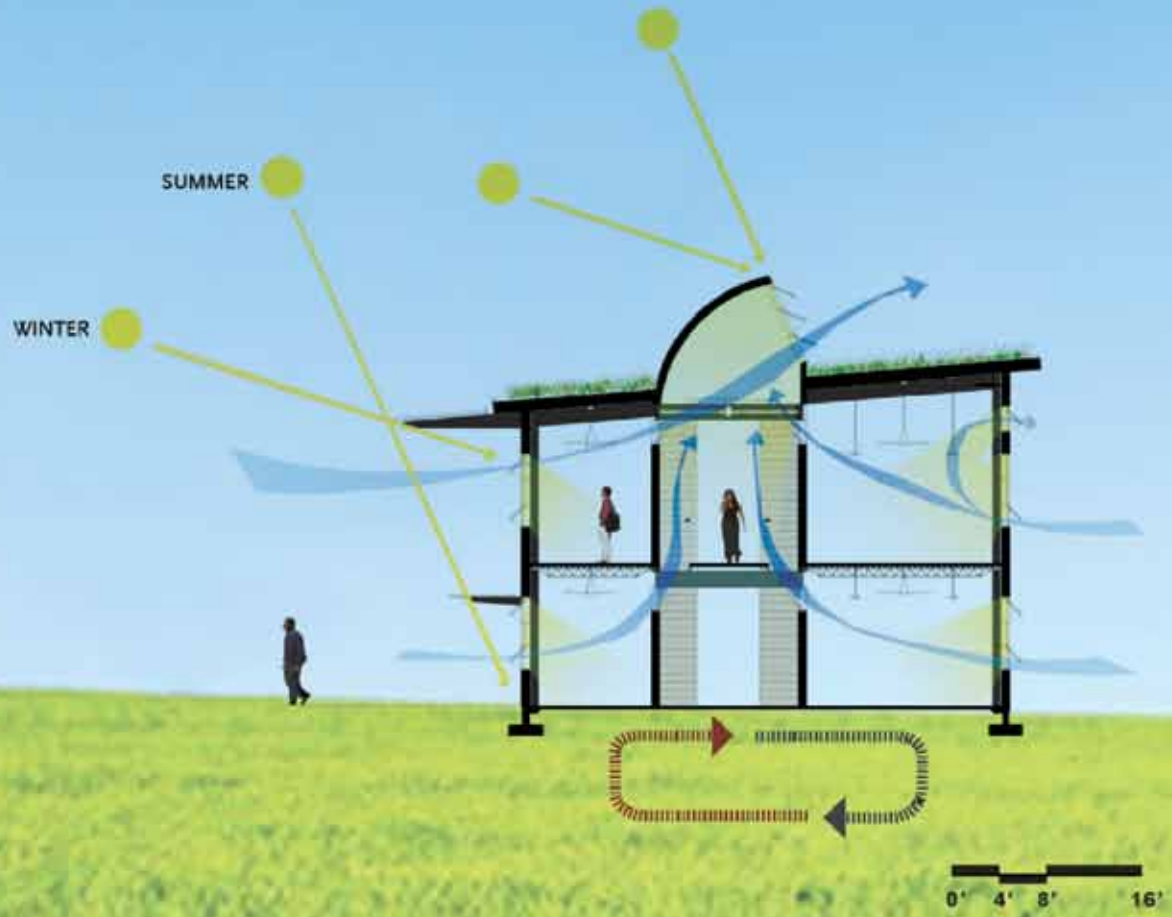
The Principles of Green Building Design

Monterey Peninsula College INTD62 Spring 2009

MPC | Monterey Peninsula College



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Art Fund Pavilion Design Competition

Classroom Design Competition

Contributors

EcoLogic Design Lab

by **Thomas Rettenwender**, M.A., Mag. Arch., LEED AP, Architect and **Niklas Spitz**

EcoLogic Design Lab

These are historic times for the green building industry. Increased awareness of both global warming and the political implications of dependence on fossil fuels has inspired a great demand for professionals skilled in technologies for conserving energy and in environmentally responsible building design. The curriculum presented in these pages was developed by the *EcoLogic Design Lab* for Monterey Peninsula College to offer students an introduction to the essential materials and methods in the green building design field today, employing a balance of lecture and audio/visual presentations, demonstrations of drawing and modeling techniques, hands-on design exercises, individual research assignments and team projects.

Course participants are introduced to professionals in the field enabling students to gain knowledge from a wide pool of experience and approaches to the design issues of our day as well as exposure to the multitude of career paths that are possible in pursuit of more sustainable construction methods, more responsible stewardship of our natural environment and more beautiful and harmonious architecture.

