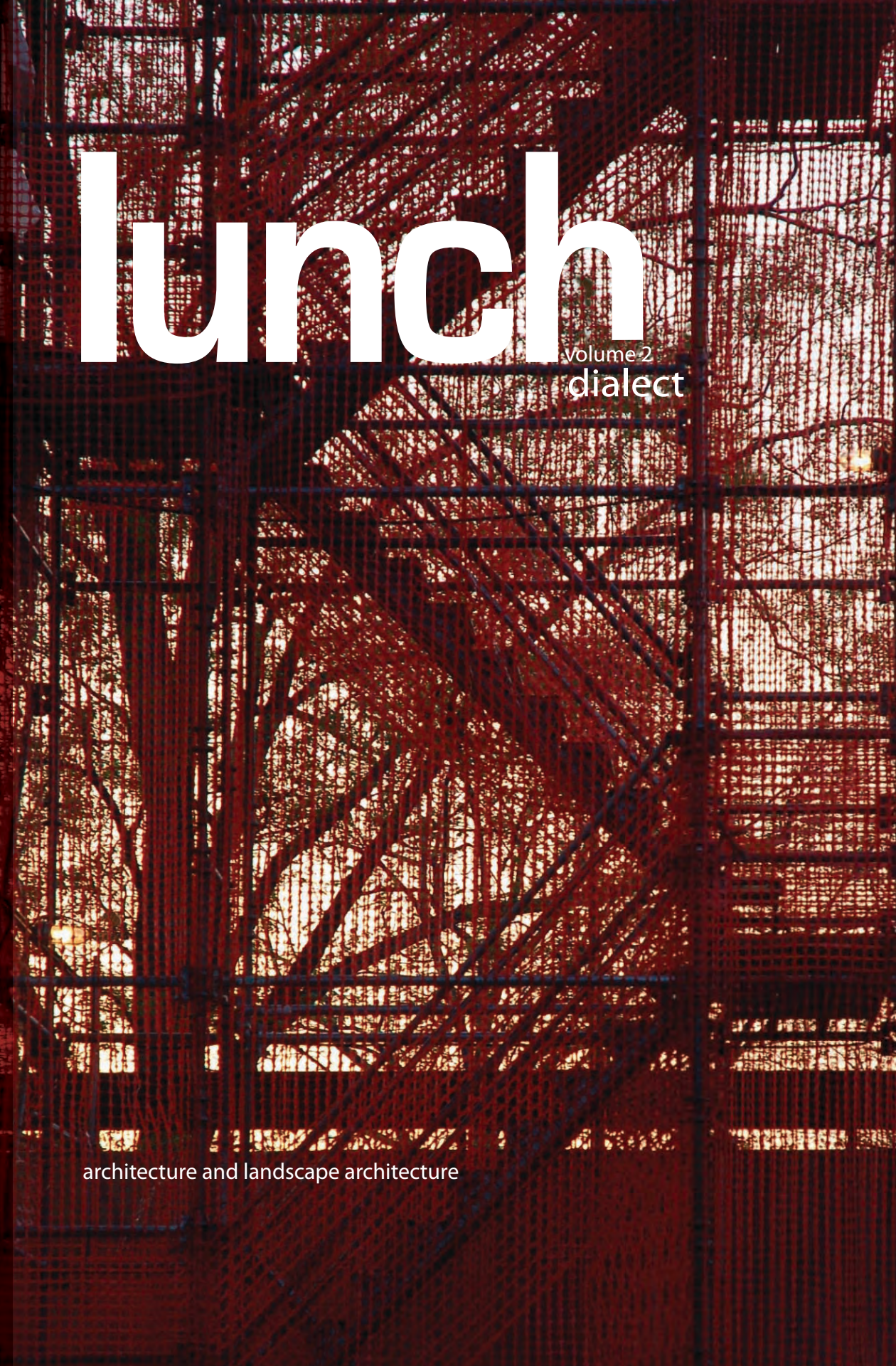

lunch
volume 2
dialect
architecture and landscape architecture

lunch volume 2: *dialect* is published with support from the University of Virginia School of Architecture and The School of Architecture Foundation.

Cover by Shanti Fjord Levy
Inside front cover photo by Kirk Martini
Inside back cover photo by Ryan Moody

Library of Congress Card Catalog Number is available.

Editors: Shanti Levy, David Malda, and Ryan Moody
Printed in the United States by Carter Printing, Richmond, VA

University of Virginia School of Architecture
Campbell Hall
P.O. Box 400122
Charlottesville VA 22904-4122
434.924.3715
www.arch.virginia.edu/lunch
archlunch@virginia.edu

