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## Reconfiguring, Replumbing, and Repurposing Hydraulic Structures - Responding to New Realities

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## **Reconfiguring, Replumbing and Repurposing Hydraulic Structures - Responding to New Realities**

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### **KEYNOTE - EXTENDED ABSTRACT**

**Keywords:** *reconfigure, infrastructure, innovation, resilient, collaboration, hydraulics*

We look into an ever-changing future filled with challenges to continue developing new water resources but with an increased emphasis on water conservation and preserving our natural environment. This is a different approach to that of the 20<sup>th</sup> century, where the emphasis was generally on development of water resources. As water engineers and managers facing an increasingly limited water supply, our challenge is to build, and in some cases change, infrastructure for a resilient future. The built infrastructure for water systems must protect life and provide a safe living environment, including an adequate supply and quality of fresh water. Skills and technologies adaptable to the new societal realities of the 21<sup>st</sup> century will be needed. This presentation will focus on the possibilities of reconfiguring, replumbing, and repurposing hydraulic structures even as we look to develop new water resources and face the growing water needs of an ever changing future. The paper is based on several case studies that concentrate on “Doing Things Differently.”

The case studies will include the following:

- Reconfiguring: Rearranging the elements of a structure
  - Las Vegas new water tunnel from Lake Mead
  - Shasta Dam Raise
- Re-plumbing: Reforming Water Conveyance Systems that connect water supply to users
  - Bay Delta -Twin Tunnels
  - Pueblo Dam- Water for Colorado Springs
- Repurposing: Amending the original purpose of a hydraulic structure
  - Glen Canyon - Environmental Flows
  - Reauthorization for hydropower
- Removal: Abolishing structures that outlasted their intended purpose
  - Elwha Dam
  - Klamath River Dams

Resilience is becoming an important factor in the design and operation of hydraulic structures. As public values continue to change and concerns develop over environmental and societal consequences of water development, it is imperative that we as water resource engineers learn the skills necessary to articulate in the public arena the importance of hydraulic structures to a sustained quality of life. We are finding that the water infrastructure built in the 20th century is not necessarily going to serve us in the 21st century. To provide the resilience we desire, we will have to do things differently.

As we strive to do things differently, innovation will play an important role in our ability to impact our future. Innovation speaks to shared thinking and informal collaboration as key components of problem solving and affecting change. As hydraulic engineers, we have always looked to innovative approaches and creative designs to solve problems. However, as the complexities of modern society create new challenges, we find the need to work as a

community. This often involves the need to invite a more diverse group to the collaboration table. Such a group would include, but not be limited to, other engineering professionals, environmentalists, architects, economist, and political leaders.

This keynote will focus on the challenge of “doing things differently” by looking at reconfiguring, replumbing, and repurposing hydraulic structures, and, in a limited number of cases, removing existing hydraulic structures. Water projects, whether new or reconfigured, are often massive, expensive, politically fraught—and an indication of things to come. In most cases, this study will look at existing structures in which something has been added to the facility over its original planned design and purpose.

Only by changing today’s approach to future water management and development can we ensure a prosperous future. This path – one that is resilient and sustainable – will help ensure a better world for future generations. The good news is that real progress is being made in responding to these new realities.