

WATER: ONE RESOURCE, MANY USES

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As water resources managers, we have a responsibility to meet the growing demands on our Nation's waterways while maintaining economic prosperity, public health, and protecting our precious environmental resources. This is a challenge to all water managers from Federal to local levels. We all must find solutions to manage for competing and conflicting demands on our water resources. Population growth has increased pressure on the demand for water and in some regions, such as the southeast, the southwest, and the far west, population growth has already produced water shortages and will continue to do so in the future. Our intermodal transportation system is stressed by the burdens of meeting the enormous transportation needs of our domestic and international economy. Communities continue to develop in the floodplains increasing the risk to public safety. America's water resources infrastructure is nearing or has surpassed its 50-year planned design life, which has the potential to adversely affect reliability and performance. Overlying these issues is the fact that Americans now place environmental values near the forefront of social priorities. There is increasing emphasis on managing watersheds as integrated systems and meeting the needs of humans and nature simultaneously.

CHANGING ROLES

In the years following World War II, the nation experienced rapid economic and population growth, which placed an unprecedented demand on water supplies. There was a need to reduce flooding in communities that were developing in floodplains and an increased need for stable water supplies. Flood control structures were designed and constructed to meet the needs of these communities, and dams and reservoirs were built to store water to provide the public a dependable water source. The majority of the flood control structures were designed to move water rapidly from vulnerable communities and the most effective engineering solutions were implemented. The solutions implemented during the majority of the 20th Century were not designed using complex computer imaging or modeling, but rather with slide rules, and were the most modern engineering solutions of the time to protect their communities.

These engineered systems allowed communities to prosper economically and to accommodate their growing populations. Some rivers were turned into concrete flood control channels and lost all resemblance of the free flowing, meandering systems that provided habitat for fish and wildlife species. Today, the U.S. Army Corps of Engineers (Corps) is the world's largest public engineering organization, consisting of 30,000 engineers, biologists, economists, ecologists, hydrologists, and many other disciplines. The Corps, along with many other water managers, recognizes the need to keep pace with

technology and demands for information so that it can adapt to changing conditions, situations, and social values.

In 2001, the Corps conducted listening sessions around the country. One of the major themes voiced by the public is that there is a critical and growing need for an integrated approach to meeting water challenges. Such an approach recognizes that watersheds are systems providing many different functions and values and that stewardship of watersheds demands consideration of the costs and benefits of the alternative uses of water resources. These systems flow within and between political jurisdictions, adding to the challenges of implementing an integrated approach. Integrated Water Resources Management (IWRM) and the increased formation of watershed organizations is a growing trend. Water managers are shifting the emphasis of water resources management from a project-by-project, jurisdiction-by-jurisdiction approach to a more holistic, integrated approach that requires increased coordination and cooperation at all levels.

As the Corps develops and strengthens the bonds of partnership for Integrated Water Resources Management among engineers and scientists, it must also bring policy and decision makers and the community of stakeholders into the discussions

IWRM must involve every level from the hydrologic cycle of a watershed, engineering systems, economic development, ecosystems, and responsible governmental systems – Federal, state, and local. Water presents a complex set of challenges and recognizing the interconnection of all the systems means managing on several layers. As water managers, we need to work together to improve our scientific capacity for managing water and do that in cooperation with states, localities, academia, and other partners that have the capacity to build a long term commitment for stronger science and better information.

ENGINEERS AND SCIENTISTS

Engineers and water managers recognize that improving scientific capacity among operators and policy makers is critical to implementing an integrated approach to water resources management. With only 2 percent of all major rivers in the United States remaining unregulated, water managers and engineers exert substantial influence over when and how water moves within our nation. They must take into consideration the extremes of climate variability and natural disasters to ensure uninterrupted water supplies, safe waterborne transportation, and flood risk management to sustain

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our economy and well being. While meeting these demands they are tasked with maintaining healthy aquatic ecosystems that support threatened and endangered species.

Changes in the flow regimes of highly engineered systems have contributed to loss of riverine and riparian functions and values. Many species have been adversely impacted by changes in water temperature, obstruction of historic migration routes, and anthropogenically altered flow regimes that have not taken ecosystem needs into consideration. The threatened and endangered aquatic species that depend upon healthy ecosystems are indicators that we need to review how we operate our facilities and achieve a more holistic approach while maintaining or improving authorized project benefits, such as preserving reservoir levels and keeping flood damage to a minimum. The Corps has been working to build long-term capacity with its scientific partners including other Federal agencies, nongovernmental organizations, and academia, to improve the ecological performance of these systems. Building this long-term capacity allows us to leverage our limited funds and partner more effectively by sharing information and bringing together a broader body of scientific knowledge.

Another opportunity to restore natural flows is during the re-evaluation of our nation's large water resources capital stock. Over the years the Corps has constructed many water resources projects that have sustained our economy and quality of life. Over time economic and environmental conditions have changed as have the Nation's valuation of environmental outputs. We should commit to continual review of project outputs and consider redirecting project purposes to incorporate environmental factors.

The Corps is bringing together scientists and engineers to review how it operates its facilities and work in partnership with academia and other stakeholders. For example, under the Sustainable Rivers Project, a partnership with The Nature Conservancy, the Corps is reviewing operations on a series of dams on nine different river systems. Although the body of knowledge and science of flow-ecology is relatively young, the Corps is able to contribute to knowledge capital as it develops new tools and modeling systems. By increasing the conceptual, technical, and institutional tools available, the Corps is providing planners and facility operators groundbreaking opportunities to change the way they manage their facilities. This knowledge will help foster more sustainable water management in the U.S. and around the world.

CONCLUSION

As the Corps develops and strengthens the bonds of partnership for IWRM among engineers and scientists, it must also bring policy and decision makers and the community of stakeholders into the discussions. Engineers and scientists must contribute to policy formulation and recommendations for investment or operations. The Corps planning model rests on a sound foundation aimed at systematically identifying water problems and

evaluating alternative solutions. Within that framework, engineers, scientists, stakeholders and decision makers can work together synergistically to achieve the plans and strategies to integrate the full range of economic and environmental values within our nation's watersheds. The work will be daunting but we have begun with a solid commitment to collaborative planning to pursue water management improvements that contribute to environmental, national, and regional economic and social goals. We welcome stakeholders to join us in the work and make water management better than ever.

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