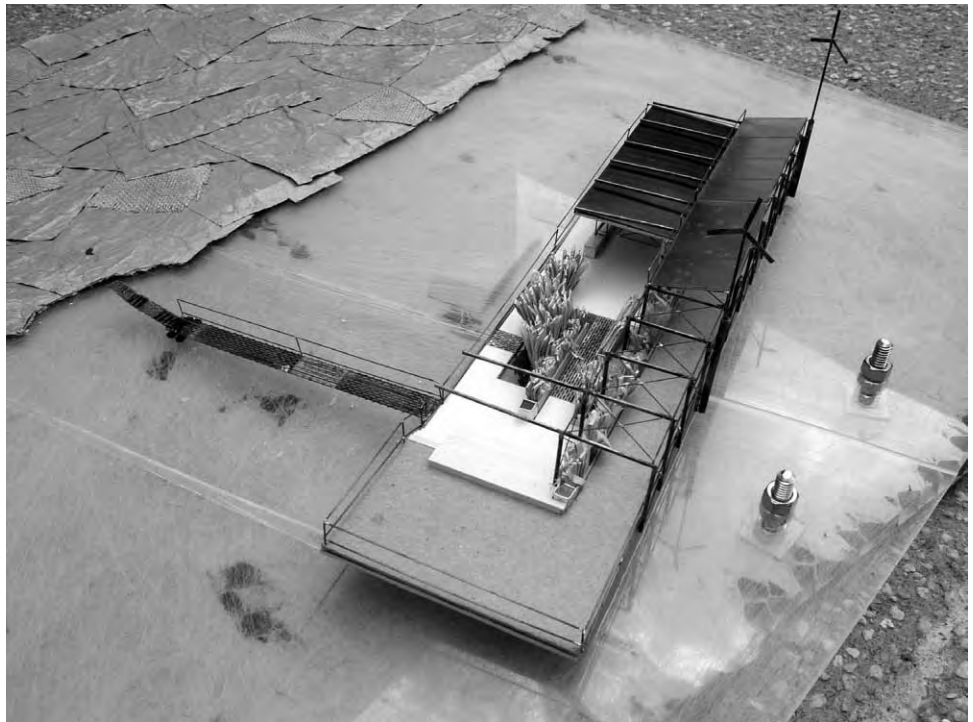
ISBN # 978-0-9771024-4-0
ISSN # 1931-7786

The Learning Barge: Architecture Working for the Environment

Phoebe Crisman
Assistant Professor of Architecture

If the children are untaught, their ignorance and vices will in future life cost us much dearer in their consequences than it would have done in their correction by a good education. –Thomas Jefferson, 1818

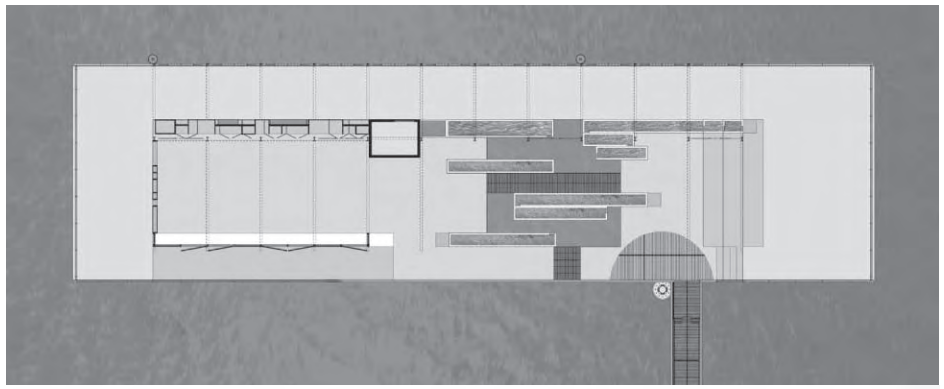
Architecture is assumed to have the power to radically transform the built environment when architects are dedicated to building community and promoting the public good. Though most architects strive to achieve these noble goals, their success requires the joint commitment of allied disciplines, clients, regulatory agencies, communities and individual inhabitants. Architecture students are often unaware of this reality, as well as the opportunities and complexities of practicing their discipline. New forms of research, pedagogy and practice are necessary to promote creative collaboration and positive change in the world. In response to this condition, the Learning Barge initiative at the University of Virginia School of Architecture engages community partners and practicing professionals in order to design and construct a floating, self-sustaining, environmental field station with positive, wide-reaching social and educational benefits. Professor Phoebe Crisman structured this multi-semester, interdisciplinary project with an innovative pedagogy that demands rigorous design research across many scales, while advancing a new model of design leadership and civic engagement. As noted by Gerald McCarthy, Director of the Virginia Environmental Endowment, the project is "exactly the kind of scholarship and research that makes beneficial change happen in the real world. Students learn, faculty develop, and communities benefit."

