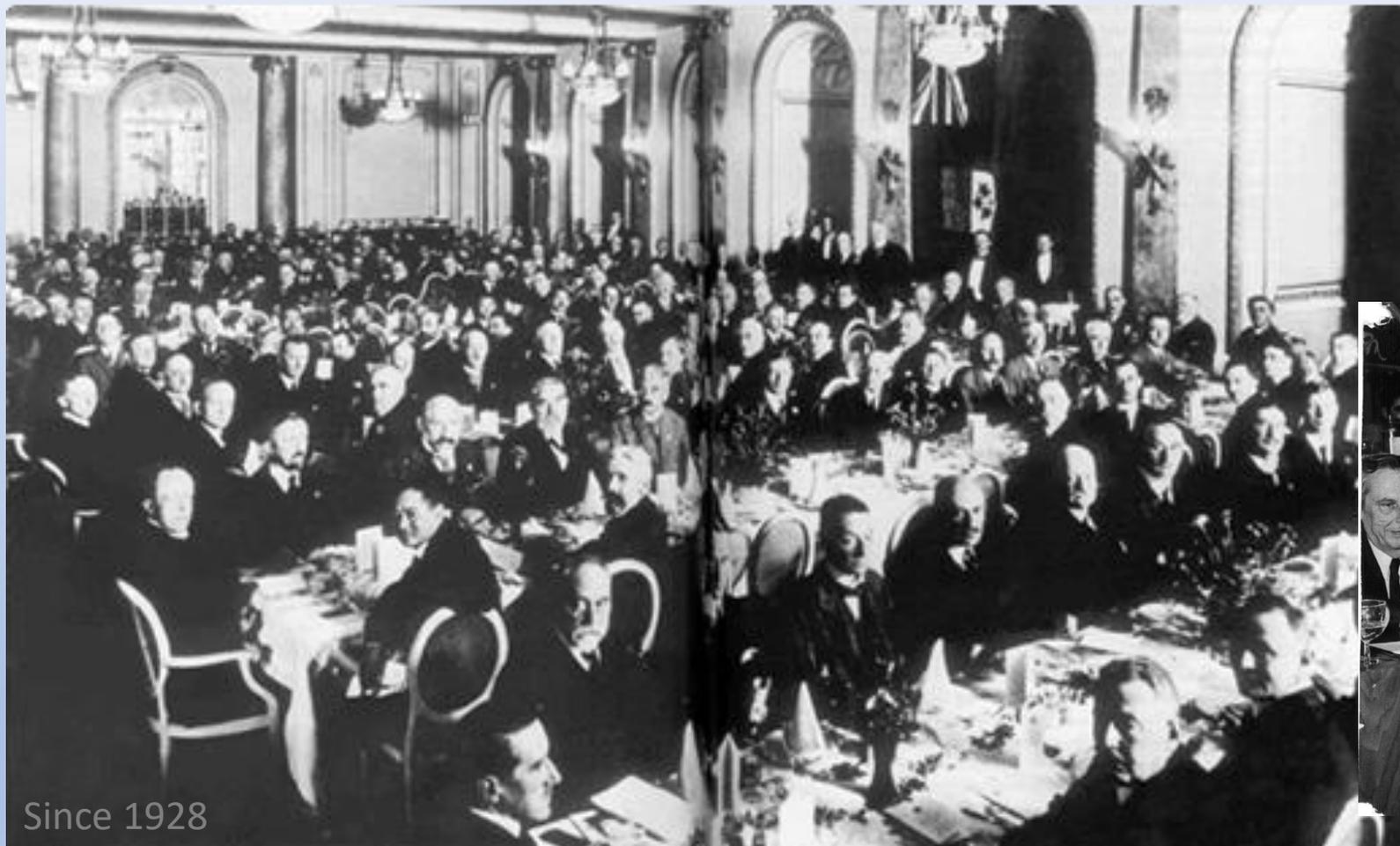


# *World Declaration on the Role of Dams for Energy Transition and Climate Change Adaptation*

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Since 1928



*World Declaration on the Role of Dams for Energy Transition and Climate Change Adaptation*

# Chengdu World Declaration on Dams and Reservoirs for Energy Transition and Adaptation to Climate Change



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

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.

