



Raising a Child and the Zen of Sediment Management

George W. Annandale

Abstract

The reliability of water and power supply from dams is highly dependent on reservoir storage, which will take on increasing importance in the future as climate change sets in. Climate change will result in increased hydrologic variability, resulting in not only larger floods but longer and more severe droughts. Enabling reliable supply of both power and water during such long droughts, which can span over multiple years, requires large reservoir storage spaces.

Globally, reservoir storage is experiencing a net decrease, the result of a reduced rate of dam construction since the 1980's and storage loss due to reservoir sedimentation. The joint reduction in reservoir storage loss and increased hydrologic variability due to climate change will lead to greater reduction in the reliability of water and power supply than previously estimated.

The realization that reservoir storage has a dual nature, i.e. that it can be either renewable or exhaustible depending on design and operating decisions, demands establishment of a new tradition in dam building and operation. Successful implementation of reservoir sedimentation management technology is necessary to ensure that reservoir storage can be managed as a renewable resource, which is necessary to secure the future of humanity. This is particularly true in the case of sustainable development of water supply sources, of which dams and their reservoirs have the greatest potential for sustainable development. The development of intergenerational equity through designing dams and reservoirs that can be used in perpetuity should be the fundamental principal of dam design and operating philosophy. Developing such a new tradition requires a radical change in our approach to water resource development.

In addition to executing research with the mental discipline necessary to develop new and practical sediment management technologies, as exemplified by this workshop, it is also our duty as engineers and developers of natural resources to act in an ethical manner and with the wisdom necessary to fulfill our role in society to enhance life quality.

Just like the discipline of Zen sought to understand the essence of Buddhist philosophy, and defined it, we should strive to understand the essential nature of our role in society

as it relates to ethics, mental discipline and wisdom. The dominant role that water resource infrastructure plays in society requires that we understand the essence of the ethical demands of sustainable development; truly comprehending the continuity of life over multiple generations and our role in enhancing life quality for all. Combined with this demand for ethical behavior is the development of wisdom in applying the fruits of research in reservoir sedimentation management, the product of our mental discipline, to ensure sustainable development of our water resources. We should not only develop understanding of the ethics, mental discipline and wisdom of our profession, but should work towards embracing it as part of the tradition of dam engineering.

Tradition is the transmission of customs and beliefs from generation to generation. That is why the question “when does one start raising a child” is not easily answered. The raising of a child does not start at birth, it starts thousands of years prior to birth. Traditions developed over millennia play a dominant role in raising a child.

Similarly, in dam engineering, we have established traditions that are now found to, sadly, lead to non-sustainable development. The historic lack of attention to the impact of reservoir sedimentation on the longevity of reservoir storage has now resulted in a global decline in reservoir storage space at a time when more storage is needed because of climate change and population growth.

Changing this established tradition in dam design will not be easy, as is the case with all traditions. However, new insights into sustainable development and the resolve of researchers to improve understanding of reservoir sedimentation management and to develop practical technologies to manage sediment provides a basis for defining the Zen of Sediment Management. It is now our duty to define and truly understand the ethical requirements of our profession, the importance of mental discipline to develop technology, and the urgent need to develop the wisdom necessary to combine the ethical demands and products of research to ensure sustainable development of our water resources.

Author

George William Annandale

George W. Annandale, Inc., Highlands Ranch, Colorado, USA.

Email: george@gwannandale.com