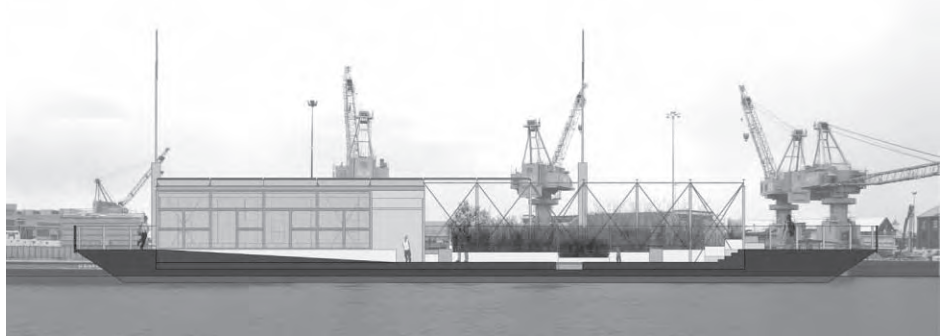


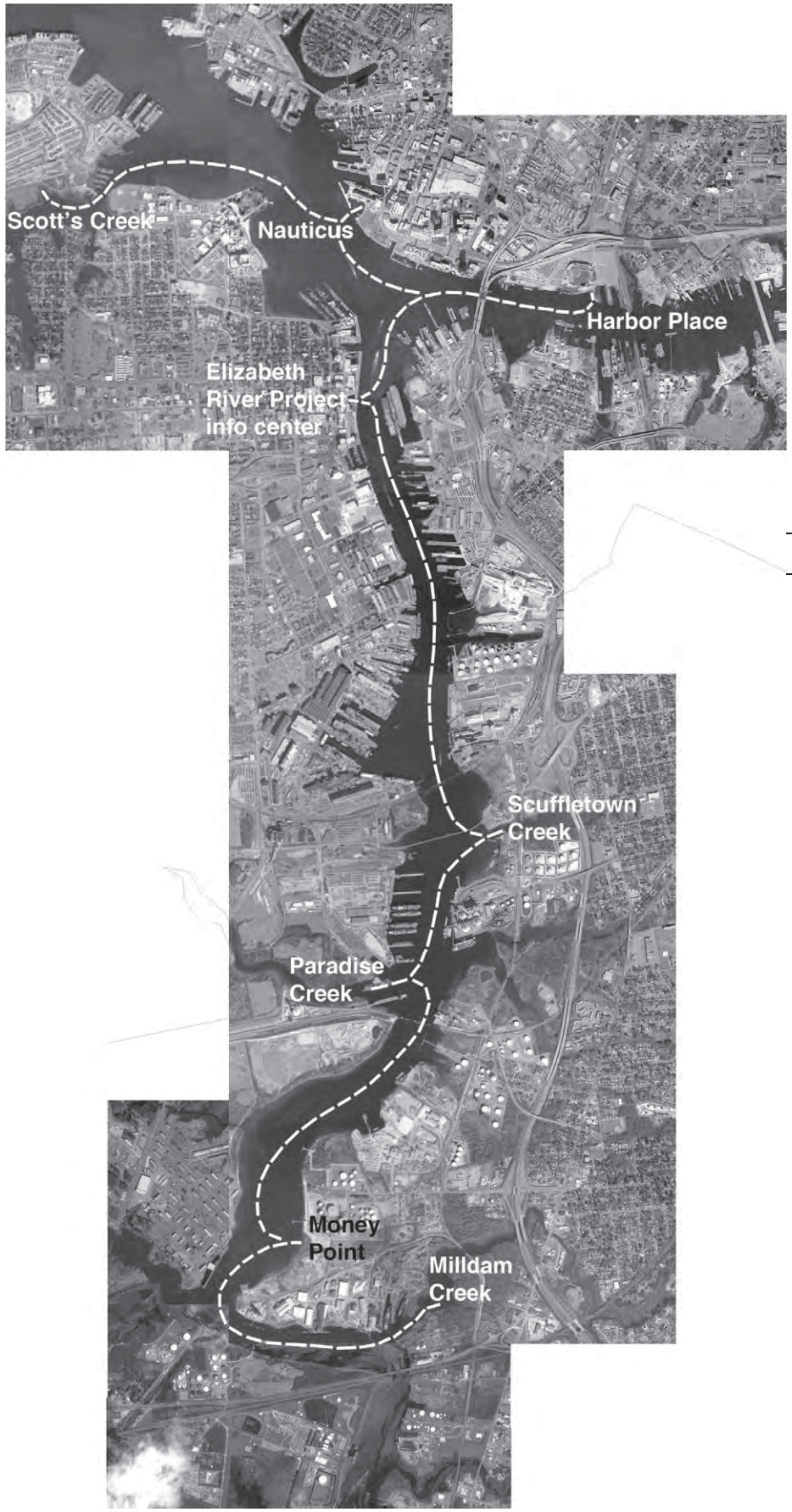
synopsis

Located on a highly polluted tributary of the Chesapeake Bay, the Learning Barge will provide interactive education for children and adults about how the river and human activities are inextricably linked. Unlike environmental education centers located in pristine nature, the Barge will traverse an important urban river and major world port. Moving to a different river restoration site every few months, the Learning Barge will teach participants about the tidal estuary ecosystem, wetland and oyster restoration, sediment remediation, and sustainable urban and architectural practices. In partnership with the Chesapeake Bay Foundation, NOAA and several public school districts, the Elizabeth River Project (ERP) will operate the Learning Barge and offer public outreach, environmental research and education activities. These programs will serve a large local population of economically disadvantaged and academically underperforming children that would not have otherwise been exposed to the river and the science education that it offers. Carefully designed to embody and clearly demonstrate environmental lessons, the Barge harnesses energy from sun and wind, collects rainwater and filters gray water with native plants, and utilizes recycled materials and green technologies.

