such as:

- 1974 : Lessons learnt from Dam incidents (LFDI) 266 cases of large dams incidents – 70 failures
- 1983 : Deterioration of Dams and Réservoirs (DDAR) An update of LFDI : 1105 cases of large dams incidents – 107 failures
- 1995 : Bulletin 99 - Statistical Anlaysis of dam failures 179 recorded failures without any detailed description
- 2020 : Bulletin 188 - Statistical Anlaysis of dam failures : Update of B99 322 failures (until 2018) without any detailed description.

Figure 1 – Derna dam failures (Lybia, 2024), Toddbrook accident (UK, 2018).

A compilation of these documents was carried out and gathered on a computer file by Michel Poupart until 2018 (retired former member of TC H "Dam Safety" and leader of the Bulletin 188 writing team). However, this database was not be posted on-line.

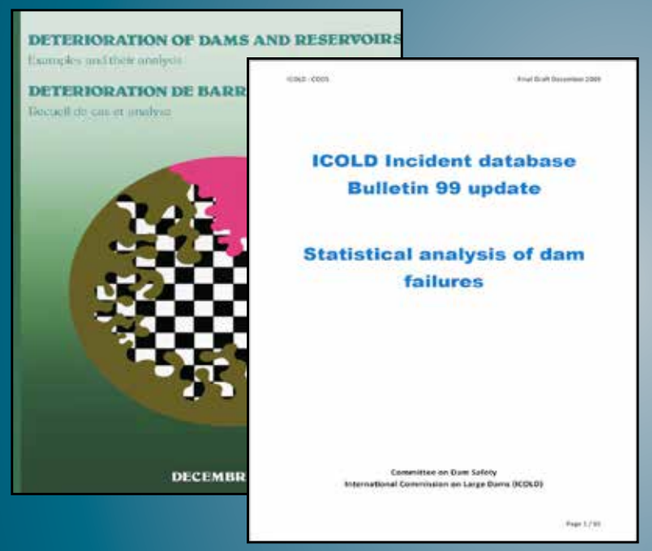


Figure 2 – Two important Icold publications on dam incidents: DDAR (1983) and Bulletin 99 update (2019 preprint version)

DAM INCIDENT DATABASE – CURRENT STATUS

Several difficulties are faced to move forward:

- Structuration of the database and the information field. Database Information fields have changed throughout the time in existing documents.
- A significant effort is required:
  - ◊ First to clarify what information / fields should be included in the database. Information need to ne "normalized" and structured in order that research and statistics can be made. At the same time, the database structure needs to be updated, but it should stay as close as possible to the latest structure proposed in Bulletin 99 update.
  - ◊ Second, to transfer and to "clean" the existing information.
- To update the database from 2018 to 2024 and each time there is a significant dam incident.
- Thinking about database governance rules. Issuing information about dam incidents is always a very sensitive topic with technical, social, economic, environmental and political issues. Any information should therefore but posted with a great care. Thus, it will be proposed that the National Committees play a substantial role in the supply and validation of online dam incident data.

A small group of "volunteers" took over from Michel Poupart's work :

- A provisional updated structuration of incident database has been proposed. It includes dam failures AND dam accidents. It is suitable to be posted online.
- Provisional governance rules are proposed.
- The provisional database was completed including dam incidents until end of 2024. In addition to dam failures, it also includes a selection of major dam accidents (Oroville, Toddbrook etc..).
- It is also possible to include "small" dam incidents when these incidents are relevant and bring particular relevant information.

ICOLD Board decided during 16/05/2025 meeting that this provisional dam incident database could be posted online with the status of a "Demonstrator" version.

"DEMO" DAM INCIDENT DATABASE – ACCESS AND CONTENT

The Demo dam incident database is only accessible for Icold website members with password and login.

A research page allows to enter queries on a limited number of fields. These results can then be exported on a excel version for global treatment.

Each dam incident is detailed on a dedicated page.

Figure 3 – Demo Dam incident database access from Icold website

Figure 4 – Demo Dam incident database: Research page

Figure 4a), 4b) – Demo Dam incident database: Dam incident detailed page (extract)

Dam incident information include :

- General information about the dam (type, height, reservoir volume, localization, spillway type, year of completion etc..).
- World Register of Dams reference is also indicated when it exists.
- Incident details (date, type, mode of failure, context, technical and organizational cause) and remedial measures
- Analysis of the dam incident. It can be done in two steps.
  - ◊ Days or weeks after the incident, a "hot" (and provisionnal) analysis can be proposed.
  - ◊ Months or years after the dam incident, it is sometimes possible to provide a "cold" analysis. It can be based, for example, on the issue of investigation reports (as recent examples: Toddbrook, Spencer dam, Braskeredfoss etc..).
- References (internet links, articles, reports etc..).

WARNING

The « demo » dam incident database is a provisionnal version. Information are sometimes not available or uncomplete. Cross-checking of information was performed as thorougly as possible. However, it is possible that there are still mistakes.

In such a case, ICOLD central office can be contacted (daniel.couvidat@icold-cigb.org) to provide uptodate information.

FROM "DEMO" TO FINAL DAM INCIDENT DATABASE – WHAT'S NEXT..

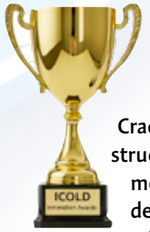
The overall goal is to propose database management technical and governance principles for the next annual meeting in 2026 (Mexico, Guadalajara) and post online an updated version of the internet database.

