"Dig It!": How an Exhibit Breathed Life into Soils Education

J. Patrick Megonigal*
Smithsonian Environ. Research Center
PO Box 28
Edgewater, MD 21037

Barbara Stauffer
Siobhan Starrs
National Museum of Natural History
MRC 101
PO Box 37012
Washington, DC 20013

Andrew Pekarik
Smithsonian Office of Policy and Analysis
MRC 502
PO Box 37012
Washington, DC 20560

Patrick Drohan
Dep. of Crop and Soil Sciences
Pennsylvania State Univ.
University Park, PA 16802

John Havlin
Dep. of Soil Science
North Carolina State Univ.
Raleigh, NC 27695

We propose that the primary goal of public soils education should not be to teach, but *to inspire*. The goal to inspire guided the design of "Dig It! The Secrets of Soil," a large exhibit in the Smithsonian's National Museum of Natural History, Washington, DC, for 18 mo beginning in June 2008. The "Dig It!" exhibit was designed from an ecosystem perspective, in which agriculture—the traditional context for soils education—is considered to be just one of many ecosystem types. For visitors inspired primarily by art and culture, there were objects chosen to surprise and expand the imagination about soils. The exhibit was designed to communicate to wide range of ages, centered on 12–14 yr olds. As such, it was rich in audiovisual media that included a cartoon, a movie, two looping videos, a kiosk for exploring the state soils, a quiz game, and a role-playing game. It also included scale models and actual soil monoliths. The exhibit addressed the full spectrum of issues that concern contemporary soil scientists—climate change, aquatic eutrophication, soil degradation, sustainable farming, and others—by organizing the content according to scale (global, regional. and local). Interviews with visitors indicated that the exhibit had the potential to effectively alter the preconceived notions of more than 2 million visitors about soils. We fully expect the exhibit to continue inspiring the public about soils through the richness of the exhibit website (www.forces.si.edu/soils; verified 6 Mar. 2010), which includes videos, games, and interactive content.

Abbreviations: NMNH, National Museum of Natural History.

The traditional goal of soil education is to teach soils knowledge. This approach has successfully trained several generations of soil science professionals but has largely failed to build real public interest in this critical natural resource. Although not universal, the apathy of the general public toward soils is apparent to any scientist who has raised the topic with a kindergarten through 12th grade audience or a relative. By comparison, the public is well informed about water and air resources. This lack of public interest in soils is problematic because the challenges facing soil resources are great (Hartemink and McBratney, 2008). It is time for the soil science community to adopt a new strategy for soils education that addresses the huge knowledge gap that exists between the public and scientists about the role of soils as a critical Earth system. We propose that the primary goal of public soils education should not be to teach, but to *inspire*. The goal to inspire guided the educational goals and design of "Dig It! The Secrets of Soil." These goals then were translated into physical objects, audiovisual productions, and interactive components.

DESIGN PHILOSOPHY AND GOALS

The decision to locate a soils exhibit in the most visited natural history museum in the world presented a significant challenge to the exhibit designers. If visitors to the museum found the exhibit uninteresting, the effort would be a spectacular investment of resources only to reinforce the impression that most of these people, numbering in the millions, already hold on the topic (e.g., Fig. 1, Lichtenheld, 2003). On the other hand, an exhibit that surprised visitors and changed their

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*Corresponding author (megonigalp@si.edu).

