

THE NATURE CONSERVANCY & DOW

2013 Annual Progress Report



Working Together to Value Nature

Three years ago, our two organizations came together to undertake an experiment to incorporate the value of nature into business decisions. We set an ambitious goal – to develop and apply methods to evaluate the benefits nature provides and create a strategic way for companies to assess, incorporate and invest in nature and these benefits. This document represents our third annual progress update, highlighting the work completed at our first two pilot sites, our efforts to develop tools for businesses to identify more easily the benefits nature provides at their sites, and the conservation impacts that may be achieved from protecting those natural resources.

Our previous progress updates have focused on the launch of our “pilot site” projects in Texas and Brazil. We have finished our first “pilot site” work in Texas, and are working together on implementation and replication opportunities. In Brazil, we are completing our work in Santa Vitória and are gaining a greater understanding of how to produce ethanol from sugar cane in ways that optimize the benefits for both business and conservation.

These pilot projects continue to highlight the importance of companies incorporating the value of nature into their business decisions as well as the unique challenges. Calculating the value of nature’s services to a company, community and the world is difficult. New analysis methods and technology are constantly being developed that might facilitate our analysis, as this is still an emerging area of study. Our organizations have worked diligently to combine our expertise, capacity, and resources into one dedicated team pursuing a common goal.

Collaborations between non-profit and for-profit sectors represent a slowly growing movement in the sustainability arena. That growth and potential to serve as a model is one reason we are so thrilled to have received the 2013 Roy Family Award for Environmental Partnership, a Harvard Kennedy School prize administered by the Environment and Natural Resources Program at the school’s Belfer Center for Science and International Affairs. The award is given out every two years, and the criterion is to honor work that “demonstrates the highest levels of environmental leadership, setting an example for public, private, and non-profit organizations throughout the world.”

We continue to be committed to that very responsibility, and welcome your feedback on our work to date, as well as the direction of our collaboration in the coming year.

Sincerely,

Neil Hawkins
Corporate Vice President, Sustainability
The Dow Chemical Company

Glenn Prickett
Chief External Affairs Officer
The Nature Conservancy



Overview

At the start of 2011, The Dow Chemical Company and The Nature Conservancy embarked on a novel collaboration to help Dow and the business community recognize, calculate and incorporate the value of nature into business decisions, strategies and goals. The Collaboration embraces a theory of change that the inclusion of ecosystem service and biodiversity assessment models in business decisions has the potential to produce stronger business performance and improved conservation outcomes.

The two global organizations are applying scientific knowledge and experience to develop and apply methods and tools for companies to use by examining how Dow's operations interact with nature. Nature provides benefits, often called ecosystem services, on which everyone depends.

The Collaboration is exploring opportunities to factor more deliberately, the value of nature into business decisions across Dow – at the corporate level and at sites around the world. Initial efforts have focused on large “pilot site” analyses, where the team is investigating tangible examples in detail at Dow sites, starting in Freeport, Texas, and Santa Vitória, Brazil, to develop evidence and tools.

The Collaboration's work will ultimately be incorporated into a broader framework of decision support tools and modules to help address business decisions organization-wide. The Collaboration is committed to sharing results and tools publicly through various communications and peer-reviewed publications for other companies, scientists and interested parties to test and apply. Further, the Collaboration has begun to share our experience with policymaking authorities and key resource stakeholders. As more companies use these methods and tools, greater investment in conservation should follow because such investment makes good business sense.

During 2013, Dow and TNC agreed to increase the length of the collaboration by adding a sixth year. Dow and The Dow Chemical Company Foundation are collectively committing \$10 million to the collaboration over the duration of that term.



Evolution of Goals

The Collaboration reached the midpoint of its six-year term at the end of December. In preparation for that milestone, in September, the Collaboration leadership met at the Chippewa Nature Center in Midland, MI, where the collaboration concept was originally launched. The goal of the September meeting was to review and update the original Collaboration goals. The Collaboration team concluded that the overall project goal is unchanged: Dow and the business community recognize, value, and incorporate the value of nature into business decisions, strategies and goals.

