

Recent and Future Trends for Dams Construction



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For thousands of years, dams have served communities by storing water for their needs. As many other technological achievements, dams have been submitted since the 80s to severe criticisms for their environmental impact. Yet, dams are entering the 2010s with a full recognition of their positive role.

The 6th World Water Forum which took place in Marseille this year recognized it. And it has brought at the center of debates a concept dear to ICOLD : the "Water-Food-Energy nexus". Because of the multipurpose nature of the reservoirs they create, dams are a unique tool for helping communities to answer the triple challenge of increasing demand for food, for energy and for water. The global increase in population and the socio-economic development will continuously raise the requirements.

The World Declaration "Water Storage for Sustainable Development" launched by ICOLD with sister organizations (ICID, IHA, IWRA) has stressed that "Water storage infrastructure is vital for human development" and there was therefore "need to accelerate the development of new water storage infrastructure for multiple purposes". Those multipurpose are : Flood management and drought mitigation, irrigation for food production, energy production, drinking water and sanitation, industrial water supply, navigation, environmental services, etc.

Thus, it is not exaggerated to say that we are entering a new Golden Age for Dams construction. A total of \$40-45 billion was invested in large hydropower projects worldwide in 2010. Hydropower use reached a record 3,427 terawatt-hours, or about 16.1 percent of global electricity consumption, by the end of 2010, continuing the rapid rate of increase experienced between 2003 and 2009. Only 30% of the world's identified hydropower potential has been developed. Turning this potential into reality would save extraordinary amounts of fossil fuel, reduce greenhouse gas emissions and improve the management of water resources.

Dams' science continues to advance with a better comprehension of geology and new tools of knowledge. Roller-Compacted Concrete

(RCC) dams continue to develop as a competitive technology for building new and rehabilitating existing dams. Since the first RCC dam in Italy, more than 400 RCC gravity dams higher than 15 m have been built worldwide.

Over the past two decades, many design details and construction methods have been adapted to enhance the final product while maintaining the speed of construction that provides RCC its competitive edge.

A whole new business is also opened by the need to improve the maintenance and operation of existing water storage infrastructure. We must indeed take into account the aging process and the effects of climate change. We have to take advantage of modern monitoring and engineering technologies which can improve the safety of structures against extreme earthquakes and floods. Very old dams will probably see their lifespan extended thanks to these advances.

As we can see, there are now plenty of new challenges for dams engineering. But the challenges are not limited to technology or engineering. Non-Governmental Organizations, often financed by Western Countries where the values of Science and Progress are strongly questioned, are continuing to organize resistances to the building of dams. Dams projects have made great progress in reducing the environmental impact and in taking into

account the interests of affected populations. But there is room for more progress and engineers must cooperate with economists, sociologists and anthropologists to make their projects better communicated, known and understood.

I am totally convinced that the dams engineering community has everything to gain from an open debate on the benefits and concerns around dams building. As has been shown in the Marseille World Water Forum, every time there is an open debate where the case for dam building necessity can be presented, people are generally convinced by the arguments presented.

The challenge for communication around new dams is not so much "how do we do it ?", but rather "why do we do it ?". ICOLD has begun in 2008 a process of communication on those "why", with the World Declaration on Hydropower for the Sustainable Development of Africa. It is now expanded with the above-mentioned World Declaration on Water Storage for Sustainable Development.

If we continue to progress in our technologies, in order to build safer dams using less natural resources and more resistant to natural disasters like earthquakes or tsunamis, if we continue to improve the way we exchange our experiences and knowledge inside ICOLD and inside each of the National Committees, if we continue to improve our communication, the future for dams engineering is bright !