Thomas Rettenwender *M.A., Mag. Arch., LEED AP, Architect*

Photo: The participants of the MPC Green Buidling Design course, Spring 2009, tour the Carmel Middle School Habitat with **Tanja Roos** in preparation for thier upcoming assignment in green classroom design.

In-class discussion in the MPC computer lab room GA 103

Field trip to Carmel Valley Middle School with Tanya Roos

Touring relocatable structures on the MPC campus

The Principles of Green Building Design Course

Monterey Peninsula College INTD 62, Spring Semester 2009

Taught and developed by Thomas Rettenwender and Niklas Spitz

Course Overview

- Design using Passive Techniques
- Integrating Green Technology Components
- Minimizing Impact of Designs on the Natural Environment

Course Outline

- Course Introduction and Student Needs Assessment
- History of Green Building
- Sustainable Design Tools - Visualization
- Site Ecology *with Joe Rigney, Toyon Consulting*
- Water Systems *with Brent Bucknum - Hyphae Design Laboratory*
- Natural Building *with Marisha Farnsworth - Natural Building Design, Education and Advocacy*
- Passive Solar Design *with Niklas Spitz - Ecologic Design Lab*
- Photovoltaics *with Farrel Williams - Apex Solar*
- Carmel Middle School Habitat *Field Trip with Tanja Roos - Carmel Middle School Habitat*
- Relocatable MPC *Field Trip with Dustin Connor, MPC Construction Management*
- Green Building Materials *with Libby Barnes - Architect, LEED AP*
- Green Roof Design *with Cooper Scollan - Habitat Gardens*
- Landscape & Structure *with Ken Principe - Landscape Architect*
- Building Metabolism *with Brent Bucknum - Hyphae Design Laboratory*
- Individual Project Assistance and Review *with Invited Guests*
- Final Review and Exhibition *Adjudicated by Local Green Building Design Professionals*

EcoLogic Design Lab

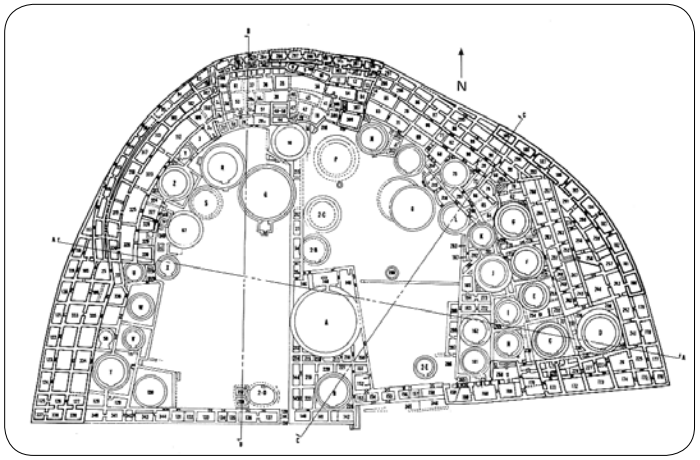
The Principles of Green Building Design Curriculum

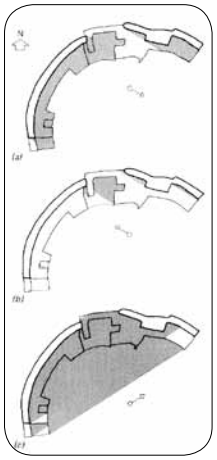
- Develop the respect, develop the skill, develop the art !

The Principles of Green Building Design

History of Green Building Design

The course begins with a historical review of green building. Our ancestors lived off the resources that the land provided locally and built their structures and villages out of natural materials. They lived in intimate harmony with nature and their villages respond to and map her movements. The images below show the Anasazi village called Pueblo Bonito in Chaco Canyon, New Mexico, built in stages beginning around 919 AD.

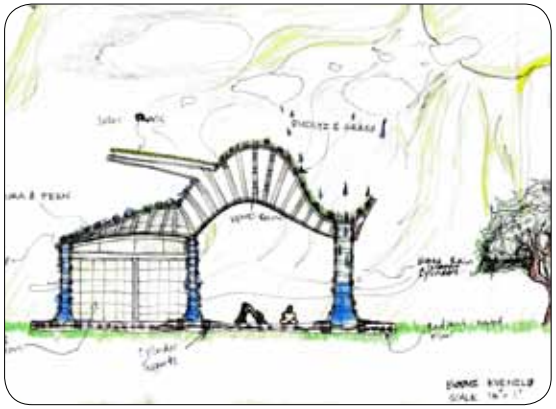




A plan (far left) of New Bonito, a vastly expanded, tiered arrangement containing up to 800 rooms reaching up to five stories high built around Old Bonito during a remarkably short time of twenty years, A.D. 1060-1080. A shadow mapping of Old Bonito (center) showing how the structures were built in response to the passage of the sun across the sky in different seasons of the year, from *Energy and Form* by Ralph Knowles and *The Architecture of Pueblo Bonito* by Neil M. Judd. A photo of Pueblo Bonito today (right) by Chuck Turner

