

FINAL REPORT

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2001 Project Abstract For the Period Ending June 30, 2004

TITLE:..... WaterScapes: Outdoor Non-Point Source Pollution Education
PROJECT MANAGER: Patrick Hamilton
ORGANIZATION:..... Science Museum of Minnesota
ADDRESS:..... 120 W. Kellogg Blvd., St. Paul, MN 55102
FUND: Environment and Natural Resources Trust Fund
WEB ADDRESS: <http://www.smm.org/>
LEGAL CITATION: ML 2001, 1st Special Session, Chap 2, Sec. 14, Subd. 10b
APPROPRIATION AMOUNT: \$265,000

Overall Project Outcome and Results

WaterScapes is a key element of the **Big Back Yard**, the Museum's 1.2-acre outdoor science park. *WaterScapes* consists both of exhibits and landscape elements that call attention to non-point source pollution (NPS) and that model approaches intended to ameliorate NPS.

The primary results of the *WaterScapes* project were the development and construction of the Big Back Yard and the fabrication and installation of the NPS exhibits and landscape elements within it. The overall organizing framework for the *WaterScapes* portion of the Big Back Yard is 'source to sink' - sediment erosion, transport, and deposition.

Three of the nine miniature golf holes address NPS - urban stormwater runoff, rural drain tiling, and impervious vs. pervious landscapes. They are embedded in an educational landscape that highlights better management of runoff through native vegetation plantings, pervious pavement, and rainwater infiltration gardens.

Project Results, Use, and Dissemination

The Big Back Yard opened on June 26. As of August 8, over 16,000 children and adults already had played the nine-hole miniature golf course and explored the park. The park has received prominent print and broadcast coverage (e.g. the StarTribune, St. Paul Pioneer Press, Highland Villages, The Avenues, The Forum, MPR, KARE-11, WCCO, KMSP). To date, the following groups have visited the park:

EarthScapes Summer Institute for Teachers
Forum of Women in the Environmental Field
Watershed Partners

Freshwater Society
Toro Foundation

Dragonfly TV, a nationally-distributed science program for youth produced by Twin Cities Public Television, used the Big Back Yard in July as a location to shoot pieces for an upcoming episode about rivers and landscape processes. The exhibit developer and owner's representative for the Big Back Yard are now providing the expertise they acquired on the project to Putting Green, Inc, which is in the process of constructing an environmental education park on the banks of the Minnesota River in New Ulm.

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Date of Report: August 19, 2004
LCMR Final Work Program Report

Project Completion Date: June 30, 2004

LCMR Work Program 2001

I. Project Title:..... WaterScapes: Outdoor Non-Point Source Pollution Education
Project Manager:..... Patrick Hamilton
Affiliation:..... Science Museum of Minnesota (SMM)
Mailing Address: 120 W. Kellogg Blvd., St. Paul, MN 55102
Telephone Number:..... 651-221-4761, 651-221-4514 (fax)
E-Mail: hamilton@smm.org
Web Address: http://www.smm.org/

Total Biennial Project Budget:

\$LCMR:	\$265,000	\$ Match:	\$965,625
- \$ LCMR Amount Spent:	\$265,000	- \$ Match Amount Spent:	\$965,625
= \$ LCMR Balance:	\$0	= \$ Match Balance:	\$0

A. Legal Citation: ML 2001, 1st Special Session, Chap 2, Sec. 14, Subd. 10b

Appropriation Language:

WaterScapes: Outdoor Nonpoint Source Pollution Education

\$133,000 for the first year and \$132,000 for the second year are from the trust fund to the Science Museum of Minnesota to create outdoor exhibits about urban and rural runoff and contamination and that demonstrate methods to improve water quality. This appropriation must be matched by at least \$265,000 of non-state contributions, cash or in kind. This appropriation is available until June 30, 2004, at which time the project must be completed and final products delivered, unless an earlier date is specified in the work program.

