# III. Framework for a Climate Ready National Water Program

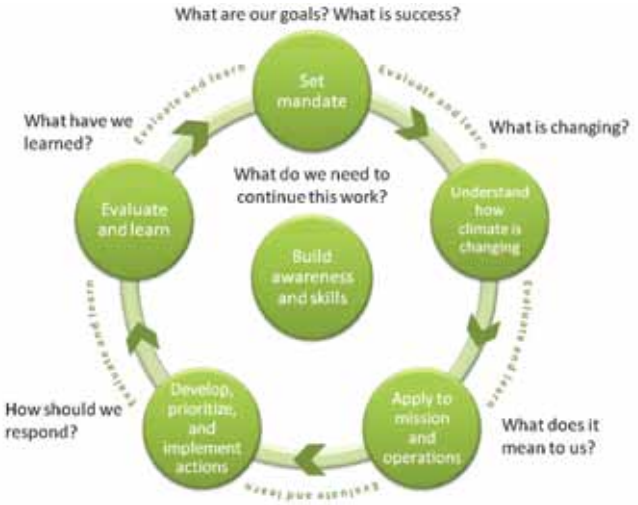
UNDER THE CLEAN WATER ACT, EPA and the states are directed to take a variety of actions to control pollution from point and nonpoint sources in an effort to achieve the Act's goal of attaining "water quality which provides for the protection and propagation of fish, shellfish, and wildlife and provides for recreation in and on the water." Under the SDWA, EPA promulgates national primary drinking water regulations applicable to public water systems to protect human health from drinking water contaminants. EPA's source water protection efforts aim to protect abundant and clean drinking water supplies. However, as climate change shifts hydrological patterns and increases variability outside of historic norms, including frequency, severity, and duration of drought or extreme rain events, achieving these goals will become more challenging.

## A. Guiding Principles

To position the NWP as "Climate Ready," we will work with stakeholders and partners to achieve our Vision. The NWP adopted the following 10 principles that inform the development of the *2012 Strategy*. These principles are consistent with, and reinforce, the principles promulgated by the ICCATF and reflect additional principles specific to managing water resources.

1. **Integrated Water Resources Management (IWRM):** Support collaboration among state, interstate, local, tribal, and federal governments and among sectors to manage the quality and quantity of sustainable water resources within watersheds and underlying aquifers (IWRM is further discussed below).
2. **Adaptive Management:** Decisions about the future are made under some conditions of uncertainty, and adaptive management provides a method for building flexibility into policy and decision-making to manage risk and to allow for new knowledge input. Uncer-

**Figure 4: Six-Step Approach to Climate Change Adaptation Planning**




http://www.whitehouse.gov/sites/default/files/microsites/ceq/Interagency-Climate-Change-Adaptation-Progress-Report.pdf (CEQ, 2010)

tainty is not necessarily a reason to defer decisions.

The *Flexible Framework* adopted by the ICCATF (Figure 4) reflects both the evolution of climate science and the likelihood that the uncertainty regarding the timing, nature, direction, and magnitude of localized climate change impacts will continue. Because investments such as for construction of water infrastructure are capital intensive, long-lived, and require long lead times, building climate change considerations into the design of these investments is reasonable, even with some degree of uncertainty in climate projections.

3. **Collaborative Learning and Capacity Development:** Collaborate with other federal water agencies and state, interstate, tribal, and local water agencies to contribute to the development of long-range plans that account for climate change impacts. Establish partnerships to assemble and develop planning and decision support tools and the underlying datasets for climate change adaptation and mitigation.

### Dealing With Uncertainty

Although we can glean clues about the likely impacts of future climate change from recent observations and research into Earth's past, the picture is still incomplete and our predictions are uncertain. Future climate change will likely be fundamentally different from changes Earth experienced in the past because of the high temperatures that are projected, the rate of climate change, and the fact that climate change is occurring in a setting where human actions have already altered natural ecosystems in many other ways. Despite uncertainties about what the future holds, decisions can be made now. Strategies for managing ecosystems in the future will need to pay special attention to the issue of uncertainty. It will be important to make decisions based on the best currently available information, and implement them in a way that preserves the ability to make adjustments in the future as more information becomes available.

Ecological Impacts of Climate Change, [NRC, 2009]

4. **Long Term Planning (i.e., multi-decadal time horizon):** Look ahead and consider ways to reduce risk over time when making adaptation decisions. Incorporate concepts of sustainability and non-stationarity (i.e., continual change in the hydroclimatic system outside of assumed norms) into the implementation of water programs.
5. **Energy-Water Nexus:** Saving water saves energy and vice versa. Adaptation and mitigation go hand-in-hand, and opportunities for both should be considered whenever possible. Managing the "water/energy nexus" will protect the aquatic environment while preserving freshwater resources for human uses and the economy. EPA developed a set of principles to promote these concepts to water managers and the general public (Figure 5), which are described in more detail in Appendix A.
6. **Systems & Portfolio Approach:** Design integrated and resilient solutions that address the inter-relationships among environmental, public health, social, and economic aspects of a climate change impact and that avoid unintended consequences. Incorporate diversification that includes contingency plans (emergency preparedness and response) to be implemented should adaptation actions under-perform.