The Collaboration team then discussed how to best achieve this goal based on the results achieved thus far by the Collaboration and the amount of time remaining. The team identified two major areas of emphasis for the remaining term of the Collaboration. First, the team agreed that working together to apply the findings from our analyses to help shape the development of Dow's next generation sustainability approach, a set of company-wide sustainability goals targeted for release in 2015, should be a top priority. This will be the third set of goals that Dow has released since 1995. A second high-priority area of emphasis relates to the integration of outcomes to corporate decision-making. As the Collaboration moves into the second half, the team will be seeking to develop tools and influence industry and other interested parties based on the lessons learned from the first two pilots. The Ecosystem Services Identification and Inventory (ESII) tool, for which the first phase of development was completed in December, is an example of the type of tool the Collaboration seeks to develop.



Pilot Site Activities

Pilot Site #1 – Freeport, Texas

Texas Operations at Freeport is Dow's largest integrated manufacturing site and the largest single company chemical complex in North America. Texas Operations manufactures more than 40% of Dow products sold in the U.S. and more than 20% of Dow products sold globally. It is also located where the Gulf of Mexico, the lower Brazos River and the Columbia Bottomlands all meet, an area encompassing a network of freshwater, marsh and forest ecosystems that are critical not only to Dow's operations but to fish and wildlife, agriculture and local communities.

The Freeport pilot, completed in January, focused on three ecosystem services upon which the Texas Operations facility and conservation in the region depend, and provided an opportunity to advance ecosystem science and conservation strategies that could have significant impact on these priority resources:

- Improving air quality through reforestation
- Mitigating coastal hazards with natural infrastructure
- Preventing disruption to freshwater supply

The results have been published for several audiences:

First, comprehensive reports, which include detailed information on the methods used to conduct the analysis, as well as all scientific models and results that were developed within the pilot, were developed for release within Dow and delivered on April 1.

Second, four papers have been developed for submission to peer-review journals. The papers include:

- Freshwater #1 – Finding Solutions to Water Scarcity: A Case Study of Incorporating Ecosystem Service Values into Business Planning at The Dow Chemical Company's Freeport Facility
- Freshwater #2 – Urban and Industrialized Watersheds Have Elevated Water Risk and Limited Opportunities to Mitigate Risk through Water Trading
- Coastal – Enabling Businesses to Evaluate the Role of Coastal Habitats in Hurricane Risk Mitigation
- Air – Integrating Reforestation as a Compliance Measure into State Implementation Plans for Ground-level Ozone: Methodology and Case Study

Reflecting on Freeport Pilot Results

As the Collaboration reviews the impact of the Freeport pilots on Dow's operations the changes are being manifested in different ways:

The most promising results are found in the air analysis which, if it can be included in the Texas State Implementation Plan (SIP), could provide Dow and other companies based in Texas the ability to consider large-scale reforestation as a method to help reduce components that form ozone. The SIP is a plan for each state, which identifies how that state will attain and/or maintain the primary and secondary National Ambient Air Quality Standards set forth in the Clean Air Act.

In addition to developing the detailed papers describing the results, the Collaboration team is working with key stakeholders to seek approval of reforestation as a compliance measure for inclusion in the SIP for ground-level ozone. Letters requesting consideration of the inclusion of reforestation in the Texas SIP have been submitted to the U.S. EPA and Texas Commission on Environmental Quality, and the Collaboration will be working with the agencies.

The freshwater analysis offered new learnings related to the impact of climate change on the future expected frequency and duration of drought periods in the Brazos River Basin. The results highlighted the value of Dow's water rights as a natural capital asset and provided a value range that could be used for price forecasting. Next steps in this process include using the analysis and valuation results to better communicate risk for Dow, track leading indicators of climate risk, communicate that water trading is a limited solution in the Brazos River basin, and follow-up on newly identified green and collaborative solutions.

The coastal analysis team developed a method that can be used to assess the role of habitats in coastal risk mitigation and is now highlighting opportunities to apply this method in places with more extensive coastal habitats. Moving forward, the coastal analysis provides Dow with a method to understand the role of habitat and sea level rise, which may be applied at other sites. The Conservancy is working with catastrophe modeling firms to incorporate habitat in industry standard models while also seeking pilot sites in North America to build the empirical evidence base for the role of habitats in coastal resilience. In addition to the site-specific knowledge gained for Freeport, Dow and other companies can look for operations with similar concerns to apply this newly developed knowledge.

