

**THE DOW CHEMICAL COMPANY AND THE NATURE CONSERVANCY
WORKING TOGETHER TO VALUE, PROTECT AND
ENHANCE WATER ECOSYSTEM SERVICES**



***JANUARY 24, 2011 - DOW AND THE NATURE
CONSERVANCY ANNOUNCE COLLABORATION TO VALUE
NATURE***

***...HELP DOW AND OTHER COMPANIES RECOGNIZE, VALUE
AND INCORPORATE NATURE INTO GLOBAL BUSINESS
GOALS, DECISIONS AND STRATEGIES.***

***THE GLOBAL ORGANIZATIONS WILL WORK TOGETHER TO
APPLY SCIENTIFIC KNOWLEDGE AND EXPERIENCE TO
EXAMINE HOW DOW'S OPERATIONS RELY ON AND AFFECT
NATURE.***



Gená Leathers
Water Issue Leader
The Dow Chemical Company

**Comparative Groundwater Law & Policy
Workshop
April 8-10, 2013**



TEXAS OPERATIONS

SIZE & SCOPE



- ◆ Freeport is Dow's Largest Integrated Manufacturing site
 - More than 5,000 acres
- ◆ 65 production plants producing 32 billion pounds of products annually
 - 44% of Dow Products sold in U.S.
 - >21% of Dow products sold globally
- ◆ Water reservoirs covering 4,700 acres
- ◆ 3,200 acres of waterways and pipeline corridors
- ◆ More than 1900 buildings
- ◆ 6 dock units, including 10 barge berths and 4 deep-water berths
- ◆ Shipping 49% of products by water, 29% by rail, 11% by pipeline, 10% by truck



DOW FREEPORT BURNING PLATFORM

SEAWATER INTRUSION



06/21/2009

PERCEPTION: THE BRAZOS RIVER HAS LARGE FLOWS RELATIVE TO DOW/LOCAL DEMAND



REALITY

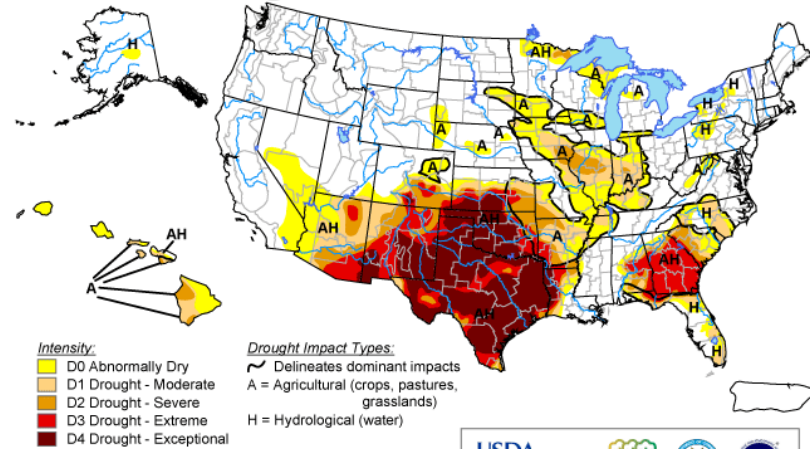


06/21/2009

PREVIOUS STRATEGY → INTERRUPTIBLE WATER

U.S. Drought Monitor September 6, 2011

Valid 8 a.m. EDT



The Drought Monitor focuses on broad-scale conditions. Local conditions may vary. See accompanying text summary for forecast statements.

<http://drought.unl.edu/dm>



Released Thursday, September 8, 2011
 Author: Mark Svoboda, National Drought Mitigation Center

FREEPORT FRESHWATER PILOT SELECTED



- **Dow Texas Operations Freeport site and Freshwater supply**
 - The first of 3 pilot projects selected
- **The Brazos River provides the primary source of freshwater to Dow's Freeport Site**
 - critical for the site operations as well as for other water users and wildlife in the water basin.
- **The State of Texas Regional Water Plan forecast the water demand, on the Brazos, to increase 54% by 2060.**
 - Municipal and industrial demands are the primary contributors to the demand increase.
- **Correspondingly trend associated with climate models predict increased average temperatures along with increased water loss from evaporation**
 - which if occur, will affect volume of flow in the Brazos.

