



Valuing Ecosystems

2011 Global Conservation Report



January 24, 2012

INTRODUCTION

The Dow Chemical Company appreciates the impacts we have on nature and our dependencies on the critical services that nature provides.

2011 marks the first year that Dow has compiled its global efforts related to Biodiversity and Ecosystem Services into one report. We have a strong history of philanthropic giving focused on protecting and preserving nature. In alignment with the company's 2015 Sustainability Goals, it is common to see Dow volunteers active in their communities and Dow nature preserves in regions where we do business. For years, Dow has been conserving land, donating property and supporting the efforts of local conservation groups and non-governmental organizations through generous grants and donations.

In 2011, we added a bold new dimension of leadership through our collaboration with The Nature Conservancy to determine the business value of ecosystems services.

The information contained in this report identifies where positive impacts occurred throughout the year, and will aid in continuing to implement a corporate strategy that delivers on Dow's Mission, Vision and Values – which include “delivering sustainable solutions to customers” and “Protecting our Planet.”

NEW COLLABORATION PROJECTS

The Nature Conservancy

- Launched 5-year collaboration to help Dow and other companies value and incorporate nature into global business goals, decisions and strategies.

Dow Lands

- Started work on identifying the value and conservation benefit of Dow properties in the United States.

Remediation

- Started work on a “Sustainable Remediation” pilot project to better value ecosystem services in remediation activities.

Life Cycle Assessment (LCA)

- Assessed how to integrate ecosystem services into LCA and chartered an effort to continue into 2012

Dow Focal Point Engagement

- More than 20 global leaders and experts are engaged with The Nature Conservancy collaboration at various levels.
- Initiated discussions between The Nature Conservancy and Dow AgroSciences and Dow Water & Process Solutions businesses to leverage areas of mutual interest and benefit.

HISTORY OF VALUING NATURE

In 1996, Dow needed a new water treatment facility at its Seadrift, Texas operations – at an estimated cost of \$40 million for a traditional gray infrastructure solution. Instead, for \$1.4 million, Dow built beautiful wetlands and natural treatment ponds. Now the land not only treats 5 million gallons of water per day, but also serves as a habitat for a variety of wildlife.

GLOBAL CONSERVATION ACTIVITIES

Data Collection and Definitions

Giving by The Dow Chemical Company and The Dow Chemical Company Foundation for conservation and nature-related activities was collected by site from leaders globally. The data received represents over 90% of sites globally and is sorted into the following categories:

- **Traditional Conservation:** Land or funds given for the direct protection of natural spaces
- **Education and Access:** Funds donated for the education of or access to natural area
- **Ecosystem Service Related:** Actions taken by Dow that have reduced dependence/impact on ecosystem services (e.g., air and water quality improvements, reduction in freshwater use, CO₂ emission reduction) and reduced the Company’s footprint. A number of activities were the result of regulatory-driven projects. This value includes total project costs.

Summary Results by Category

Traditional Conservation

\$932,000

Nature Education and Access

\$368,600

Ecosystem Service Related

\$19,555,000 (includes total project cost)

Methods Development and Valuation

\$1,000,000 The Nature Conservancy

\$100,000 World Resources Institute, Aqueduct Project

\$900,000 in-kind resources from Dow Chemical

Selected highlights from this year are shown on the map below. They are representative of the types of conservation projects done around the world, but do not include all of the actions Dow has taken in this area.



- ① **Ground-Hornbill Conservation – Bryanston, South Africa**
The number of Southern Ground Hornbills has decreased by two thirds and the species is close to becoming officially endangered. Over the past 50 years, Ground Hornbills have lost over 70% of their natural habitat. This research project aims to gain a scientific understanding of the conditions the Ground Hornbills thrive in so that suitable areas to place them in can be identified.
- ② **Habitat Conservation and Wastewater Treatment Plant Upgrade**
 Cartagena, Columbia
- ③ **Mata Atlantica Forest Recovery**
 Franco da Rocha, Brazil
- ④ **Black Skimmer Colony – Freeport, TX, USA**
In the middle of its manufacturing site in Freeport, TX, Dow has an oyster shell parking lot that is protected year-round to enable the successful nesting of one of the largest black skimmer colonies on the

HISTORY OF VALUING NATURE

In 1963, Dow employee Howard Garrett appointed a study committee to explore the possibility of establishing a nature center in Midland, Michigan. By 1965, the Herbert H. and Grace A. Dow Foundation had leased 198 acres of land at the confluence of the Pine and Chippewa Rivers to the Chippewa Nature Center – where Dow products and volunteers continue to play a role in educating the public.