B. Status of Match Requirement:

The Science Museum of Minnesota has raised the \$265,000 match stipulated by the LCMR for the project, *WaterScapes: Outdoor Non-Point Source Pollution Education*, from the following sources:

St. Anthony Falls Laboratory	\$833,342
MetroEnvironmental Partnership Program	102,283
Lower Minnesota River Watershed District.....	10,000
Ramsey Soil and Water Conservation District.....	10,000
Capitol Region Watershed District	10,000
Total	\$965,265

The Science Museum of Minnesota originally included WaterScapes match money in the budget that it submitted to the St. Anthony Falls Laboratory in March 2001 for the National Center for Earth-surface Dynamics (NCED). National Science Foundation (NSF) approval of this project did not arrive before the match deadline of December 31, 2001, so the museum applied money from the Mississippi National River and Recreation Area (MNRRA) toward the WaterScapes match. Now that the NCED is an approved and funded NSF project, the museum wishes to apply these funds toward the WaterScapes match so that it can redirect the MNRRA money to other needs in its outdoor science park, such as Science House. Additionally since December 2001, the Lower Minnesota Watershed District has earmarked \$10,000 for the WaterScapes project.

II. and III. FINAL PROJECT SUMMARY:

Overall Project Outcome and Results

WaterScapes is a key element of the **Big Back Yard**, the Museum's 1.2-acre outdoor science park. *WaterScapes* consists both of exhibits and landscape elements that call attention to non-point source pollution (NPS) and that model approaches intended to ameliorate NPS.

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Three of the nine miniature golf holes address NPS – urban stormwater runoff, rural drain tiling, and impervious vs. pervious landscapes. They are embedded in an educational landscape that highlights better management of runoff through native vegetation plantings, pervious pavement, and rainwater infiltration gardens.

Project Results, Use, and Dissemination

The Big Back Yard opened on June 26. As of August 16, nearly 20,000 children and adults already had played the nine-hole miniature golf course and explored the park. The park has received prominent print and broadcast media coverage (e.g. the StarTribune, St. Paul Pioneer Press, Highland Villages, The Avenues, The Forum, MPR, KARE-11, WCCO, KMSP). The following groups have visited the park since its June 26 opening:

EarthScapes Summer Institute for Teachers
Forum of Women in the Environmental Field
Watershed Partners

Freshwater Society Board of Directors
Toro Foundation

Dragonfly TV, a nationally-distributed science program for youth produced by Twin Cities Public Television, used the Big Back Yard in July as a location to shoot pieces for an upcoming episode about rivers and landscape processes. The exhibit developer and owner's representative for the Big Back Yard are now providing the expertise they acquired on the project to Putting Green, Inc, which is in the process of constructing an environmental education park on the banks of the Minnesota River in New Ulm.

IV. OUTLINE OF PROJECT RESULTS:

Result 1. SMM Staff and Administration for Development of the Big Back Yard

LCMR Budget:	\$97,237	Match:	\$354,318
Balance:	\$0	Match Balance:	\$0

The Science Museum of Minnesota will assemble and manage a team consisting of both museum staff and outside experts that will create an overall development plan for the Big Back Yard and specifically develop, design, and fabricate the 'source to sink' and nonpoint source pollution exhibit components for the Big Back Yard. The Museum's core team consists of a project director, a project production manager, an exhibit designer, and two prototypers.

Personnel..... \$97,237

- Project management - Patrick Hamilton, 17% FTE over two years
- Exhibit designers - Bart Hayes and Cary Forss, 3% FTE over one year
- Graphic production – Rhonda Schrader, Tom Seivert, Jennifer, Brede, 4% FTE over one year
- Project production manager – Ken Kornack, 22% FTE over two years
- Prototyper – Peder Thompson, 20% FTE over two years
- Exhibit fabricators – Shelly Campbell, Gary Roach, et. al., 16% FTE over one year
- Efi Foufoula-Georgiou, director, St. Anthony Fall Laboratory, no cost to the project
- Jeff Marr, lab manager, St. Anthony Falls Laboratory, no cost to the project
- Gary Parker, professor, St. Anthony Fall Laboratory, no cost to the project
- Chris Paola, professor, St. Anthony Fall Laboratory, no cost to the project

Completion Date: June 1, 2004

Final Status:

From January through June 2004, Patrick Hamilton focused his efforts on securing additional sources of funds to permit the complete build out of the Big Back Yard and worked with Jim Roe, lead exhibit developer, and scientists at the University of Minnesota's National Center for Earth-surface Dynamics (NCED) to produce all of the graphic panels for the Big Back Yard. New funding sources were obtained and all graphic panels were completed and installed.

