

WATER: THREATS AND OPPORTUNITIES

Recommendations for the Next President

Background Material

Dr. Peter H. Gleickⁱ
October 9, 2008

Lack of a National Water Policy

As we enter the 21st century, pressures on water resources are growing and conflicts among water users are worsening. In the United States, wasteful use of our limited and unevenly distributed freshwater resources is prevalent, in part because of an absence of a basic national water policy. If this waste continues unabated, it will impoverish this and future generations, destroy the limited remaining aquatic ecosystems, and threaten future food supply. There is also a clear and urgent need for a comprehensive national water policy to guide a more rational approach to water management and protection of our water quality. Existing federal water programs must be restructured. Federal water laws, including the Safe Drinking Water Act and the Clean Water Act, must be modernized. Federal water efforts must be better coordinated and linked with other priority efforts such as flood planning, economic development, and energy policy.

A new national water policy would provide coordinated leadership to states, many of which are struggling with adapting to climate change and increasing water scarcity or contamination. States and local governments need help; border states, in particular, need clearer guidance on international water management with both Canada and Mexico; and intergovernmental coordination is needed among federal agencies with conflicting and competing mandates.

The Pacific Institute has called for the creation of a National Commission on Water for the 21st Century to provide guidance and direction on the appropriate role of the United States in addressing national water issues. The United States Congress has shown a marked interest in such a Commission, passing the 21st Century Water Commission Act of 2007 (H.R. 135) and recently scheduling debate of a similar bill in the Senate (S. 2728). Some form of national reassessment is needed in the next few years.

In addition to creating a new national water commission, federal water laws and programs must be updated. In particular, the federal government has the mandate under the Clean Water Act to

ⁱ Dr. Peter H. Gleick is a member of the U.S. National Academy of Sciences; Academician of the International Water Academy in Oslo, Norway; a MacArthur Fellow; and president of the nonpartisan Pacific Institute in Oakland, California.

“restore and maintain the chemical, physical, and biological integrity of the Nation’s waters.” However, recent administration of the Act has been woefully inadequate, limited primarily to water quality issues.¹ Today, the scope of the Act is being further constrained to “navigable” waters.² The Clean Water Act should be revised to apply to all waters, funding should be expanded to allow the assessment and use of “best available technology” for pollution control, and the physical and biological integrity of rivers should be protected by a joint federal-state program to establish environmental flow requirements for all of the nation’s rivers. The federal Safe Drinking Water Act also requires serious re-examination to ensure that new contaminants can be quickly evaluated, consistently monitored in the nation’s waters, and reduced to safe levels. Efforts must especially ensure that economically disadvantaged and rural communities are not exposed to higher contaminant levels than the rest of the population.

Finally, the 21st century will require new approaches to water planning. The federal government has an important part to play, though not in its traditional role as infrastructure builder. Today, improving the efficiency of our existing water resources through reducing waste and inefficiency is the fastest and cheapest way to provide “new” water. All federal legislation that directly or indirectly affects fresh water use, such as the Farm Bill, trade laws, plumbing codes, and tax code revisions, should establish incentives for improving water efficiency and reducing wasteful use of water.³

Recommendations: Develop a 21st Century National Water Policy

- Constitute a new national, bipartisan Water Commission for the 21st Century to evaluate and recommend changes to national water policy.
- Work with Congress to update the national Clean Water Act and the Safe Drinking Water Act to ensure the integrity of the nation’s water resources, protect against new contaminants, and permit the use of new technologies.
- Reorganize and streamline the diverse and uncoordinated federal water responsibilities and expand the collection of water-use and water-quality data.
- Reinvigorate and expand investment in our drinking water and wastewater treatment system through bonds, tax incentives, and direct support for small communities.
- Work with Congress to establish incentives for improving water efficiency and reducing wasteful use of water in federal legislation, such as the Farm Bill, trade laws, plumbing codes, and tax code revisions.
- Establish a process for setting and enforcing environmental flows for all major river systems.

