



DuPont Victoria

Community engagement leads to enhanced wetland program

Founded in 1802, DuPont is a science company putting science to work to solve problems in ways that make life better and safer. The company delivers science-based solutions that make real differences in people's lives around the world in areas such as food and nutrition, health care, apparel, safety and security, construction, electronics and transportation. Operating in 70 countries worldwide and with 135 manufacturing and processing facilities, the company's 2003 revenues were US\$ 27 billion and the company employed 81,000 people, approximately half of whom work outside the USA. DuPont's core values have remained constant over the years: commitment to safety, health and the environment; integrity and high ethical standards; and treating people with fairness and respect.

Increasing public concerns about deep well injection, a method involving the piping of liquid waste or sewage into a chamber surrounded by non-porous rock at a level well below the aquifer, led to DuPont's initiation of a voluntary program to eliminate reliance on this method. At the Victoria Plant in Texas, the company worked in close cooperation with local groups, including the Sierra Club, leading experts and consultants, researching and developing a design for the Wetland that would dramatically improve environmental performance and ensure long-term viability for the manufacturing facilities.

Wetlands are where the water meets the land. An ocean is not a wetland, nor is a river or the Great Lakes. The shores connected to these areas are where you will find wetlands. Wetlands come in many shapes, sizes, and varieties. According to the definition there is no size limitation. A wetland can be freshwater or saltwater. Freshwater wetlands are commonly called ponds, marshes, bogs, swamps, riverbanks, and constructed wetlands. Saltwater wetlands are called coastal marshes and estuaries. Bayous can be either saltwater or freshwater. A wetland requires three things:

1. It must be covered with water part of the time to a depth of no more than 6.6 feet (about 2 meters). The soil must be saturated to the surface at some time during the growing season of the prevalent vegetation.
2. It must support and have water dwelling or hydrophilic plants that are adapted to grow, effectively compete, reproduce, and/or persist in anaerobic soil conditions.
3. It must have hydric soil.

Wetland habitats are home to 43% of US federally listed endangered and threatened species. Coastal wetlands help protect the land from storm surges. Wetlands are able to clean and purify the water by removing sediments, toxins, heavy metals, microorganisms, nutrients and waste material. Replacing them with manmade water treatment plants would cost billions of dollars yearly. Wetlands are nurseries for 75-90% of the fish and shellfish harvested in America.





This natural resource accounts for US\$ 111 billion dollars in sales and provides one and a half million jobs.



The Guadalupe River valley is home to many different species of wildlife, some rare. Among the species found in the river is the Guadalupe Bass, the state fish of Texas; there are also large populations of rare birds and wildlife. Its parks and reservoirs are popular recreation areas, and Guadalupe State Park and Honey Creek State Natural Area combined protect 4,200 acres (1,700 hectares) of the river basin.



Minimizing environmental impacts

The DuPont plant in Victoria, Texas, produces nylon intermediates, used in fabrics, and ethylene based polymers, a type of plastic, from hydrocarbon-based resources. Simply put, hydrocarbons are any chemical composed of a chain of hydrogen and carbon. These are resources such as fossil fuels. For the past 50 years, the plant has been a major supplier of these products with current capacity exceeding 2 billion pounds per year (907 million kg/yr). The manufacturing process requires use of freshwater from the Guadalupe River and produces liquid waste streams. Historically, these wastewater streams were disposed of using deep-well injection systems.

However, increasing public concerns led to the initiation of a voluntary program to eliminate reliance on deep-well injection that would also dramatically improve environmental performance and ensure long-term viability for the manufacturing facilities. Among the concerns voiced was the fear that waste injected into deep wells would contaminate the groundwater by leaching through to abandoned oil or water wells. Additionally, DuPont had voiced its intention to discharge 12 million gallons a day of treated wastewater containing some salts into the Guadalupe River. The company was confident that environmental impact would be minimal, but some thought otherwise. One, a shrimp fisherwoman named Diane Wilson, explained that "Salt can be one of the worst things you can have for a bay system, because shrimp follow salt gradients, and they know where to go to an estuary to get their food because they're following how it gets saltier and then fresher. And when you've got something that is pouring nothing but salty water into a bay system, what you've got is this whole species that won't even go into the nursery area. So they're in this much wider basin where there is not the food, there is not the protection. And what you end up doing is killing off a whole crop, a whole species." She eventually decided in 1996 to go on a hunger strike to protest the plan. Also protesting DuPont's activities in Victoria was the Sierra Club, a group founded in 1982 by naturalist John Muir.

Building a wetland

DuPont began research on its environmental improvement program in 1980 to reduce waste and eliminate deep-well disposal at the site. These process changes have been supplemented by the construction of a biological wastewater treatment facility (biotreatment), a 53-acre wetland and a 200-acre land application pilot program for the beneficial reuse of biosolids.