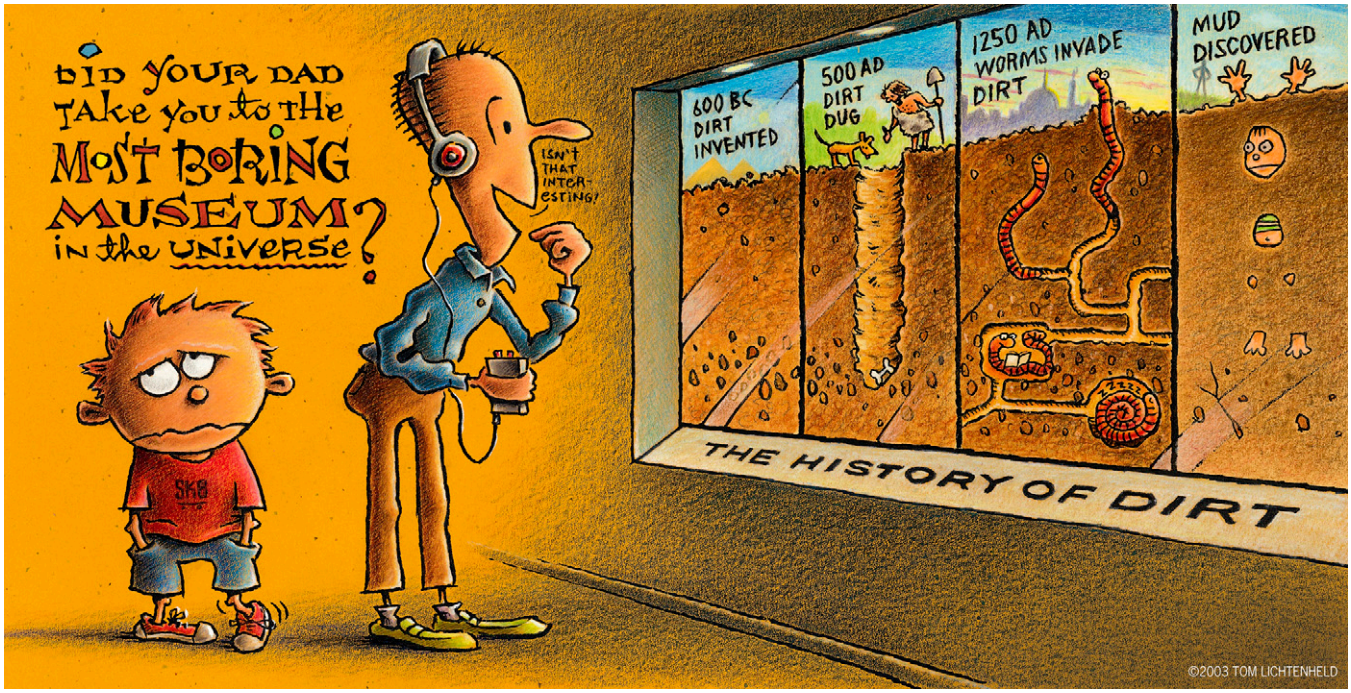

Fig. 1. The author of a children's book published in 2003, well before "Dig It!" opened, imagined that visiting a soil exhibit would be a wonderful example of something that makes a kid grumpy. Illustration from Lichtenheld (2003).

preconceived notions about soils would have tremendous impact precisely because the public is so poorly informed about the scale and scope of soil resources in their everyday lives. For these reasons, the designers had to be exceptionally clear about the goals and philosophy of the exhibit design.

Soil Inspiration

The "Dig It!"exhibit was on display at the Smithsonian Institution's National Museum of Natural History (NMNH) from June 2008 through January 2010. Surveys conducted in advance of both "Dig It!" and a soil exhibit at the Field Museum of Natural History in Chicago showed that visitors find the topic uninteresting even when they understand that soils are important to people (Perry and Garibay, 1996). This "inspiration gap" works against the adoption of improved land use practices—whether voluntarily or through legislation—that must ultimately take place if we are to conserve soil, water, and air resources. By contrast, the influence of polar bears on the biosphere is negligible, but the public is highly motivated to act on their behalf. Gaining public support for actions on the behalf of soil resources requires engaging the public's sensibilities about nature and culture. This philosophy guided the selection of images, examples, and location settings for the exhibit content.

The "Dig It!" design team adopted an ecosystem approach to presenting soils based on the assumption that different visitors are inspired by different places—farms, cities, forests, grasslands, savannahs, wetlands, or tundra. We wanted to elicit the emotions people experience when they visit such places, reasoning that a person who realizes that soils give life to an arrestingly beautiful forest, for example, will more easily appreciate the role of soils in a wetland or an agricultural field. In the ecosystem context, urban and agricultural areas are simply two types of ecosystems among several. One consequence of giving comparable treatment to all types of ecosystems was relatively little emphasis on agriculture compared with traditional educational treatments. This was a departure from past practices in which agriculture dominated the context and examples used in soils education. The notion of terrestrial ecosystems as a central feature of soils education was heuristically appealing because it emphasized the connectedness between soils and nearly any other topic of interest in the natural and environmental sciences. An ecosystem approach also provides avenues for adapting soil science content to a student's local environment, whether that is urban centers, forests, agriculture, or tundra.

Many people are inspired by culture or objects, and here we also sought to expand the examples used in the exhibit beyond those of which a visitor might already be aware. In addition to numerous references to food and fiber, we emphasized pigments, dyes, medicines, and wood. The display of 53 soil monoliths was the most memorable part of the "Dig It!" exhibit for many visitors, but even more surprising to some was a commissioned piece of sculpture designed to capture the idea of soils at the center of Earth's great cycles of elements, water, and air. Interviews with visitors showed that this sculpture was particularly effective for visitors who were more inspired by art than by science.

Educational Goals

A second goal of the "Dig It!" exhibit was to raise public awareness about a few overarching principles that anchor our understanding of soils: soils are living; soils are varied; soils change; soils link land, air, and water; soils are difficult to recover. These are basic facts that one must understand to appreciate

soil resources, analogous to knowing that water runs downhill for water resources. The principles were distilled from exercises conducted at two workshops attended by soil scientists, educators, and exhibit specialists (Drohan et al., 2010). They did not appear in the exhibition as written above, but guided the selection of images and the examples used in audiovisual pieces, interactive pieces, and the text of the exhibit. Rather than presenting an uninspiring list of soil principles, our strategy was to illustrate the principles with engaging content and allow the visitor the freedom to deduce the principles through intuition.

Design Considerations

Exhibits are a challenging medium for education because the audience is not captive. This problem is compounded by a topic like soils that has the potential to bore an audience. In Mann (2008), Charles Mann described the challenge of communicating soils to a general audience: "Journalists sometimes describe unsexy subjects as MEGO: My Eyes Glaze Over. Alas, soil degradation is the essence of MEGO." The "Dig It!" design team developed a few unwritten rules to address these issues and guide the exhibit design: the exhibit shall not bore visitors; the exhibit shall not require reading; the exhibit shall not be linear. The primary goal of inspiring visitors, rather than teaching specific knowledge, was an important step toward the first rule of avoiding MEGO. We also wanted the exhibit to be rich in scientific content, however. Our solution was to develop playful or engaging ways of presenting the science content, a task that required equal parts of two things—creative ideas and an understanding of the single most important concept to convey in a given piece.