**Figure 5: Principles for an Energy Water Future: The Foundation for a Sustainable America (See Appendix A for full description)**

http://water.epa.gov/action/energywater.cfm

- **Efficiency in the use of energy and water should form the foundation of how we develop, distribute, recover, and use energy and water.**
- **The exploration, production, transmission and use of energy should have the smallest impact on water resources as possible, in terms of water quality and water quantity.**
- **The pumping, treating, distribution, use, collection, reuse and ultimate disposal of water should have the smallest impact on energy resources as possible.**
- **Wastewater treatment facilities, which treat human and animal waste, should be viewed as renewable resource recovery facilities that produce clean water, recover energy, and generate nutrients.**
- **The water and energy sectors—governments, utilities, manufacturers, and consumers—should move toward integrated energy and water management from source, production, and generation to end user.**
- **Maximize comprehensive, societal benefits.**

7. **Cost of Inaction:** Understand the risk of inaction and its cost (i.e., the value at risk) compared to the cost of proactively adapting to projected climate change impacts. Support decision-making and express tradeoffs in terms of costs and benefits (quantified and non-quantified short- and long-term risks), as well as between action and inaction.
8. **Environmental Justice:** Account for the most vulnerable by assuring that our plans and programs consider the needs of those with a higher degree of vulnerability (e.g., children, economically disadvantaged communities, tribes, islands).
9. **Performance Evaluation:** Set clear goals against which to assess performance, and guide adaptation and refinement of program planning, policy design, and implementation. Include numeric targets where appropriate.
10. **Mainstreaming Climate Change into Core Programs:** As experience is gained and tools are developed, integrate climate change mitigation and adaptation into the NWP. Ultimately, we would no longer need a "climate change" strategy; rather, climate change would be integrated into the planning and management of our core water programs.

## B. Integrated Water Resources Management (IWRM)

Because surface water and ground water flows across political jurisdictions, state and local government actions that are coordinated throughout watersheds and across the underlying aquifers can more successfully protect and preserve these resources than disparate actions taken piecemeal. Watershed and aquifer boundaries are the optimal organizing principle for

state, interstate, tribal, and local management of fresh water to ensure these resources remain abundant and clean across the nation for current and future generations.

IWRM is a framework to holistically address current water resource issues and emerging climate change complications, such as increasing incidence of flood and drought. There are several definitions of this term, but for the purpose of this strategy, the NWP uses IWRM to describe opportunities for state, interstate, tribal, and local officials to voluntarily collaborate at watershed or aquifer scales, with support from federal agencies, to protect and preserve freshwater resources through mutually beneficial solutions. IWRM calls for intersector planning (e.g., between the energy, water, and agricultural sectors) to sustainably manage water resources. A shorthand way to think of IWRM is "one water." To be most effective, IWRM should take into account water quantity and quality, surface water and ground water, salinity of coastal estuaries, land use, floodplain management, point and nonpoint sources of pollution, green and grey infrastructure, and climate change adaptation and mitigation (EPA-R9 2011).

### Case Study: IWRM in California

In 2002, the Californian legislature passed the Integrated Regional Water Management (IRWM) Act and established IRWM as the framework for collaborative planning for all aspects of water resources in a region (IRWM is an example of IWRM). Between 2002 and 2006, California voters passed three Water Bonds authorizing $1.8 billion to fund competitive grants for IRWM planning and implementation. The California Department of Water Resources established guidelines for Regions to consider as they each developed their own coordination, planning and decision-making processes. Thus far, California has 46 active IRWM regions, covering 82% of the State. In 2011, EPA Region 9 worked with California to develop a technical guide for incorporating climate change into IRWM planning (CA, 2011a). For more information on California's program, see: www.water.ca.gov/irwm/docs/Brochures/Brochure_IRWM_020410.pdf

Strategic actions described throughout this document point to NWP efforts to work with other federal, state, interstate, and tribal agencies and other stakeholders in assembling information on the hydrologic relationships between surface water and ground water, and between water quality and quantity; developing planning support tools for water resource managers to address climate change adaptation; and building public understanding of the interaction between water use and the quality and sustainability of ground water and surface water.

The NWP intends to seek opportunities to integrate IWRM into national and regional activities and coordinate with other federal, state, interstate, tribal, and local agencies as well as with nongovernmental and private sector stakeholders to support IWRM at hydrologic scales.

IWRM is a voluntary collaboration of state, interstate, local, and tribal governments, and economic sectors, supported by federal agencies to sustainably manage the quality and quantity of water resources within watersheds and underlying aquifers.