In 2014, the Collaboration will continue to look for opportunities to integrate the knowledge gained from the pilots into Dow's operations.

Pilot Site #2 – Santa Vitória, Brazil

Pilot Background

Demand for agricultural land use is projected to increase in Brazil. Agricultural expansion can impact biodiversity and ecosystem services. Thus, advancing methods and providing a case study that demonstrate how companies can make decisions about expanding agricultural production in ways that minimize impacts and maximize ecosystem services to provide benefits to both businesses and conservation is essential. The Collaboration is positioned to do just that with the help of the Dow-Mitsui joint venture, Santa Vitória Açúcar e Álcool (SVAA), and their site located in Santa Vitória, Brazil.

The SVAA site is located in the Ituiutaba micro-region, on the border between two critically endangered biomes – the Cerrado and the Atlantic Forest – and is close to the São Simão hydropower plant reservoir on the Paranaíba River (Figure 1). This region sits in the heart of Brazil's agricultural region, where about 15% of natural vegetation remains which is highly fragmented and poorly protected. The prevailing land use in the region consists of extensive cattle ranching and to a lesser extent agricultural cultivation, largely for sugarcane.

SVAA plans to cultivate sugarcane fields for the production of ethanol. SVAA has committed to adhering to Brazil's Forest Code, which includes designation of permanent preservation areas (PPAs) including riparian areas, reforestation of approximately 20 percent of properties as legal reserves, and replanting of 10 trees to every 1 tree removed.

Institutional context: Improving implementation of Brazil's Forest Code

In addition to SVAA operations, the collaboration has also been working together with Santa Vitoria Municipality, and the Minas Gerais state government to support regional scale land use planning and Forest Code implementation. To support this objective the collaboration developed a web portal to be used by SVAA, Santa Vitoria, and Minas Gerais to streamline the implementation of the Forest Code and provide local decision makers with information for landscape planning.

The Collaboration recognized the need for a decision support system to identify the most important areas for conservation and to provide land owners with streamlined options for Forest Code implementation. Thus, the team advanced a tool that uses



Figure 1. SVAA site in relation to major biomes of Brazil.

spatial landscape models to guide landowners in Legal Reserve compliance by identifying and prioritizing: 1) habitat remnants within a property with high conservation value, 2) potential areas with a higher success for natural regeneration and 3) potential offset areas with high value for conservation. In 2013, the team completed the first version of this tool and used it to assess rural properties within the SVAA region. Planning outcomes from this spatial tool are expected to improve ecological benefits and business value relative to the more common ad-hoc practice of implementing the Forest Code parcel-by-parcel. This tool will be made publicly available to users within Brazil, including the Conservancy, Dow, other businesses, and government agencies.

Optimizing business land use decision-making with nature

The location of the new sugar cane fields and legally required restored natural areas can influence the functioning of ecosystems and the value of the services they provide to SVAA and to local communities – including erosion control and water purification. The Collaboration’s pilot provides a framework to inform how SVAA can meet its sugar cane production needs most efficiently, while strategically locating required forest restoration on land that optimizes the benefits from biodiversity and ecosystem services.

The pilot analysis includes the modeling of sugarcane expansion, biophysical constraints and production costs. To ensure that our models are realistic and can be implemented, the legal context in Brazil is considered, and the Forest Code regulations are incorporated in the modeling framework. The team is applying biological models to identify opportunities to reduce habitat fragmentation and promote connectivity in order to conserve biodiversity. Additionally, the analysis includes quantifying the value of natural areas for other ecosystem services: improved water quality via retention of sediment, nutrient regulation for drinking water, and carbon sequestration.

By integrating the agricultural, legal (Forest Code), and biophysical models, the Collaboration is studying how to maximize the number of species and ecosystem services in the SVAA region for a given sugar cane production target, and vice versa. This analysis will be used to quantify the benefits and costs associated with different land use planning decisions (Figure 3).