Many people experience exhibits almost exclusively through vision, making it important to have images, audiovisuals, and decorative elements that communicated the educational messages without the need to read. Because visitors experience exhibits in a nonlinear fashion, avoiding crowds or gravitating to interesting elements, we could not assume they had learned from a previous section of the exhibit. In addition, the NMNH exhibit hall had two entrances, so the exhibit had to make sense when traveling in either direction.

The target audience for the exhibit was families with children 12 to 14 yr in age, which corresponds to middle school students in the United States. As a result, difficult concepts had to be conveyed using simple vocabulary and sentence structures. The jargon of soil science was translated into terms or phrases that were free of exceptions, qualifiers, and caveats. We preferred concise statements that were just 95% accurate to longer, qualified statements that were 100% accurate.

The physical structure of an exhibit exerts a very strong influence on how visitors experience the content. The entrances must be inviting and open so that people can quickly assess the content and judge the time a visit may require. Structures had to be attractive, safe, and durable enough to withstand rubbing, rocking, poking, and hanging without scratching, fading, or breaking. The exhibit had to be accessible to visitors with disabilities. Finally, many design compromises were made in order for the exhibit to travel to other venues. To do so, it had to be both sturdy and modular enough to be dismantled, packed, shipped, and set up again in many different configurations.

The Designers

A team of about six Smithsonian Institution employees and contractors designed the exhibit and exercised editorial control over the project. The team was dominated by exhibit professionals with expertise in design, writing, project management, exhibit travel, and related topics; there was one scientist (the curator) on the team. The distribution of science and non-science expertise was appropriate because successful exhibits focus more on effective presentation than science content per se.

The Smithsonian design team produced a series of progressively detailed floor plans and scripts that were reviewed by outside experts such as the SSSA Design Team (Drohan et al., 2010). These were eventually translated into construction drawings for the physical elements and graphic design files for the printed elements. The physical production of the exhibit required more than 20 contractors with specific areas of expertise. These included artists who work in various media, such as painters or sculptors, film producers, animators, model makers, microscopic imaging specialists, and construction experts.

PARSING SOIL SCIENCE

The first challenge the design team tackled was organizing the universe of soil science into tractable units that visitors could quickly grasp. After two workshops and innumerable meetings over 3 yr, the team settled on a design with six rooms and two entrances (Fig. 2). About half of the 465-m^2 space was devoted to describing soils and their properties, formation, and functions (Rooms 1 and 3, Fig. 2). The first room was an entrance that opened onto the NMNH rotunda. It was designed to visually attract visitors and poetically introduce them to soils and soil life. The walls were a photorealistic mural of an idealized mid-Atlantic U.S. landscape in profile (Fig. 3), based on actual soil series and accurate Munsell colors. One of the murals had monitors showing videos of soil animals and time-lapsed root and hyphae growth. The room had ambient sounds that included trickling water, digging, crickets, and frogs.

Sizing Up Soils

The entrance opened into a room titled "Sizing Up Soils." Here visitors were greeted with large, high-resolution images of beautiful landscapes and inspiring quotes such as this selection from William Bryant Logan (Logan, 1995):

> "How can I stand on the ground every day and not feel its power? How can I live my life stepping on this stuff and not wonder at it?"

It was important to make an immediate emotional connection with the visitors so they would care enough to stay. This task was somewhat easier to achieve at the opposite entrance, where everyday objects derived from soils were on display.