Gulf Coast. In 2011, more than 1,000 skimmers made it their home. On the first Saturday in June, Dow enables members of the public to view and take photos of the skimmers to highlight the need for the conservation of the coastal habitat the skimmers prefer. Dow employees partner with members of the Gulf Coast Bird Observatory to host the event and answer questions.

5 Guadalajara Spring Forest Recovery

Guadalajara, Mexico

6 King Crab Protection

Kasaoka, Japan

7 Bois de l'hopital Nature Preserve

Lauterbourg, France

8 **Peregrine Falcons – Louisville, KY, USA**

One of 12 nesting pairs of Peregrine Falcons in Kentucky have chosen the Louisville site as its home for the last 3 or 4 years. Employees look out for the falcons especially each year when the chicks start flying. The young ones frequently have to be retrieved from inside buildings or rescued and replaced in their nest.

9 Philippine Eagle Adoption

Makati City, Philippines

10 Watershed Initiative Network,

Little Forks Conservancy, and Bay Sail Shipboard Education

Midland, MI, USA

11 Whooping Crane Recovery Program

Hahnville, LA, USA

12 **Braakman Nature Reserve – Terneuzen, The Netherlands**

On Saturday November 19, a group of enthusiastic Dow Terneuzen employees participated in the first Dow nature-volunteers working event in the Braakman nature reserve, adjacent to the site. The activity was part of a new partnership between Dow and Staatsbosbeheer, the non-profit organization that preserves state owned nature reserves. Through this partnership Dow wants to show nature and industry can not only coexist, but can be good neighbors, for instance by engaging employees. In an aligned initiative, the inventory of onsite flora & fauna is being updated to raise awareness that nature values are present inside the fence and engage employees in preserving these where possible.

13 Dow Learning Center at Calgary

Calgary, Canada

14 Energy and CO₂ Reduction

Map Ta Phut, Thailand

15 Wastewater Treatment Upgrade Project

Qingpu, China

16 Robert Bateman Get to Know Nature Project

Fort Saskatchewan, Canada

17 Air Quality Improvements

Varenes, Canada



The Dow-TNC Collaboration

2011 Progress Report



January 24, 2012

Working Together to Value Nature

Measuring how much nature is worth to a company, community or the world isn't easy — and often, the tremendous importance and economic value of nature's benefits are appreciated only upon their loss.

But leading organizations have realized that nature is an essential and fragile asset, one which we all impact and depend upon. So we all need to be looking for ways to value nature and improve how decisions associated with its services are made.

Last January, Dow and The Nature Conservancy embarked on a very important experiment — one that we hope will help build a roadmap for how companies assess, incorporate and invest in nature and the benefits it provides, like fresh water, clean air and flood protection. This update, our first annual, reflects the activities we undertook to develop our collaboration, identify our first pilot site, scope our areas of analysis at the first site and engage in a global dialogue to advance awareness of this important issue and field of work.

We know that it will take public and private sector collaborations like this one to make real change happen — and to make the value of nature a fundamental consideration in business decisions. That's why we are committed to rolling up our sleeves, putting boots on the ground to test our methods, and engaging leaders and experts from a variety of disciplines along the way. Our work together provides an important opportunity to demonstrate the inherent value of nature and make business practices more sustainable.

We welcome your feedback and experiences to improve our work and build the dialogue.

Sincerely,



Neil Hawkins
Vice President, Sustainability and EH&S
The Dow Chemical Company



Glenn Prickett
Chief External Affairs Officer
The Nature Conservancy



Overview

In January 2011, Dow and The Nature Conservancy announced a breakthrough collaboration to help Dow and the business community recognize, value and incorporate nature into global business goals, decisions and strategies.

