The Promise of Science Parks

Natural Attraction: Implementing Your Science Park
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What began in India as a “curtain raiser” for a new science center has taken on a life of its own. Around the world, ASTC members are discovering the attractions of science parks—those carefully designed outdoor exhibit areas that combine whole-body play with informal science learning. What makes them so popular? How do you go about designing one? What codes and standards apply? How does outdoor learning differ from what goes on inside the science center? What is the next step in outdoor facilities? These questions and more guide this issue on the “promise of science parks.”

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Cover: Bordered by the sparkling Rill, the new Science Park at Vermont’s Montshire Museum forms a transitional pathway between the built environment of the museum and the natural New England landscape. Photo courtesy Copley Wolff Design Group, Boston, Massachusetts.
There are many reasons why science parks are increasingly popular at science centers worldwide. For the parent museum, the outdoor setting provides plenty of space for exhibits, and flexibility in their arrangement. It facilitates the educational use of natural resources like sun, wind, and water, and it complements and expands existing indoor activities with visually attractive, cost-effective outdoor correlates.

For visitors, science parks mean open air, fun, and a relaxed learning environment. People enjoy the opportunity to observe, feel, and enjoy the many scientific phenomena that surround us. They appreciate that science can be learned in different locations, not just in classrooms and laboratories.

Using the Outdoor Science Center at my own museum—SciTech Hands On Museum, in Aurora, Illinois—as an example, this article will offer suggestions for those institutions fortunate enough to have room for outdoor exhibits, as they start the process of designing and implementing a science park.

Getting started

Advance planning for a science park involves many steps: evaluating available space, targeting potential audiences, identifying project resources, and choosing partners.

With a population of 150,000, Aurora is Illinois’ second-largest city. Located nearby are two prominent government research facilities: Fermi National Accelerator Laboratory (Fermilab) and Argonne National Laboratory. SciTech was established in 1988 by scientists from these labs. Along with other community volunteers, they developed some 250 hands-on indoor exhibits, including a unique Solar Telescope that projects a 90-centimeter image of the sun into an interior viewing area.

Over time, the museum has become a fixture of the community, attracting some 50,000 visitors a year and serving 30,000 more through outreach.

In 1999, SciTech embarked on a program of indoor and outdoor expansion and renovation. The setting of the museum, at the southern tip of an island where two branches of the Fox River meet, is striking, but a pretty outdoor area facing the water was being used as a staff parking lot. Why not turn it into an Outdoor Science Center? Having been outdoor exhibits director at the Clore Garden of Science, in Israel, I was familiar with outdoor exhibits’ power to attract and inspire visitors.

In designing our project, we were influenced by the Clore Garden, by India’s extensive network of outdoor science parks, and by U.S. science parks at the Sciencenter, Ithaca, New York; the New York Hall of Science, Queens; and the St. Louis Science Center, in Missouri. Our Outdoor Science Center incorporates elements of each. We saw it as a place where families and groups could spend quality time together, especially when the weather was too nice to stay indoors.

Because SciTech has limited resources, we couldn’t proceed alone. We needed partners, and one way to get them was to fit our project into a larger community plan. We met with representatives from the Aurora Public Arts Commission, Cordogan Clark Architects, and Fermilab, and came up with the idea of an “Outdoor Science and Art Walk,” which would provide educational opportunities, add interesting forms to the urban landscape, and enhance the image of downtown.

This concept created a synergy of dedicated people and more resources than we could have got by ourselves.

The partners identified 10 open spaces in downtown Aurora as sites for potential outdoor exhibits. To date, three have been developed: the Outdoor Science Center at SciTech; the 16-foot-diameter Sundial, located in a historic neighborhood; and the...
Swimming Stones, a kinetic stone-and-water sculpture in a downtown plaza. Funders include the Kane County Forest Preserve, the Illinois Public Museum Program, Illinois First, the National Science Foundation, the City of Aurora, and private donors.

Durable, accessible, and safe

Because science parks can be expensive and complicated projects, we decided to implement our plan in stages. The Outdoor Science Center was built over two years with a few exhibits introduced each summer.

Our first step was to do an extensive evaluation of the site, considering modifications to ensure proper drainage. We calculated the path the sun would follow during the year—important for solar exhibits—and evaluated our water, electricity, and communication needs. We thought about visitor comfort: Would our guests have adequate drinking water, shade, and benches for resting?

Our final design called for exhibits to be arranged on a 5,000-square-foot brick terrace complete with planters, picnic tables, and sun shades. Museums that plan to host special events might wish to include food-service facilities and outdoor lighting.

Durability was a primary concern, and investment in quality materials is worth a lot after the fact. Noncorrosive metals—aluminum, brass, stainless steel—are excellent, if expensive to work. High-quality oak weathers well over time, maintaining its look and functionality. We went with aluminum and stainless steel.

The extra you spend on materials may save you a lot in maintenance. That’s not insignificant, because outdoor exhibits exposed to the elements need at least as much attention as indoor ones. Daily visual inspections and periodic tune-ups are critical for ensuring the smooth operation of a science park.

Safety and accessibility are equally important. Naturally, we wanted all visitors to be able to enjoy the Outdoor Science Center in comfort and safety. According to the National Program for Playground Safety, each year more than 200,000 children are injured on U.S. playgrounds, with more than 75 percent of these injuries due to falls.

Since there are no U.S. or state codes pertaining specifically to outdoor science exhibits, the codes for playground access, equipment, and surfaces are generally applied. (For information, see page 13.) To ensure the security of exhibits and visitors, the Outdoor Science Center is fenced, with controlled access. When visitors are using the exhibits, trained staff members are on hand. A minimum age for users is posted.

Choosing outdoor exhibits

Choosing interactive outdoor exhibits can be daunting—there are so many options available. Possible themes include botany, ecology, the environment, motion, music, optical illusions, solar energy, sound, space exploration, water, waves, wind, and more. For each, there might be several exhibits (see opposite page).

The Outdoor Science Center at SciTech currently includes five extra-large exhibits and five smaller ones. Themes include Motion, Waves, Music, and Solar and Water Energy. Our large exhibits are permanently anchored to sturdy concrete pads covered with safety-tested cushioning. Smaller exhibits can be moved into the museum for winter usage.

Our signature exhibit is the 45-foot-tall Weather Wave, which allows visitors to create vertical standing waves. Two decorative vanes on top show the wind’s strength and direction. The Weather Wave is visible for a long distance. When it was first built, people used to stop their cars on the bridge to get a better look. It got us a lot of media coverage.

The Giant Lever consists of a skilift-type bench hanging at the end of a horizontal 33-foot pole. The pole rests on a fulcrum point with a ratio of 1:3. Visitors sit on the bench, and, to lift them, their friends pull on chains attached to the pole with ratios of 1:1, 1:2 and 1:3, thereby demonstrating the lever effect.

Everyone who rides our Bicycle on a Tightrope gets a firsthand experience of the center of gravity, as the suspended weight keeps rider and bike stable. Our state senator rode it at the Outdoor Science Center’s dedication; he was so happy that he decided to help fund the next stage.

One of our most popular exhibits is the YouYo, an oversized inverted yo-yo. The flywheel representing the yo-yo mechanism is mounted at the top. The user pulls the rope, propelling himself or herself higher with each turn of the wheel. It takes practice, but once you do it well, you can go as high as the limiting bar allows: in this case, 13 feet off the ground.