Box 1: U.S. Water Resources

Hundreds of billions of dollars have been spent over the past century on water infrastructure, including dams, aqueducts, levees, treatment plants, and distribution systems. These facilities have had tremendous positive effects on the nation, human health, and our economy, but they have also been accompanied by severe negative effects, including degradation of our natural ecosystems, a false sense of protection against floods, and complacency toward water-quality problems. During the same boom in construction, more than 60 percent of the inland wetlands of the U.S. were lost, half of all stream miles were polluted to a significant extent, and many major fisheries were destroyed.⁴

As the new century begins, these traditional approaches to water planning, while still firmly entrenched in many water-planning institutions, are beginning to change. The costs of new water infrastructure now often exceed the costs of improving our water-use efficiency and productivity. We must no longer assume that demand for water will

continue to grow; indeed, water use in the United States is no longer increasing, even though our economy and population continue to grow. Water use in the U.S. peaked in 1980, but has decreased since then, as shown in Figures 1 and 2. Yet industrial output and productivity have continued to soar, clearly demonstrating the possibility of breaking the link between water use and industrial production. The key message here is that improving the productive use of our existing water resources, through reducing waste and inefficiency, is a much faster and cheaper way to meet new water needs.

Figure 1: Total U.S. Water Withdrawals and Gross National Product from 1900 to 2000.

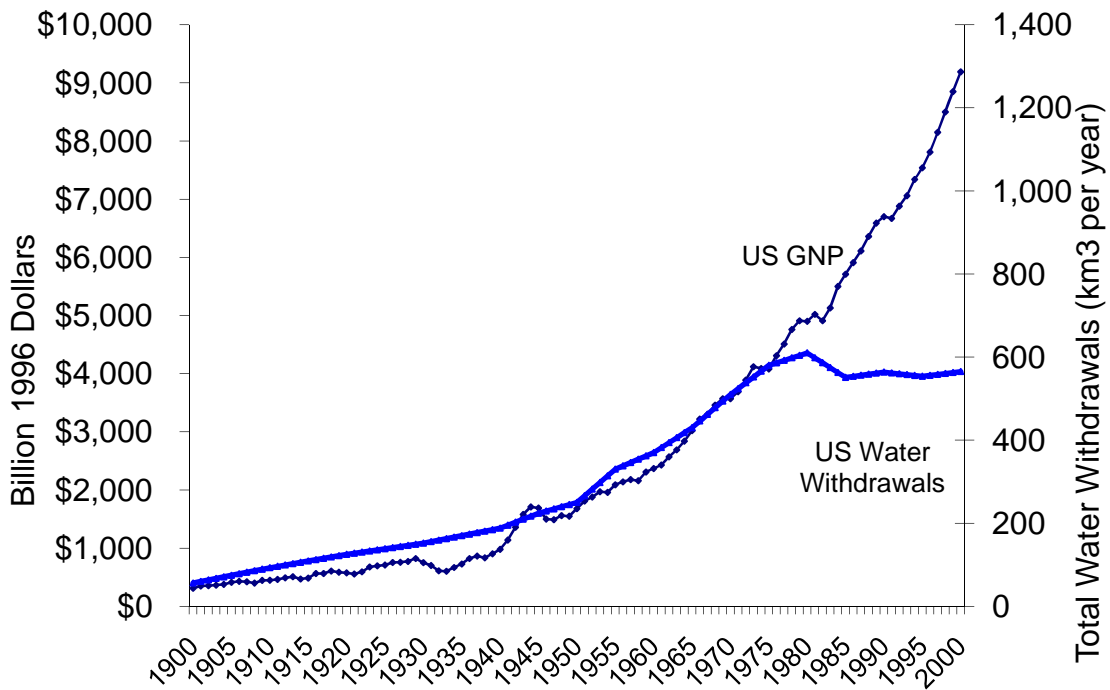
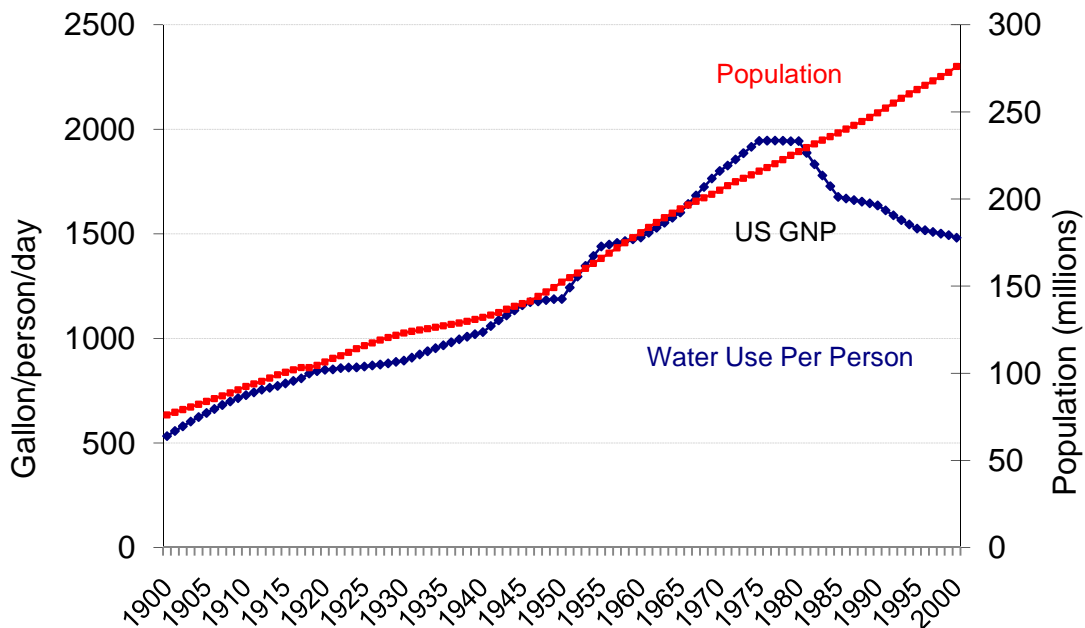