Ken Kornack, project production manager, concentrated his efforts on working out engineering questions with the NCED lab manager, helping the Museum’s prototypers to finalize fabrication of the exhibit components, coordinating all graphic production, and overseeing the work of all contractors on the site of the Big Back Yard. Construction of the Big Back Yard resumed in the middle of March after the shutdown for winter back in December. The general contractor, PCL, reached substantial completion by the end of May. Landscaping work by the successful lower bidder, Valley Crest, was completed by the middle of June.

Cary Forss, the exhibit designer, completed work on the kiosk for the Big Back Yard. He then turned his attention to designing trellises to provide areas of shade in the park. He completed his design work and Ken Kornack oversaw the construction of the trellises by outside contractors.

The prototypers, Peder Thompson and Gary Roach, completed their work on all of the exhibit components with the exception of erosional landscapes and underwater landslides. These two components will undergo additional prototyping this summer with NCED funds. Peder and Gary then worked with Museum exhibit fabricators to assemble the erosion recorder and dam removal models, which are completed and installed.

Science Museum public relations staff worked with all of the major media outlets in the Twin Cities metropolitan area to secure coverage for the Big Back Yard. The result was about \$104,000 in free media coverage.

TV Coverage for the opening of the Big Back Yard Ad Equivalencies

Media	Date	News Hour	Duration	Est. Ad Equivalency
KARE-TV	Thurs., June 24, 2004	5:30 a.m.	3:18	\$3,522
KARE-TV	Thurs., June 24, 2004	6:30 a.m.	3:31	\$4,876
KARE-TV	Thurs., June 24, 2004	10:30 a.m.	2:46	\$767
WCCO-TV	Fri., June 25, 2004	5 a.m.	3:07	\$155
WCCO-TV	Fri., June 25, 2004	5:30 a.m.	3:44	\$1,548
WCCO-TV	Fri., June 25, 2004	6 a.m.	2:59	\$1,393
WCCO-TV	Fri., June 25, 2004	6:30 a.m.	2:46	\$1,703
KSTP-TV	Fri., June 25, 2004	11:30 a.m.	:39	\$460
WCCO-TV	Sat., June 26, 2004	8:30 a.m.	:28	\$232
KMSP-TV	Tues., June 29, 2004	6 a.m.	2:50	\$2,762
KMSP-TV	Tues., June 29, 2004	6:30 a.m.	2:50	\$1,393
KMSP-TV	Tues., June 29, 2004	7 a.m.	3:22	\$1,806
KMSP-TV	Tues., June 29, 2004	7:30 a.m.	2:13	\$1,277
KMSP-TV	Tues., June 25, 2004	8 a.m.	3:25	\$1,445
TOTAL	14 segments		37:58	\$23,339

Print coverage for the opening of The Big Back Yard, June 2004 Ad Equivalencies

Media	Date	Title/Headline	Est. Ad Equivalency
Avenues	June 26, 2004	Putt-putt with purpose	\$2,595
Villager	July 14, 2004	Putt-putt with purpose	\$3,225
WHERE Twin Cities	July 2004	Mini-golf: Art or Science?	\$6,200
Pioneer Press	June 22, 2004	Calendar listing	\$200
Pioneer Press	June 26, 2004	Links Lessons	\$22,152
Star Tribune	June 24, 2004	Science in the Sun	\$425
Star Tribune	June 26, 2004	Science lessons at the fore	\$15,763
Star Tribune	July 14, 2004	Strokes of Genius	\$30,535
TOTAL			\$81,095

Result 2. Professional Design and Project Assistance for the Development of the Big Back Yard

LCMR Budget: **\$52,364** **Match:** **\$190,806**
Balance: **\$0** **Match Balance:** **\$0**

The Science Museum of Minnesota will contract with several professional consultants and firms for advice and assistance on exhibit design, landscape design, construction management, and environmental mitigation for The Big Back Yard.