Our fifth large exhibit is the Coupled Swing. A single swing linked to a swinging 150-kilogram weight demonstrates the energy transfer between coupled pendulums. The visitor starts to swing, but gradually her motion slows as the weight begins to swing. The weight then slows down, “pushing” the visitor, and the cycle repeats.
Among our smaller exhibits, the Lithophone is a favorite of mine. This xylophone-like marble percussion instrument has a range of one full octave. The acoustic properties of the marble produce a clear resonating sound. Visitors play on it all day long.

Programming and evaluation

At one level, a science park is a marvelous playground. Children certainly enjoy it that way. To enhance their learning, we have developed programs centering on science themes of ecology, environment, energy, and more. Story lines that incorporate treasure hunts appeal to most audiences. A good outdoor educational activity we have used is Bob Miller’s work at the Exploratorium on light and shadows (www.exploratorium.edu/light_walk/).

Visitor responses to the outdoor Science Center have been favorable. School groups and families interact enthusiastically with exhibits and report positive experiences. A number of newspaper articles have given us positive publicity.

My own experience is that science parks appeal to diverse audiences. All visitors seem to feel more relaxed about experimenting outdoors, perhaps it’s because they are not exposed to the cultural messages a building may project. There is a need, however, for more formal evaluation of outdoor science exhibit areas. A visitor-centered process, with front-end research to assess what people know and are interested in knowing, would assist in selection of themes. Summative evaluation could look for changes in attitudes or understanding as a result of visitors’ outdoor experiences.

The time is ripe for more science centers to provide their visitors with outdoor experiences. Science exhibits that engage children’s bodies and minds whet young appetites for more. Outdoor exhibit areas add an extra dimension to an indoor science center and provide a challenging experience that complements the indoor visit.

Ronen Mir is executive director of SciTech Hands On Museum, in Aurora, Illinois. A guest scientist at Fermilab, he also serves as a consultant to science centers in the United States, South America, and Israel.

An Outdoor Exhibits Sampler

Organized by theme, these are exhibits that have been used successfully outdoors in science parks. For information on suppliers, contact the author at ronen@scitech.mus.il.us—R.M.

• Sun
  Heat tunnel: a half-white, half-black crawl-through pipe that collects heat
  Solar furnace: a parabolic mirror that concentrates the sun's rays to a focal point
  Solar water heater and photovoltaic cells: demonstrate alternative energy sources
  Solar fountain: produces water height proportional to solar radiation

• Wind
  Wind turbine: demonstrates wind power
  Wind/weather vanes: show direction and speed
  Bernoulli blowers/airplane wings: show lift

• Water
  Water cannons: spin vanes or small turbines
  Water turbines: engines to produce energy
  A rhimedes screw: raises water from a pond
  Wave pools: generates waves in standing water
  Dam: directs water flow

• E cology
  Ecological pond: shows local fauna and flora
  Meteorological station: measures weather
  Sorting separators: paper, plastic, metal and glass sorters
  Landfill models: for experimentation

• Physics and Mechanics
  Standing wave generator: produces a torsion wave
  Giant lever: demonstrates leverage ratios and fulcrum point
  Slides: straight, cycloid, and other shapes
  Inverted Yo-Yo: raises the user
  Gyro wheel: demonstrates gyroscope forces
  Pulley system: demonstrates leverage ratios
  Coupled swings: transfer of energy between two pendulums
  Coriolis simulator: simulates one-sixth Earth gravity
  Lunar simulator: simulates one-sixth Earth gravity field of the Moon
  Planetary scales: show visitor's weight on different planets
  Scale model of Solar System
  Sundial: tells time and offers clues about the Earth's rotation around the Sun

• Sound
  Sound pipe: 110-meter pipe that creates a sound delay of one-third second
  Pan pipes: different pitches by length
  Echo tube: sealed at one end to reflect sound
  Acoustic mirrors (whisper dishes): facing parabolic mirrors that transmit sound
  Lithophone: a marble percussion instrument resembling a xylophone
  Musical rocks: percussion pillars made of strong (lava) rock
  Metral drums: traditional or modern designs

• The Solar System
  Moon and Jupiter gravity swings: simulates swinging in these planets' gravity
  Lunar simulator: simulates one-sixth Earth gravity field of the Moon
  Planetary scales: show visitor's weight on different planets
  Scale model of Solar System
  Sundial: tells time and offers clues about the Earth's rotation around the Sun
India: Cradle of Science Parks

By Saroj Ghose

Planning for India’s first full-fledged hands-on science center, the Nehru Science Centre in Bombay, began in 1979, the International Year of the Child. Because all exhibits were to be designed and developed in-house, the 250,000-square-foot science center would take about five years to complete. As a curtain raiser for the project, the design team conceived the idea of a “science park,” featuring outdoor science exhibits. This low-cost idea could be implemented quickly, we thought, and would set the stage for the much larger project to come.

The Children’s Science Park, located on 10 acres of land fronting the new science center, was set up in nine months’ time as our gift to the children of Bombay in the International Year of the Child. Its success was phenomenal. Since then, every science center built in India by the National Council of Science Museums (NCSM) has had a science park as a curtain-raising feature.

Of course, each new park has its own characteristics. In Bombay, the science park included common playground objects modified to demonstrate the principles of science. Swings were adapted to show the laws of pendulums; off-centered seesaws demonstrated the use of levers; rolling balls showed minimum-time path in a cycloid, or centrifugal force in a loop; and pulleys and gears provided examples of mechanical advantage.

But the science park in Bombay was more than just a physics playground. It took a total approach to physical science, technology, biological science, energy, and environment—setting exhibits in a lush green landscape dotted with colorful flowers and fruit-bearing trees for attracting birds. The beauty of the park, with its ornamental garden, fountains, and ponds, added flavor to the science exhibits.

Science park exhibits must be simple to understand, attractive enough to hold visitors for a long time, sturdy enough to stand the tests of extreme weather, and inexpensive enough for replication. In India, we started with regular steel, adding an anti-rust coating of paint, but later changed to stainless steel. Today, design, fabrication, prototyping testing, and subsequent modifications are done in-house—some centrally by NCSM, and some by each center. Landscape design and exhibit design are integrated, with planting and exhibit fabrication occurring simultaneously.

A section of each science park is devoted to live animals attractive to young children, such as birds and butterflies, turtles and fish, rabbits and guinea pigs. At Bombay, the success of this section led the science center to establish a Pet Club, a place where children could take out chosen animals on a month-by-month basis, with instructions on their food and care.

This kind of project requires a leader who has a genuine love for plants, birds, and live specimens, as well as expertise in the conceptual development of hands-on outdoor exhibits. This rare combination of talents was possessed in abundance by the late director of the Nehru Science Centre, R.M. Chakraborti.

Informal science education is becoming more sophisticated in India, and the country’s newest science park reflects that trend. Now under development on 300 acres in the western part of the country, the park will be one of the largest science parks in the world.
Israel: Shedding Light on Science

By Roni Ashkenazi and Judy Malkosh

The Clore Garden of Science is located on the campus of the Weizmann Institute of Science in Rehovot, Israel. The science education center’s open-air setting, according to its creator and director, Moshe Rishpon, is an ideal framework for exploring scientific principles. “The mild Mediterranean climate allows us to remove the ‘roofs’ and place our exhibits, which describe and demonstrate natural phenomena, in nature itself,” says Rishpon. “The sky is not the limit. It’s a vital element in many of the displays.”

Science museums contribute to ecological education when they demonstrate or teach about environmental issues, such as renewable energy sources. Israel is blessed with an average of 300 sunny days a year, so we are ideally placed to examine the possibilities of solar energy. Our outdoor exhibits take advantage of the extensive research in this field at the Weizmann Institute. Some use the sun’s energy directly, while in others the light is converted into heat.