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

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, NGOs, and civil society.



Understanding of their dam, especially of spillway to accidents, downstream tail overtopping of the dam. As learned benefits the making all dams safer. The ICOLD has shown that sharing incidents and failures is state-of-the-art practices. It is thus imperative that dam experts, but expert reports on the incidents, be made freely available to the international community. ICOLD safety approach emphasizes the importance of risk reduction. This includes national and international dam safety: structural measures to minimize failures as well as awareness about dams. Safety approach should be based on river basin, many of 20 basins, often include a of dams and levees. Ultimate responsibility is shared between the dam owners and operators. Financial resources are essential for dam safety. Regulatory authorities in ensuring adequate practice design, construction, contract management, and enforcement within accepted Developing norms, is a key factor to success. Perspective to dam safety. International Dam Safety provides wide experience, advice to designers, authorities to better of best practices.

Working towards safety incidents, international organizations call upon all companies to safety improve all dams. Financial incentives are needed to support dam safety.

- Comités Técnicos
- Clubes Regionales (GT)
- Comités Especiales (ad hoc)

<b>A</b>	COMPUTATIONAL ASPECTS OF ANALYSIS AND DESIGN OF DAMS (2023-25)	<b>Q</b>	DAM SURVEILLANCE (2023-24)
<b>B</b>	SEISMIC ASPECTS OF DAM DESIGN (2023-26)	<b>RE</b>	RESETTLEMENT DUE TO RESERVOIRS (2021-2024)
<b>C</b>	HYDRAULICS FOR DAMS (2021-25)	<b>S</b>	FLOOD EVALUATION AND DAM SAFETY (2020-24)
<b>D</b>	CONCRETE DAMS (2021-24)	<b>T</b>	PROSPECTIVE AND NEW CHALLENGES FOR DAMS AND RESERVOIRS IN THE 21st CENTURY (2023-27) (AD HOC Committee)
<b>E</b>	EMBANKMENT DAMS (2023-27)	<b>TRS</b>	TROPICAL RESIDUAL SOILS (2023-26)
			AND RIVER BASIN MANAGEMENT (2021-24)
			MECHANICAL EQUIPMENT (2023-26)
			IAL AND ADVISORY (AD HOC Committee)
			E CHANGE (2023-24)
<b>I</b>	PUBLIC SAFETY AROUND DAMS (2022-25)	<b>Z</b>	CAPACITY BUILDING AND DAMS (2021-24)
<b>J</b>	SEDIMENTATION OF RESERVOIRS (2023-26)	<b>ZA1</b>	WORLD DECLARATION ON THE ROLE OF DAM IN THE ENERGY TRANSITION AND CLIMATE CHANGE (2023-25) (Ad-hoc)
<b>K</b>	INTEGRATED OPERATION OF HYDROPOWER STATIONS AND RESERVOIRS (2023-27)	<b>ZA2</b>	GENDER DIVERSITY AND INCLUSION (2023-25) (Ad-hoc)
<b>L</b>	TAILINGS DAMS & WASTE LAGOONS (2023-27)	<b>ZX2</b>	YOUNG ENGINEERS
<b>LE</b>	LEVEES (2018-2024)	<b>ZX3</b>	ICOLD BOARD
<b>M</b>	OPERATION, MAINTENANCE AND REHABILITATION OF DAMS (2023-26)	<b>ZX4</b>	Joined members of Committee E & M – Update of Bulletin 48A
<b>N</b>	PUBLIC AWARENESS AND EDUCATION (2021-24)	<b>ZZ1</b>	REGIONAL CLUB ASIA (APG)
<b>O</b>	WORLD REGISTER OF DAMS AND DOCUMENTATION (2021-24)	<b>ZZ2</b>	REGIONAL CLUB AMERICAS (INCA)
<b>P</b>	CEMENTED MATERIAL DAMS (2020-25)	<b>ZZ3</b>	REGIONAL CLUB AFRICA (ARC)
		<b>ZZ4</b>	REGIONAL CLUB EUROPE (EURCOLD)