Contracts \$52,364
 Landscape architecture – Barbour & LaDouceur Design Group, \$12,920
 Exhibit Development – Jim Roe, 20,672
 Owner’s representative – Sterns & Associates, \$10,498
 Stormwater management – Barr Engineering, \$2,330
 Site surveying – Sunde Surveying, \$560
 Environmental monitoring and reporting - PEER Engineering, Inc., \$4,307
 Environmental review – MPCA, \$646
 Construction cost estimating – PCL Construction, \$431

Completion Date: June 1, 2004

Final Status:

PCL, the general contractor for the Big Back Yard, achieved substantial completion on the construction of the park at the end of May. The City of St. Paul inspected and approved all of the work and provided the Museum with a certificate of occupancy in early June. Valley Crest, the landscaping company, began its work in early May and concluded its work during the third week of June. ThemeScapes, the firm working closely with the Museum on the miniature golf course and the braided stream table, completed its work the week of June 21. Peer Engineering, Inc. found no signs of contamination during park construction and submitted a final report to the MPCA’s Voluntary Inspection and Clean-up program in May. All contractors have completed their work on the Big Back Yard and the various warranty periods are now in effect.

Result 3. Big Back Yard Construction

LCMR Budget:	\$62,642	Match:	\$228,258
Balance:	\$0	Match Balance:	\$0

The Science Museum of Minnesota will contract with a general contractor to perform the overall site grading and utility installation for The Big Back Yard. The contractor will rough grade the site and export any excess material. The contractor will install the main walkway through The Big Back Yard and all pathways. The scope of work also will include running water lines and electrical lines throughout the park and making connections to the sanitary sewer where needed. The contractor will build the platforms for the free-standing exhibits and construct the rainwater garden and its attendant stormwater collection system. The contractor will be responsible for overseeing the installation of the irrigation system as well as all landscape material.

Contracts..... \$62,642
 Big Back Yard construction – PCL, \$62,642

Completion Date: June 1, 2004

Final Status:

All site grading and utility installation work is completed for the park. The main walkway and all pathways are in place. The Minnesota Pollution Control Agency provided \$13,000 so that the Museum could substitute UNI Eco-Stone pavers in place of asphalt for the plaza around the Xcel Energy transmission tower at the center of the park. This paving system provides a surface strong enough for large trucks to drive on but absorbs all precipitation that falls on it. All water lines and electrical lines and connections to the sanitary sewer are also finished. The Fibrex material donation from Andersen Corporation arrived in early May and all exhibit platforms are finished. The rainwater gardens and associated stormwater collection system are installed and operational. All landscaping work, including the irrigation system, is completed.

The Big Back Yard limited outdoor lighting currently does not permit operation of the park beyond daylight hours. This situation has not proven to be a limitation, given the many hours of sunlight in summer. Hours of park operation may need to be shortened as we move into the shorter days of autumn. District Energy St. Paul, Inc. is providing the Museum with \$5,000 to experiment with a novel outdoor lighting system.

Mooncell, Inc. manufactures an outdoor light powered by a solar panel and small wind turbine. The units are self-sufficient and thus can be placed anywhere without the need to run electrical conduit. The Museum has ordered one of these outdoor lights and will install it this fall. If the unit performs well, we will determine whether it would be worthwhile to seek funds to purchase and install additional units throughout the park.