The Garden of Science is divided into eight courtyards, each concerned with a different field of science. Here is a sampling of exhibits in different courtyards that make use of our plentiful sunlight:

• **Full Rainbow.** Water sprinklers set in a circle in front of a black background demonstrate the full-circle rainbow and the dispersion of the sun’s white light to all its spectral components.

• **Solar Furnace.** A parabolic-shaped mirror captures the energy in the sun’s rays, causing a thick piece of wood at its focal point to burst into flames.

• **The Globe.** A concrete globe 1 meter (39 inches) in diameter is set parallel to the Earth, allowing viewers to observe the shifts between day and night on the continents, as well as the annual changes of seasons.

• **Solar Fountain.** A panel of photovoltaic cells, directed toward the sun, converts sunlight energy into electric energy to drive a small electric motor, which in turn pumps water through a fountain.

• **Solar Collectors.** Six mirrors can be manipulated to reflect incoming sunlight onto a central collector. This collector, absorbing the focused, concentrated light energy, warms up and induces a needle to rise. It is the same principle as found in the Weizmann Institute’s Solar Tower.

• **Solar Water Heater.** The visitor directs a black solar collector covered with water pipes toward the sun. Water passes through the pipes, following the thermo-siphon effect, and flows into a small holding tank. In Israel, solar water heaters are a common sight; they save a significant amount of domestic energy consumption.

The Garden of Science benefits greatly from the Weizmann Institute’s facilities, and from its scientists and graduate students in all areas of the natural and exact sciences. By encouraging research staff to work at the Garden, the Institute supports our efforts and promotes our development. More than 200 Institute scientists and students volunteer as instructors and advisors in the Garden’s extracurricular science programs.

Garden of Science programs also include a guided visit to one of the most sophisticated solar research facilities in the world, the Canadian Institute for the Energies and Applied Research, which is located on the Weizmann campus. This 3,000-kilo-
An outdoor science park in Finland is the climate. In a Finnish winter, temperatures can plunge to -40°C (-40°F), and a single snowfall may reach 50 cm (20 inches) or more. Though the exhibits are covered in winter, the materials—aluminum, stainless steel, and stone—have been chosen to endure harsh conditions. The few wooden elements, pressure-treated to be weatherproof, will be replaced after normal wear and tear.

The park’s season extends only from May through September, but our summers give us long, beautiful days, with temperatures averaging 30°C (86°F), as well as “white” nights to enjoy the facility.

Our experience from the first two years shows that visitors greatly appreciate the outdoor exhibits, regardless of the weather. In a 2001 visitor survey, two-thirds of respondents said they had visited Galilei Park; they gave it a higher rating than we usually get for our exhibitions. Feedback was even more positive in 2002. What’s more, the average visiting time in the museum seems to have increased since the park opened—perhaps all that fresh air gives visitors more energy to pursue the joy of discovery outdoors.

Mikko Myllykoski is director of experiences at Heureka, the Finnish Science Centre, Vantaa.
Outdoor Exhibits: Thinking Outside the Fence

By Stephen Pizzey

Today's science center scene is truly international. The good news about this is that you can travel almost anywhere and find a modern science museum with the latest hands-on exhibits. The bad news is that, standing inside one of these magnificent, air-conditioned structures, it is sometimes hard to remember which city you are in, let alone which country.

Step outside, however, and right away you know where you are. You can feel it, breathe it, see it, and smell it—the individuality and sense of place returns. If it's hot and dusty and scented, it's India; if it's cool and misty and looks like rain, it's England.

This is a gross generalization, but the point I am making is that there are adventures to be had beyond the confines of the gallery. Outdoors is the new frontier for science centers—an opportunity for exhibit builders to let their creativity, talent, and originality flourish, and for the millions of visitors to science centers to find new ways to appreciate the world around them.

Like many in the field, I first encountered outdoor science exhibits in India, where they are laid out in a formal setting and are gardens in their own right. But even earlier, I was fascinated by sculpture parks and those outdoor art exhibitions where you wander on wooded trails past installations. I liked the idea that artists were taking the found environment and playfully adding to it. For me, as a science exhibit person, the parallel was obvious—not only is art all around us, but science is, too (and is arguably more interesting).

After designing outdoor exhibits for others over the years, I decided it was time for our team to build our own. In 1999 we opened the outdoor Discovery Park at our Observatory Science Centre, in Herstmonceux, East Sussex. This was an opportunity to bring playful interaction between visitor and exhibit to the fore, encouraged by the unusual appearance of the exhibits and the delight of discovering them in a natural setting. Our Sound Tubes, for instance, resemble a tree-like collision of giant vacuum cleaner hoses, and our propeller-topped Energy Track looks as if it might go airborne at any moment (although the "propeller" is, in reality, an air brake).

In my experience, the outdoor setting changes the visitor's response. The pace slows, and people have time to work with the exhibits and get involved in the outcome. A great cheer goes up whenever a group, having lifted a ball to the top of the Energy Track, watches it accelerate back down a spiral. Weather permitting, children often picnic beside their favorite exhibit.

Placing exhibits outdoors certainly enhances the visitor experience, as comments in our visitors' book show. But this is only the beginning, and science parks and gardens are emerging and evolving with interesting results, as exhibit builders take on the challenge of working in this new...
environment and exploring its options.

At Discovery Park, for example, the property’s long sight lines inspired staff member Ian Walters to create a unique sculpture. From one angle, his assemblage of bizarre, seemingly wind-eroded structures shows a map of the world; from another, it coalesces into the face of Albert Einstein. Once in a while, some visitor wandering through the park realizes what the sculpture represents—and soon everyone knows, and the enthusiasm is shared.

If I have one concern about outdoor exhibit settings, it is the implication that science is all around us, but only as far as the fence. What if we were to let our imaginations roam even farther afield, on the other side of the fence?

With this thought in mind, and with much arm waving, in 2000 I was awarded a fellowship from the U.K.’s National Endowment for Science Technology and the Arts (NESTA) to explore my science-in-landscape ideas. This was a wonderful opportunity, and I started by forgetting exhibits entirely and seeing what really was around.

I chose as my first vantage point my houseboat on the river Thames in West London. The Thames is tidal there, and each day I watched the currents produce interesting turbulent effects, including vortices. I noticed also the effect of the seasons on sunrises and sunsets and on the trees on the opposite bank. A theme of cycles emerged—lunar, diurnal, and annual—as I spent a year making a photographic record. (To my amazement, the winter solstice sun rose right in the middle of the Hammersmith Bridge—my favorite London bridge—and the summer solstice sun set right over The Doves, my favorite pub.)

This is something anyone could do, and many have. The challenge is to get museum visitors to see these things as well. Already some exhibit ideas are emerging. Those river vortices, for example, suggest placing wand-like devices in the flow to exaggerate the phenomenon. A giant zoetrope might show the sequence of change in a tree through the seasons.

After ASTC’s 2001 conference in Arizona, I took a trip to Sedona, the Grand Canyon, and Monument Valley. The wind- and water-carved landscapes I saw there set me thinking about making erodable towers for Herstmonceaux.

Of course, ancient exhibits exist already in the landscape—Stonehenge being a classic example. They, too, can inspire new ideas. The idea I am working out now is a family of paths traversing the landscape that would trace out the shadow of a disc on a pole at different times of year. The visitor could select the path corresponding to his or her birthday, in the knowledge that on that day the shadow would follow the path.

Plenty of other ideas have occurred to me as a result of my NESTA fellowship. Recently, I have been invited to think about placing some exhibits on a hilltop in India. Perhaps my shadow paths would work there. As I sit here in an English winter, remembering India’s dusty, scented warmth, that’s a tempting offer.