Green Building Design Visualization

The course encourages active participation in the design process as this is where the vision is communicated. There is no one design medium that can fulfill all our needs. Following an introduction to a palette of different design visualization techniques, students are encouraged to find the technique that suits them and the project best.



Examples of student work: Section Sketch by MPC students Bodhi Kvenild and Mio Fukushima (far left); study model by Jim Farrow (center); Sketch-up model by Hanna Nishiguchi and Hugo Perez showing the interior of their Sustainable Swing Space.

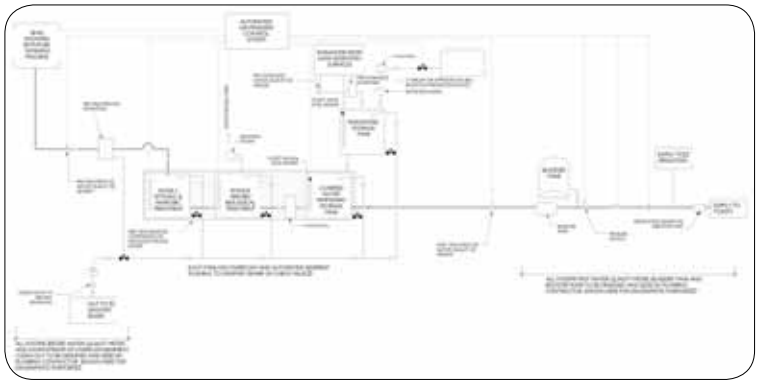
Site Ecology

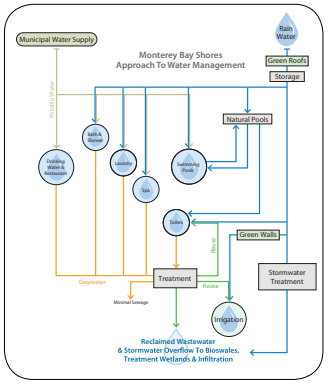
The green building design process begins with an intimate understanding of the site in all its beauties and complexities. An ecological approach to design aims to integrate the systems being introduced with the existing on-site ecological functions preformed by mother nature. These ecological functions provide habitat, respond to the movements of the sun, purify the air as well as catch, filter and store water. Designers can create features in their buildings that mimic the functions of particular eco-systems. Rooftops can support ecosystems modeled upon alpine meadows, living walls mimic forest canopies, sloped roofs support species from the serpentine grasslands and water treatment roofs can behave like brackish marshland. Species that thrive in natural ecosystems may also utilize habitats created in man-made structures. Creating new habitat on structures in urbanized areas is especially important to support bio-diversity and a healthy ecosystem.

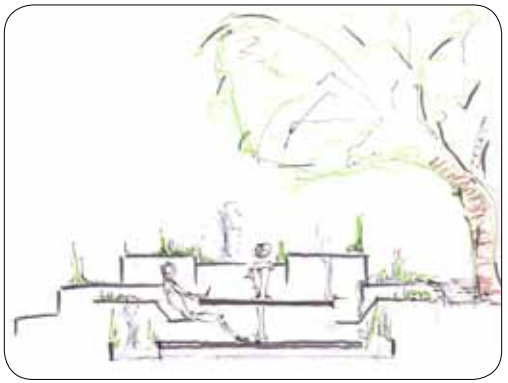
A mapping (left) of the resident ecosystems, potential ecological analogs and potentially supported species for the Google Campus in Mountainview, Ca. by Brent Bucknum, Thomas Rettenwender and Kirstin Weeks with Rana Creek Habitat Restoration and William McDonough + Partners.

Water Systems

Water - often called the source of life - can be captured, stored, filtered, and reused. It provides a valuable resource to be celebrated in the process of green building design. According to Art Ludwig in *Create an Oasis out of Greywater*, only about 6% of the water we use is for drinking. There is no need to use potable water for irrigation or sewage. The Green Building Design course introduces methods of rainwater harvesting, grey water systems, and living pools.