Valuing incentives for improved spatial planning

Planning at a landscape scale instead of at each farm parcel individually is likely to lead to better environmental outcomes as well as a reduction in production costs. It is also likely that environmental compliance costs can be reduced, with greater flexibility to protect existing habitat remnants in areas least profitable for agriculture.

The team will also show how biodiversity and ecosystem services can be brought into decisions to optimize profits and ecosystem services. For carbon sequestration, the team is estimating the amounts of carbon stored in the above-and below-ground biomass as well as in the soil for each land use/land cover types in the SVAA region. For surface water quality, the team is modeling the effect of land use/land cover (LULC) conversion on drinking water in the SVAA region using regionally-specific modifications of equations from the Natural Capital Project’s InVEST sediment and nutrient retention models. These models allow us to forecast the amount of sediments, nitrogen and phosphorus reaching waterways for different landscape compositions and configurations.

The final results of the Brazil pilot will be submitted for peer review publication in 2014 and released on the Collaboration websites (www.nature.org/dow, www.dow.com/sustainability/change/nature_conserv.htm).

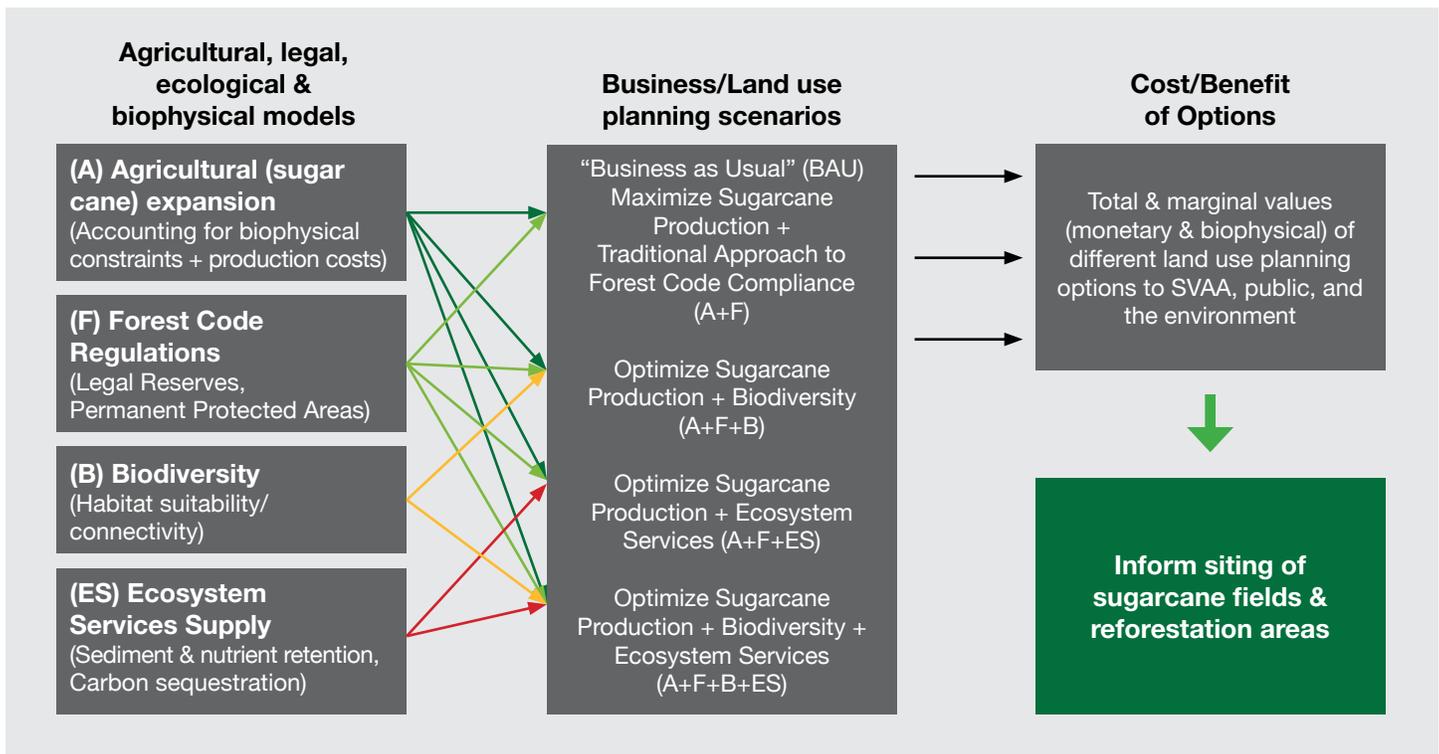


Figure 3. Analysis flow chart for modeling and valuation of agriculture, biodiversity, and ecosystem services in the SVAA region.