Stephen Pizzey is director of Science Projects Ltd., London, and founder of the Observatory Science Center and Discovery Park, Herstmonceaux, East Sussex, U.K. He can be reached at steve@science-projects.com.
Landscape as Exhibit: The Science Park at Montshire Museum

By David Goudy

There are many ways to offer visitors an experience of science out of doors. At the Montshire Museum in Norwich, Vermont, we planned our Science Park, which opened in July 2002, as an exhibit in its own right. We envisioned the new two-acre space as a transitional experience, one that would link the constructed world of the museum to the natural world of the surrounding landscape.

Just as a Roman atrium could be seen as a garden with walls or a landscaped room without a roof, so Science Park reflects a spatial and experiential duality. It is more open, more natural, more subject to the elements than the museum building it adjoins. Yet, at the same time, it is more constrained, more controlled, and more formal than the natural areas to which it leads.

A path of discovery

The Science Park design team, led by landscape architect Lynn Wolff, of Boston's Copley Wolff Design Group, and Montshire curator of exhibits Joan Waltermire, planned the new park to reflect its rural New England setting. The museum sits on a dramatic 110-acre tract along the Connecticut River, the state's eastern border. The sculpted landforms that shape Science Park, and the native materials utilized throughout—wood, stone, granite, and plant materials—were chosen to harmonize with the larger river valley and mountain landscape.

In keeping with the transitional theme, the edges of Science Park were intentionally blurred.Visitors move from manipulating hydraulic devices in the Rill, a winding, 250-foot-long artificial watercourse, to relaxing on a bench in a riparian forest, unaware of when they have left the built environment and entered the natural setting.

Also reflected in the design is Science Park's educational agenda: helping visitors to experience the patterns and complexities of the natural world. Many natural processes are so subtle that their inherent beauty and intricacy can be missed, or so common that curiosity about them is lost. Visitors who encounter Ned Kahn's Wind Wall, a 40-foot-high panel of shiny steel disks fluttering in response to bursts and streams of moving air, are apt to note the exhibit's resemblance to patterns visible in nearby wind-tossed trees. Or they may comment, as one did, that "it looks like water," making a basic connection about air and water as related fluid phenomena.

Other exhibits in Science Park support the intellectual transition from abstract indoor exhibits that model natural-world behavior to the natural world itself. Indoors, for instance, visitors can explore flow in the Flow Tunnel exhibit by moving various-shaped objects in a pearly fluid under glass and observing the resulting streamlines. Outside, in Science Park, they can plunge their hands directly into water and manipulate objects in the winding Rill. A few hundred yards away, on one of our interpretive trails, they can watch water tumbling around huge boulders as it flows from a natural brook into the Connecticut River.

Sounds in nature provide another example. In the controlled environment of Montshire's aquarium, visitors can observe frogs and listen to recordings of each species' songs. Outdoors, those who wonder how such small creatures can generate so much noise can try dramatic and surprising experiments with acoustics and resonance in exhibits like the Humming Stone, the Listening Tube, and the Resonant Pendulum. Then, farther along the path, visitors can pause on a bench beside a natural pond to enjoy a springtime amphibious chorus.

Visitors young and old enjoy the water steps at the Montshire Museum's new Science Park.

Photo courtesy Copley Wolff Design Group
Lessons learned

So complex a project demanded a lot of patience from the collaborators. Some aspects of the undertaking were classic landscape design, and some were clearly the domain of the exhibit designer, but most were a blend of both. Finding the right balance proved exceptionally challenging, especially given the museum staff’s desire for rigorous prototyping.

Landscape architecture and exhibit design are disciplines that inherently respect one another but have little experience working closely together. The customary pacing and scheduling of a landscape project may not allow time for an exhibit designer to adequately test the exhibit aspects of a proposed design. Technical or cost issues that arise during development may induce modifications in the landscape that appear to be benign—yet turn out to compromise carefully prototyped exhibition elements.

At Montshire, with our many outdoor water features, the line between visitor enjoyment and participation and visitor safety was difficult to predict. In several cases, we were perhaps too successful with the former, at the expense of the latter. Generally operating on the assumption that providing many degrees of experimental freedom is a positive aspect of exhibit design, we didn’t anticipate that some of our young visitors would find the Rill most enticing as a water slide, or that decorative boulders in the stream—intended for experiments in water flow—would inspire people to leap across their wet and slippery surfaces.

Rather than impose rules and forbid behavior, we have attempted to analyze the unsafe behaviors and redesign those features to channel youngsters’ interest in safer and more educationally productive ways. For example, by adding more experimental devices in the Rill, we have made it less appealing for body sliding, but more enticing for experimental hydraulic challenges. Rock sliding appeared to be, in part, a desire to cross the Rill, and bridges have now been added for safer crossings and more access to the stream flow.

In its initial season, Science Park was a stunning public success. Visitation was up by 40 percent, and visitor comments were highly complimentary. As a transitional pathway, Science Park has increased the percentage of museum visitors who spend time on the nature trails during the warm season from approximately 16 percent to nearly 80 percent. Already, the park has received extensive regional print coverage, as well as an article in the New York Times Travel Section, and it was featured in a television special by a major New England station.

Lessons learned from our first summer of operation resulted in a long list of improvements and modifications, including those mentioned above. Still, given the scale of the project, the list represents a reasonable level of remediation.

Questions remain to be explored, of course. Have visitors to Science Park increased their observation skills? Are they making more connections? Has curiosity grown? The museum has its own continuing path of discovery ahead, as these questions are answered and Science Park continues to evolve.

David Goudy is director of the Montshire Museum of Science, Norwich, Vermont. For more information, visit the museum’s web site: www.montshire.org.
Resources for Science Parks

READING LIST


- Evans, Philip S., and Brian Donnelly. Accessible Landscapes: Designing for Inclusion. San Francisco, Calif.: San Francisco State University, 1993. A product of the Accessible Landscapes Project at SFS.


SAFETY

Consumer Product Safety Commission (U.S.)
www.cpsc.gov

National Playground Safety Institute (U.S. National Recreation and Park Association)
www.nrpa.org
For a list of NPSI Certified Playground Safety Inspectors in your U.S. state, fax a request on official company letterhead to 703/858-0794; you should receive the list within two weeks.

ASTM International
www.astm.org
Formerly known as the American Society for Testing and Materials, ASTM International publishes safety and quality standards accepted and used around the globe. A site search on "playground" will yield current standards for surfaces and equipment.

National Program for Playground Safety (U.S.)
www.playgroundsafety.org
Established at the University of Northern Iowa, with a 1995 grant from the Centers for Disease Control and Prevention, NPPS is a public resource for information on playground safety and injury prevention. Two CDs produced by NPPS, CPSC + NPPS = Safe Playgrounds and Planning Accessible Safe Playgrounds Using the Americans with Disabilities Act, illustrate respectively how to apply Consumer Product Safety Commission guidelines and ADA requirements to the development of safe, accessible playgrounds; the disks sell at cost for $25 each, or $40 for the pair.

ACCESSIBILITY

Disability Business Technical Assistance Centers
www.adata.org/dbtac.html
Ten regional DBTACS have been established by the U.S. National Institute on Disability and Rehabilitation Research to provide "one-stop" information, training, and technical assistance to employers, people with disabilities, and those with responsibilities under the Americans with Disabilities Act (ADA).

