

European  
ICOLD Club



# MANIFESTO

## Dams & Reservoirs



November 2016



Encouraging the exchange of up-to-date information, guidelines and research results on matters related to design, construction, operation, maintenance of dams, reservoirs and water resources systems, as well as their social, environmental and economic aspects



Facilitating the interchange of information on the different legislation, standards and practice applied in respect of reservoir safety and environmental impact in different countries



Participating in public awareness activities to explain the social, environmental and economic benefits of dams and reservoirs and encouraging the organization of regular European Symposia on Dams and Reservoirs



Co-operating in the professional training of young engineers in relation to dams and reservoirs through participation in Symposia, Working Groups and in exchanges of staff between countries



Provide information to advise European decision-makers on emerging issues on dams, reservoirs and water resources system



The EURCOLD is one of the regional interest groups created by ICOLD in 1995, the *International Commission on Large Dams*, to facilitate the interchange of knowledge and experience between countries with common interests and socio-economic environments.

The European ICOLD Club (EURCOLD), by means of this document, aims to create awareness in Europe on the role that water reservoirs and dams play in our lives and, consequently, call for a smarter governance framework.

This **MANIFESTO** consolidates the collective effort of all sectors represented in EURCOLD, including government agencies, industries, universities, research centers, enterprises, professional associations, etc. It represents a commitment by the European dam industry to the effective, efficient, socially concerned, transparent and responsible management of water resources.

There are approximately **60,000 large dams in the world**. These dams **store and regulate 4,000 km<sup>3</sup> of water**, which represents about one third of the world's renewable water resources. In Europe there are about 6,100 large dams, more than 10% of the total number of large dams in the world, which create about 5% of the world's existing reservoir capacity.



**Water governance**, supporting technologies and necessary infrastructure, such as dams, are playing an **increasingly important role in society**, due to their broad impact in water supply, food security, renewable energy production, climate change mitigation, drought management, flood protection, water ecosystems, transportation, recreation, sustainable development and overall societal resilience.

The role of water reservoirs and dams across all of the issues listed above may seem clear, indeed obvious, to many of the members of ICOLD. However, their relevance and strategic value deserve to receive full credit and recognition from the society that this industry serves.



# DAMS, WATER SUPPLY AND HEALTH



Reservoirs created by dams supply drinking water to millions of people, sometimes in very large cities without any or limited sources of fresh water.

The **human body can survive** weeks without food, **but very few days without water**. In addition, as many as 4,000 people die each day around the world, due to water scarcity or contamination. The Millennium Summit (UN, 2000) established 2015 as the year to reduce the number of people without access to drinking water and basic sanitation services by 50%. Although there have been significant achievements, there is still a lot of work ahead.

Dams contribute to producing 40% of the world's food through irrigated agriculture, linking food security linked to the existence and proper management of reservoirs. Irrigation indeed stabilizes food production and increases average incomes in rural areas.

Some European countries, particularly in the Mediterranean basins, have less than 10% of natural water courses regulated, while in Northern and Central basins regulation of natural water courses reaches 40%. In any case, reservoirs certainly provide health security to large numbers of citizens and are vital for sustaining many lives.



# DAMS AND ENVIRONMENT

Society as a whole is placing more and more emphasis on environmental issues for dams, as well as investigating, implementing and communicating their sustainability aspects and incorporating multi-purpose benefits into dam projects.

The positive attitude and high level of consciousness of European dam owners and operators towards the preservation of water bodies, the restoration of wetlands and the creation of oasis for animals, flora and ecological biodiversity in arid and semi-arid areas must be emphasized. Other key issues which receive particular attention from dam owners are the facilitation of fish migration (upstream and downstream) and sediment management, including river and coastal hydro-morphological issues.

Nevertheless, reservoirs and dams, like any other significant change within the natural environment, also have implications for landscape, wildlife and biodiversity. When the changes represent negative externalities, they must be effectively addressed, by avoidance, mitigation or compensation (Avoid-Mitigate-Compensate concept).