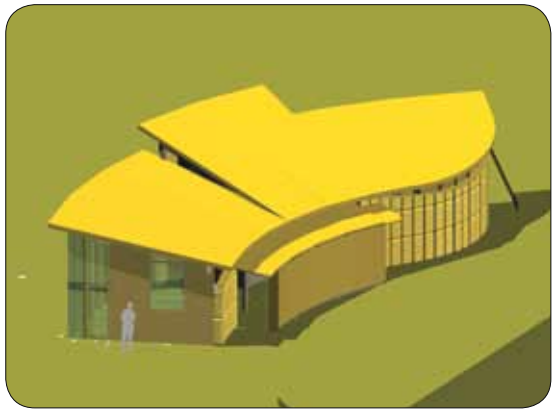




Green St., San Francisco (far left) and Monterey Bay Shores Ecoresort (center) grey- and rain-water flow diagrams by Brent Bucknum, Thomas Rettenwender and Kirstin Weeks; Villa Athena, Living Pool and Landscape Design, Athens, Greece (right) by Thomas Rettenwender, Brent Bucknum and Constantine Papachristopulous

Natural Building

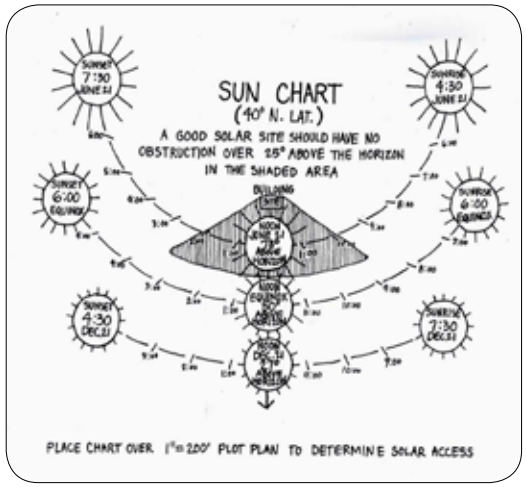
One-half of the world's population lives or works in buildings constructed of earth. Strawbale construction is now gaining in popularity and many jurisdictions in California have adopted the Strawbale Building Code. Green Building Design favors natural building for its local availability, ease of use, lack of toxic ingredients, increased energy efficiency, and aesthetic appeal.

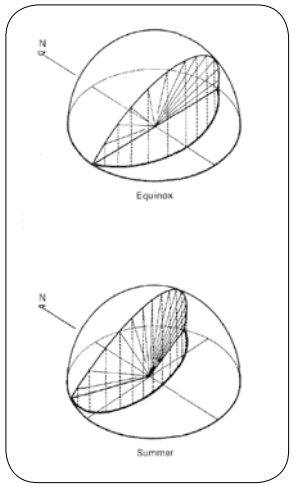


The Sandbag Museum, Hesperia Ca. (far left) designed by Nader Khalili; Slotover Strawbale Residence, Bonny Doon, Ca. designed by Thomas Rettenwender currently under construction (center); applying natural plaster (right)

Passive Solar Design

Passive solar design refers to the use of the sun's energy for the heating and cooling of living spaces. The building itself or some element of it takes advantage of natural energy characteristics in its materials to absorb and radiate the heat created by exposure to the sun. Passive systems are simple, have few moving parts and no mechanical systems, require minimal maintenance and can decrease, or even eliminate, heating and cooling costs.





Solar flare photo by NASA (far left); Sun chart showing seasonal solar angles by the Coast Economic Localization Link (center) and Shading diagram (right) showing solar angles for Pueblo Bonito, Chaco Canyon, New Mexico, at the equinox (top) and summer solstice (bottom) from Ralph Knowles, *Energy and Form*