National Center on Accessibility (U.S.)
www.ncaonline.org
Click on "Recreation, Parks, Tourism" and then "Playgrounds" to find a variety of linked resources on accessibility, including PDF and text versions of the U.S. Access Board's final Americans with Disabilities Act Accessibility Guidelines for Buildings and Facilities: Play Areas, issued October 18, 2000.

Smithsonian Guidelines for Accessible Exhibition Design
www.si.edu/opa/accessibility/exdesign/start.htm
This online resource offers tools for integrating accessibility into the exhibit design process.
Mind, Body, and Spirit: The Benefits of Outdoor Learning

By Eugene G. Maurakis

At the Science Museum of Virginia (SMV), in Richmond, we are in the master-planning stage for Discovery Park, a new, multidisciplinary outdoor science area to be located on a 13-acre parcel of land directly behind the museum. Discovery Park will integrate themes of natural history, ecology, chemistry, earth science, energy, physics, and transportation in alignment with the Virginia Standards of Learning and the Project 2061 Benchmarks for Science Literacy of the American Association for the Advancement of Science.

At SMV, we believe that linking children, young and old, to the world around them is fundamental to their healthy physical, emotional, and educational development. Our goals for the science park are to improve the general public’s understanding and appreciation of science concepts and to connect visitors to their biological, chemical, and physical environments. As part of the planning process, we have reviewed formal studies and popular literature on human interaction with the outdoor environment.

The media warn us often about our disconnection from nature—about cutbacks in school recess time; about people working and living in artificial environments about safety considerations that keep children indoors on the computer or in front of the television—but these problems are not new. They have been evolving for years.

Vance Packard, in his 1983 book Our Endangered Children: Growing Up in a Changing World, notes that children and parents were spending fewer hours outside than previous generations did. Richard Louv, in the 1994 Childhood’s Future, said that people today are likely to know more about wildlife in Africa from watching television than they do about the environment outside their back doors.

Children have become dependent on programmed sensory stimuli that hold their attention through heightened adrenaline flow. Simulated experiences have replaced such former recreations as wandering outdoors, catching fireflies, or looking for tadpoles.

Developmental researchers like Doris Fromberg, Lorraine M. Cune, Mary Zanes, Brian Sutton-Smith, and Mary R. Irvin stress the importance of outdoor play and learning to children’s physical, social, and cognitive development. Fromberg, M. Cune, and Zanes cite the role of play in fostering personal meaning and reveal that children are most likely to feel motivated, not anxious, about learning when they are able to use challenging and varied materials in a safe environment that encourages active involvement and provides positive feedback.

Sutton-Smith, a child psychologist, writes that play has become too regimented and playgrounds too barren. He urges the creation of heterogeneous natural habitats, rather than prefabricated metal and plastic jungle gyms. R. Irvin, too, notes the value of natural play elements such as sand, water, and snow, and recommends that gardens and animals be included in outdoor play facilities when possible.

Lay writers convey a similar message. In their 1994 book The Geography of Childhood: Why Children Need Wild Places, children’s physical, social, and cognitive development. Fromberg, M. Cune, and Zanes cite the role of play in fostering personal meaning and reveal that children are most likely to feel motivated, not anxious, about learning when they are able to use challenging and varied materials in a safe environment that encourages active involvement and provides positive feedback.

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Just as children learn to use “indoor voices” and “indoor behavior” in indoor spaces, so too they expect to be given more license outdoors—particularly when the word “playground” is involved. This lesson was brought home clearly a few years ago to the design team, led by BKSK Architects, that planned and developed Kidpower!, the 30,000-square-foot Science Playground at the New York Hall of Science (NYHOS), Queens.

In the four years it took us to complete the project, our design team had to make a fundamental shift in the way we approached outdoor spaces. Issues of durability, programming, and, most importantly, safety were re-evaluated for an outdoor playground setting, where the rules and guidelines are constantly evolving.

The Science Playground opened in 1997 to rave reviews from educators and children. Designed for kids aged 6 to 14, the park attracted a large and lively audience. But NYHOS soon realized that to ensure safety in the high-speed, interactive playing environment, families with younger children would have to be turned away—not a happy situation for visitors or staff. This led the science center to seek an expansion of outdoor opportunities for children of all ages. In 2000, NYHOS initiated plans to build the Preschool Garden of Science.

Each of these projects evolved with a unique aesthetic, guided by the collaborative planning of designers and museum educators and by the learning and safety needs of its user group.

**The Science Playground**

The outdoor science park at the New York Hall of Science may be one of the biggest outdoor science parks in the world, but it wasn’t among the first. Museum director Alan Friedman got the idea for the interactive outdoor area after seeing smaller versions of science parks in India.

Taking a design cue from the NYHOS building’s original function as a 1964 World’s Fair site, the science center teamed up with BKSK Architects to create the brightly colored tectonic character of the playground.

In designing the exhibits, the team operated on the basic principle that, to a child, everything is an exhibit. Our job was to make the lessons...
The two dozen exhibits in the Science Playground, including a 150-foot-long Energy Wave, a 30-foot Giant Seesaw, and 100 feet of water exhibits, are all designed to illustrate basic principles of physics and the relationship between kids, energy, and the physical world.

Tensegrity principles, angular momentum, structural engineering, and the nature of energy waves are not in the typical elementary school science diet. Our challenge as a design team was to make these concepts accessible to the average 8-year-old. Our design process was a collaborative one, drawing on the expertise of science and museum educators, architects, exhibit designers, structural engineers, and landscape architects. This wide group brought a range of perspectives to the table, allowing for an ambitious and unique design.

In the Science Playground children learn these concepts through direct interaction with what they see as fun playground equipment. A Climbing Space Net that holds 15 classmates is less intimidating to a fourth grader than Newton's Third Law of the Universe. Yet in playing on the Net, and seeing how the movement of one person affects the shape of the web, kids have already learned that “for every action there is a reaction.”

The Science Playground exhibits are organized along a structural armature, which serves as a unifying element, a pedestrian bridge, and a framework for exhibits, and allows the site to function on several levels.

- The Suncatchers exhibit allows children to use mirrors to refocus beams of sunlight onto photo cell targets on a kinetic sculpture. Hit a target, and a kid can activate spinning pinwheels or a cool (literally) fog machine. That child has also just learned about reflection and the power of the sun.

- The kid-powered Whirlpool Column shows the beauty of vortices in nature.

- The Standing Spinner demonstrates angular momentum and answers that burning question: How do figure skaters make themselves spin so fast?

- These and all the exhibits are powered by the users, so the kids can see a direct relationship between their actions and energy and the physics of the universe. Facilitators who monitor the children's safety are also available to explain the concepts of physics to kids as they play.

### Safety First

The hands-on, feet-on, full-body environment of the Science Playground enhances the learning experience but also presents increased safety risks. Indoor environments tend to have clear signals as to what is fair game and what is “off limits.” Outdoors, everything is a potential springboard, grip, or invitation to climb. One solution for NYHOS was a safety consultant who reviewed all our plans, from schematic design through construction drawings and final site visits.

For designers and educators, the temptation to do more and include more chances to teach can lead to unsound decisions about the design of exhibits and the capacity of an outdoor play space. An expert can look at designs and programming with an explicit eye for safety. There are very specific codes for traditional playground equipment, but in an innovative outdoor playground you tend to encounter a lot of situations that aren't in the rule book. At NYHOS, we married a design that encourages exploration and risk-taking with the expertise of a safety consultant to create a space where children can physically challenge themselves in a safe manner.