A webinar should be organized by the end of 2025 to discuss these principles and be able to implement and post online an updated version of the internet database.

In addition, it has been suggested during last annual meeting in Chengdu (May 2025) that additional technical sessions could be organized during Icold annual meetings during general assembly and dedicated technical session (presentation of past year main incidents, presentation of newly available information for recent incidents, "remember" anniversary decade presentation of older incidents etc...)

ICOLD INNOVATION AWARDS 2025

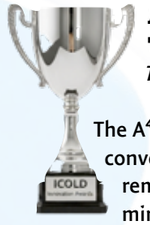
The Three Winners



DEVELOPMENT OF HIGH CRACKING-RESISTANCE DAM CONCRETE WITH EXPANSIVE LOW-HEAT PORTLAND CEMENT AND APPLICATIONS IN ULTRA-HIGH ARCH DAMS

Wenwei LI, Chaoran ZHANG, Shuguang LI

Crack formation in ultra-high arch dams like Baihetan and Wudongde (>300 m height) presents significant structural risks due to complex construction conditions and xerothermic valley environments. Conventional moderate-heat cement (MHC) concrete is inadequate for such settings. Researchers addressed this by developing expansive low-heat Portland cement (ELHC), engineered through four proprietary methods: mineral phase optimization, controlled expansion kinetics, synchronized early strength with reduced hydration heat, and industrial-scale calcination. ELHC concrete features low cement content, reduced water-cement ratio, and high fly ash substitution, resulting in lower thermal gradients and autogenous expansion (~10 με at 90 days). Compared to MHC, ELHC concrete exhibits a 40–80% increase in crack resistance and enables simplified, robust thermal control strategies. ELHC was extensively deployed in Baihetan and Wudongde dams, with zero cracking observed over eight years. Its success marks a milestone in dam engineering and has catalyzed broader applications in CFRDs, railways, and bridges, delivering substantial technical and economic benefits.



ADVANCED CONSTRUCTION SYSTEM OF A4CSEL FOR AUTOMATED DAM CONSTRUCTION TOWARD THE NEXT GENERATIO

Takaya MATSUMOTO, Youichi IZUSHI, Kenji TERAUCHI

The A⁴CSEL (Quad Axel) system represents a breakthrough in automated construction, integrating autonomous conversion of conventional machinery, algorithmic replication of skilled human operations, and centralized remote-control architecture. This system enables multi-site autonomous construction management by a minimal engineering workforce. Its deployment in constructing the tallest CSG dam validated its operational efficacy, achieving an 80% reduction in manual labor through remote-controlled AAC (Autonomous Construction) machinery, tripling production throughput, and decreasing fuel consumption by 40–50%, thereby mitigating environmental impact. The system also enhances occupational safety by minimizing human-machine interaction in hazardous zones. A⁴CSEL's scalable architecture supports rapid infrastructure deployment, positioning automated construction as a strategic enabler for national development. Its widespread adoption is projected to elevate construction industry standards, optimize resource utilization, and reinforce the sector's role in socio-economic growth through high-efficiency, low-impact, and safe construction methodologies.

NESSIE®: AN INNOVATIVE SOLUTION FOR SUSTAINABLE SEDIMENT MANAGEMENT IN RESERVOIRS

Raphaêl GAILLARD, Stéphane CAFFO

This report presents the engineering and innovation process behind NESSIE, an autonomous sediment management robot developed through an innovation partnership initiated in 2018 between Watertracks and EDF, led by Raphaël Gaillard and Stéphane Caffo. NESSIE was designed to complement conventional dredging systems by providing a precision-controlled, low-impact solution for sediment extraction in hydroelectric reservoirs. The system addresses regulatory constraints on sedimentation while preserving reservoir storage capacity and optimizing water resource management. The report details the sedimentation dynamics that required intervention, followed by the robot's design architecture, including its mobility, sediment capture mechanisms, and integration within reservoir operations.Two deployment scenarios demonstrate NESSIE's operational efficiency and adaptability. The innovation pathway is revisited, highlighting iterative prototyping, field validation, and cross-disciplinary collaboration. The conclusion explores future enhancements, including real-time monitoring, AI-driven navigation, and broader applications in sustainable hydro-infrastructure maintenance.

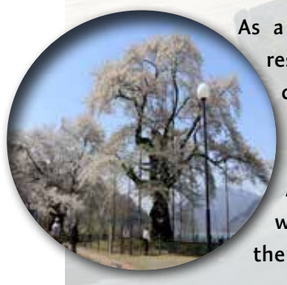
The experience of changing public perception of the importance of dams in Japan

Brief history of dams in Japan

From ancient times, the Japanese people have been familiar with irrigation, water supply and flood control facilities. Rice cultivation was introduced to Japan around the 10th century BC. The earliest rice paddies with civil engineering facilities can be found in south-west of Japan. In the 6th century, the Emperor at that time established centralized government. He prepared irrigation systems for paddies and allocated a certain area of paddy to farmers. A certain portion of the harvest was collected as tax. Sayama-ike, an oldest earth-fill dam for irrigation still in use today, was built in the early 7th century.

In the 20th century, many large dams for flood control and hydropower have been constructed in the central highland, as there are high mountain peaks of over 3,000 meters in elevation and many steep swift-flowing rivers.