Pilot Site #3 - TBD

The Collaboration is excited about the opportunities to expand its work. During our two previous pilot analyses, however, the Collaboration team felt it prudent to select a third site based on the learnings from the first two locations, the data obtained from the early results of the ESII tool, and the manner in which the value of nature will be included in Dow's next generation sustainability goals. Therefore, the selection of the third site has been strategically delayed.



Photo credit: Jen Molnar, TNC

Corporate Activities

ESII Tool

The Collaboration entered a new phase in 2013 as the team began the development of a tool, which provides a rapid assessment of ecosystem services at a site level. This tool has been named the Ecosystem Services Identification & Inventory (ESII) Tool, and it will allow businesses to estimate the business value from nature from lands on and adjacent to their sites, as well as the public value from lands on-site (Figure 4).

The vision for the ESII tool is to develop software for a tablet device that a site technician can use to collect relatively simple ecological data, which can be used to identify and model the rather complex production of ecosystem services at a site. By providing this ecosystem service production data, the tool would enable engineers to estimate the value of those ecosystem services to the business using replacement cost calculations. In addition, the tool is expected to provide estimates of the value of ecosystem services from the business sites to the surrounding community.

In addition to the analytical outputs, the tool should provide broader benefits for companies as well. For example, as Dow staff uses the tool to assess sites, it will help create awareness of ecosystem services and the value of natural assets at Dow sites and adjacent areas. Successful development of this tool would facilitate prioritization of ecosystem services and inform decisions that could protect, restore, or improve these services. Estimates of public value from Dow's natural areas would inform community and other stakeholder conversations, and outputs from the tool will add value to Dow processes, reporting and analysis.

Tool Development Process

The collaboration team is working with a consulting company with extensive experience in creating tools for identifying and quantifying ecosystem services at a business site level, EcoMetrix Solutions Group (ESG). Together, Dow, TNC, and ESG are creating a novel tool that:

- uses ecological attributes to identify and quantify ecosystem services at a business site.
- translates the production of services into economic benefits to the business by providing data in units of measure that engineers and finance staff can put into their own valuation models.
- can be used to estimate economic benefits to the surrounding community. The team is currently testing the tool at Dow sites; ultimately the tool will be shared publicly and testing with other companies could ensure its broader applicability.

The collaboration team began phase 1 ("proof of concept") of ESII Tool development in August, when 16 experts from various disciplines (ecology, engineering, site management / operations, finance and economics) met to discuss the design, concept models, tool format and valuation schema. The tool will initially cover eight priority ecosystem services: air quality control, climate regulation, erosion control, flood hazard mitigation, water provisioning, water quality control, water quantity control, and aesthetics. Pilot site testing took place at three Dow facilities starting in late October and ran through the remainder of the year, and results from those site tests will be used to inform the modules that comprise the tool. A team of experts met again in November to provide critical review of tool development to date and focus on the methods for valuing the benefits from nature to the business and the surrounding community.

Initial Findings

The initial findings from Phase 1 have supported proof of concept for the ESII tool and affirmed the team's expectation that, upon completion of development, the ESII tool should allow a business to rapidly identify, roughly characterize and catalog ecosystem services and natural assets at and around business sites.

The Collaboration team expects that the ESII tool, along with the results and lessons from the pilot projects in Freeport, Brazil and the third site, will provide a foundation for the development of a broader framework through which the value of nature can be considered within decision-making across Dow's operations and for other corporations. The ESII tool will identify, prioritize, and value ecosystem services with outputs informing existing Dow work processes. The broader framework is envisioned to support established decision systems and provide practical options and guidelines for integrating ecosystems valuation into business decisions. We expect the result will be long-term business value as well as benefits from biodiversity and ecosystem services to a multitude of stakeholders.