As clearly stated by the Water Framework

Directive:

- Dams interrupt the continuity of rivers.
- Reservoirs and dams have impact on the aquatic system and change the chemical, physical and biological processes of river ecosystems.
- Dams cut off sediment flow to downstream habitats and increase the coastal erosion.
- Reservoirs and dams can create significant concerns for downstream areas, when not managed and operated properly.

Furthermore, the report “A Blueprint to Safeguard Europe’s Water Resources”, issued by the European Commission in 2012, states that the most widespread pressure on ecological status in the EU originates from changes to water bodies. However, the provision of better inland navigation and recreational facilities, as well as the support offered by reservoirs against fires and droughts, are major aspects that should be duly emphasized among the benefits offered by these infrastructural systems.



# DAMS AND CLIMATE



The widely recognized issue of the “water-energy” nexus, focus of 2014 UN World Water Day, is actually a trifecta, “**Water-Energy-Climate**”, which is at the heart of many opportunities and concerns in today’s world. The Intergovernmental Panel on Climate Change report (Source: IPCC AR5 SPM, 2013) shows dramatically different possible scenarios for climate projections in the medium and long terms, depending on possible different environmental policies. In this context:

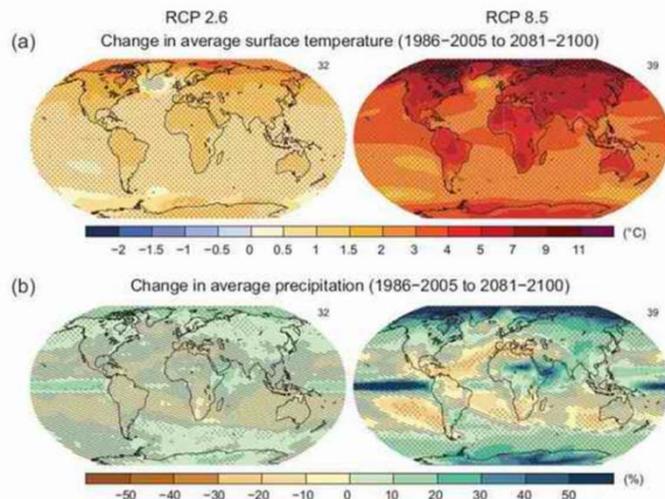
- Hydro and Hydropower dams have become essential for effectively reducing the human impact on Climate Change (i.e. to comply with Kyoto Protocol).
- Regulating and flood protection dams have also become of paramount importance to counteract both the potential increasing frequency and magnitude of water scarcity and floods due to Climate Change ensuring the health and overall safety of the population.

In Europe, between 1989 and

2008, large floods caused 4% of the total casualties (about 150 casualties per year), about 27% of the people affected and more than 40% of all economic damage caused by natural events (Source: 9<sup>th</sup> European ICOLD Club Symposium, 2013).

It is worth mentioning the dramatic consequences of flash floods in Mediterranean regions, which represent a key issue in those areas.

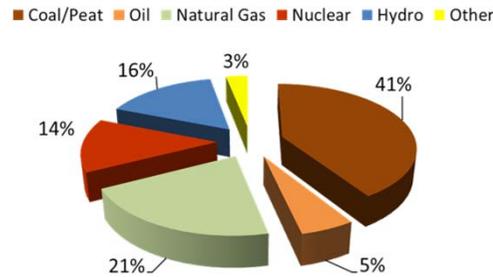
Moreover, to illustrate the impact of some major protection infrastructures systems, the huge flood events in Central Europe in May 2010 and May/June 2013 must be mentioned. The role of dams in flood mitigation in Europe has been investigated by the European ICOLD Club for more than 50 significant real cases. The reduction of flood peak ranged between 12% and 100%, with a mean value of 54% (Source: Report of the European ICOLD Club Working Group “Dams and Floods”: Dams and Floods in Europe. Role of Dams in Flood Mitigation, 2010).



# DAMS AND ENERGY



**Hydropower** is a fully mature technology in use in 159 countries worldwide. It **provides about 16% of the world's electricity**, more than nuclear power, much more than wind, solar, geothermal and other renewable sources combined, but still much less than from fossil fuel plants (Source: ICOLD, "Dams and Hydroelectricity", 2013).