The global organizations are applying scientific knowledge and experience to develop methods and tools for companies to use by examining how Dow's operations rely on and impact nature. There are many ways that nature benefits people – often called ecosystem services – like providing fresh water and buffering floods and storms. We all depend on these benefits, and our activities can also impact nature in ways that limit our ability to rely on them.

By finding ways for companies to account for nature's services on their bottom line, this collaboration will deliver new practices that lead to solutions that benefit both business and conservation. Tools, models, summaries of lessons learned and results will be shared publicly and through peer-review for other companies, scientists and interested parties to test and apply.

Over the course of five years, Dow and The Nature Conservancy are working together to implement and refine ecosystem services and biodiversity assessment models at three Dow sites around the globe. These sites will serve as "living laboratories" for developing, testing and implementing scientific and economic methods that can be used by Dow and other companies to improve business practices through conservation. As more companies use these methods and tools, it will likely lead to greater investment in conservation because it makes good business sense.

Dow and The Dow Chemical Company Foundation are collectively committing \$10 million to the collaboration over five years.

Progress to Date

Daily production by Dow impacts and depends upon a number of ecosystem services—like fresh, flowing water necessary for manufacturing processes and waste treatment, as well as for providing habitat for many species; coastal marshes that buffer floods and hurricanes while providing habitat and nurseries; and forests that clean the air and support the health of people and nature in the surrounding region. Since the launch of the Collaboration, the Conservancy and Dow have been working together to identify key biodiversity and ecosystem services that Dow impacts and depends upon at priority sites around the world.

Site Selection

We have identified our first pilot site where we will be developing and testing methods. The following co-developed site selection criteria were applied to select this site and will be used for the selection of future locations:

- 1. Material:** Pilots should address material, priority and critical business decisions/issues that involve biodiversity and ecosystem services (BES). These issues should be relevant and applicable for Dow and other businesses.

HISTORY OF VALUING NATURE TOGETHER

In July, 2008, Dow announced its \$1.5 million exclusive support of The Nature Conservancy's Cachoeira Restoration Project, an essential part of a large-scale reforestation and protection program in the Atlantic Forest of Brazil.

2. **Priority:** Project at the site addresses critical-to-Dow ecosystem service and/or site is in an area of high biodiversity and/or ecosystem risk/value.
3. **Advancing:** Pilots should advance the development of methods for integrating and valuing ecosystem services at a landscape level.
4. **Value:** Pilot learnings are relevant and valuable to Dow and the environment, and replicable on multiple Dow sites; relevant to other businesses.
5. **Application:** Site analysis can inform Dow work processes.
6. **Data:** There are sufficient BES data available for ecological and economic analysis.
7. **Scale:** Significant benefits: Pilots can demonstrate business benefits of incorporating BES into decision-making; have the potential for direct and tangible conservation benefits at scale and provide societal benefits (e.g., improvements in overall water supply for communities), either at the pilot site or another location. Overall, benefits from the pilot work should be consistent with the scale and expectations of the collaboration. Sites should be of significant size to be relevant to Dow and the region, and ensure they are replicable.
8. **Support:** Site is consistent with TNC geographic and programmatic priorities and with Dow business priorities. TNC operating unit and Dow site managers support engagement on the project and business leaders are engaged.
9. **Location and Variety:** Sites should provide an overall mix of conditions and situations, including: Geographic and developing/developed countries, existing and new construction, and variability of production processes.

Using these criteria, the first pilot site of the collaboration was chosen: Dow's Texas Operations in Freeport. A second site is expected to be identified in Brazil later this year. Once selected, a scoping process identifies the priority ecosystem services and analysis to be undertaken.

Pilot Site Activities

Dow's Texas Operations in Freeport

Texas Operations in Freeport is Dow's largest integrated manufacturing site, and the largest single company chemical complex in North America. Texas Operations manufactures 44% of Dow products sold in the U.S. and more than 21% of Dow products sold globally.