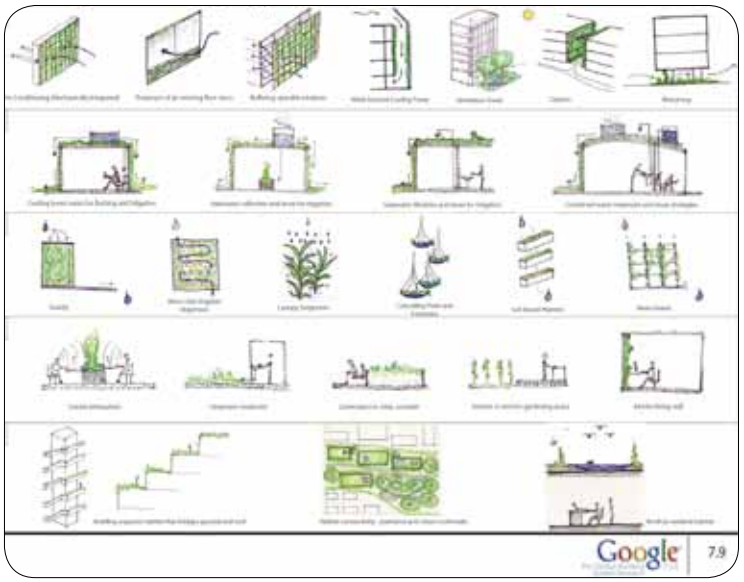
Green Building Materials

Before choosing building materials we can find out where the materials come from, how they have been harvested, what the ingredients are, whether they are salvaged, reused or refurbished. We can research how they will perform over their lifetime of the building, whether they release harmful V.O.C.s and how they can be processed or reused after disassembly.

Green building materials: (from left) insulation made of recycled post-consumer natural cellulose; bamboo flooring; Forest Stewardship Council logo that certifies products made from sustainably harvested wood; Benjamin Moore zero VOC Natura paint

Living Architecture

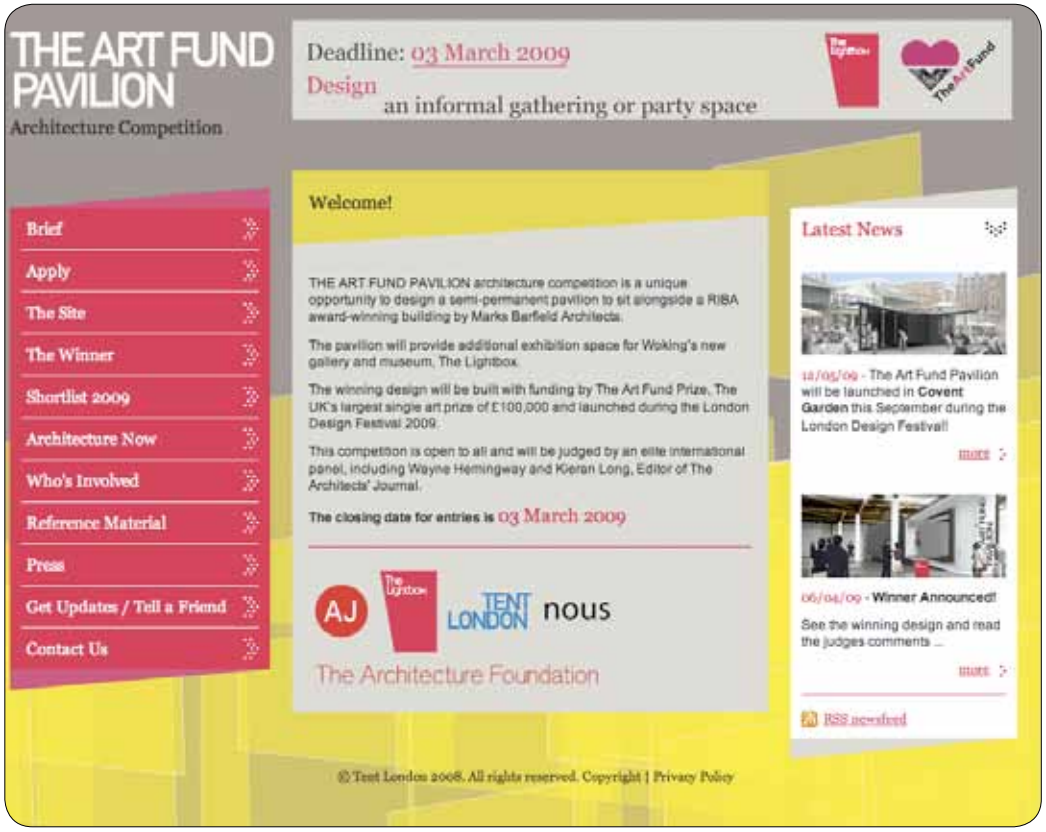
We take for granted that our environment - like our bodies - can metabolize nutrients and waste. Living Architecture focusses on these processes, integrating ecological functions into our buildings to catch, store, and filter water, purify air, and process other nutrients. Living Architecture also addresses biophilia, the documented health benefits associated with being in touch with living systems in our built environment.



The *Google Living Architecture Analysis* (left) by Brent Bucknum, Thomas Rettenwender and Kirstin Weeks with Rana Creek Habitat Restoration and William McDonogh + Partners setting out a 'patern language' of Living Architecture techniques; *Monterey Bay Shores Ecoresort* (right) designed by Thomas Rettenwender and Brent Bucknum with Rana Creek Habitat Restoration and BSA Architects, which restores the native flandrian dune formation and revegetates over 90% of the site providing extensive habitat for native flora and fauna.