Hydropower plants are generally classified in three functional categories:

- Run-of-River (RoR).
- Reservoir (HPP).
- Pumped Storage Plants (PSP).

Reservoir HPP and PSP can provide electric power grids with a full range of energy services, including:

- Back-up and reserve with quick start and shutdown capabilities.
- Regulation and frequency response.

- Spinning reserve, in case of unexpected load changes in the grid.
- Reactive power compensation and voltage support.
- Black start capability.

**In Europe, hydropower is currently the largest renewable energy resource**, with about 360 TWh generated in 2012. This corresponds to about 12% of net European electricity generation and about 60% of electricity from renewable resources in 2012 (Source: EUROSTAT, 2012). It is worth noting that **reservoir hydropower plants and pumped storage plants also facilitate the expansion of other renewables**. The deployment of sustainable hydropower avoids the annual emission of 1 billion tons of CO<sub>2</sub> (Source: International Energy Agency. Technology Roadmap – Hydropower, 2012).

Moreover, emerging Marine Renewable Energy technologies must be mentioned, including tidal power, in-stream kinetic tidal power, wave energy and ocean thermal energy. These present a very significant untapped potential for Europe.



# OUTCOME: A CALL FOR A SMARTER GOVERNANCE FRAMEWORK IN EUROPE



The European Commission issued a White Paper (EC, 2001) in which a number of principles of good governance are described. These are openness, participation, accountability, effectiveness, coherence, proportionality and subsidiarity. These principles should help the undertaking of tasks needed for governance of systemic risks.

Inspired by such overarching principles, there is the need to address a number of issues that have already emerged or will certainly become systemic risks in our societies, all of them related to reservoirs and dams:

## ***Water resources, climate and environmental policies***

The Water Framework Directive (2000) and the Blueprint to Safeguard Europe's Water Resources aim to possibly turn rivers back to their original environment and underline the need to improve the resilience of the aquatic system to adapt to a changing climate. Moreover, it is deemed important to progressively retrofit existing structures, in order to improve the water status. The Flood Directive (2007) focuses on non-structural measures, while the Critical Infrastructure Directive (2008) does not specifically identify large dams as critical infrastructures to

European citizens. The integration of new and existing dams, polders and green infrastructures could be the actual answer to flood mitigation. Moreover, dams can contribute to creating new natural reserve sites and to promoting landscape and flora-fauna-habitat protection areas.

## ***Energy policies***

Differing situations exist among the European States with regard to their legislation for granting or renewing rights to use hydropower. Some countries implement a competitive process for new installations or renewal of existing schemes, while others do not. Permit durations vary greatly from some years to unlimited duration (Source: Regimes for Granting Right to Use Hydropower in Europe. J. M. Glachant, et al., 2014).

Differences exist at regional, national, as well as at a European level. Understanding and harmonizing the main differences between national hydropower regimes is particularly important in order to establish a coherent and common European policy.

Finally, the development of small, as well as large hydro plants and PSP, is fundamental to support the increase of intermittent renewable energy sources (wind, solar) and to help secure the European grid.



The role of reservoirs and dams expressed in The Blueprint to Safeguard Europe's Water Resources and in the Water Framework Directive differs and even contradicts the views of dam owners and other sector organizations. A policy of opposition is unlikely to produce positive results. Common sense should point to searching for points of contact and mediation between the different positions. Reservoirs and dams, jointly with other structural and non-structural measures, can represent the key system in the framework of Integrated Water Resources Management. Efforts are needed, at technical and institutional level, to find the necessary mediation between different positions that should converge for the common well-being.

The European ICOLD Club launches this MANIFESTO with the aim of promoting an honest and transparent public debate which will hopefully facilitate actions to raise awareness of European policy to support the role of reservoirs and dams for water supply, irrigation and energy generation, providing an effective contribution to climate change adaptation, preserving the environment, and increasing societal resilience.



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