In 1950, Japan's first modern rock-fill dam for hydropower in the central highland, Miboro Dam (H=131m) was planned. The project faced with fierce local opposition to construction. The president of the state-owned hydropower company negotiated earnestly, politely, and in good faith with the residents of the proposed submerged area, and after more than 7 years negotiation, finally it reached a settlement on the relocation.



As a token of appreciation for the residents, a 400-year-old large cherry trees (20m high, 6m trunk) in submerged area were transplanted to the dam site. Although this transplanting work was very difficult and challenging, the cherry trees took root and, every spring, they are in full bloom, with petals still scattering into the reservoir. The story related to this transplant work has been adapted into novels and dramatic movies.

In 1963, Kurobe Dam (H=186m), the tallest arch concrete dam was constructed in a nature reserve area. All major facilities as headraces, penstocks, power plants and access roads were underground. Tateyama-Kurobe-Alpine-Route is 40 km sightseeing route by electric bus, ropeway and tunnel cable railway. You can meet spectacular sceneries and alpine fauna and flora, which attracts nearly 1 million visitors a year. (https://www.alpen-route.com/en/)

The story of the various difficulties during construction was made into a blockbuster movie starring Toshiro Mifune, a world-renowned actor in director Akira Kurosawa's films. Several dramatic movies related to other dams have been also released. These films helps the people to understand the technical and social complexities faced during planning, construction and operation.

Experience of Yamba Dam

When a dam project is announced, there are usually strong protests. Negotiations for relocation become difficult. The Japanese Government therefore prepare laws and rules for compensation for losses, support for rebuilding livelihoods and the promotion of the welfare of relocated people. However, in the case of the Yamba Dam, it took a long time to conclude negotiations due to stiff resistance.

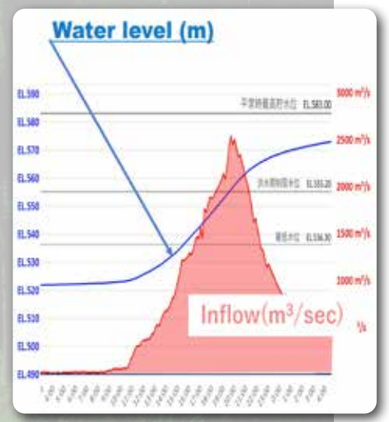
The Yamba Dam (H=116m) was planned in 1967 in the upper area of Tone River basin in Kanto Plain which area is 17,000 km² includes Tokyo metropolitan area. When extreme heavy rainfall occurs in this basin, Tokyo may suffer severe flood damage. The government has strengthened the levees of Tone River and constructed several flood control dams. But the Yamba dam could not be constructed, because of hard resistance. After 42 years negotiations, it had almost reached a conclusion by 2009.

Same year, the Liberal Democratic Party (LDP), the governing party for nearly 50 years, lost the general election, and the Democratic Party of Japan (DPJ) administration began. DPJ declared the policy of "from concrete to people", meaning "value people, not construction project in budget priorities". The national budget was restructured, resulting the suspension of many large infrastructure projects such as new dams, new highways and new ports.

As a symbol of the "concrete to people" policy, the DPJ administration stated, "Yamba Dam project would be suspended and reviewed." The residents who had made up their minds to accept relocation were surprised at the sudden suspension of the dam project.

From 2009, the Yamba Dam functions' re-examination based on the current situation was started. The re-examination took more than 2 years and concluded in September 2011. The conclusion was that dam was the most advantageous in flood control, water utilization and hydropower. The policy was changed again and construction project was restarted. In December 2012 DPJ lost the general election.

The contractor was Shimizu corporation, Tekken corporation and IHI infrastructure Joint venture. The contractor then resumed construction of the dam, working day and night.



In 2019, the dam construction work was almost finished and it was time for impounding. Initial impoundment was started on 1st October 2019. During initial impoundment, extremely powerful typhoon Hagibis moved northward from the Pacific Ocean and attacked the center of main island in mid-October 2019.

Tone River basin experienced extreme large volume of rainfall. Despite initial impoundment, Yamba Dam stored the floodwaters from rainfall and prevented flood damage in the downstream areas including Tokyo metropolitan area. Reservoir water level rose 54 meters in two days, which was abnormal speed of water level rising in first impoundment. The flood which maximum inflow was approximately 2,500 m³/sec by accumulated rainfall of 347 mm, was successfully stored and its volume was 75 million m³.

Fortunately, there are not any damage on dam, abutments and reservoir.

The twists and turns of Yamba Dam project, long-time relocation negotiations, its suspension and restart were well known. The incredible fact that this dam brought flood control benefits to Tone River basin and Tokyo metropolitan area during the initial impoundment was widely reported by medias. This news provided an opportunity to the public to reaffirm the benefits of dams for recent changes in the natural environment, such as increased heavy rainfall.

Strat of initial impoundment

Initial Impoundment after severe flooding

(Those 2 photos are provided by Tone River Dams Integrated Management Office, Ministry of Land, Infrastructure, Transport and Tourism)

Tourism around Dam

Dam tourism is popular around the large dams in Japan. Many dams allow public access to top of dam and reservoir. Prominent celebrities have claimed to be dam enthusiasts, and TV programs on dam tourism have been often broadcast. These have been very helpful in creating a positive perception of dams. Today, there are not so many objections to dam, although some environmental groups still claim to be against them. JCOLD has supported in editing a 200-page, all-color travel guidebook, "How to Walk Around the Dams". The authors are eight private dam enthusiasts, who wrote comprehensive information on 200 prominent dams, with beautiful photographs, location maps, dam features and information of nearby attractions such as hot springs.