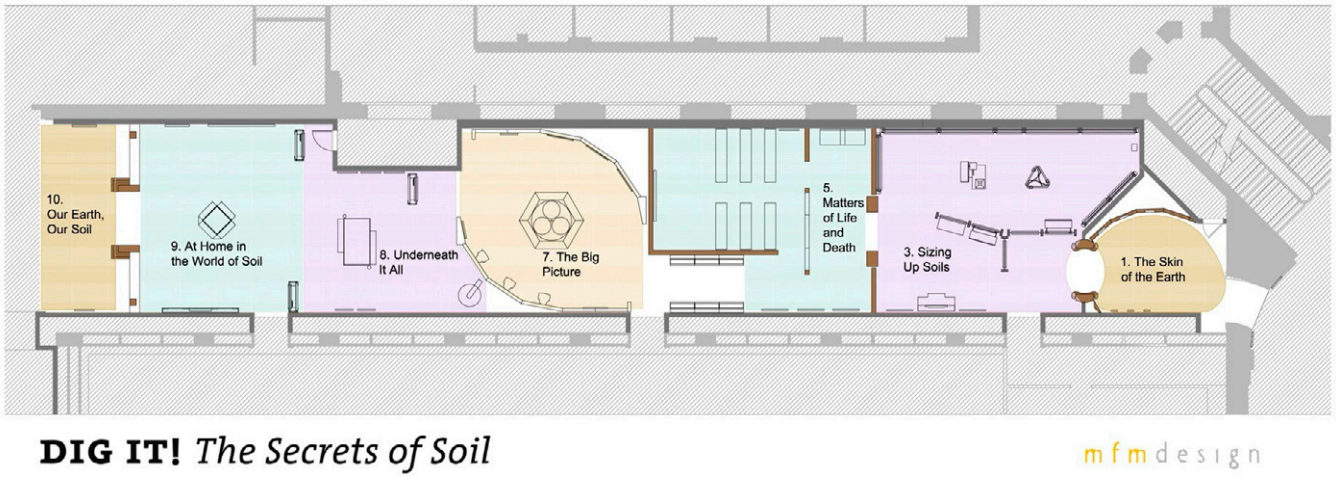

Fig. 2. Floor plan of the "Dig It!" exhibit in the National Museum of Natural History.

In many ways, "Sizing Up Soils" illustrates the overall exhibit design in microcosm. It included memorable objects—a collection of 53 monoliths from the 50 U.S. states, the District of Columbia, Guam, and Puerto Rico—arranged purposefully to be a montage of colors, patterns, and layering (Fig. 4). This approach to organizing the monolith display was effective, judging by comments we overheard in the gallery, such as a teenage girl who said, "I had no idea there were so many kinds ... how weird!" Thus, visitors could understand one of our soil principles—soils are varied—without reading a single word. This idea of variation in soil properties was leveraged elsewhere in the exhibit to explain the roles that soils play at different spatial scales, including the visitor's backyard, landscapes, biomes, and the planet. Indeed, the plural "soils" was used throughout the exhibit to emphasize the fact that there are thousands of variations on soil. An extremely important contribution of the monolith display was the personal connection visitors could make to their home state.

"Sizing Up Soils" tackled the difficult, but important, topic of soil-forming factors with an analogy to cooking. A mock kitchen included "recipes" for the 12 major soil orders and an animated video in which two chefs competed to make the best soil from a single starting ingredient (i.e., parent material)—sand (Fig. 5). The chefs had 6000 yr (time) to manipulate the climate, organisms, and relief to create a unique soil. One chef made a colorful forest soil (a Spodosol) and the other made a bog soil (a Histosol). One of the three judges was a flatulent methanogen that delighted younger visitors and introduced the topics of microbial diversity and greenhouse gas emissions. The contrast of two extremely different soil types illustrates how often subtle interactions among the soil-forming factors can produce the vast variety of soils on Earth, such as those illustrated in the monolith

Fig. 3. A photorealistic mural inviting visitors to enter at the "Skin of the Earth" entrance to the "Dig It!" exhibit.

Fig. 4. The display of monoliths from all states in the United States, Puerto Rico, Guam, and Washington, DC. The foreground shows models and interactive pieces that explain the meaning and importance of soil horizons.

collection. If the two soil types had been visually similar to the untrained eye, such as an Ultisol and an Oxisol, it is probable that visitors would have missed this point and the piece would have been far less effective.

Finally, the room had several interactive pieces to physically engage visitors with the content. These included a computer-driven kiosk for exploring the state soils and a three-dimensional, movable puzzle designed to teach children that soils have layers. Following our ecosystem approach, the puzzle depicted a swamp forest, a boreal forest, a desert, and a grassland. Perhaps the most simple, effective, and popular interactive piece was a group of three acrylic tubes that illustrated how form affects function in soils. The tubes contained magnified particles of artificial sand, silt, and clay (Fig. 6). A visitor could flip the tubes and see how texture affects the rate at which "water" moves through soils. The piece was effective because it was visual, the educational goal was readily apparent, and parents felt confident in their ability to interpret the result for children.

Matters of Life and Death

The fifth room of the exhibit was dedicated to one of the most exciting frontiers in soil science—life (Fig. 2). The centerpiece of the room was a theater where visitors could sit through a 6-min movie titled "Soil Science Investigations," modeled on the television series CSI (Crime Scene Investigations), in which a team of soil detectives solves a grizzly pumpkin murder! In the process, the audience learned that microbes decompose plants and animals, thereby converting organically bound nutrients in tissues back to a form that can be used by growing plants. To quote the movie, "soils are nature's ultimate recycling bin." The movie interspersed live actors with animations that helped visitors to visualize the activity of microbes and other soil organisms. For example, visitors observed an animation of microbial cells releasing extracellular enzymes that broke apart organic matter and released nutrients. The success of the movie hinged on our decision to dedicate more text to the engaging detective story than the scientific content. The key to making the piece short and entertaining, but also rich in scientific content, was to identify two key scientific points to emphasize: the vast diversity of soil organisms and their role in sustaining life through the decomposition of soil organic matter.

SOILS TO SCALE

About half of the exhibit was dedicated to explaining why the welfare of people and the planet are intimately connected to soils. The designers wanted to address this topic as broadly as possible, but struggled to organize the information in a way that would be readily apparent to visitors. Eventually, we realized that the key was to explicitly address spatial scale, with rooms dedicated to human–soil interactions at global, regional, and local scales (Rooms 7–9, Fig. 2).