Preliminary Design Exercise: Week 1-4

In preparation for the final design project, students are introduced to the international design competition format - including site data, submission requirements and a submittal dead line. The focus of the exercise is to develop a design vision and be able to represent this vision with intuitive illustrational methods. For beginning and intermediate designers the sketch model provides a quick, textured, and comprehensive method to visualize their ideas in three dimensions.

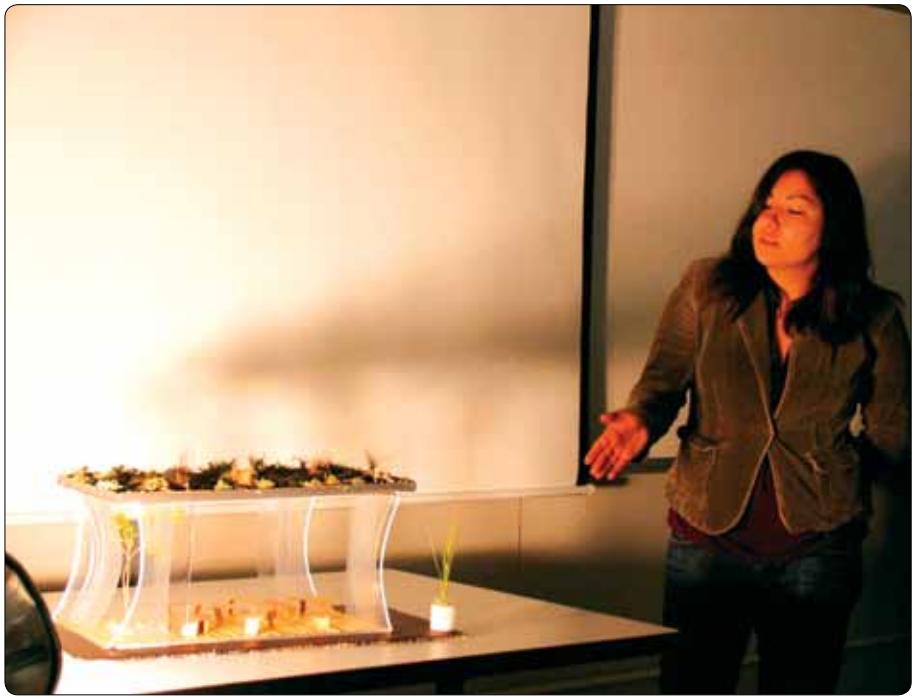


Students are encouraged to submit their work to the international Art Fund Pavilion competition, to design a semi-permanent art exhibition space to sit alongside a RIBA award-winning building by Marks Barfield Architects in London. The pavilion will provide additional exhibition space for the new gallery and museum in Woking, Surrey, UK known as **The Lightbox**.

The winning design will be built with funding by The Art Fund Prize, the UK's largest single art prize of £100,000, and launched during the London Design Festival 2009.

This competition is open to all and will be judged by an elite international panel, including Wayne Hemingway and Kieran Long, Editor of The Architects' Journal. See *http://www.tentlondon.co.uk/artfundpavilion/*

Art Fund Pavilion Project Presentations, in room GA103 at MPC, March 3, 2009: models by **Meridith Cochran** (far left), **Remi Webster** and **Nancy Lombard-Gay** (left), **Hana Nishiguchi** (right).



Mio Fukushima presents her Art Pavilion Tea House design made exclusively out of recycled materials from the Ocean Sushi Restaurant in Monterey.

Nico Rivetti deconstructing his tree house art pavilion.

Chelsea Frost Williams presenting the growing bamboo exhibition tent she designed with Josh Koepke.

Michael Lapin presenting the Art Fund Pavilion Design he did with **Robert Nelson** and **Paris Vogelpohl**. Michael has been licensed as a general building contractor for the past twenty-nine years and designed and built his own home, shop, and decks in Carmel Valley, Ca.

Art Fund Pavilion Design

by **Mike Lapin, Robert Nelson,** and **Paris Vogelpohl**

This design complements the RIBA award winning building by Marks Barfield Architects and the shape of the Canal Courtyard.

This student design team decided to utilize oriented strand board, polypropylene fiber, radiant heat, bamboo flooring, and photovoltaic panels in the construction of the tent. The oriented strand board would be obtained from a wood distributor who uses wood from well managed forests.

This tent is environmentally sound, can be built quickly, and is an aesthetically pleasing place to show artwork, enhancing both the natural surroundings and the existing building.