The company gathered a panel of stakeholders, experts and company engineers to determine the best way to structure the wetland area. The group included representatives of several sectors of the community, including the Victoria Independent School District and Victoria College, the Sierra Club, the Victoria Birding Club and government representatives. Community input was a key factor in the inclusion of a treatment wetland to visually demonstrate water quality prior to its return to the Guadalupe River.



This group, called the Wetland Advisory Team, suggested such enhancements as:

- Incorporation of wildlife habitat enhancements such as selection of plants to provide forage and habitat, addition of deep open water zones for waterfowl and inclusion of protected islands, in total adding 75 acres to the habitat;
- Inclusion of an outdoor education center suitable for classroom groups and development of an educational program that includes a full-time educator;
- Addition of public access features including an observation platform, information kiosk, bird watching blind, walking trails, boardwalk across wetland and a water sampling pier;
- Cost-effective treatment capacity that is designed to polish effluent water and provide buffering in the event of a biotreatment unit upset.

In addition, the group produced a set of selection criteria for the plants to be included in the wetland. They had to have:

- Documented performance of use in water quality enhancement;
- A physical growth pattern conducive to providing water flow distribution and erosion control;
- The ability to provide rapid growth and colonization of open areas but still integrate well into a diverse vegetative community.

The plants also had to be native to the Victoria area and provide some habitat for waterfowl or wildlife.

Creating this wetland as a buffer between the plant and the river itself meant that water could be released, after treatment, into a relatively isolated area containing natural methods of purifying the water. Thus, any remaining impurities could be monitored and removed before the final “product” flowed into the Guadalupe River system.

The other type of waste resulting from manufacturing, non-liquid effluent composed of assorted biosolids, is sent either to a landfill or applied to a 200-acre land application pilot area. This land is currently producing a hay crop. In addition, consultants prepare an annual report evaluating the land application system. This annual report includes biosolids data, soils and groundwater analyses, application rates and hay quality data. The hay is being fed to horse and zoo/wildlife center animals in the area. The local birding club is active in counting and recording birds sighted.



Aerial view of the wetland

In addition, DuPont formed a partnership with the Victoria Independent School District to jointly fund a full-time position for a teacher responsible for developing the educational program of the facilities at the wetland. The program has been developed taking into account the requirements of Texas’s “Essential Knowledge and Skills”, which state that at least 40% of a student’s science classes have to be hands-on. The success of this aspect can be gauged from the statements of teachers, including the praise of one teacher, “I feel like the DuPont [wetland] site is part of my classroom.”



Positive results

The reactions of those in the wetlands advisory team to the finished product have been overwhelmingly positive. One member wrote, "This project could serve as a model for improving industry and community relations...the successful rejuvenation of chemical manufacturing wastewater at the plant has provided the community with numerous benefits." Their conservation efforts have also drawn praise from others. As one birdwatcher wrote in the local newspaper, "Here is a case where dozens of wetland [bird] species, many of which are unusual or rare, have found new homes." Importantly, the wildlife and plants of the site appear to be doing well. During DuPont's annual test of the health of fish in the wetland, some species were healthier than their counterparts in the reference pond. Many larger animals were attracted by the abundance of the wetland, and the only problem noted was an overpopulation of nutria, a small beaver-like rodent, in the ponds. To answer this, population control methods are being employed, and several alligators have been attracted to the site; they will also help reduce the numbers of nutria.

The wastewater treatment facility includes several technical innovations developed during semi-works and engineering studies that improved process performance while lowering investment from US\$ 100 million in 1991 to US\$ 45 million in 1998. The buffering capacity of the 53-acre treatment wetland allowed DuPont to reduce the size and amount of equipment that typically would be necessary to handle process upsets and avoid permit incursions. Conventional equipment cost estimates a savings of US\$ 10-12 million due to the wetland's buffering capacity. Providing equivalent buffering capacity via conventional processing equipment would have cost 3-4 times the wetland's investment cost of US\$ 3 million. In addition, the site has won numerous awards, including "Habitat of the Year" from the Wildlife Habitat Council. With regards to DuPont's use of community input, Paul Tebo, DuPont vice president for Safety, Health and the Environment, said, "The community engagement that facilitated turning this wetland into an asset for habitat enjoyment and education is a model of the new kind of partnership that needs to exist at our sites worldwide".

DuPont sold its Victoria Plant as part of the sale of Invista in April 2004.

More information

Additional information about the Wetland can be found at
<http://www.dupont.com/corpB420010615/environment/wetland/index.htm>

Other Resources:

Information on wetlands in Texas
<http://www.glo.state.tx.us/wetnet/>

Guadalupe River
<http://www.tpwd.state.tx.us/park/guadalupe/guadalupe.htm>

Sierra Club
www.sierraclub.org

About the WBCSD

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