The Big Picture

Earth may be an ocean planet based on area, but it is a soil planet for people and the vast biodiversity of Earth's terrestrial and freshwater biomes. Much contemporary earth system

Fig. 5. Scenes from the Soil Chef cartoon. Live actors played competitors Pierre LaTerre and Sandy Marsh (top left). Shown are the three cartoon judges—Gassy Gallagher, Sylvania and Quincy Carapace—and a member of the studio audience with a special interest in soil (right-top to right-bottom, respectively). The chefs created a Spodosol (bottom left) and a Histosol (bottom middle).

research is focused on soils as places where life, minerals, water, and air interact (Brantley, 2008). The seventh room of the "Dig It!" exhibit was dedicated to global connections among soils, other earth systems, and people (Fig. 2).

Standing in front of a global map of the 12 major soil orders, visitors played a multiple choice game that presented interesting and surprising facts about how soils affect the earth system (Fig. 7). For example, they learned that the productivity of the Amazon rainforest is controlled by P in Saharan desert soils blown across the Atlantic Ocean (Gardner, 1990; Swap et al., 1992; Okin et al., 2004). Similarly, the aquatic productivity of large areas of the central Pacific Ocean is controlled by Fe derived from Gobi Desert soils (Jickells et al., 2005). Other topics included the effects of global warming on permafrost soils, emissions of the greenhouse gas CH_4 from wetland soils, the fact that soils are a C reservoir twice the size of the atmosphere, and that every drop of fresh water has passed through a soil. Each of the questions represented an area of active scientific research in contemporary soil science.

The global-scale effects of human activity on soils were addressed even more directly in a video and two case studies. The video is another example of our "less is more" approach to the exhibit. It was fairly short and composed of arresting images, music, and phrases. In 4 min, it explained that soils are threatened by erosion, salinization, permafrost thaw, desertification, urban sprawl, eutrophication, and conversion to open water due to sea level rise. It ended with the positive message that visitors can address these problems with their own actions.

The exhibit sought to reveal the hidden beauty of soils, highlighting the esthetics of color, texture, and pattern. To further communicate with visual learners and those inspired by art objects, we commissioned an original sculpture to communicate the concept of soils at the center of Earth's great cycles—water, C, and N (Fig. 8). Visitors saw wood panels painted with soil-related features such as roots, microbes and rocks. The vertical

Fig. 6. The tumbler tube feature demonstrated the difference in the size of sand, silt, and clay particles, but went a step further by showing how particle size affects an important soil property—water movement.

elements of the sculpture represented the exchange of water and gases among soils, the atmosphere, and groundwater. The horizontal light ropes represented the movement of organisms and matter between soils in a landscape or across the globe. The decision to commission the sculpture was risky, but interviews showed it had the power to effectively communicate the main message—soils are integral to the Earth system—to visitors who would not have learned this otherwise. For those people who are more fact oriented, the piece left a positive impression of soil science as a contemporary and creative enterprise. Our conclusion is that risks are well worth taking in soil education.

Soil Savvy

People tend to associate the word *soil* with farms, as if soils stop at the edges of cities, forests, wetlands, and other ecosystems. Certainly, the public does not widely recognize that soils in one part of a landscape influence soils elsewhere, or that soils influence streams, lakes, and estuaries.

Children and adults alike are fascinated by detail-rich physical models. The eighth room in the "Dig It!" exhibit (Fig. 2) considered soils at the regional scale with a large model of a