The largest piece of safety equipment in the NYHOS playground is its floor, made up of a resilient underlayment covered by a colored wearing surface. The poured-in-place underlayment consists of a base mat made of 100 percent recycled tires, mixed with a binder. The top layer of wear-resistant crushed rubber is colored in brilliant blue and purple.
NYHOS again brought in BKS Architects, in collaboration with Lee Weintraub Landscape Design, to create the Preschool Garden of Science. In contrast to the “built” quality of the Science Playground, the design team felt the playground for younger children should be a more natural environment.

A flat site adjacent to the existing playground was contoured to create planted hills and valleys. The stylistic difference signals kids that they are in a different space with different rules, but the proximity allows parents and facilitators to check on older and younger children simultaneously.

NYHOS is also currently refitting the original Science Playground to meet the code for younger children, so families can move freely between the two.

“Exhibits” in the Preschool Garden are somewhat less defined than in the Playground. For the preschoolers, we re-applied the notion that, to a young child, everything is an exhibit. As a teaching tool, the landscape setting is ideal for young children. It allows for the creation of a strong sense of place and a combination of sensory and exploratory experiences.

A meandering path and accompanying watercourse lead visitors through the Garden of Science. Along the way, vantage points change, allowing for new discoveries around each bend. In contrast to this curving trail, man-made walls cut through the hills and provide “activity paths.” They also create a relationship with the original Science Playground, lining up with the steel support frames of the structural armature.

In the Garden, too, children understand that outdoors rules are different from indoors. Organized along the linear walls in a loosely thematic way, activities here encourage mess making, sound making, and movement. By grouping the activities, we intended that kids would expand their own exploration as they interact with other children engaged in related activities.

Conclusion

Key to the design of both the Science Playground and the Preschool Garden of Science are the issues of durability, maintenance, and safety. Materials really take a beating when exposed to weather and the physical presence of active children. Everything has climbing potential, hoisting potential, and learning potential, and all elements have to be scrutinized for the hazards.

There are specific, well-documented playground codes and standards that one can follow as a designer, but once you step outside the traditional playground realm of slides and monkey bars, issues are less clear. Safety, durability, and catering to the age of the user were the most important guidelines in creating a safe and exciting environment for the outdoor science learning platform.

Joan K. Revin is a partner in BKS Architects, New York City. For photos and descriptions of the two NYHOS projects, go to www.bkskarch.com. For information on safety codes for playgrounds, see “Resources for Science Centers,” page 13.
Open to Everyone:
Making BioQuest Accessible

By Roy Griffiths

BioQuest is an outdoor educational complex currently under development at the North Carolina Museum of Life and Science (NCMLS), in Durham. Envisioned more than a decade ago as part of our Master Plan 2000, the $20 million project takes full advantage of the museum’s 70-acre site, which includes fields, swamps, an abandoned quarry, and woodlands, and capitalizes on NCMLS’ unique strengths as a hybrid science center, nature center, and zoo.

Phase One of BioQuest was completed in 1999 with the opening of MagicWings, a year-round butterfly conservatory. Phase Two—featuring two new outdoor exhibit areas, Down to Earth and Catch the Wind—is scheduled to open in 2004–05. It represents the field’s first comprehensive plan to link animals and plants in the outdoors with interactive exhibits in the context of a science center.

The complex second phase has required the combined skills of the Brown Jurkowski Architectural Collaborative, landscape-design firm EDAW, animal-enclosure designers Bassett Associates, and exhibit designers Jeff Kennedy Associates, along with our in-house team. Major funders are the National Science Foundation and Durham County.

Integral to the process has been the museum’s commitment to provide accessible experiences for all visitors. NCMLS’ 2001–02 participation as one of six regional host sites for ASTC’s NSF-funded Accessible Practices workshops has furthered our longstanding commitment to accessibility. In our existing facility, we have worked with advisors from the disabilities community to provide multisensory experiences at exhibits, appropriate color contrast in galleries, and large-print and braille maps for wayfinding. Advisors continue to participate actively in the exhibit-evaluation process for BioQuest. And because our new exhibits will be fully outdoors, utilizing dramatic topographies, we have worked with advisors from the disabilities community to provide accessible experiences at exhibits.

Multimedia programs will include audio description and captioning. Accessibility concerns have helped shape the design of Down to Earth, where visitors can explore the aerial environment, on a human scale, the mechanics of lift used by birds and insects. Accessibility challenges in Catch the Wind are also numerous. Current plans call for integrated multisensory exhibits, careful consideration to grades and surfaces, and an abundance of resting spots so visitors can comfortably sustain their explorations.

We anticipate that modifications will result from the continuing involvement of accessibility advisors in our implementation of BioQuest, as well as the formal exhibit evaluation being conducted by Inverness Research Associates. As BioQuest takes NCMLS to a new level of excellence, we are confident that we can create an outdoor environment in which informal science learning is a side-by-side experience open to everyone.

Roy Griffiths is vice president for exhibits and planning at the North Carolina Museum of Life and Science, Durham. For more on accessibility guidelines, see “Resources for Science Parks” page 13.
Freedom and Ownership:
The Berkeley Adventure Playground

By Katherine Ziff

The Berkeley Adventure Playground (BAP) looks nothing like a typical outdoor science park—or a typical playground. On an acre and a half of municipal parkland, adults and children use hammers, saws, and paint provided free of charge to build and renovate forts with scrap lumber. A cable zip line and climbing structures complete the picture, but most of the energy goes into building.

Adventure playgrounds were invented in Europe after World War II, when playground designers noticed more children playing in overgrown fields and construction zones than in their carefully designed play areas. They decided to create unconventional playgrounds with “loose parts,” including scrap lumber, mud, plants, live animals, and fire pits for cooking.

Adventure playgrounds reached the United States in the 1970s. Most have now closed or been converted into traditional playgrounds, primarily because neighbors objected to their haphazard appearance. BAP is an exception. In 24 years of summer and weekend operation, it has served nearly 500,000 visitors.

I found out about BAP while researching an outdoor exhibit area for Sausalito's Bay Area Discovery Museum (BADM). On my first visit, a boy of about 9 years of age invited me on a guided tour of "his" fort, a rambling two-story structure with several interior rooms. Intrigued by the freedom and ownership he felt, I was inspired to do an internship at BAP toward my master's in museum studies at John F. Kennedy University.

I worked at BAP on Saturdays for six months as a playground supervisor, and am now completing a research project on adventure playgrounds.

Science centers and adventure playgrounds share several core values. At both, visitors use real tools, make measurements, test predictions, and solve problems. BAP’s trained staff coach visitors on how to find a safe design, and introduce lessons, such as the use of leverage to pull nails, when appropriate. Based on my informal observations, adventure playgrounds may even be ahead of science centers in attracting diverse audiences, creating opportunities for intergenerational learning, and encouraging environmental stewardship.

Although there are risks involved (during my time at BAP, we had several skinned knees and one puncture wound), adventure playgrounds show that visitors will create their own challenges when designers trust them to—and when communities provide them space to do it.

My experience at BAP is informing my current assignment at BADM: the development of our new My Place by the Bay expansion, which includes three indoor and two outdoor components. It has had the most impact on Discovery Cove (opening spring 2004), a 2½-acre outdoor exhibition designed for children ages 5-8. The Cove offers science experiences based on local features, such as a shipwreck, tide pools, and habitats in the Marin Headlands. Because the Golden Gate Bridge is visible from our site, we will have the Bridge under Construction; kids can rivet pieces to our bridge or design their own smaller bridges.

Elsewhere, visitors can test their engineering skills against those of the native dusky-footed wood rat, whose lodge of sticks and grasses can reach a height of 5 feet. We provide materials, but children must work together to design and build their own structure. BADM may not be handing out hammers, paint, or saws, but we hope to convey the same message as adventure playgrounds: that any child can be a powerful problem-solver.