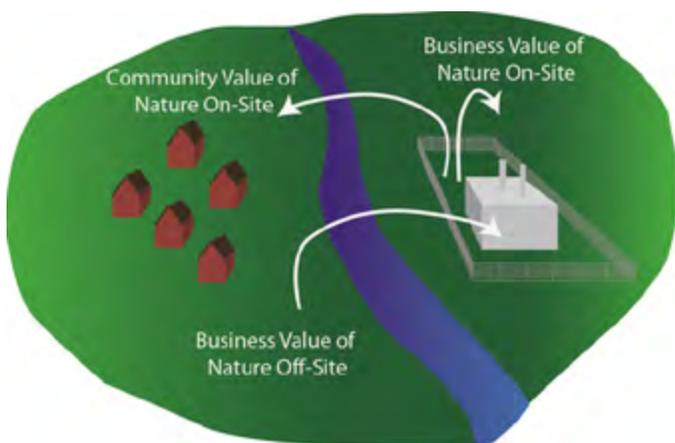


Figure 4. The ESII Tool will enable business to rapidly assess the value of nature on and adjacent to a site.

BESTCAT Tool

Many companies have turned to tools like social and environmental impact assessments, biodiversity action plans, and environmental management systems to identify, assess and plan operations. But a company looking to make biodiversity and ecosystem services a key part of corporate strategy, or to include them within sustainability reporting, requires a broader perspective and deeper knowledge of natural systems. It can be challenging for companies to make related regional and global strategic decisions, due to the limited amount of biodiversity and ecosystem services information available on a global scale, difficulty in accessing these global data, and working with data that is often not organized for business risk and opportunity analysis.

In order to address this challenge for businesses, the Collaboration has created a web map tool: the Biodiversity and Ecosystem Services Trends and Conditions Assessment Tool (BESTCAT). It provides businesses open access to global data and a user interface that allows them to easily compare and prioritize their current or future portfolio of assets with regards to biodiversity and ecosystem services. It increases usability of these metrics by offering online mapping technologies, simple data input requirements, and production of reports. The initial version of the BESTCAT tool includes five global biodiversity metrics: species diversity (both at the global and biome level), threatened species, habitat intactness, and habitat protection. In October 2013, a peer-review paper detailing the biodiversity metrics and uses of these metrics within the tool was published in the online journal "Sustainability." Currently, the Conservancy is obtaining feedback and comments from businesses, other NGOs and academia to further test the validity and value of the tool. Our team is also presently establishing partnerships with all data providers of BESTCAT to ensure future data maintenance and support of the tool.

Companies Valuing Nature

The Collaboration encourages other companies to incorporate the value of nature into business decision making, a significant component of achieving the Collaboration's goal of taking our strategies to scale. Collaboration results have been presented in numerous venues to a variety of audiences. In addition, the Dow and The Nature Conservancy engaged in the development of a whitepaper, *The Case for Green Infrastructure*, created by a working group comprised of members of several companies, including Shell, Unilever, and Swiss Re. The group gathered and evaluated a number of Business Case Studies focusing on green and/or hybrid infrastructure solutions, and recommended that green infrastructure solutions should become part of the standard toolkit for modern engineers. The evaluation concluded that hybrid approaches, utilizing a combination of green and gray infrastructure, may provide an optimum solution to a variety of shocks and improve the overall business resilience.

Policy

The Collaboration continues efforts to work together on policy issues. During 2013, there were several successes to report. The Water Resources Development Act (WRDA) is a key U.S. Federal policy priority for the Conservancy, especially as it pertains to encouraging investments in natural infrastructure. In May, the Conservancy contacted Dow, which agreed to support specific natural infrastructure language that TNC sought to have added to the bill. The Conservancy received positive feedback from the offices of several Senators who observed the Conservancy and Dow working together on this bill.

Based on the feedback received from members of Congress and their staffs, it is clear that the Collaboration can be a powerful advocate when they join forces to support legislation. The Collaboration will work to identify additional legislation on which TNC and Dow can partner to advance the cause of conservation.

Policy efforts have been undertaken in other areas of the collaboration as well. Within the Brazil project, the Collaboration team has been active at the state and local level, working together to encourage an interpretation of the Forest Code in a way that promotes the dual optimization of conservation benefit and agricultural production.