Result 4. Big Back Yard Exhibits Fabrication

LCMR Budget:	\$52,757	Match:	\$192,243
Balance:	\$0	Match Balance:	\$0

The Science Museum of Minnesota will fabricate and install outdoor exhibits about ‘source to sink’ sediment flows and nonpoint source pollution. These exhibits will include a large braided stream table, a 3-D topographic and bathymetric map of the world, the ‘source-to-sink’ model, the landscape evolution model, the turbidity current model, and the dam-removal exhibit. This work will include all outdoor signage and graphic display panels and the The Big Back Yard kiosk that will orientate visitors as they enter The Big Back Yard from the Museum’s level one doors.

Contracts..... \$10,767
 Rainwater garden design – Barr Engineering, \$10,767

Other Supplies..... \$41,990

- Graphic production supplies and materials, 11,990
 - Paper and ink- \$3,850
 - Laminate embedding -\$8,140
- Exhibit fabrication supplies and materials, 30,000
 - Lumber-\$2,560
 - Metal-\$2,400
 - Hardware-\$8,500
 - Equipment(motors, pumps, filters, etc)-\$8,040
 - Furniture (benches, stools)-\$3,000
 - Fabrication Services-\$5,500

Completion Date: June 1, 2004

Final Status:

The large braided stream table, 3-D topographic and bathymetric map of the world, the ‘source-to-sink’ model, and the dam removal model are finished and installed in the park along with all of their associated graphic display panels. Fabrication of the landscape evolution model and the turbidity current model is not finished yet. These two models will be completed with funding from the NCED and will be installed in spring 2005.

The Museum is investigating the feasibility of developing a 5,000-square-foot traveling exhibit about the role of water in mediating large-scale planetary processes. If the necessary funding package can be assembled, a number of the free-standing exhibit components developed and installed in the Big Back Yard would be replicated for inclusion in an exhibit that would travel to science museum and centers throughout the U.S.

V. TOTAL PROJECT REQUEST BUDGET:

All Results: Personnel	\$97,237
All Results: Contracts	\$125,773
All Results: Other Supplies.....	\$41,990
TOTAL BUDGET:.....	\$265,000

VI. PAST, PRESENT AND FUTURE SPENDING

WaterScapes is part of a larger Science Museum/City of St. Paul initiative to make the Mississippi River in downtown St. Paul a compelling public educational/recreational resource.

A. Past Spending: The Museum already has spent \$100,000 on installing basic infrastructure in its outdoor exhibit space, The Big Back Yard, and on initial landscape work.

B. Current and Future Spending: *WaterScapes* is part of a larger Museum plan to develop exhibits and programs for The Big Back Yard. The Metropolitan Council's Environment Committee on January 25, 2001 approved the museum's request of \$102,283 from the 2000 MetroEnvironment Partnership Grant Program for the urban runoff of the *WaterScapes* project. The remaining \$162,717 in match that the museum needs to raise has been written into a National Science Foundation grant by the University of Minnesota's St. Anthony Falls Laboratory.

C. Project Partners:

- Efi Foufoula-Georgiou, director, St. Anthony Falls Laboratory
- Jeff Marr, lab manager, St. Anthony Falls Laboratory
- Gary Parker, professor, St. Anthony Falls Laboratory
- Chris Paola, professor, St. Anthony Falls Laboratory

D. Time: The project will be completed by July 1, 2004.

VII. DISSEMINATION

Associated with the WaterScapes exhibits will be a Citizen's Guide to Stormwater. This guide will be printed back-to-back on card stock. Museum visitors will be encouraged to take the guide home with them. The guide will contain a graduated list of stormwater mitigation suggestions that range, for example, from simply redirecting downspouts from impervious to pervious surfaces to establishing rain gardens to becoming aware of alternatives to conventional curb and gutter.

VIII. LOCATION

WaterScapes will be located in the Big Back Yard (the outdoor space at the new riverfront Science Museum of Minnesota), in the city of St. Paul and the county of Ramsey.

IX. REPORTING REQUIREMENTS:

Periodic workprogram progress reports will be submitted no later than December 31, 2001; July 31, 2002; December 31, 2002; July 31, 2003; December 31, 2003; and June 30, 2004. A final workprogram report and associated products will be submitted by June 30, 2003, or by the completion date as set in the appropriation.