ANALYSIS



- Dow and The Nature Conservancy collaboration scientists incorporated the effects of predicted climate change and increase demand into existing models of the Brazos River basin to predict future water availability. **Previous analysis had not considered these synergistic effects.**
- The models predict that there will be more frequent and severe basin-wide water shortages, with the maximum length of shortages in the lower basin where Dow withdraws its water potentially increasing three-fold.
- Analysis confirmed scenarios of potential reduction of future freshwater flows in the Brazos in studies conducted independently by Dow using historic flows, **while adding new information about the influence of predicted higher temperatures.**
- **Traditionally**, companies may have projected the increasing costs to ensure supply of water. But disruption to supply is not an option for most companies.
 - In the past, **companies may have assigned the variable cost of water**
 - Today recognize that in **drought event disruptions users will pay much more than the average cost of water to ensure water supply is not disrupted.**
 - **Must model costs based** not on water when available (costs of water rights) but **the cost during water interruptions (up to and including cost of desalination)**, and associated loss impacts must be factored into cost comparisons.
 - Ecosystem service models can help better predict the frequency of these drought events, improving financial models.

RESULTS



Nature-based and collaborative solutions may provide cost-competitive ways to improve the value of Dow's freshwater assets incrementally, while also benefiting other users and ecosystems. Collaboration experts brainstormed potential response initiatives, which were narrowed to the following five that were analyzed in more detail:

- Wastewater reuse – construct wetlands to filter purchased municipal wastewater**
- Reservoir flood pool reallocation – support the reallocation of flood pool storage at U.S. Army corps of Engineers' reservoirs and complementary floodplain restoration**
- Panhandle land management – replace high water-use invasive plants with lower water-use native plants in the Texas panhandle**
- Municipal Rebate – support re bate program for municipal users to buy water efficient appliances or switch to native landscaping that does not require watering**
- Agriculture Water Reallocation – support for fund improvement s in irrigation technology and purchase saved water**

RESULTS (CONT.)



All response initiatives, except for wastewater reuse, were found to be cost-competitive with the base solution of expanding Dow's existing reservoir system.

- In total, these initiatives have the potential to enhance basin supplies of water by 60,000 acre-ft per year. These types of solutions could complement traditional engineering approaches.

Initiatives also provide additional benefits to the public and ecosystems.

- Collectively these initiatives could protect 21,500 acres of habitat and generate public benefits of at least \$10 million over the next 30 years.
- However, these actions have legal, political and technical challenges, which would need to be addressed before implementing.

Companies are beginning to shift their thinking about water.

- Previously considered an almost limitless, free or low-priced commodity
- Now recognized as a finite resource that needs to be considered when making strategic decision. Simply stated, it is not an option to run out of water.
- The importance of understanding the "economics of water" will continue to increase as higher demand and reduced supply lead to water scarcity in varying regions around the world.

WORKING TOGETHER TO VALUE, PROTECT AND ENHANCE WATER ECOSYSTEM SERVICES



TYING BACK TO GROUNDWATER FOCUS:

CONCEPTS AROUND DEFINING AND DESCRIBING THE VALUE OF WATER AND ECOSYSTEM SERVICES CONTRIBUTION ARE APPLICABLE TO VARIOUS CATEGORIES OF WATER SOURCES INCLUDING GROUNDWATER.

CURRENTLY, WE DO NOT HAVE THE SAME LEVEL OF UNDERSTANDING WITH RESPECT TO GROUNDWATER AS WE DO FOR SURFACE WATER RELATIVE TO THE FREEPORT SITE BUT THE LEVEL OF UNDERSTANDING IS INCREASING RAPIDLY IN TERMS OF HOW TO INCORPORATE AND MANAGE