Tree Column Pavilion by **April Allard & Peter Quintanilla**

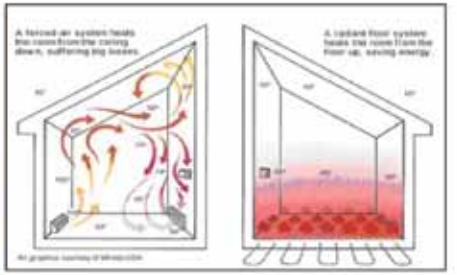
The Tree Column Pavilion is an exhibition gallery that carries the look of a natural grove of trees at first glance - upon further inspection its reveals itself as a functioning art pavilion. The pavilion extends no more than 25' in diameter and 12' in height. Visitors can meander through the grove observing art suspended by wires as if the pieces were magically suspended in air.

Peter Quintanilla is an ISA certified arborist, specializing in the art and science of pruning trees. Originally from Los Angeles, Peter has been living and caring for trees on the Monterey Peninsula since 2000. He hopes to combine his interests in both trees and architecture to help build tree houses.

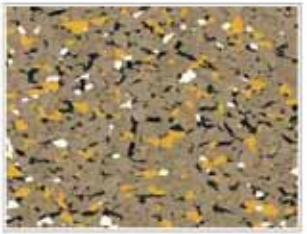
April Allard studied Ecology at Humboldt State University and is now pursuing a career as a naturalist, native plant advocate, community coordinator, and garden therapist in Coastal California.

Tree Columns: Recycled cardboard tubing comes in various lengths and diameters. These tubes are hollow, lightweight, can be telescoped for ease of transport and easily broken down into separate components at the end of the day. Hollow interiors allow for wiring between solar collectors and pavilion lighting.

Many fast growing timber bamboos can reach a diameter of 5" and a height of 35-50'. These can be cut down to appropriate heights, cured and placed within the synthetic forest to provide a natural green ambiance.



Passive Solar Radiant Heating: Water can be heated during day through a passive water heater system with backup supply from residual energy of solar collectors. This can be installed in flooring as well as tree columns for comfortable forest temperatures.



Flooring: Elevated floor boards allow access to crawl space as well as space for underground wiring and radiant heating. Floor surface made of leaf imprinted or shaped recycled rubber tiles. Tiling allows for easy set up and break down. Rubber flooring absorbs noise and impacts and is also water and slip resistant.

Fish Scales Pavilion by **Noel McNamee** and **Eefje Theeuws**

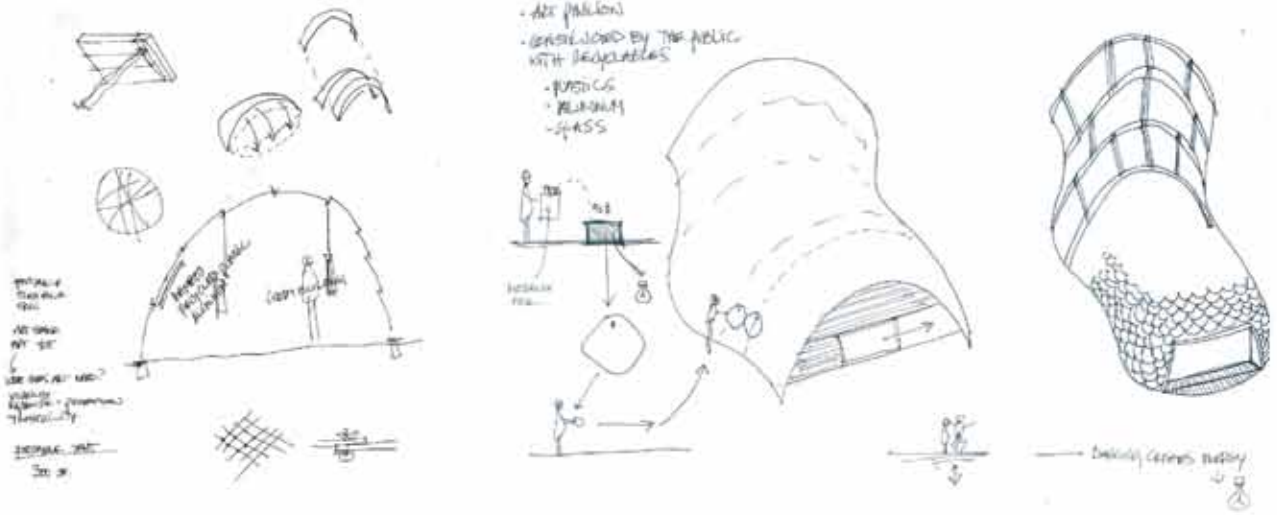
Eefje Theeuws presenting the Fish Scales Pavilion she designed together with **Noel McNamee**. Visitors to the exhibition pay an entry fee of one recycled-material shingle that is pressed on site and added to the roof.