The project has received several national awards, including the 2006 National Student Collaborative Design Award from the American Society of Landscape Architects, a 2007 NCARB Prize for the Creative Integration of Practice and Education in the Academy from the National Council of Architectural Registration Boards, a 2007 P3 Sustainability Award from the US Environmental Protection Agency, and the 2007 Youth Council for Sustainable Science and Technology P3 Design Award from the American Institute of Chemical Engineers. The diverse disciplines and professional organizations that have commended the project demonstrate both the breadth and depth of this design research initiative.







connect

The Learning Barge initiative emerged from research into the concept of Sites Out of Mind—those residual spaces and disenfranchised populations rarely addressed by architects. The Elizabeth River and her shores is such an unseen, yet central site connecting the cities of Norfolk, Portsmouth, Chesapeake and Virginia Beach. One of the most polluted waterways on the Eastern Seaboard, the Elizabeth is a culturally complex, economically challenged, pollution-ridden tidal estuary with river health indicators that show high PAH levels, instances of cancer in indicator species, reduced biomass and degenerating biodiversity. The Elizabeth River Project is an environmental non-profit organization whose mission is to clean and restore the river. A U.Va. partnership with ERP was forged and the Learning Barge was conceived as an educational outreach project that would help the community to better understand how the river functions as an industrial, social and ecological unit, while reinforcing the concept that local human settlement and industrial activity has ecological ramifications on the greater Chesapeake Watershed and the Ocean itself.

learn

The Barge will be a floating learning station and working platform that brings people to observe and help with important river restoration work, and provides the inimitable experience of river occupation to local residents who otherwise would not have the opportunity to directly interact with and thus better understand the systems and functions of the watershed in which they live. Because the US Navy and private industries own most of the waterfront, an observation point could not be established on shore. The river, however, lies within the public domain. The sitelessness of the barge is a great asset within this decentralized context. As ERP cleans the river creek by creek, the Learning Barge will move to the work site and serve as both a place of observation and a place for staging operations. It will be the symbol and consistent element that reveals the common purpose linking disparate sites along the river. In keeping with ERP's strategy that avoids singular, big-budget remediation projects in favor of multiple, smaller projects that proceed over time, the Learning Barge will evolve and educate, "one creek at a time."

Collaborators

Nauticus & NOAA @ Nauticus

curricular goals:
- Maritime History and Culture
- Weather
- River Ecology

EE activities:
Self-tour of Battleship Wisconsin
Navigation Games

Tornado in a Tube
Pressure cups activity

Water testing
River Eco Expeditions

EPA
Environmental Protection Agency

curricular goals:
- Increase public awareness and knowledge of environmental issues and challenges.
- Help people gain an understanding of how their individual actions affect the environment, and acquire skills that they can use to weigh various sides of issues, and become better equipped to make informed decisions.

EE activities:
Quizzes, puzzles

CBF
Chesapeake Bay Foundation

curricular goals:
- Improve water quality in the Chesapeake Bay by revealing the relationship between people, land, and water.

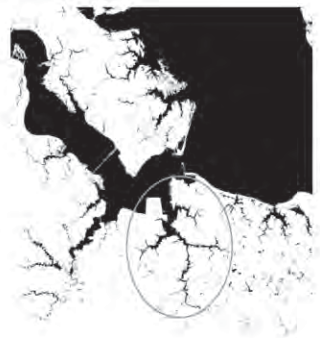
EE activities:
Investigate local waterways.
Observe, collect data, analyze, and synthesize information through field study.

Virginia Naturally

curricular goals:
- To connect students with Virginia's environmental education resources.

EE activities:
Web based activity sheet, workbooks, games

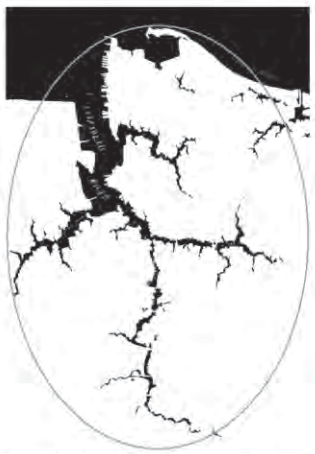
Virginia Aquarium



curricular goals:
- To increase the public's knowledge and appreciation of Virginia's marine environment and inspire commitment to preserve its existence.

EE activities:
Touch tanks
Terrarium

ERP - Elizabeth River Project



curricular goals:
- Educate schoolchildren and the public on river ecology and the Elizabeth River's key challenges.

