OVERVIEW
***The Value of Water to the U.S. Economy* Report**
DRAFT for SAB Consultation
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1. Purpose
    a. Analysts and policy-makers currently lack comprehensive, science-based information on the value of water to the U.S. economy.
        i. Available data and literature offer some insights to the importance of water to certain sectors of the economy, but the information available is limited.
        ii. Lack of understanding or ability to systematically analyze the broader economic implications of alternative resource management strategies may hamper the ability of EPA and others to make resource protection and management decisions that are both environmentally sustainable and economically sound.
    b. This report is the first step in an EPA research initiative to address this issue. Its purpose is to provide a consistent set of background information on:
        i. The use of water in various sectors of the economy.
        ii. The sensitivity of those uses to changes in water supply and quality.
        iii. The impact of the availability and quality of water resources on a variety of economic factors, such as:
            1. Regional economic development; and
            2. U.S. competitiveness in the global economy.
    c. The report is also intended to:
        i. Provide a baseline understanding of the data, methods and models available to analyze the value of water to the U.S. economy;
        ii. Serve as a foundation for expert analysis of key issues;
        iii. Support EPA efforts to engage a broad range of stakeholders in a discussion of these issues.

2. Context and Conceptual Framework
    a. Effective and efficient decision-making by public and private sector entities requires reliable information about the supply or quantity of water available, the quality of that water, and the value of alternative uses of the resource. This information provides decision-makers with important economic insights about:
        i. The scarcity of water;
        ii. Competing options for the use of water resources; and
        iii. The opportunity costs of alternative uses of water.
    b. EPA, for example, conducts a wide range of economic analyses in support of regulatory initiatives and other policy decisions. Such analyses may include:
        i. Assessments of the direct cost of complying with a regulation (e.g., costs of capital equipment to modify production processes; changes in labor or material costs);

ii. Assessments of the potential benefits of the regulation, such as reductions in health risks and improvements in water quality; or
iii. Assessments of the impacts of a regulation on certain socioeconomic groups, as required by statute or executive order (e.g., small businesses, children, disadvantaged or particularly vulnerable populations).
iv. When a regulation affects industries in a particular sector of the economy, the economic analysis may also include the use of partial or general equilibrium models to estimate the impact of the regulation on output and product prices within the sector or throughout the economy, respectively.

c. Other public and private sector entities may conduct similar analyses to inform decision-making.
d. As a general rule, analyses at the intersection of the economy, the environment, and society are constrained by a lack of analytic resources (e.g., data, methods, models) that accurately and comprehensively describe the dynamics within and between these systems, including our economy's relationship to its water resources. All decision-makers, whether in the public or private sector, could make more informed and sustainable decisions if this information was broadly available.
e. The ultimate goal of this effort, therefore, is to develop a systems-level understanding of:
    i. Water's role in the economy;
    ii. Interdependencies between and among various uses; and
    iii. Ways in which the nation can improve management of its water resources to:
        1. Promote environmentally sustainable economic growth, and
        2. Maximize the economic value derived from water's use.

3. Economic Perspectives for Evaluating the Value of Water
    a. To evaluate how water is valuable to the U.S. economy, this report adopts the following perspectives:
        i. Microeconomic efficiency – the value of water is related to its relative scarcity, its alternative uses, and the opportunity cost of those uses.
            1. Getting the pricing right is important to getting efficient outcomes
        ii. Sustainability – the value of water is viewed within the context of dynamic integrated environmental, economic, and social systems.
            1. Value in an integrated system is derived from direct and indirect impacts, including through market and nonmarket production and consumption
        iii. Value of the marginal product of water – the value of water is viewed within the context of its use as an input in the production of valuable goods and services.
            1. The value of water is related to the value of the output is it used to produce

2. The value of water is related to the mix of inputs used in production, which is impacted by the marginal rate of technical substitution between those inputs

b. The value of water is also viewed in terms of its impact on the structure and long-term performance of the U.S. economy as a whole. For example:
    i. Given projected trends in population growth and composition, trends toward urbanization, shortages in critical infrastructure investment, global warming, and other strategic drivers of change, how does the availability of water affect patterns of economic and regional development in the U.S.?
    ii. How does water create competitive advantages for the U.S. in the 21st Century global economy? In what sectors of the U.S. economy are these competitive advantages most strategically significant to the nation as a whole? What are the implications on regional economic development?
    iii. What factors will affect the ability of the U.S. to maximize the economic value generated by its water supplies in the 21st Century?