Katherine Ziff is exhibit developer at the Bay Area Discovery Museum, Sausalito, California (www.badm.org). To reach the BAP site, go to www.ci.berkeley.ca.us/coolthings/.
Math Initiative Launched

Backed by a $2 million grant from the National Science Foundation, ASTC and TERC, the Massachusetts-based education and research development organization, have launched Building M Mathematics Momentum in Science Centers, a new professional-development initiative for the field. The ultimate goal is to increase the U.S. public's awareness of mathematics.

ASTC's journey toward capacity-building in mathematics began with a two-day open interest meeting following the 1998 ASTC Annual Conference in Edmonton, Alberta. The next step was a 2000 NSF-funded study of mathematics programs in five institutions; principal investigator Andrea Anderson's final report, Mathematics in Science Centers, was published by ASTC in June 2001. (The March/April 2001 issue of ASTC Dimensions also focused on mathematics programs and exhibitions in science centers.)

Building Mathematics Momentum is consistent with the 2001 report's recommendation that ASTC undertake an initiative to "enable science centers to offer more and better mathematics in more institutions, nationwide." Starting in November 2002, TERC and ASTC will collaborate with 13 U.S. ASTC-member institutions over three years to:

- identify the mathematics needs of science center staff
- organize an annual Alpha Institute, as well as local or regional staff workshops, on topics such as data, measurement, algebra, national standards, and visitor accessibility
- identify strategies for engaging multiple audiences in informal mathematics
- develop an online mathematics

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For updated listings of calendar events, visit www.astc.org.
course for science center staff.

Alpha sites for the project include the Buffalo Museum of Science; the Children's Museum of Houston; the Fort Worth Museum of History and Science; the Lawrence Hall of Science; the Miami Museum of Science; the Museum of Science (Boston); the New England Aquarium; the New Jersey State Aquarium; the North Carolina Museum of Life and Science; the Oregon Museum of Science and Industry; the St. Louis Science Center; the Scienceworks (Ithaca, New York); and the Science Museum of Minnesota.

The first annual Alpha Institute is scheduled for March 16–18 at the Lawrence Hall of Science, Berkeley, California. For more information, contact DeAnna Banks Beane at 202/783-7200 x137, dbbeane@astc.org.

Visitors Polled on Science Research

In mid-2002, the Liberty Science Center (LSC), in Jersey City, New Jersey, contracted for a front-end evaluation to assist staff in developing a new exhibition about “breakthrough science”—current research projects that have wide-ranging implications. The study was carried out by Randi Korn & Associates.

Objectives of the evaluation, which included both questionnaire and in-depth interviews with visitors at LSC and the Franklin Institute, Philadelphia, were to document whether and how museum visitors evaluate science research, what their attitudes are toward research and scientists, and what concerns they have about science research issues.

Overall, respondents had positive attitudes toward science research. Among a list of 12 research topics, questionnaire respondents rated highest those with a clear connection to human health (e.g., brain function and new discoveries in fighting disease) and daily life (e.g., renewable energy sources and fuel-efficient cars). In-depth interviews showed that visitors expect science centers to present current research in a truthful, unbiased manner.

To obtain a full copy of the study, Breakthroughs: Front-End Evaluation, contact Kevin Coffee at Liberty Science Center, kcoffee@lsc.org.

Science Parks Noted in Sourcebook

Now available for purchase, the ASTC Sourcebook of Science Center Statistics 2002 includes data compiled from member surveys on attendance patterns and trends; school groups, teachers, and youth; employees and volunteers; and science center finances.

Among its entries are the following facts about outdoor science facilities:

• 43% of survey respondents worldwide report having an outdoor exhibit area or science park.
• Outdoor exhibit areas range from 200 square feet at the Science and Technology Center of Indonesia, in Jakarta, to nearly 260 acres at the Hugh Moore Historical Park and Museum, Easton, Pennsylvania.
• The median size reported for outdoor science parks is 19,653 square feet.

Sourcebook 2002 costs $25 for member institutions and their employees; $40 for nonmembers. To place an order, contact publications assistant Shirley Gaines at 202/783-7200 x140; fax 202/783-7207; or e-mail pubs@astc.org.
**Spotlights**

By Carolyn Sutterfield and Hilary Troester

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**NATURE AS SCULPTOR** — In a new $2.5 million outdoor exhibition, Forces That Shape the Bay, the natural history of the San Francisco Bay comes to life at California’s Lawrence Hall of Science (LHS).

The nearly one-acre, landscaped interactive view exhibition, scheduled to open in June, enjoys a panoramic view of the bay from its site on the Berkeley science center’s southwest terrace. Its centerpiece is a 90-foot-long water feature, loosely based on the actual Sierra watershed, that shows the course of the Sacramento and San Joaquin rivers as they run from the mountains through foothills and the Central Valley to the bay and the Pacific Ocean. Simulations of seasonal flow depict varying conditions: drought, normal, or heavy rainfall. A series of small dams lets visitors redirect the flow, illustrating multiple uses of California water for consumers, agriculture, and industry.

In other elements of the exhibition, a computer simulation takes visitors from 20,000 years ago to the present day, dramatically illustrating the most recent ice age, in which the current San Francisco Bay was formed. The BayLab outdoor mobile teaching space and bilingual audioguide engage visitors in learning more about the geologic, plant, animal, and human elements that continue to shape the Bay and its surroundings.

Forces That Shape the Bay is funded by a major grant from the National Science Foundation and contributions from private donors. The watershed model is sponsored by the East Bay Municipal Utilities (Water) District.

**Details:** Barbara Ando, bjando@uclink.berkeley.edu

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**TAKING THE PLUNGE** — Water is more than just summertime fun at Hidrodoe, a new interactive water park opening March 22 in Herentals, Belgium. Visitors can get their feet wet at the park created by Pidpa, the national water company, while learning more about issues like sustainable development and water purification.

The 5,000-square-meter (10,000-square-foot) park incorporates hands-on activities within outdoor, parklike settings. The educational heart of the park is Water World, a visitors center where families can watch a “Drop,” a multimedia show on the importance of water; try science experiments in the “What is Water?” zone; follow an animated timeline about water in the History Cave; explore the beauty of water in Landscape; and speculate on the future of water in computer programs at Aqua Station. Outside are two water gardens—’one offering exciting hands-on experiments, the other inviting relaxation and meditation.”

The Water Café and Water Shop complete the park complex.

Exhibits for Hidrodoe were designed and fabricated by Northern Light Co-Design, Amsterdam; architects for the project were P. Schellekens and L. Vanhout. Besides Pidpa, supporters include Toerisme Vlaanderen and the European Fund for Regional Development.

**Details:** Caroline Schuit, caroline.schuit@pidpa.be; www.hidrodoe.be

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**FLOATING WORLDS** — After long travels, two massive granite “floating balls”—“kugels”—to their German makers—have come to rest, 250 feet apart, outside the Science Museum of Virginia (SM V), in Richmond. There, as the Mary Morton Parsons Earth-Moon Sculpture, they demonstrate in 1-foot-to-1,000-miles scale the relationship in size and distance between the Earth and its moon.

Inspiration for the $1 million project came from a 3-foot granite floating ball at Ohio’s COSI Columbus, which spins and tumbles in its water-filled base at a visitor’s touch. Staff at SM V envisioned an even grander display, with two polished kugels representing our home planet and its satellite. In 1998, after raising the necessary funds, SM V placed its order with Kusser Granitwerke of Aicha vorm Wald, Germany, makers of most of the world’s floating-ball sculptures. The 9-foot-diameter “Earth,” made of South African black granite, would be the largest sphere the Kusser family had ever created.