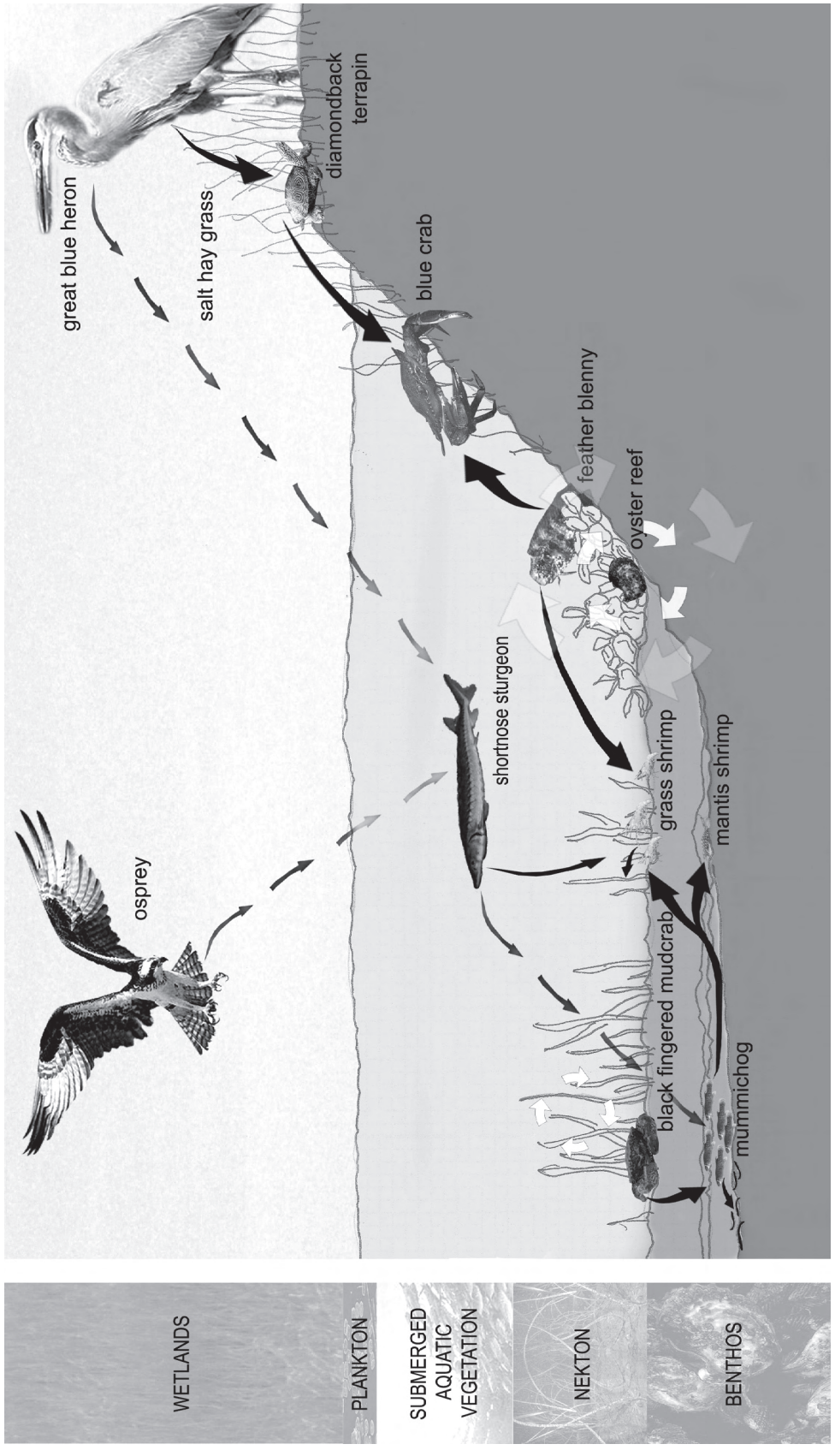
EE activities:
Princess Elizabeth's visits
River is alive - bottom grabs
Visits to restored wetlands

educate

The Barge's primary mission is education. The Use Plan estimates that the Learning Barge will touch the lives of more than 19,000 people each year via school field trips, university research activities, teacher training, adult workshops and public events. This semi-nomadic field station and its curriculum will take advantage of the unique qualities of the particular docking site, as well as the student grade level. For instance, the Middle and High School curriculum will address issues relevant to the science portion of the Standards of Learning, such as living systems and life processes, resource management and conservation, energy, habitats, data collection and weather. Additionally, the Barge will be utilized as a site for students to develop skills in writing, drawing and mapping. U.Va. students envisioned scenarios for several days of onboard activities, thereby concretizing the range of opportunities afforded by the architecture, season, location and the age of visitors. Funded by a Virginia Environmental Endowment grant secured by project director, six teachers and three science coordinators from three public school districts along the Elizabeth River developed the initial ideas into a realizable curriculum with specific lesson plans. By cultivating the education of conservation and recognition of how our actions impact the environments that we occupy, the Barge will be a crucial instrument in creating responsible, future citizens and stewards of the land.