Declaración Mundial sobre el Papel de las Presas en la Transición Energética y el Cambio Climático



World Declaration on the Role of Dams for Energy Transition and Climate Change Adaptation

## Términos de referencia: (2023)

- ▶ Elaborar un borrador de la “**Declaración Mundial sobre el Rol de las Presas para la Transición Energética, las Medidas de Mitigación y la Adaptación al Cambio Climático**”
- ▶ Identificar las principales características de las presas para la mitigación del cambio climático, en términos de la **viabilidad de una nueva matriz energética** para minimizar las emisiones. Rol de las presas para la generación hidroeléctrica y las instalaciones de almacenamiento por bombeo para proporcionar almacenamiento de energía limpia para la estabilidad de la red.
- ▶ Identificar las principales características de las presas para la **adaptación al cambio climático**
- ▶ Recopilar sugerencias de los principales actores en el campo y de los Comités Nacionales de ICOLD.
- ▶ Recopilar referencias y sugerencias, con el apoyo de la Oficina Central y la Junta Directiva de ICOLD , para conseguir **adhesiones** y finalizar la Declaración Mundial que se presentará en ICOLD INDIA 2024.



# Chengdu World Declaration on Dams and Reservoirs for Energy Transition and Adaptation to Climate Change



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- Cambio climático
- El papel de las presas en la adaptación al cambio climático
- Presas e inundaciones
- Presas y sequías
- Presas y gestión integrada de los recursos hídricos
- El papel de las presas en la transición energética
- Recomendación de acciones.

## A CHANGING WORLD

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**Drought events** are also expected to occur more frequently and are likely to be more persistent and intense. Dams and reservoirs, through water storage and proper reservoir management, along with other measures at the river basin scale are critical in addressing the challenges posed by 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

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.

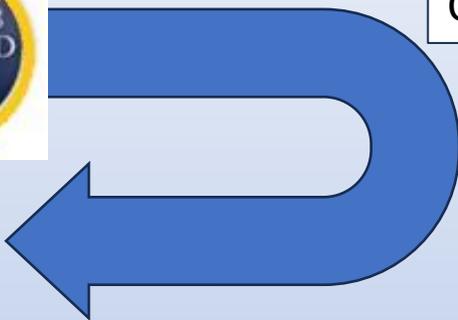
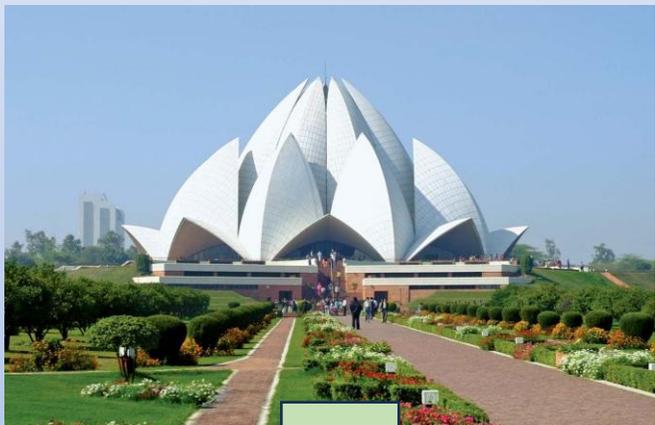
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# Hoja de ruta



COMITÉS NACIONALES



World Declaration on the Role of Dams for Energy Transition and Climate Change Adaptation