Oku-Tadami Dam (H=157m, http://okutadami.co.jp/English-okutadami/) has a 560MW hydropower station with one of the largest reservoirs fed by Oze marshland. Oze marshland is in nature reserve area, wetland spreads out at an altitude of 1,700 meters, with streams, small ponds, grasslands, forests and a variety of trekking routes. Skiing and snowboarding slopes are provided with powder snow in winter in the vicinity of the Dam.

Conclusion

In Japan there used to be negative opinions about dams due to resettlement, environmental destruction, and huge expenditures. However, the people have reaffirmed the benefits of dams, which are the ability of flood control, the ability to produce the renewable energy, and the ability of water storage for tap water.

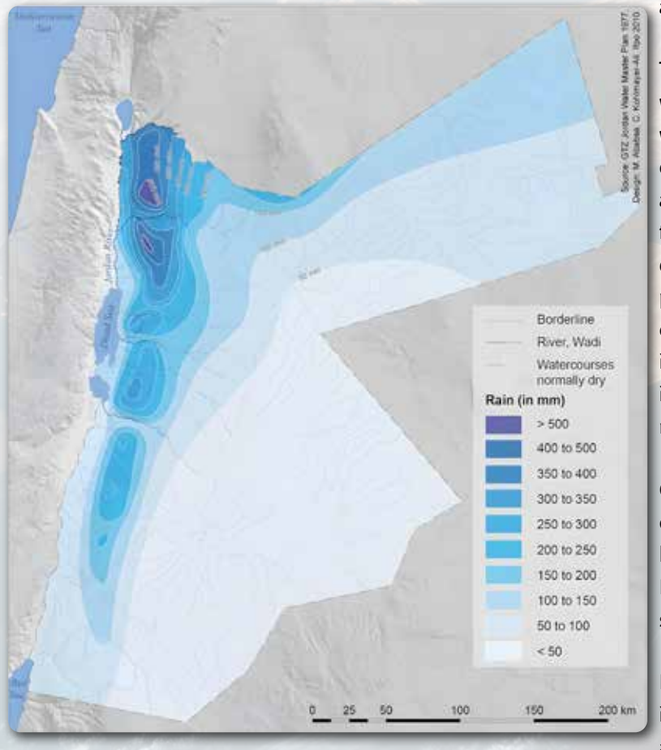
Despite various concerns, dam projects bring value to human society over the long term, 100 years or more, and it should not be discouraged by short-term thinking or opposition and current political situations, which may change in a period of time.

Oze marshland in winter

by Hiroyasu SUGIYAMA
Former President of JCOLD
(Japan Commission on Large Dams)

JORDAN, elected as a Member Country of ICOLD during the 93rd General Assembly in Chengdu, China (May 2025)

Jordan is one of the most water-scarce countries in the world, with renewable water resources estimated at less than 100 cubic meters per person per year—far below the international water poverty line of 500 cubic meters. The country's arid climate, limited rainfall, the influx of refugees, and increasing demand for agricultural and domestic water use all contribute to mounting pressure on its water resources.



In recent years, Jordan has also been increasingly affected by the impacts of climate change, which have disrupted the distribution and timing of rainfall. This has resulted in more frequent and intense flash floods in some regions, while other areas have experienced prolonged droughts—further straining the already limited water resources and complicating water management efforts.

To address these challenges, Jordan has invested in a range of infrastructure and water management strategies, including the construction and operation of 17 major dams across the country.

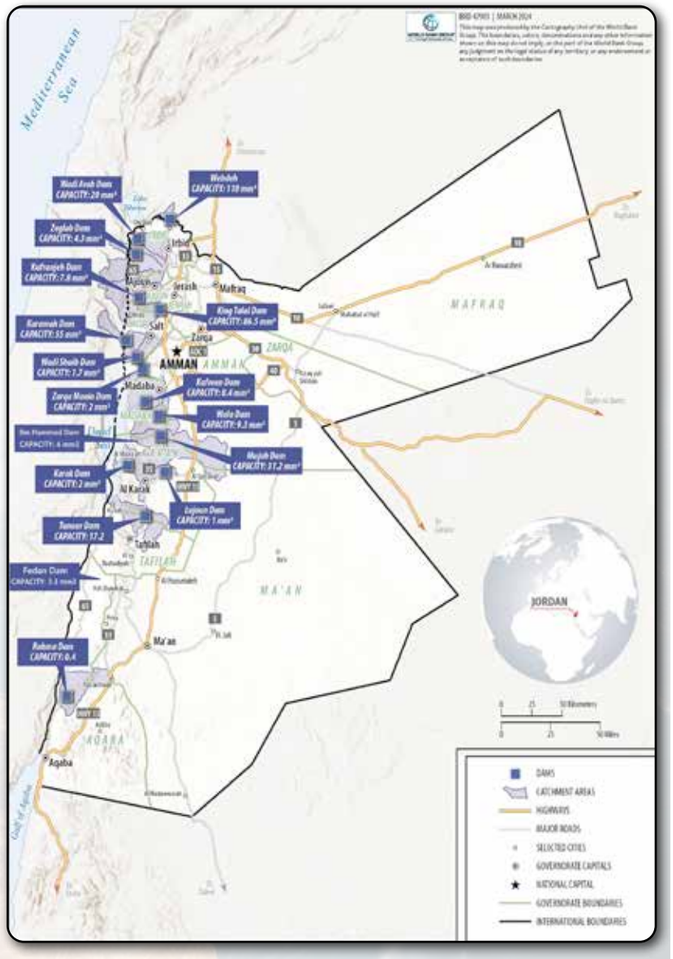
These dams play a critical role in storing surface water from seasonal rainfall and flash floods, which would otherwise be lost due to rapid runoff and evaporation. They also support irrigation in key agricultural zones, thereby contributing to national food security. In addition, the dams provide water for domestic and municipal uses, particularly during dry periods, and help mitigate flood risks in downstream communities. Some of these dams also play a role in collecting and storing treated wastewater, which is reused for agricultural purposes—supporting resource efficiency and sustainable water use.