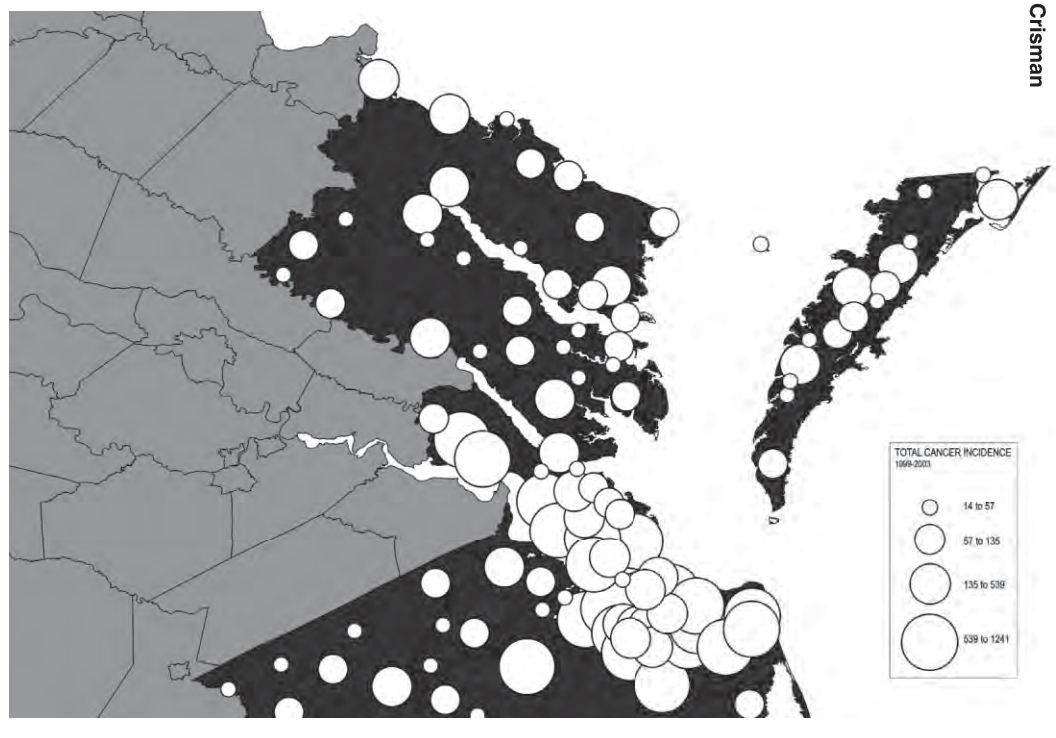
Paradise Creek
March 21st
10th Grade Earth Science - 24 students
SOLs:
Geography (map making, recording information)
Earth science (weather, hydrologic cycle, ecosystem, flora/fauna identification)
Physics (fluid properties, buoyancy)
Civics

9:00	There are a number of possibilities for the students' arrival to the site. One would be to arrive via boat and walk onshore from an existing dock. Another, perhaps in the case of a summer camp group, would be to canoe to the site from a point further upstream. A third would be for the students to arrive from land; their buses could park at varying possible distances from Giant Cement, with each distance affording them a different sort of approach to the site.
9:20	Students arrive at Giant Cement and meet with a company representative. Discuss Giant Cement's presence in the area and walk along shoreline. What is the environmental impact of cement making? What does it mean to be a River Star and in what projects do they engage?
10:00	Students guided to landing arm and board the barge.
10:10	Armature: Conversation about sustainable power generation, tied to notions expressed by Giant Cement (i.e. lesser environmental footprint, resource conservation, land use and groundwater infiltration, conversion of natural energy). Discuss the U.S. Naval Yard Superfund Site and Landfill.
10:30	Small group activity: Each group on the barge develops a speculative map of the Chesapeake Bay watershed, after short discussion of how the creek plays a role within this boundary. Further discussions: How does water infiltrate into natural and man-made sites? How much surface on the drive over was paved, how much was permeable? Where does that water go? Discuss together and develop a common class map on the barge surface with chalk.
11:30	Lunch on barge at story telling stairs facing wetland.
12:00	Wetland and ecosystems: Discuss engineered solutions to water regeneration, including constructed wetland ecology. Discuss local ecosystem, including focus upon the process of a wetland "waking up" from its winter dormancy. Discuss how one recognizes the different parts of the shoreline (i.e. its various layers and buffers, endemic plant and animal species, etc.). Possibility of student participation in cultivation tasks for the barge wetland.
12:40	Habitat/endemic species: oyster reefs and life cycles, oysters' natural ability to cleanse the river, present the oyster reef at Paradise Creek. Discuss the Atlantic flyway/spring and fall migrations, osprey nesting. Present other native species. Discuss plants being the most important element of maintaining healthy wildlife habitat. Possibility of student participation in building osprey nests or an activity that could be contribute to oyster regeneration efforts.
1:15	Students given sketchy maps of the area and divided into teams. Each chooses a tool (i.e. core sampler, etc.) to map the character of a part of the shoreline. Where are the sediment and vegetative layers discussed on the barge, what is the profile of the land at the site, how does one represent this? How has local industry affected the profile of the land?
1:50	Develop a common map defined by the various types of information gathered. Students show samples collected during their shore trip and explain what these say about the shoreline. Discuss the geography of the Chesapeake Bay area, Portsmouth, and how the scale of the creek shore relates to larger geographical frames. Collective map stored in artifact wall for later students to see and compare to their own.
2:30	Leave by bus (with copy of map for in-class use).