Figure 2. Total U.S. Population and Per-Capita Water Withdrawals: 1900 - 2000.



Water-Related Threats to National Interests and Security

In the past two decades there has been a major rethinking of the field of international security. With the end of the Cold War and the breakup of the Soviet Union, the world has witnessed growing concern over regional conflicts; civil, religious, and ethnic wars within regions; and, particularly, the connections between environmental degradation, scarcity of resources, and regional and international politics and disputes. These latter issues have loosely been grouped under the term “environment and security.”⁵

History shows that access to resources has been a proximate cause of war, resources have been both tools and targets of war, and environmental degradation and the disparity in the distribution of resources can cause major political controversy, tensions, and violence. A chronology of such conflicts has been published and is regularly updated, listing hundreds of incidents.⁶ In 1989, U.S. Secretary of State Baker stated,

“The strategic, economic, political, and environmental aspects of national security and global well-being are, today, indivisible.”

In 1997, Secretary of State Albright said:

“Not so long ago, many believed that the pursuit of clean air, clean water, and healthy forests was a worthy goal, but not part of our national security. Today environmental issues are part of the mainstream of American foreign policy.”⁷

There are very strong connections between water resources and conflict, and a growing number of regions where such connections are particularly relevant. The risk that water-related disputes and conflicts will directly affect U.S. national interests is high and growing. The links between water and security suggest two separate areas where U.S. policy actions may be appropriate.

Recently, concerns over the risks of terrorism have risen much higher on the global list of worries and priorities. These concerns have spilled over into the area of water resources, causing experts and policymakers to review possible terrorist threats to developed water systems and, ultimately, human health and politics. Modern society depends on a complex, interconnected set of water infrastructure designed to provide reliable safe water supplies and to remove and treat wastewater. As a result, this vital infrastructure is vulnerable to disruption from war, intrastate violence, or terrorism.⁸ U.S. foreign policy and security organizations must be prepared to identify and analyze potential threats to vital U.S. interests, particularly related to water. Additionally, we must use a combination of physical barriers, real-time chemical and biological monitoring and treatment, and smart, integrated response strategies to protect sensitive water systems.

U.S. foreign policy must also place a greater emphasis on reducing the risks of water-related conflicts around the world. Various approaches exist for reducing water-related tensions, including legal agreements, the application of proper technology, institutions for dispute resolution, and innovative water management. These approaches hold great promise for maintaining world peace but have not yet been adequately adopted.

Recommendations: Spotlight National Security Issues Related to Water

- Explicitly monitor and track water-related threats to security and U.S. interests.
- Conduct a series of integrated workshops within the War College system, the State Department, CIA, Homeland Security, and other agencies on critical water security challenges, including the vulnerability of U.S. water systems to terrorism, and regional threats.
- Reduce the risks of international water-related conflicts by committing appropriate diplomatic resources within the State Department.
- Reduce the risks of domestic water-related terrorism by working with local and regional water agencies to identify and reduce vulnerabilities.