4. As EPA's initial step in attempting to address these issues, this report draws on available literature and data to provide an overview of the nexus between the nation's economy and its water resources.
    a. Focus: economic activity that is currently captured in national economic statistics
    b. Complement to a parallel EPA effort to characterize the economic value of non-market ecosystem services
    c. Considers both "off-stream" and selected types of "in-stream" water use:
        i. Off-stream: use of water that is withdrawn or diverted from its source.
        ii. In-stream: use of water that is not withdrawn or diverted from its source.

5. Organization of the Report:
    a. Chapter 2: Overview of Water Supply and Use
        i. Distribution of water withdrawals by source:
            1. Surface water vs. groundwater
            2. Fresh water vs. saline water
        ii. Water withdrawals by USGS water-use category
            1. Public supply
            2. Domestic self-supply
            3. Irrigation
            4. Livestock
            5. Aquaculture
            6. Industrial
            7. Mining
            8. Thermoelectric power
        iii. Overall trends in off-stream water supply and use
        iv. Data quality/completeness

b. Chapter 3: Public Supply and Domestic Self-Supply
    i. Background information on current supply, use, and trends
    ii. Regulation of drinking water quality
    iii. Economic data on the water supply sector and domestic water use
    iv. Domestic water demand and demand-side management
    v. Public water supply infrastructure and investment needs
c. Chapter 4: Agriculture (includes water withdrawn for irrigation, livestock, and aquaculture)
    i. Overview of the U.S. agriculture sector
    ii. U.S. agriculture in a global context
    iii. Water use in U.S. agriculture
    iv. Water supply issues affecting agricultural water use
    v. Water quality issues affecting agricultural water use
d. Chapter 5: Manufacturing
    i. Overview of the U.S. manufacturing sector
    ii. U.S. manufacturing in a global context
    iii. Water use in U.S. manufacturing, by industry
        1. Focus on five industries estimated to account for more than 90 percent of water use in the manufacturing sector:
            a. Chemical manufacturing
            b. Paper manufacturing
            c. Petroleum and coal products manufacturing
            d. Primary metals manufacturing
            e. Food, beverage, and tobacco products manufacturing
        2. For each industry, provide information on:
            a. Economic output and related data
            b. Water use
            c. Water sources
            d. Trends and issues related to the industry's use of water
e. Chapter 6: Mining and Energy Resource Extraction
    i. Overview of U.S. mining and energy resource extraction (coal, crude oil, natural gas, and uranium)
    ii. U.S. mining and energy resource extraction in a global context
    iii. Water use by activity
        1. Discuss water use for three major categories of activity:
            a. Extraction of coal, uranium, and other minerals
            b. Crude oil production
            c. Natural gas production
        2. For each activity, provide information on:
            a. Water supply issues affecting water use
            b. Water quality issues affecting water use

f. Chapter 7: Electric Power Generation
    i. Overview of electric power generation in the U.S.
        1. Current capacity and output by source and region
        2. Projected future generation and trends
    ii. Water use
        1. Thermoelectric cooling
            a. Water withdrawals and water consumption
            b. Intensity of water use by source of power
            c. Variation in use by cooling method
            d. Trends/projected future use
        2. Hydropower
    iii. Effect of water resource constraints and conditions on electric power generation
        1. Regional water supply constraints
        2. Interrelationship of water quality and supply issues
g. Chapter 8: Commercial Fishing
    i. Overview of U.S. commercial fishing sector
    ii. U.S. commercial fishing in a global context
    iii. Major resource management issues that affect the sector's current productivity
        1. Overfishing
        2. Coastal habitat degradation
h. Chapter 9: Recreation and Tourism
    i. Recreation and tourism nationwide
    ii. Overview of water-based recreation and tourism in the U.S.
    iii. Participation and expenditures by activity
        1. Swimming/beach use
        2. Recreational fishing
        3. Boating
        4. Wildlife/nature viewing
        5. Hunting (waterfowl)
    iv. Impact of water quality and supply issues on recreation and tourism