restore

The Elizabeth River is a tidal estuary with a low flush-rate that amplifies the problems of waterborne pollutants. Toxins do not leave the vicinity until they degrade, which in some cases may take centuries. For this reason the river bottom is highly contaminated. The mapping of US EPA data revealed that the vast majority of contemporary pollutants are smokestack emissions that settle onto the land. Surface water takes contaminants directly back into the estuary, thereby making runoff the largest current pollution concern for the Elizabeth River watershed that is located within a metropolitan area of 1.6 million inhabitants. This is the very reason that the Barge is so incredibly important; residents need to know the implications of the way they live. Though ERP and the Learning Barge team acknowledge industry as a necessary part of a healthy economy in the region, responsible architects and citizens of the watershed must ask: how do we enable people to continue to live and thrive within in this industrialized context? The Barge will link natural systems within the local ecology and its integrated engineered systems in order to efficiently function in a sustainable way, and educate visitors in the process.



sustain

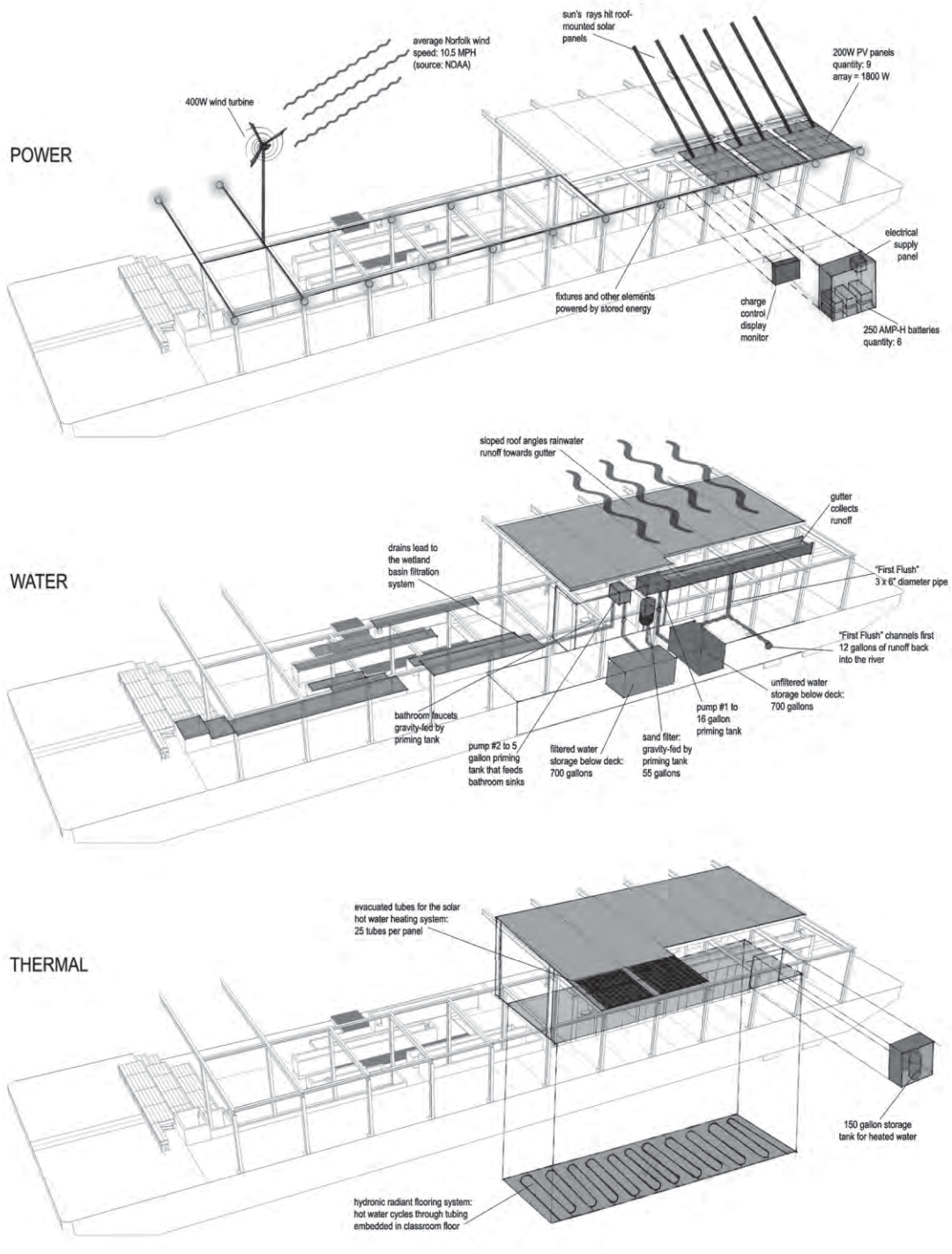
The Learning Barge will be independent of the power, water and waste grid by generating electricity from the sun and wind, optimizing efficiency, maximizing daylight and natural ventilation, and reducing consumption. The Barge will utilize mechanical, electrical and water systems to replicate the self-cleansing properties of the natural ecology that it educates about and operates on. In a healthy wetland the plants remove contaminants and make the water habitable for microorganisms that begin the food chain. In order to perform off the grid and prevent further damage to the local ecology, the Learning Barge will be equipped with several generative and sustaining technologies. Professor Paxton Marshall and his students from the University of Virginia School of Engineering and Applied Sciences refined and detailed the mechanical and electrical systems. A photovoltaic array and wind turbine will produce power for the barge and the electric engine of a sixteen-foot skiff. Deep cycle batteries will provide over three days of storage capacity onboard. An evacuated tube solar hot water array will heat the radiant flooring system in the classroom. The systems have been sized to provide required power, while encouraging Barge visitors to monitor and reduce energy consumption onboard, thereby developing an awareness of how and where electricity is generated and then consumed. Multiple water-saving and filtration devices will be employed on the Barge. Rainwater will be collected and filtered for hand washing, composting toilets will eliminate waste while creating soil for plantings, and onboard filtration basins will use native freshwater plants to clean gray water. River water will be hand-pumped into a separate set of basins where native estuarine plants will purify and release the captured water.