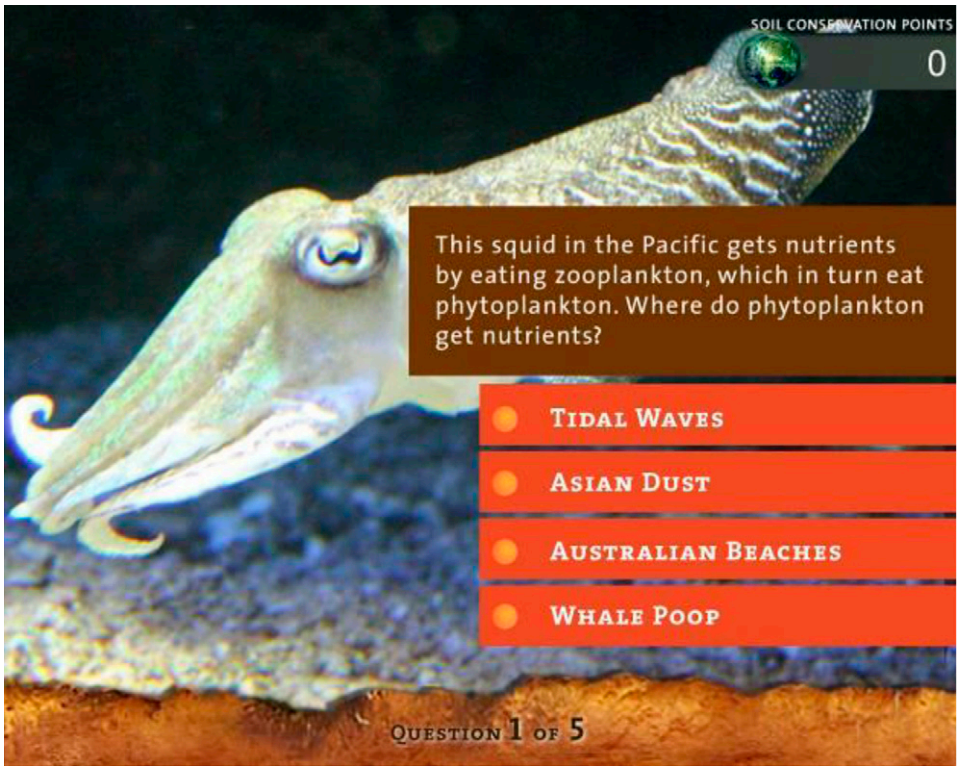

Fig. 7. Visitors tested their soil knowledge with a quiz game. The questions were written to emphasize global connections among soils and the role of soils in global issues such as climate change.

Fig. 8. The exhibit featured a commissioned sculpture titled "Soil Planet," which represented soils at the center of the Earth's major cycles of water and elements.

landscape located at an urban–rural boundary (Fig. 9). It illustrated the many demands we place on soils by showing an urban area with buildings, houses, roads, parking lots, basements, foundations, and even a subway; the rural side of the landscape had an earthen dam, pasture, and riparian forests. Brief text explained how soil uses at high elevations in the landscape affect soils and water at lower elevations.

An active area of soils research and public policy development is the effects that excess nutrients have on rivers, estuaries, and the coastal ocean (Rabalais et al., 2002; Galloway et al., 2003; Beman et al., 2005). The exhibit tackled this issue with a series of panels titled "Soil Sense for the Planet." In images and relatively detailed text, it acknowledged the conflict between the demands of a growing human population for food, fiber, and fuel, and the environmental degradation caused by agriculture. It offered insights into solutions that motivate contemporary research, including no-till and low-till agriculture, and "smart" technology for applying fertilizers only when the plants demand them. This piece was relatively information rich and written at a high level for an adult audience.

Agricultural practices influence the capacity of soils to act as sinks and sources of greenhouse gases, making agriculture a particularly important area of climate change research. The Greenhouse Gas Calculator allowed visitors to play the role of a farmer (Fig. 10), who chooses a crop to grow (corn [*Zea mays* L.], soybean [*Glycine max* (L.) Merr.], or switchgrass [*Panicum virgatum* L.]), the tillage system (till or no-till), and the amount of fertilizer to add (none, medium, or high). In this animated game, touching a cell phone brought advice from a soil scientist who bore an uncanny likeness to SSSA member and retired USDA soil scientist Dick Cline. The visitor learned how their decisions affected both crop yield and greenhouse gas exchange. A talking robin provided feedback, explaining that different decisions could be made to improve crop yield or reduce greenhouse gas emissions. One key to the success of this interactive game was choosing combinations of variables that generated the widest possible range of outcomes, while limiting the permutations to a number the visitor could quickly assimilate. Another key to success was access to an extremely rich database on the topic from a Long-Term Ecological Research Program site at the Kellogg Biological Station, Hickory Corners, MI (Robertson et al., 2000).

At Home

The most intimate connection the exhibit made between the visitor and soils occurred in the ninth room (Fig. 2), the center of which was a physical model of a suburban backyard (Fig. 11). It showed composting, recreation, a garden, and a foundation. It included both a septic tank and a well to illustrate that we depend on soils for both clean water and wastewater cleansing. Many of the objects inside the house had their origin in soils. In both models, the soils in the side view were depicted accurately, with horizons of varying color that changed with landscape position.

Visitors were surprised by the many ways soil products touch their everyday lives. Using a visual experience approach, this was communicated with a video illustrating the manufacture or use of common products (Fig. 12). The visitors saw people growing food,

painting, making fabrics, bottling vitamin pills, and building wooden instruments. The images were rich, the text was constrained to soil-related words from many languages, and the music was emotional. The piece was intended to inspire people about soils, using their personal connections to soil resources.

Fig. 9. A model of an idealized landscape in the mid-Atlantic region of the United States.

LEVERAGING "DIG IT!"

A limitation of the "Dig It!" experience is that it does not engage all the senses. For a variety of reasons, it was not feasible or advisable to provide actual soil for people to touch or smell, experiences that certainly inspire soil scientists. This limitation was partly overcome with moveable carts attended by docents (i.e., volunteer educators). Here visitors, particularly children, were able to touch soils and observe living organisms.

Accessibility to the exhibit was limited by the fact that it is a physical object. This limitation was addressed by creating a web version of "Dig It!" designed to recreate the interactive experiences and content of the actual exhibit (www.forces.si.edu/soils; verified 6 Mar. 2010). The usefulness of the website site was greatly enhanced by the production of an expansive series of educational materials by the National Association of Conservation Districts.

ASSESSING "DIG IT!"

By many measures, "Dig It!" has been a success. An entrance–exit survey completed during summer 2009 showed that 20% of all visitors to the museum visited "Dig It!", amounting to more than 2 million people for the duration of the show. In addition, the website had 4.3 million hits during a 15-mo period beginning in July 2008, and the media has provided a steady stream of coverage.