Collectively, these dams have a total storage capacity of approximately 336 million cubic meters. The largest dams—such as Alwehdah Dam, King Talal Dam, Wadi Al-Arab Dam, and Mujib Dam—are strategically vital for supporting the country.

Institutionally, the Ministry of Water and Irrigation is responsible for managing Jordan's water resources and overseeing their distribution across various sectors. Meanwhile, the Jordan Valley Authority serves as the sole entity responsible for the operation, maintenance, and overall management of the country's dams.

To support the JVA in its mandate, the Government of Jordan established the Jordan National Committee on Large Dams (JOCOLD) by a decision of the Prime Minister. JOCOLD serves as an independent advisory body, assisting the JVA in resolving technical challenges and overseeing dam surveillance operations. It plays a key role in evaluating any emerging signs of distress or deficiencies in dam structures and systems, as well as overseeing the implementation of dam-related studies and the operation of dam facilities. The committee comprises academics, university professors, dam experts, and representatives from various technical associations. It is currently chaired by Dr. Elias Salameh, a distinguished expert in water resources and geology. Recently, JOCOLD became a member of the International Commission on Large Dams (ICOLD), and aspires to be an active contributor to the global exchange of knowledge and best practices in dam engineering, safety, and sustainable water management.

Sustainable management of these dams is a cornerstone of Jordan's national water strategy, which aims to balance immediate human needs with long-term water security under conditions of increasing scarcity and climate variability.



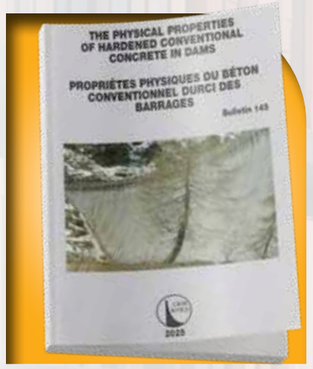
By Eng. Hisham Alhesa
Secretary General of the Jordan Valley Authority

Member Countries of ICOLD

Jordan, as the other countries of ICOLD, are elected during a General Assembly. The list of our Member Countries can be found on our website:
https://www.icold-cigb.org/GB/icold/member_countries.asp
If you want to be part of the ICOLD Family, the first step is to have a National Committee in your Country. Rules are detailed in the document "Application for Membership to ICOLD" and can be found on this webpage:
https://www.icold-cigb.org/GB/icold/institutional_files.asp

Feel free to reach the ICOLD Central Office at contact@icold-cigb.org if you need more information.

New Bulletins available



Bulletin 145: PHYSICAL PROPERTIES OF CONVENTIONAL HARDENED CONCRETE FOR DAMS

ICOLD Bulletin 145 reviews the physical properties of hardened conventional concrete used in dams. It focuses on mass concrete characteristics like strength, elasticity, creep, shrinkage, thermal behavior, permeability, and frost resistance. The bulletin explains typical behaviors, influencing factors, and experimental determination methods. It also details how to integrate these properties into mathematical models for design and monitoring.

Bulletin 164 Vol. 2: INTERNAL EROSION OF EXISTING DAMS, LEVEES AND DIKES, AND THEIR FOUNDATIONS: *Case histories, Investigations, Testing, Remediation and Surveillance*

ICOLD Bulletin 164 Volume 2 explores internal erosion in existing dams, levees, and dikes through global case histories. It provides guidance on investigations, sampling, testing, and risk analysis to assess vulnerability. The bulletin also covers remediation strategies and long-term surveillance systems. Contributions from international experts and engineers aim to prevent future failures. The publication makes specialized knowledge in geophysics and lab testing accessible to dam engineers.

Bulletin 165: SELECTION OF MATERIALS FOR CONCRETE IN DAMS

ICOLD Bulletin 165, Selection of Materials for Concrete in Dams, is dedicated to the choice of hydraulic binders and mineral additions as well as adjuvants and waste water. This applies to both conventional concrete (CVC) and roller compacted concrete (RCC) dams. The Bulletin is a Practical Guide for the choice of materials for concrete dams, and provides project actors with the decision-making framework to make the right choices of materials in places where resources may be limited.