recycle

In addition to these green systems, the use of new materials was minimized. Donated and recycled material from local fabrication facilities and scrap-yards was used whenever possible. All materials were put through a rigorous Life-Cycle Analysis and selected to be integral with the educational program of the Barge. An important agenda for the students involved was to implore the true meaning of “sustainable”. If designers of the built environment only seek to lessen the degree of harm to the planet, then the situation will never improve, but only do less damage; this is not sustainable. The Barge will actually leave the river-based sites cleaner than when it arrived.

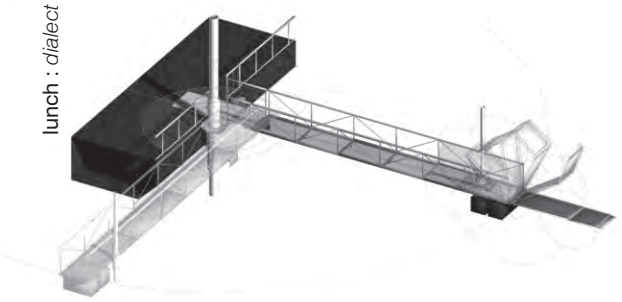
interact

Professors and professionals in several disciplines have donated their expertise and time to work with the students throughout the process. For instance, naval architect Eric Matherne (Matherne Marine Design) provided invaluable maritime code and construction advice and completed construction documents for the barge hull. Students learned about state-of-the-art automated cutting and welding processes while visiting the Norfolk shipyard that will fabricate the hull and steel structure. Architect Michael Petrus (Crisman+Petrus Architects) was a weekly participant during the Fall 2006 Intention>Fabrication Technology Seminar, which focused on design development and detailing of the classroom envelope. Structural engineer Dennis Moler (Moler & Associates) advised on the design of the classroom’s steel structure. Ecologist Edward Morgereth (Biohabitats) and his colleagues offered guidance on plant selection and the filtration basin system. These are just a few of the many advisors and collaborators that have made this complex project possible.



practice

The Learning Barge represents the future of architecture towards greater synthesis with ecology and environment, while providing a design research model for how architects and students might approach the challenges ahead. The project demonstrates an integrated way of working across scales – from watershed, to district, to detailed architecture – that combines both breadth and depth. This methodology is best learned in an academic practice that identifies problematic issues, especially in underserved places and with disadvantaged populations, and offers unimagined alternatives. Collaborations between diverse disciplines and environmental organizations have been inspiring and productive for all involved. As noted by Marjorie Mayfield Jackson, Executive Director of ERP, "In the fifteen years since the inception of the Elizabeth River Project, no academic professional has provided more useful, more cutting-edge or more committed technical support for our restoration efforts. In the last two years, [Phoebe Crisman's] research has led to powerful results on our urban waterfront." Already the Learning Barge project has established itself as a significant national model for education about urban habitat restoration and sustainable architecture. When construction is complete and educational programs commence in the fall of 2008, students and the public will have the opportunity to actively engage the cultural and environmental ecologies of the Elizabeth.



inspire

A convergence of recent societal trends has placed architecture in a powerful position to influence positive change through design insight—an insight that must be fostered in the academy. Greater public concern for the environment and sustainability creates a favorable situation for design innovation and the architect's role as a public advocate possessing both creativity and technical expertise. Strong skills in creative problem solving and visual communication position them well in an increasingly image-based society. To this end, architectural education must promote critical insight and the material ability to make visions real. When reflecting on her participation in the 2007 Learning Barge studio, architecture student Erin Dorr wrote: "The hands-on nature of the project is perhaps its most valuable asset. For both the students involved in its design and construction, and more importantly for the thousands of children and adults who will experience it each year, the Learning Barge serves to prove that the deepest, most significant lessons are best learned through physical engagement and interaction." Connecting students with community partners and allied disciplines around a common goal and through a creative and rigorous design research process is clearly an inspiring and effective way to begin.