Although there was no comprehensive study of visitor reaction to "Dig It!", we do have insights from interviews conducted by Smithsonian Institution staff with more than 20 visitors representing a range of visit-group types. The interviews were focused on four specific elements the Smithsonian design team marked for possible revision. In some interviews, however, the visitor was also asked about the exhibition as a whole and within the context of their NMNH visit.

When asked about the exhibition as a whole, these visitors tended to make three points. The first was that the exhibition topic was unexpected and interesting. Soil or "dirt" is a subject the visitors did not expect to find at the NMNH, but they were drawn in by the displays. The display of monoliths was one of most effective features at making a strong connection between the topic and the visitors. Because the monoliths were identified by state, there was a natural tendency to seek out one's home state (or the state of relatives, friends, previous residences, etc.). One goal of all Smithsonian Institution exhibits is to make a personal connection to the visitor, and "Dig It!" appeared to do better than most exhibits in this regard. Once visitors began looking for the soil of a particular state, they were spontaneously involved in a core object experience: comparing related objects in search of differences and similarities. This led naturally and easily to the texts that explain why the soils look so different. Visitors also singled out the interactive piece showing how water moves through soils of different textures (Fig. 6).

Second, some visitors believed that "Dig It!" was more interesting than much larger and more elaborate exhibitions in the museum because they felt it had a wider range of experiences in the form of objects, photos, interactive devices, videos, models, and art. Thus, it appealed to many different tastes and preferences. It seems that this variety may have made it easier for diverse visitors to find a point of engagement and entry.

Third, some visitors were able to generate rather deep insights into the nature of soil science. For example, a 10-yr-old girl was inspired by the strangeness of the sculpture ("flashing lights and kind of crazy") to conclude that, "Soil is like a different planet on the same planet as us because it is different than above it. There is less air and more life." She felt that if you explored soil,

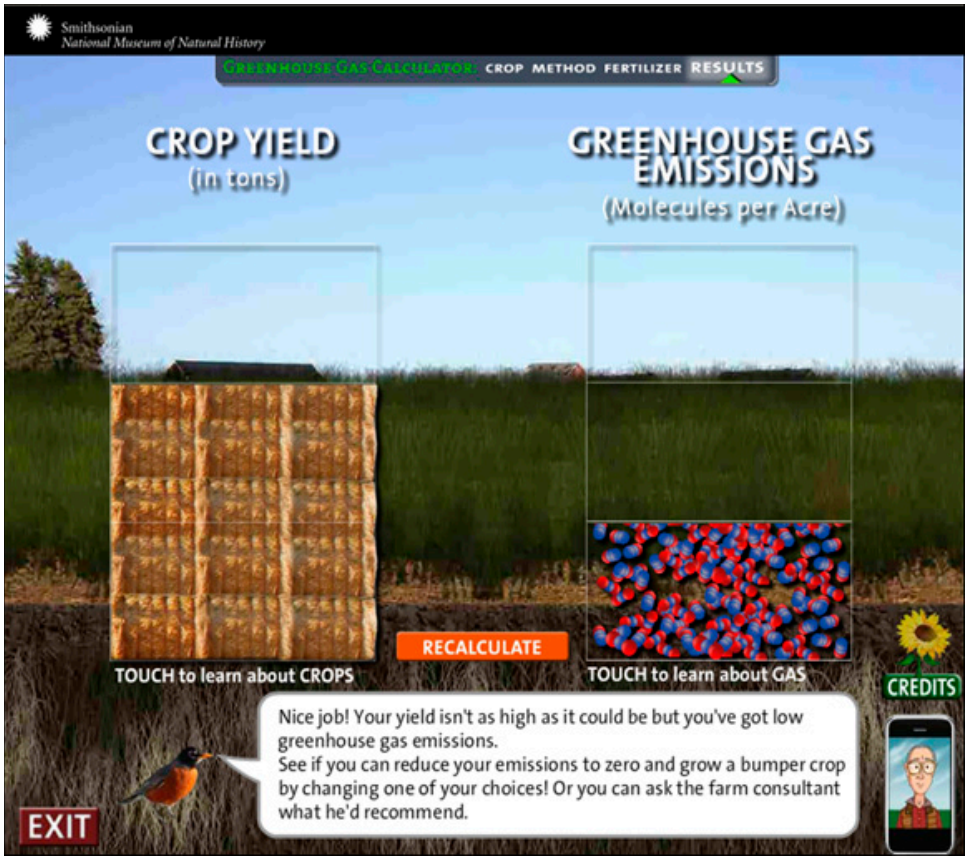

Fig. 10. Visitors used the Greenhouse Gas Calculator to play the role of a farmer, choosing to maximize yields, minimize greenhouse gas emissions, or striving for a balance between these two goals. By touching the cell phone (bottom right), the visitor received advice from an animated soil scientist on which crops to grow, whether to till or not, and how much fertilizer to add.

you would find things that you had not imagined. A response like this child's is a reminder that the power of an exhibition to affect thinking is not necessarily a straight line; it is not just a matter of "presenting" facts or explicating the way we want people to think. An exhibition, like the sculpture, is an artistic act; it creatively brings together objects, ideas, and people in a way that can excite, move, and inspire.