Identification: Over 40 Dow and TNC experts convened in Freeport to determine critical ecosystem services the site depends on and/or impacts. The experts adapted the *Ecosystem Services Review* process – co-developed by the World Resources Institute, World Business Council for Sustainable Development and Meridian Institute – to identify priority ecosystem services.

Prioritization: From the identified dependencies and impacts, three ecosystem services were determined to have high value for investigation: Freshwater, Air Quality Mitigation, Coastal Natural Hazard Mitigation.

Analysis: In 2011, the Collaboration scoped and began to conduct business- and conservation-relevant analyses related to each of the three ecosystem services.

- **Fresh Water:** The Dow Freeport manufacturing site receives its fresh water supply from the Brazos River. To improve the ability of Dow and other water users to plan for future water scarcity, the Collaboration is forecasting the changes in the supply of this ecosystem service. The core of the analysis is forecasting changes in the future flow of water in the river and changes in demand in the

Brazos River Basin. We will also investigate changes in the location of the Brazos River's "salt wedge." During periods of drought and low river flow, salt water from the Gulf of Mexico migrates tens of miles upriver, making freshwater unavailable to water users along the affected section of the river. The location of this wedge will likely be affected by changes in river flow, sea-level rise, and land subsidence. From this analysis, we will identify opportunities that could increase the availability of water for users and ecosystems in the Lower Brazos River Basin. We will conduct a cost-benefit analysis of these options, including estimating their effects on other stakeholders and ecosystems. Understanding the value of water to Dow, other water users, and the ecosystems on the Lower Brazos is a key deliverable of this study.

- **Air Quality Mitigation:** The Collaboration is evaluating the cost effectiveness of large-scale tree planting projects for the reduction of nitrogen oxides (NO_x) and other ozone precursors. If proven to be cost effective and sustainable, tree planting may be an option for regional air quality improvements and emissions reduction through existing credit trading programs. In addition to modeling the potential effectiveness of this example of "green infrastructure" in the region, we will also evaluate the ancillary ecosystem service benefits it would provide. For example, large-scale tree planting projects would result in carbon sequestration and potentially water quality improvements, and recreational opportunities. These could decrease the total cost of the project and/or provide additional public benefits.
- **Coastal Natural Hazard Mitigation:** The Collaboration is evaluating the value of coastal marshes. By reducing storm surge during tropical storms, these marshes have direct value to Dow Freeport Operations and other people in the region who are located along the Gulf of Mexico. They are also rich ecosystems that provide services not privately captured by Dow, such as habitat for spawning fish which increases fish yield in the Gulf of Mexico, recreation and aesthetic quality. Understanding the value of protecting and restoring these marshes as natural infrastructure will allow Dow to include them in coastal risk assessment decisions alongside gray infrastructure options like existing and proposed levees.

Tool Development

In parallel to the work at pilot sites, the Collaboration is developing tools that will inform corporate decision-making. The first is a Biodiversity and Ecosystem Services (BES) Assessment Tool to provide business managers quick access to information on potential corporate risks and opportunities related to BES. Using global maps and indicators, it aims to help managers improve corporate visioning and goal setting, prioritization of global BES risks and opportunities, and alert individual business units of potential BES risks and opportunities in their areas. We have created an initial version of this tool and will be beta-testing and publishing it in 2012.

Work Process Modification

The Collaboration is beginning to work to integrate biodiversity and ecosystem services data and considerations into Dow's work processes. As part of the ongoing work, the Collaboration has provided initial guidance on ecosystem services that may be incorporated into the following work processes: Environmental Impact Assessments and Supplier Questionnaires. TNC provided habitat information on Dow manufacturing locations that was included in Dow's 2010 Annual Sustainability Report and will be in future reports produced by Dow.