Bulletin 167: REGULATION OF DAM SAFETY: AN OVERVIEW OF CURRENT PRACTICES WORLDWIDE

ICOLD Bulletin 167, Regulation of Dam Safety: An Overview of Current Practices Worldwide, provides a comprehensive review of legal and regulatory arrangements for the safety of dams among the countries represented at ICOLD. As such, this review is essentially a snapshot of the situation being in place at the end of the first and the beginning of the second decade in the 21st century. This Bulletin is useful not only to these countries which have weak or non-existent legal and regulatory dam safety frameworks but also to these jurisdictions which are considering changes and improvements to existing legislation and regulations.

Bulletin 169: GLOBAL CLIMATE CHANGE, DAMS, RESERVOIRS AND RELATED WATER RESOURCES

The purpose of ICOLD Bulletin 169 is to assess the role of dams and reservoirs in adapting to the effects of global climate change, determine the threats, and potential opportunities, posed by global climate change to existing dams and reservoirs, and then recommend measures to mitigate against or adapt to the effects of global climate change.

Bulletin 171: MULTIPURPOSE WATER STORAGE ESSENTIAL ELEMENTS AND EMERGING TRENDS

The bulletin highlights the global and local importance of water storage, emphasizing its role in multi-purpose development within the hydrological cycle and water-energy nexus. It discusses economic, financial, and institutional aspects of long-term reservoir planning and governance. Case studies illustrate structural and non-structural solutions for better infrastructure management. The bulletin stresses adaptive water management and conservation to gain public acceptance. It concludes with key elements and trends, offering a method to assess their evolving criticality throughout a reservoir's life cycle.

Bulletin 179: ASPHALT CONCRETE CORES FOR EMBANKMENT DAMS

This Bulletin covers the state-of-the-art of current practice after the important development in design and construction during the last 25 years. It addresses all aspects of the design, construction, performance and operation. Characteristics of asphalt concrete cores, requirements for the mix design, laboratory testing and quality control are discussed. Technical specifications are also presented and proposed. Finally, several typical case histories with characteristics and performance are given in Appendices.

Bulletin 187: FLOOD EVALUATION, HAZARD DETERMINATION AND RISK MANAGEMENT

ICOLD Bulletin 187 outlines modern design criteria for dams and hydraulic structures, emphasizing the importance of defining the design flood. It explores evolving flood determination methods and the need to incorporate external risk factors. The bulletin includes chapters on flood volume analysis, stochastic approaches to flood risk, and proactive flood forecasting. Case studies in the appendix illustrate challenges in short-, medium-, and long-term flood management.

Bulletin 194: TAILINGS DAM SAFETY

ICOLD Bulletin 194, Tailings Dam Safety, aims to assist the international community to further develop and adopt safe practices for tailings dam planning, design, construction, operation, and closure with a focus on the technical aspects that are mentioned but not fully developed in other recent National and Industry Guidelines and Standards. Governance and human aspects have also been touched on with appropriate references where other guidance documents are considered more comprehensive.

Our core activity

The International Commission on Large Dams (ICOLD) plays a pivotal role in advancing global dam safety and sustainability through the development of reference technical bulletins. These publications, produced by international experts, establish best practices for the design, construction, and operation of large dams. ICOLD's work has significantly improved dam safety worldwide and strengthened risk management frameworks. Notable contributions include guidance on tailings dam safety, governance, and lifecycle management, which have informed regulatory reforms and improved resilience in water and energy infrastructure globally.

From Hydropower to Hybrid Energy: The Yalong River's Role in China's Green Future

The Yalong River originates from the southern foothills of the Bayankara Mountains, with the length of the mainstream as 1,571 km, a natural drop of 3830 m, and an annual runoff of 60.9 billion m^3. The Yalong River basin is gifted with abundant hydro, wind, and solar power resources, with a total scale exceeding 100 GW. The Yalong River energy base, developed by Yalong River hydropower Development Co.,Ltd., with integrated hydro, wind, and solar power has been listed in the national 14th five-year plans. It will become the world's largest integrated clean energy base when completed.


Jinping-I Hydropower Station

Representative Hydropower Projects

Ertan Hydropower Station —China's largest hydropower station built in the 20th century

It is China's first large hydropower project using a large-scale World Bank loan. It is a model project in China's early adoption of modern enterprise systems and construction management systems such as employer accountability, construction supervision, competitive bidding, and contract management. Its capacity is 3.3 GW.

Jinping-I Hydropower Station – the world's highest arch dam

During the construction, multiple world-class technical difficulties were overcome to build the world's tallest dam (305 m), greatly advancing the progress of many subjects and technologies, and creating a new milestone for dam construction. Its capacity is 3.6 GW.

Jinping-II Hydropower Station – with the world's largest hydraulic tunnels

The total length of the underground tunnels is 116.7 km, making them the world's largest cluster of hydraulic tunnels. During construction, key construction technology for tunnels with large overburden has been developed, advancing China's tunneling and underground engineering technology to a new level. Its capacity is 4.8 GW.


Kela PV Project

Lianghekou Hydropower Station: the world's highest rockfill dam (303 m)

Lianghekou Hydropower Station is China's first 300 m-class super-high rockfill dam project built with "whole-process intelligent construction technology", realizing a leap from digitalization to intelligentization in dam construction, initiating a new direction of intelligent hydraulic engineering. Its capacity is 3 GW.

Daofu PSH Project —A large PSH station at the world's highest altitude

It's located in Daofu County, Ganzi Prefecture, at an altitude of 4300 m. It has a capacity of 2.1 GW, becoming Sichuan Province's largest PSH project. It can accommodate 6 GW of variable solar power into a stable high-quality power supply, which will be a model for "PSH+PV" integrated development.