Observations and interviews also showed that some pieces in the exhibit were not effective because they were too complex. Considering that simplicity was a specific goal of the exhibit design, this result emphasizes the axiom that "less is more" when presenting soil science to the public.

CONCLUSIONS

"Dig It! The Secrets of Soil" is the most ambitious attempt to date at presenting soils to the general public in an exhibit format. The project required unprecedented funding. It leveraged the

Fig. 11. A model of an idealized suburban back yard in the United States showing the personal connections visitors have with soils in their everyday lives.

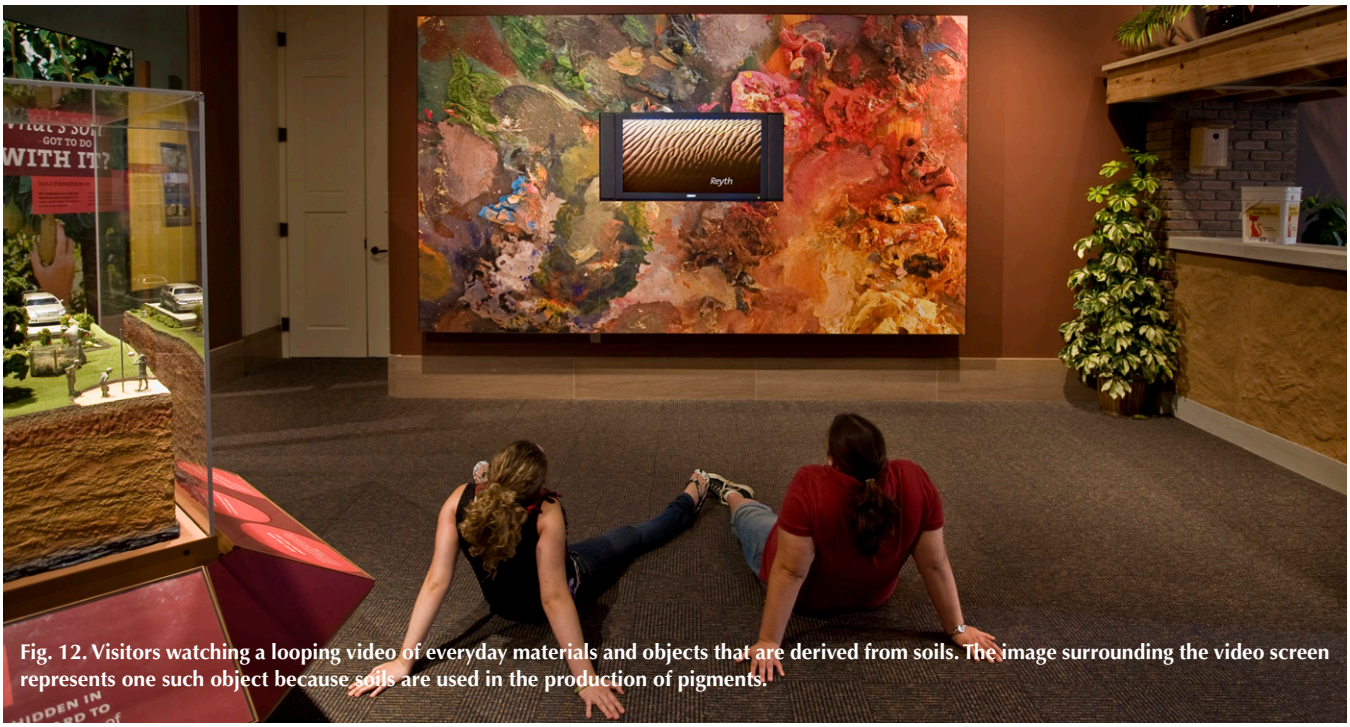

Fig. 12. Visitors watching a looping video of everyday materials and objects that are derived from soils. The image surrounding the video screen represents one such object because soils are used in the production of pigments.

international stature of the Smithsonian Institution; the visibility of the NMNH in the U.S. Capital; the expertise of exhibit professionals, educators, and scientists throughout the Smithsonian Institution; the scientific, administrative, and financial resources of the SSSA; the generosity of federal agencies (especially the NRCS), corporations, and individuals; and the great enthusiasm and expertise of the soil science community.

It is not enough for the general public to understand that soils are important—they must be inspired by soils as living, fascinating, and even beautiful natural bodies. We attempted to achieve this goal by adopting an ecosystem context for presenting soil science and consequently taking the emphasis off of presenting agriculture as the main reason people should care about the topic. We presented soil science in the broadest context possible, addressing phenomena ranging from local to regional to global in scale. We connected soils to culture, presenting the widest possible variety of everyday objects derived from soils. We avoided the temptation to present the full richness of soil science in favor of a few basic concepts. Finally, we were not afraid to have fun and take risks by developing cartoons, movies, and art objects to communicate the topic.

Observations and limited interviews indicated how the exhibit could effectively alter preconceived notions about soils. The exhibit format was itself a significant departure from traditional presentations that may have contributed to this result. It is our opinion, however, that a more important factor, and one that is more generally applicable to public soils education, is that "Dig It!" was designed primarily to inspire rather than teach.

ACKNOWLEDGMENTS

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