## ICOLD recomienda enérgicamente las siguientes acciones:

- ! i) Desarrollo de la capacidad de almacenamiento a nivel mundial:** La capacidad de almacenamiento per cápita ha disminuido constantemente desde la década de 1980 debido al crecimiento demográfico, la sedimentación en los embalses y la disminución del ritmo de construcción de presas. Se necesita más almacenamiento para la transición energética y para mantener los beneficios tradicionales de las presas en las nuevas y desafiantes condiciones impuestas por el cambio climático.
- ii) Aceleración del desarrollo hidroeléctrico:** los responsables políticos y la sociedad civil deben centrarse en el almacenamiento por bombeo sostenible y en esquemas hidroeléctricos basados en el almacenamiento, para equilibrar el crecimiento y la transición energética hacia la vía de cero emisiones netas.

## ICOLD recomienda enérgicamente las siguientes acciones:

- iii. **Desarrollo del potencial hidroeléctrico, especialmente en el mundo en desarrollo, en regiones donde sólo se ha aprovechado entre el 10 y el 30 por ciento del potencial hidroeléctrico, se requieren importantes esfuerzos, compromiso y cooperación entre los principales interesados, como organizaciones internacionales, gobiernos, instituciones pertinentes, ONG y la sociedad civil.**
  
- !** iv. **Introducción del almacenamiento de energía como nuevo uso oficial de los embalses en leyes de aguas y reglamentos licencias, para facilitar una transición energética efectiva y una gestión moderna del agua adaptada a las necesidades actuales.**

## ICOLD recomienda enérgicamente las siguientes acciones:

- ! v. Establecimiento de un marco regulatorio claro y estable para el almacenamiento de **energía** que incluya **tarifas** adicionales para el almacenamiento de energía. Se requieren reformas políticas urgentes para facilitar la transición energética y garantizar la equidad en el acceso a la energía, garantizando la viabilidad financiera de los proyectos de energía hidroeléctrica basada en el almacenamiento y de bombeo, como claves para el compromiso de transición energética.
- ! vi. **Reformas administrativas.** Se deben llevar a cabo con urgencia medidas para simplificar y agilizar los procedimientos de otorgamiento de concesiones para nuevos proyectos hidroeléctricos y de almacenamiento por bombeo, especialmente en lo relativo a la **autorización ambiental y el acceso a la red**. Se requiere financiación concesional para impulsar el almacenamiento de energía de larga duración en embalses.

## ICOLD recomienda enérgicamente las siguientes acciones:

- ! vii. Destacar los impactos ambientales positivos de los proyectos de presas y embalses que contribuyen a las necesidades de agua y a la transición energética, reconociendo que, en muchos casos, los impactos positivos pueden superar otros impactos negativos.
  
- ! viii. Fortalecer la gestión de la seguridad de las presas mediante su rehabilitación y modernización, incluyendo vigilancia, previsión de caudal en tiempo real y sistemas de alerta temprana para mejorar la resiliencia, la operación optimizada de la gestión de los embalses, la regulación inteligente y el desarrollo de capacidades, frente a **fenómenos extremos** exacerbados por el cambio climático.

## ICOLD recomienda enérgicamente las siguientes acciones:

- ix. **Promover la gestión sostenible del agua y los sedimentos** es esencial para preservar las funciones de las presas y embalses, considerando las limitaciones técnico-económicas, ambientales y/o regulatorias.
- x. **Fomento de la investigación y el desarrollo de nuevas tecnologías** que faciliten la mitigación y adaptación al cambio climático. Esto incluye la exploración de la implementación de sistemas híbridos de baterías hidroeléctricas, centrales eléctricas virtuales, sistemas de datos automatizados mediante inteligencia artificial y una arquitectura integral de sistemas de información, así como materiales avanzados para la construcción y rehabilitación sostenible de presas.

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Gracias por su atención



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