Representative Wind and PV Projects

Kela PV Project—the world's largest hydro-PV hybrid project

It's located in Yajiang County, Ganzi Prefecture, at an altitude of 4000 m to 4600 m. Phase I's capacity is 1GW. Phase II's capacity is 1 GW. It will build the first gigawatt-size hydro-PV hybrid project in the world, making a model for intensive large-scale development of renewable energy.

Labashan Wind Power Project—China's first batch of large wind and solar power projects

It's located in Dechang County, Liangshan Prefecture. Its capacity is 258 MW. It will be built in two phases.

Zhalashan PV Project —Sichuan Province's largest new energy project

It's located in Yanyuan County, Liangshan Prefecture, at an altitude of 3200 m to 4200 m. Its capacity is 1.17 GW.

Conclusion

The Yalong River basin stands as a cornerstone of China's clean energy strategy, leveraging its exceptional hydro, wind, and solar resources to create the world's largest integrated renewable energy base. Through pioneering projects such as Ertan, Jinping, and Lianghekou hydropower stations, alongside innovative ventures like the Kela PV and Daofu PSH projects, the region has set new global benchmarks in engineering, sustainability, and intelligent construction. Once fully developed, the Yalong River energy base will not only ensure a stable, green power supply for China but also serve as a model for large-scale renewable energy integration worldwide.

Policy-makers, financiers and practitioners benefit from three days of interaction in Ghana at AFRICA 2025

The AFRICA 2025 conference, co-hosted by Aqua-Media International and ICOLD, took place in Accra, Ghana, from 8 to 10 July, bringing together more than 300 participants from 48 countries; more than half were African nations. ICOLD officers were well represented, with the President and Secretary-General giving opening messages, and a number of experts from national and technical committees chairing of presenting in sessions.

African delegates met counterparts from Asia, Europe, and North America, exchanging ideas on hydropower, renewable energy, financing, and sustainable development. Participants reflected a wide spectrum of stakeholders, including policymakers, government representatives, utilities, financial institutions, professional associations, consultants, contractors, and researchers. This allowed the event to link high-level policy discussions with practical experiences, from those directly engaged in delivering energy projects on the ground.

The opening plenary ceremony welcomed participants with traditional Ghanaian drummers, before speeches that highlighted Africa's achievements and challenges in energy. Alison Bartle of Aqua~Media International spoke of Ghana's long hydropower history, referring to large hydro plants and dams, floating solar schemes, and small hydro installations. She noted that since AFRICA 2013 in Addis Ababa, total hydro capacity across Africa had grown by 48 percent, from 26.3 to more than 39 GW. Hydropower now supplies over 40 percent of national electricity in 21 African countries. Major schemes are under development, such as Batoka Gorge between Zambia and Zimbabwe, Mpatamanga in Malawi, Mphanda Nkuwa in Mozambique, Grand Falls in Kenya, Kikot-Mbébé in Cameroon, and the long-anticipated Inga 3 in the DRC. But she noted how many countries remain left behind, including South Sudan, Sierra Leone, Guinea Bissau, and Chad, where per capita electricity consumption can be less than 40 kWh/year and millions live without reliable power. She stressed the urgency of capacity building and innovative financing strategies to ensure broader access.

Representatives of Ghana gave further insights. Kwaku Wiafe of the Volta River Authority, also president of Ghana's National Committee of ICOLD, explained how the Akosombo Dam of the 1960s had transformed Ghana's economy. He referred to recent climate risk studies on the Volta River carried out after severe flooding in 2023. Kow Eduarkwa Sam, CEO of the Bui Power Authority, described the evolution of Ghana's energy mix. After decades dominated by thermal power, the country is prioritizing renewables again, especially hydro and hybrid systems. He cited BPA's floating solar PV project on the Bui reservoir, adding that FPV capacity could reach 350 MW by 2026.

ICOLD President D.K. Sharma recalled his own experience in India, describing water storage and sustainable energy as the heartbeat of economic growth and emphasized ICOLD's mandate of capacity building in developing nations. Secretary-General F. Corrégé traced ICOLD's history and highlighted its evolving role in addressing climate change and the energy transition. He stressed the importance of water storage and integrated basin management highlighting the significance of ICOLD's World Declaration on the role of dams in the era of climate change.

Jie Tang, World Bank, reaffirmed the Bank's commitment to hydropower, noting that since 2022 it had financed 131 projects in 68 countries, with total support of $17 billion. He underlined that hydropower requires patient financing because of long construction times and high risks. He also highlighted the need for early

attention to environmental and social issues and for benefit-sharing mechanisms to ensure projects serve communities equitably.

The African Development Bank's Henry Paul Batchi presented AfDB's central role in Africa's energy transition, predicting that hydropower's contribution would double by 2030 compared with 2020, enabling it to replace fossil-fuel generation. AfDB supports large multipurpose projects, PPPs, hybrid hydro-solar plants, pumped storage, and modernization of existing facilities. He cited Mphanda Nkuwa, Ruzizi III, and Inga III as examples, and explained the M300 initiative, which seeks to deliver electricity to 300 million Africans by 2030 across 32 countries.