Finally, as part of the air quality project, the Collaboration team is working with counterparts from Dow Texas Operations, and TNC-Texas Chapter to influence policy at the state level (Texas Commission on Environmental Quality) and at the federal level (EPA-Office of Air Quality Planning and Standards). The end result that the team seeks is the inclusion of the reforestation concept from the Freeport Air Pilot in the Texas state Supplemental Environmental Projects for air quality, which would allow Dow and other companies the option to invest in reforestation alongside other traditional gray measures such as air scrubbers to meet regulatory requirements.



Roy Family Award

One of the highlights of the year for the Collaboration was being honored as the recipient of the 2013 Roy Family Award for Environmental Partnership, presented by the Harvard Kennedy School. The award is presented every two years to celebrate an outstanding public-private partnership project that enhances environmental quality through novel and creative approaches. The prize is awarded through the Environment and Natural Resources Program in the Kennedy School's Belfer Center for Science and International Affairs. The event took place at the Kennedy School on October 7, and was accompanied by a panel presentation featuring Neil Hawkins, Vice President of Global Environment, Health, and Safety (EH&S) and Sustainability at Dow, and Glenn Prickett, Chief External Affairs Officer for TNC.

The Collaboration was selected from a group of highly qualified projects nominated from around the world that tackle tough

environmental problems ranging from sustainable mining in developing countries to reducing the pollution associated with textile manufacturing. Experts around the world reviewed the nominees with the following criteria: innovation, effectiveness, significance, and transferability.

The Roy Family has been a longtime supporter of the development of public-private partnerships to meet social goals. The Roy Family Award attempts to provide positive incentives for companies and organizations worldwide to push the boundaries of creativity and take risks that result in significant changes that benefit the environment.

The purpose of the Roy Family Award for Environmental Partnership is to draw attention to an exceptional partnership and its achievements while inspiring others to replicate or expand upon its success.



Photo credit: Harvard Kennedy School

Objectives for Year 3

Objectives for Year 3	Status
1. Finalize and publish Freeport pilot results	Green
2. Conduct analysis for Santa Vitória pilot	Green
3. Identify third pilot site	Deferred
4. Identify and evaluate three novel green infrastructure projects	Red
5. Finalize and release BESTCAT tool	Green
6. Continue development of the decision support framework	Green
7. Continue to catalyze commitments of other businesses to integrate the value of nature into business decision making. Promote these efforts at the Clinton Global Initiative and other key venues, expanding global participation in the initiative	Green
8. Continue to explore opportunities to pursue joint policy positions that support ecosystem-related strategies and natural infrastructure investments with the U.S. Government, Brazil Federal and State Governments, and Texas Air Quality mitigation approach	Green

KEY: Green = Complete Red = Not Pursued

Item 3 was deferred so it could be informed by experiences from the first two pilots and the ESII tool results. Item 4 was not included due to prioritizing other new activities for the Collaboration, and was pursued by Dow outside the Collaboration.

Year 4 Collaboration Goals:

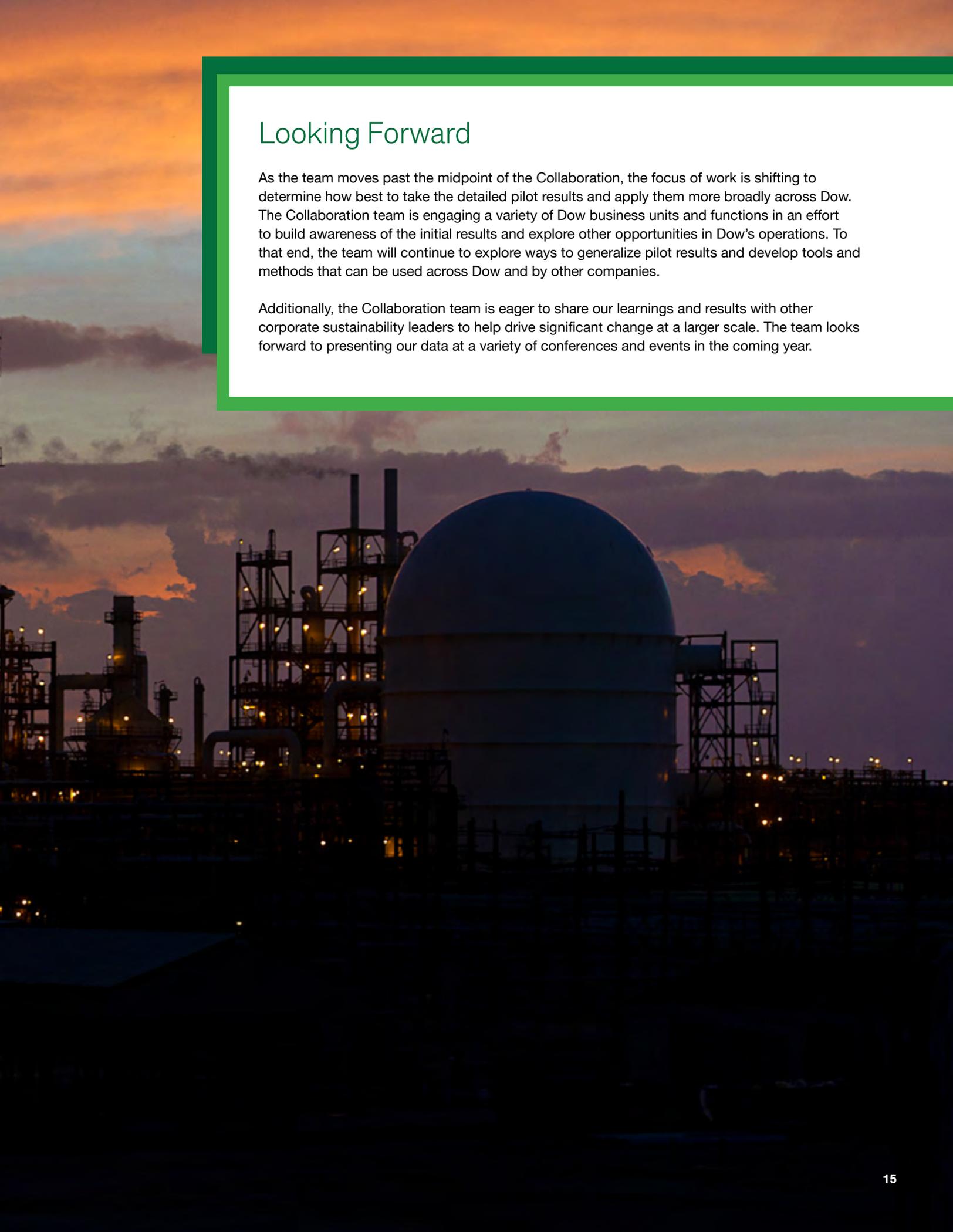
1. Finalize and publish Brazil pilot results
2. To advance the development of the decision support framework; continue development of the Ecosystems Services Identification and Inventory (ESII) Tool, including addition of more ecosystem services, testing, and validation of the tool.
3. Continue to evaluate the ways to leverage results from first two pilots. by defining opportunities to bring ecosystem services value into finance and other business processes at Dow
4. Identify third pilot
5. Incorporate the value of nature into Dow's next generation approach to sustainability, including metrics, targets and goals.
6. Share Collaboration results with other companies to encourage them to integrate the value of nature into their business decision-making.
7. Continue to advocate jointly on policies that support ecosystem-related strategies and natural infrastructure investments



Photo credit: Jen Molnar



Photo credit: The Dow Chemical Company



Looking Forward

As the team moves past the midpoint of the Collaboration, the focus of work is shifting to determine how best to take the detailed pilot results and apply them more broadly across Dow. The Collaboration team is engaging a variety of Dow business units and functions in an effort to build awareness of the initial results and explore other opportunities in Dow's operations. To that end, the team will continue to explore ways to generalize pilot results and develop tools and methods that can be used across Dow and by other companies.

Additionally, the Collaboration team is eager to share our learnings and results with other corporate sustainability leaders to help drive significant change at a larger scale. The team looks forward to presenting our data at a variety of conferences and events in the coming year.



Photo credit: Jen Molnar, TNC

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