A Continuing Global Water Crisis

The failure to provide basic sanitation services and clean water to billions of people around the world is perhaps the greatest failure of human development in the twentieth century. As a result, water-related diseases such as cholera, dysentery, and parasitic diseases are increasing in many developing countries. Nearly 250 million cases of water-related diseases are reported every year, with between 5 and 10 million deaths. The failure to completely satisfy basic human needs for water and water services is the result of rapid population growth, underinvestment, growing urbanization, and misdirected priorities.⁹

Eliminating water-related diseases requires more than merely constructing infrastructure or providing clean water. It also requires maintaining and operating that infrastructure, teaching children about adequate hygiene habits, identifying other transmission routes such as unclean handling of food, and controlling disease vectors. The United Nations Millennium Development Goals call for significant improvements in access to basic water services, and while progress is being made, far more could be done.

The U.S. government should play a major role in changing the priorities of aid organizations for how money is currently spent and work with international organizations to refocus aid efforts in this critical area. In addition to real improvements in the quality of life, there are great advantages in improving international goodwill.

Recommendations: Expand the Role of the U.S. in Addressing Global Water Problems

- Refocus U.S. international aid spending priorities toward meeting basic water needs in conjunction with efforts of international nongovernmental organizations and the private sector.
- Increase efforts for monitoring water quality and water-related disease.
- Expand the scientific, educational, and financial leadership of the U.S. in addressing unmet needs for water for all.

Integrating Climate Change into U.S. Water Planning and Management

Leading climate scientists now believe that human-induced climatic changes are already occurring and that additional changes are unavoidable even if we act now to reduce our emissions of these gases. These climatic changes will have widespread consequences for every aspect of life on earth. Among the most important will be impacts on water resources, including effects on both the natural hydrologic system and the complex water-management schemes we have built to alter and control that system.¹⁰

Global climate changes will have major effects on the timing and magnitude of precipitation, evaporation, and runoff. While specific regional impacts will depend on future changes that are only incompletely understood, some consistent and robust results can be described. In the arid and semiarid western U.S., modest changes in precipitation can have large impacts on water supplies. In the Rocky Mountains and the Sierra Nevada, warming will increase the ratio of rain to snow, accelerate spring snowmelt, and shorten the overall snow season, leading to more rapid, earlier, and greater spring runoff. Sea-level rise is already affecting our coastal aquifers and vulnerable infrastructure and populations.

Climate-induced changes will also affect the size, frequency, and consequences of extreme events, which have great economic and social costs for U.S. residents. Flooding, the nation's most costly and destructive natural disaster, could become more common and extreme. Recent research suggests that greenhouse warming is likely to increase the number of intense precipitation days and flood frequencies in more northerly portions of the nation and that the frequency and severity of droughts could also increase in some regions.¹¹

Climate change will also affect water quality, though much less research has been done on this aspect of the problem. Potential negative impacts include reductions in dilution flows, increased storm surges, and higher water temperatures. Low flows in western rivers could increase salinity levels; warmer waters could threaten aquatic life directly and by reducing dissolved oxygen levels. An increase in days with more intense precipitation could increase agricultural and urban pollutants washed into rivers and streams.

Despite growing scientific concern, a 2007 GAO report finds that many federal agencies have not made climate change a priority and critical long-term strategic plans do not address climate change. In addition, resource managers lack specific guidance for incorporating climate change into their work, and therefore regularly fail to do so.¹² Policymakers and resource managers must begin to integrate climate change into all long-term water planning and management or risk serious, and costly, consequences.

There are many opportunities for reducing the risks of climatic variability and change for U.S. water resources. We note the applicability of the precautionary approach taken in many international agreements, including the United Nations Framework Convention on Climate Change, to which the U.S. is a party:

Parties should take precautionary measures to anticipate, prevent or minimize the causes of climate change and mitigate its adverse effects. Where there are threats of serious or irreversible damage, lack of full scientific certainty should not be used as a reason for

postponing such measures, taking into account that policies and measures ... should be cost-effective so as to ensure global benefits at the lowest possible cost.¹³

Decisions in the U.S. about water planning, the design and construction of new infrastructure, the type and acreage of crops to be grown, urban water allocations and prices, reservoir operation, and management have traditionally relied upon the assumption that future climatic conditions would be the same as past conditions. This reliance on the past record now may lead us to make incorrect – and potentially dangerous or expensive – decisions.

One of the most important coping strategies must be to begin planning for future changes. Changes may be necessary in the design of projects not yet built. Modifications may be required to existing facilities to permit them to continue to meet their design objectives. New projects may need to be built or old projects removed. New institutions may need to be created or old ones revamped in order to cope with possible changes.