The International Energy Agency (IEA-HYDRO) was represented by Klaus Jorde, who said that global hydropower capacity needed to double by 2050 to meet climate targets, yet progress was two to three times too slow. He called for greater recognition of hydropower's role in energy security, modernization of plants, evaluation of hydropower's multipurpose benefits, and mobilization of affordable financing for developing economies. He invited African nations to join IEA Hydro's collaborative programs, with at least one country preparing to do so by the conference's close.

Regional cooperation was another highlight. Nigerian representative Imo Ekpo presented the newly formed West and Central Africa Hydropower Alliance (WCAHA), a platform for capacity building, knowledge exchange, and regional collaboration.

A Memorandum of Understanding was signed during the conference between Uganda's UEGCL and Ghana's Bui Power Authority, establishing five years of technical cooperation on floating solar, operational strategies, and future projects. This agreement, resulting from initial discussions at AFRICA 2023, illustrated how the series of regional conferences can generate concrete partnerships.

The exhibition hall complemented the discussions, hosting manufacturers, consultants, associations, and service providers. It became a hub for business networking and international collaboration.

AFRICA 2025 demonstrated that persistent inequalities in electricity access remain a central issue, with some countries advancing rapidly while others remain in deep energy poverty. Financing was another major concern, given the complexity, cost, and duration of hydropower projects. Participants stressed the importance of patient, innovative financing structures adapted to Africa's realities. Hydropower was consistently affirmed as a cornerstone of the energy transition, thanks to its ability to provide stable, dispatchable power and multiple co-benefits such as water supply and flood control. Technological innovation, including floating solar, hybrid systems, and pumped storage, is reshaping what is possible. Finally, capacity building and regional cooperation were seen as essential to ensure sustainable progress.

AFRICA 2025 showcased both achievements and challenges. Africa has expanded its hydropower capacity significantly and has major new projects underway, but millions of people still lack electricity. Addressing this gap will require investment, cooperation, and innovation.

The event underlined the shared commitment of governments, financiers, and private actors to make hydropower central to Africa's future.

By Alison Bartle
Aqua-Media International

SAVE *the* DATE

94th ICOLD Annual Meeting - 21 to 29 May 2026

We are pleased to welcome you to the 94th ICOLD Annual Meeting, a space where the world's brightest minds come together to explore, share and discuss the latest innovations and challenges in dam management and construction. In the heart of Mexico, surrounded by our cultural and natural wealth, together we will chart the future of an essential infrastructure for water management and global sustainable development. This is the time to be inspired, learn and build a resilient tomorrow!

With great pride and excitement, I extend my most sincere invitation to ICOLD Mexico 2026, an event that promises to mark a before and after in the history of our organization. As President of ICOLD Mexico, it is an honor for me to host this extraordinary meeting, which will not only bring together the brightest minds in dam and water resources engineering, but will also be an opportunity to discover the greatness and wealth of a country that lives in constant synergy with water: Mexico.

Our country, with its unparalleled cultural diversity, breathtaking landscapes and legacy of innovation in hydraulic engineering, is ready to welcome you with open arms. Mexico has been able to transform its challenges into opportunities, and throughout our history we have demonstrated our capacity for resilience and evolution, in which water has always been and continues to be a symbol of life and prosperity.

ICOLD Mexico 2026 will be much more than a technical event; it will be a celebration of ideas that transform, projects that build sustainable futures and partnerships that are born to last. Here, under the Mexican sun, we will discuss global water challenges, share innovative solutions and celebrate our passion for creating a more resilient and connected world.

In addition to the technical richness, I invite you to immerse yourself in the vibrant culture of our country, to tour our colonial cities, to marvel at our archaeological sites and to let yourself be carried away by the warmth of our people. Every corner of Mexico tells a story, and I am sure that this will be an experience that will remain engraved in your memory.

With the conviction that together we will continue to build bridges of knowledge, I look forward to seeing you at Mexico 2026, an event that will be as unforgettable as it is transformative. It is time to share, learn and strengthen our global community around water, and what better place to do so than in the land where water flows like the very soul of our nation.

Mexico is a country of contrasts and wonders, where cultural and natural wealth intertwine to create a vibrant nation, proud of its history and committed to its future. From the majestic deserts of the north to the lush jungles of the south, Mexico is a country that pulsates with life in every corner, where water flows like the soul of our people.

Water, an essential and sacred element, has been a pillar of Mexican greatness since ancient times. Ancient civilizations, such as the Mayans and Aztecs, mastered hydraulic engineering, creating systems of canals and dams that reflected their deep connection with water. Today, Mexico remains a country where water not only nourishes our fields and cities, but also our traditions, our culture, and our identity.

In every state, in every region, Mexico offers a unique experience. Colonial cities that seem frozen in time; archaeological sites that speak to us of a glorious past; beaches, mountains and jungles that invite adventure and wonder. And in the midst of it all, water remains the vital force that irrigates our lands, drives our economy and strengthens our innovation.

We are ready to host ICOLD Mexico 2026, an event that will not only put our world-class technical and engineering capabilities on the global stage, but will also allow visitors to immerse themselves in the essence of what we are: a resilient, generous Mexico, where water is the symbol of our greatness and our will to build a sustainable future.

Welcome to Mexico, where the water flows and the greatness never stops.

With gratitude and enthusiasm,

Dr. Humberto Marengo Mogollón
President, ICOLD Mexico

THE DAMS NEWSLETTER

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