Year 1-2 Objectives & Progress

Objectives for Year 1	Status
1. Educate Dow and other business, science and policy communities on ecosystem services and biodiversity impacts and dependencies	Green
2. Understand how ecosystem service valuation can be used in specific business decisions made by Dow	Yellow
3. Develop site selection criteria	Green
4. Select key business units and sites and identify priority business risks and opportunities related to ecosystem services	Green
5. Identify and scope areas of analysis at pilot 1	Green
6. Identify site for pilot 2	Green
7. Assess ecosystem services trends and apply valuation techniques at pilot sites.	Yellow
8. Identify opportunities for Dow to value select corporate land holdings using ecosystem services considerations, in addition to pilot site analyses	Yellow
9. Form a community of businesses to engage and encourage other firms to incorporate the value of nature into their business processes (TNC Business Council and others)	Yellow
10. Hire additional TNC expertise and capacity needed to carry out activities	Yellow

KEY: Green = Complete Yellow = In Process and On Track

Objectives for Year 2
1. Run environmental models, complete analysis, make significant progress on two and complete at least one ES economic valuation Publish interim results for three areas of analysis at pilot 1 (TX Operations at Freeport)
2. Scope and commence analysis at pilot site 2 (expected in Brazil)
3. Select third pilot site
4. Test and publish the Biodiversity and Ecosystem Service Assessment Tool
5. Outline the Corporate Conservation Framework to guide how methods from the pilots will be integrated across Dow's operations
6. Continue developing and testing the integration of nature's value into business processes
7. Explore opportunities in U.S., Texas state and Brazilian policy – identify and potentially develop applicable joint policy positions to support ecosystem-related strategies and natural infrastructure investments and advocate for change
8. Continue to catalyze commitments of other business to integrate the value of nature into business decision making and promote these efforts at Rio+20 and the Clinton Global Initiative
9. Evaluate recent conservation activities by Dow and propose improvements (e.g., investing in the protection of forests, lakes or rivers that might protect essential ecosystem services for Dow or society)
10. Identify and pursue opportunities for applying ecosystem service-related business strategies at select sites and businesses, in addition to pilot analyses
11. Develop written and web-based materials that share the work of the Collaboration

Increasing Awareness

One of our key objectives this first year was to promote the importance of valuing nature by business, and to engage the business, science and policy communities who might serve as peer reviewers and testers of the products of our collaboration. The collaboration was featured in a number of public forums attended by customer, industry, government, academic and NGO stakeholders, which fostered broader exploration and adoption of ecosystem valuation practices and solicited input and ideas to enhance our work. A sampling of key events includes:

January	Collaboration Launch , Detroit Economic Club, Detroit, Michigan
March	GLOBE European Union Debate , The Economics of Ecosystems, Brussels, Belgium Presentation , Dow Latin America Opinion Leader Forum, Sao Paulo, Brazil
April	Roundtable Discussion , The New Economics of Land, Fortune Brainstorm Green, Laguna Niguel, California
May	Presentation , World Business Council on Sustainable Development Corporate, Washington, D.C.
June	Presentation , The Nature of Business, World Economic and Environment Conference, Xingdao, China Panel Discussion , Ecosystem Markets: Making Them Work Conference, American Forest Foundation / World Resources Institute, Madison, Wisconsin
August	Presentation , Dow Sustainability Innovation Student Challenge Award Reception, Berkeley, California Presentation , Ecological Society of America Annual Meeting, Austin, Texas Presentation , TNC Corporate Council for the Environment, Charleston, WV
September	Executive Presentation , American Society of Corporate Executives, The Economics of Ecosystems, Palm Beach, Florida Panel and Discussion , Game-changing Innovation: Technologies for Building Social and Economic Value, Clinton Global Initiative, New York
October	Dow-TNC Panel , The Future of Sustainable Business Metrics, Sustainable Life Media/Wharton School of Business, Philadelphia, Pennsylvania
November	Panel Discussion , Global Business of Biodiversity Forum, London, England Poster , Nation Academies Keck Futures Initiative Conference, Irvine, California

Contacts

The Nature Conservancy

Michelle Lapinski, Director, Corporate Practices, mlapinski@tnc.org

Jennifer Molnar, Director, Sustainability Science, jmolnar@tnc.org

www.nature.org/dow



The Dow Chemical Company

Mark Weick, Director, Sustainability Programs, mcweick@dow.com

John DiMuro, Project Manager, Ecosystem Services, jdimuro@dow.com

www.dow.com/sustainability