Museum staff anxiously followed the progress of the kugels as the giant black sphere and its 2-foot white granite sister were ground, polished, and carved to represent the surfaces of the two planets. The floating balls were then carefully packed (the larger one alone weighs 29 tons) and shipped to the United States.

Installed on their matching bases in Richmond in January, the spheres now revolve slowly on their proper axes, each supported by a thin layer of pressurized water (22.4 pounds per square inch for the “moon,” 33.8 psi...
for the larger sphere. Visitors are welcome to touch, turn, roll, and reorient the massive kugels.

Details: www.smw.org

NEW FOCUS, NEW NAME—in October 2002, the Science Center of Eastern Connecticut, New London, entered into a formal licensing agreement with the Cold Spring Harbor Laboratory (CSHL), Long Island, New York, to provide educational programs originated by CSHL’s Dolan DNA Learning Center. Both institutions are ASTC members. CSHL is where James Watson did his groundbreaking DNA work in the 1950s; the laboratory remains on the cutting edge of molecular and genetic research. Its new partner is the third facility (and only other ASTC member) licensed to deliver the Learning Center’s multimedia programs on molecular biology and genetics research. To signal this shift in emphasis, the science center has changed its name to the SCIENCE EpiCenter & DNA Learning Center (EpiCenter).

Initially, the EpiCenter will focus on middle school students in Connecticut and nearby Rhode Island and Massachusetts, delivering DNA programs either on-site (using their YouthALIVE! student/mentors as assistants), or through outreach programs. The eventual plan is to offer adult, parent/child, homeschool, and Advanced Placement programs. Says EpiCenter executive director Kit Powers, “DNA is not just about forensics.... It involves philosophies, morals, ethics. It will be important to our lives for decades to come.”

Details: Diana Ketner, SCIENCE EpiCenter, (860) 442-0391

HOME AT LAST—On March 29, WonderLab Museum of Science, Health and Technology will open its permanent facility in downtown Bloomington, Indiana. The science museum, which got its start in 1995 as a traveling outreach program, has been housed in an interim facility since 1998. The new 15,000-square-foot, two-story building, with an additional 7,000 square feet of outdoor nature area, will help bring a renaissance of investment to the city’s Urban Enterprise Zone.

The $1.7 million project was designed by the firm of Christine Matheu, Architect. WonderLab staff have collaborated with professional exhibit fabricators to create interactive experiences for the new museum.

Highlights include the Oliver W inery Grapvine Airarium, where the visitor can learn about the different types of grapes; the G eology, chocolate, and nature exhibits; the Bubble-Airium, where the visitor can learn about the mathematical and physical properties of bubbles; and the Fitzgerald Hall of Natural Sciences, featuring live animals and exhibits on Indiana geology; and the How T hings Work, a hands-on gallery devoted to everyday phenomena like electricity and optics. Additional activity rooms will enable WonderLab to offer targeted educational programs.

An outdoor park, featuring native greenery, will be planted as a community project this spring. Adjacent to a planned pedestrian greenway, it will be used for outdoor science programs and demonstrations.

Details: Diana Ketner, SCIENCE EpiCenter, (860) 442-0391

Grants & Awards

New York's Brooklyn Children's Museum (BCM) was one of 13 U.S. organizations to receive a 2002 Coming Up Taller Award at a December 2 Capitol Hill ceremony hosted by first lady Laura Bush. The annual awards—jointly sponsored by the President’s Committee on the Arts and Humanities, the National Endowment for the Arts, the National Endowment for the Humanities, and the Institute for Museum and Library Services—were established in 1998 to recognize excellence in community-based, after-school arts and humanities programs that encourage creativity in young people. BCM was honored for its M useum Team, a free, multi-tiered after-school program that serves more than 700 youths aged 7 to 18.

The Pittsburgh Children's Museum has received $8 million from the Commonwealth of Pennsylvania to help fund an expansion linking its current home with the neighboring Buhl Building. The combined facility will be known as the Pittsburgh Children's Museum and Center.

Among ASTC members receiving National Science Foundation Informal Science Education grants starting in 2003 are the following:

- Museum of the Rockies, Science Museum of Minnesota, and University of Nebraska State Museum: $2.85 million as part of a consortium (with the Kansas M useum and Biodiversity Center, the Sam Noble O kla homa M useum of N atural History, and the Exhibits M useum of the U niversity of M ichigan) for E xploring Evolution, a three-year project that will introduce the concept of evolution to museum audiences and 4-H groups through a combination of traveling exhibitions and activity kits.
- Lawrence Hall of Science: $1.35 million for the Real A stronomy Experience, an interactive exhibition in which visitors can use robotic telescopes, image-processing software, and a functional telescope equipped with a Charge-Coupled Device (CCD) camera to learn about the universe and the progress of modern astrophysics.
- California Academy of Sciences: $2.47 million for Water Is Life, a 30,383-square-foot permanent exhibition, with educational programming, that will engage the public with the living world of water through three habitat components: the Philippine Coral Reef, the California coast, and the Global Rainforests.
La Cité des Sciences et de l’Industrie, Paris, has a new president. Appointed in October 2002, Jean-François Hébert previously served as general secretary of administration in France’s Ministry of Defence. He also worked for the Ministry of Culture and Communication and was involved in the design and building of the new Bibliothèque de France in Paris in the early 1990s.

Charles L. Katzenmeyer has assumed the new position of vice president for external affairs at the Adler Planetarium & Astronomy Museum, Chicago. Formerly associate director for development and public affairs at the Smithsonian Institution’s National Museum of Natural History, in Washington, D.C., he will oversee the Adler’s efforts in fund-raising, sponsorship initiatives, lobbying, branding, and public affairs.

The new director of the Lawrence Hall of Science, Berkeley, California, is Elizabeth K. Stage. Most recently director of the Mathematics Professional Development Institutes in the University of California’s Office of the President, Stage worked in mathematics and computer education at LHS in the 1980s. She is an elected fellow of AAAS, president-elect of the National Center for Science Education, and a former chair of the California Curriculum Commission. She replaces retiring LHS director Ian Carmichael, who will return to teaching at UC-Berkeley.

Mark D. Roberts has joined the staff of Nauticus, the National Maritime Center, Norfolk, Virginia, as director of development. Previously, Roberts was director of annual giving for the Virginia Commonwealth University Foundation.

At its April annual meeting, the National Academy of Sciences (NAS), Washington, D.C., will present its most prestigious award, the Public Welfare Medal, to Shirley Malcom, head of the directorate for education and human resources at the American Association for the Advancement of Science.

Joining AAAS in the early 1970s, Malcom led the development of programs such as the Black Churches Project, which worked to bring science and health education to the African-American community, and Proyecto Futuro, which connects science with Latino-American culture and communities. She has also served on the National Science Board, the President’s Committee of Advisers on Science and Technology, and the Gender Working Group of the U.N. Commission on Science and Technology for Development. Malcom currently chairs the Committee on Capacity Building in Science of the International Council for Science.

“Dr. Malcom has served science with extraordinary scope, originality, and achievement,” says R. Stephen Berry, NAS home secretary and chair of the selection committee. “She has helped bring science to millions of students who otherwise might not have had the opportunity.”

New York’s Buffalo Museum of Science has named David Cinquino its museum experience manager. Most recently project manager for a local furniture corporation, Cinquino spent 14 years as director of research and interpretation at the Buffalo and Erie County Historical Society.