The scientific community has advocated this position for nearly twenty years. In 1990, the Climate and Water Panel of the American Association for the Advancement of Science concluded:

“Among the climatic changes that governments and other public bodies are likely to encounter are rising temperatures, increasing evapotranspiration, earlier melting of snowpacks, new seasonal cycles of runoff, altered frequency of extreme events, and rising sea level...*Governments at all levels should reevaluate legal, technical, and economic procedures for managing water resources in the light of climate changes that are highly likely.*” [Italics in original.]¹⁴

Similarly, reports from the Intergovernmental Panel on Climate Change have long urged water managers to begin “a systematic reexamination of engineering design criteria, operating rules, contingency plans, and water allocation policies” and states with “high confidence” that “water demand management and institutional adaptation are the primary components for increasing system flexibility to meet uncertainties of climate change.” This emphasis on planning and demand management rather than construction of new facilities marks a change in traditional water-management approaches, which in the past relied on the construction of large and expensive infrastructure, and also marks a bold step forward to addressing one of the most critical challenges of the 21st century.

Recommendations: Integrate Climate Change into all Federal Water Planning and Activity

- Update the 2000 National Assessment on the impacts of climate change on U.S. water resources by developing adaptation strategies for responding to unavoidable impacts.
- Reduce greenhouse gas emissions associated with water systems by reducing the energy cost of providing, treating, delivering, using, and cleaning water.
- Integrate climate change into all federal water decisions, planning, and management, including new construction and the operation of existing water systems and reservoirs.

-
- ¹ Postel, S. and B. Richter. 2003. Rivers for Life: Managing for People and the Environment. Island Press. Covelo, California.
- ² Two Supreme Court decisions – Solid Waste Agency of Northern Cook County v. Army Corps of Engineers and Rapanos v. United States – have limited the Clean Water Act’s application.
- ³ Cooley, H., J. Christian-Smith, and P.H. Gleick. 2008. More with Less: Agricultural Water Conservation and Efficiency in California: A Special Focus on the Delta. Pacific Institute. Oakland, California. Online at www.pacinst.org.
- ⁴ Gleick, P.H. 1998. The World’s Water 1998-1999. Island Press, Washington, D.C.
- ⁵ Gleick, P.H. 1993. “Water and conflict.” International Security. Vol. 18, No. 1, pp. 79-112 (Summer 1993).
- ⁶ See the Water Conflict Chronology, at <http://www.worldwater.org/conflictchronology.pdf>.
- ⁷ For quotes and references relevant to environmental security issues, see the regular report from the Woodrow Wilson Center (Washington D.C.) “Environmental Change and Security Project Report.”
- ⁸ Gleick, P.H. 2006. “Water and Terrorism.” Water Policy, Vol. 8, pp. 481-503.
- ⁹ For detailed information on access to water around the world and progress toward the Millennium Development Goals for water, go to the World Health Organization 2008 Update “Progress on Drinking-water and Sanitation: Special focus on sanitation.” http://www.who.int/water_sanitation_health/monitoring/jmp2008/en/index.html. See also, Gleick, P.H. editor, 2008. The World’s Water 2008-2009: The Biennial Report on Freshwater Resources. Island Press, Washington, D.C.
- ¹⁰ Detailed information on climate change science and impacts can be found in the reports of the Intergovernmental Panel on Climate Change (IPCC), published by Cambridge University Press in 2007. For detailed information on the impacts of climate change on U.S. water resources, see the 2000 report from the Water Sector of the National Assessment of Impacts of Climate Variability and Change for the United States (U.S. Global Change Research Office, Department of Interior, USGS).
- ¹¹ See Cooley, H. 2006. “Floods and Droughts.” In P.H. Gleick, editor, The World’s Water 2006-2007: Island Press, Washington, D.C. pp. 91-116.
- ¹² Government Accounting Office. 2007. Climate Change: Agencies Should Develop Guidance for Addressing the Effects on Federal Land and Water Resources. GAO-07-863. Washington, D.C.
- ¹³ United Nations Framework Convention on Climate Change (UNFCCC). 1992. International Legal Materials (ILM), Vol. 31, pp. 849. See also <http://www.unfccc.de>.
- ¹⁴ Waggoner, P.E. (editor). 1990. Climate Change and U.S. Water Resources. John Wiley and Sons, Inc., New York.



**PACIFIC
INSTITUTE**

654 13th Street, Preservation Park, Oakland, California 94612, U.S.A.
510-251-1600 | www.pacinst.org