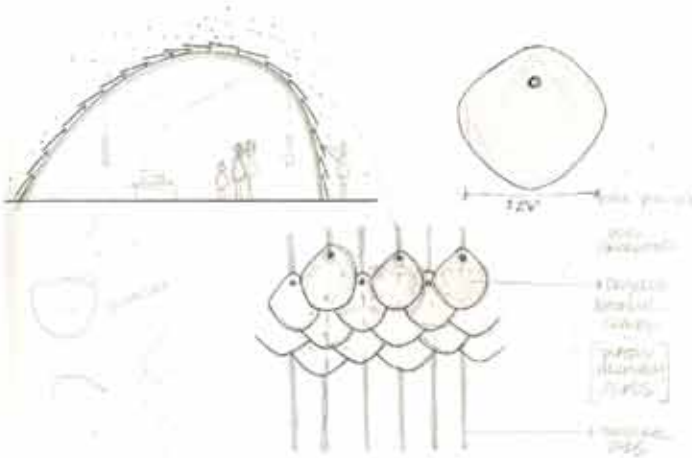




green building design assignment one

art fund london competition: "recycled materials fish scales pavilion"





noel mcnamee + eefje theeuws
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EcoLogic Design Lab

Final Green Building Design Project Assignment: The 2009 Open Architecture Challenge: Classroom

Photo: The final review of the student design assignment in the MPC Art Gallery, June 3, 2009. The invited judges included Polly Osborne, Christoph Williams, Ken Principe, Laura Strohm and Sunshine Giesler (see Judges pp. 25-26) who rated and awarded the projects in the following categories: Sustainability, Innovation, Presentation. The Audience Award was determined at the event by all participating students and visitors

The Challenge: Students of the MPC Green Building Design Course were given the parameters of the **'2009 Open Architecture Challenge: Classroom'** as the framework for their final Green Building Design class assignment. The challenge was to design the classroom of the future for a local school of their choosing.

Students presented their final designs in the MPC Art Gallery on June 3, 2009. Their projects were critiqued and evaluated by invited professionals in the following categories: **Most Innovative, Most Sustainable, Best Presentation, Audience Award.**

Students were encouraged to develop a visionary approach to the design of the classroom of the future and prepare materials to present their design vision to a host of invited guests. In the process of sharing their design expertise and submitting their designs to the contest, they will become advocates for better classroom design in their communities and possibly win the prize money of $55,000 for themselves and their chosen school !

For more information about the *2009 Open Architecture Challenge: Classroom* go to:
http://www.openarchitecturenetwork.org/competitions/challenge/2009

Why Should Schools Go Green ? *text by* 'The Germinators'

For students and teachers, green schools mean reduced incidence of asthma, decreased absenteeism, improved academic performance and increased teacher satisfaction. For parents, green schools offer the confidence that comes with knowing their children spend their days in an environment that is both healthy and conducive to learning. Numerous studies have demonstrated the significant quantitative benefits of green schools. One study[1] revealed a positive correlation between green schools and lower operating costs and reduced adverse health effects. Findings show that **green schools use an average of 33% less energy, 32% less water, an average of 38.5% reduction in asthma, with an increase of less than 2% in initial building costs, while providing financial benefits that are 20 times as large in the long run.**

Another study[2] performed on behalf of the California Board for Energy Efficiency involving more than 21,000 students showed a dramatic correlation between daylit school environments and stronger student performance. These findings demonstrate that **daylighting techniques enable 20% faster progression in math, 26% faster progression in reading and views out of windows increased over-all academic performance by 5-10%.**

In addition to a healthier indoor environment, increased academic performance, reduced adverse health effects, and lower operating expenses, green schools are better for the environment. Green schools use less energy, less water, incorporate non-toxic materials, and can make positive contributions to the local ecosystems. Green schools can also serve as a teaching instrument themselves, showcasing green technologies to students and local communities.

Building healthy high performance school buildings is now far more fiscally prudent and less risky than building conventional, inefficient and unhealthy school buildings. By improving the learning environment and saving the school system money, green schools can improve the futures of thousands of students while showing environmental leadership and fiscal responsibility.

References: *(1) "Greening America's Schools: Costs and Benefits." Gregory Kats, Capital E. (October 2006).*
(2) "Daylighting in Schools," Heschong Mahone Group. (August 1999)

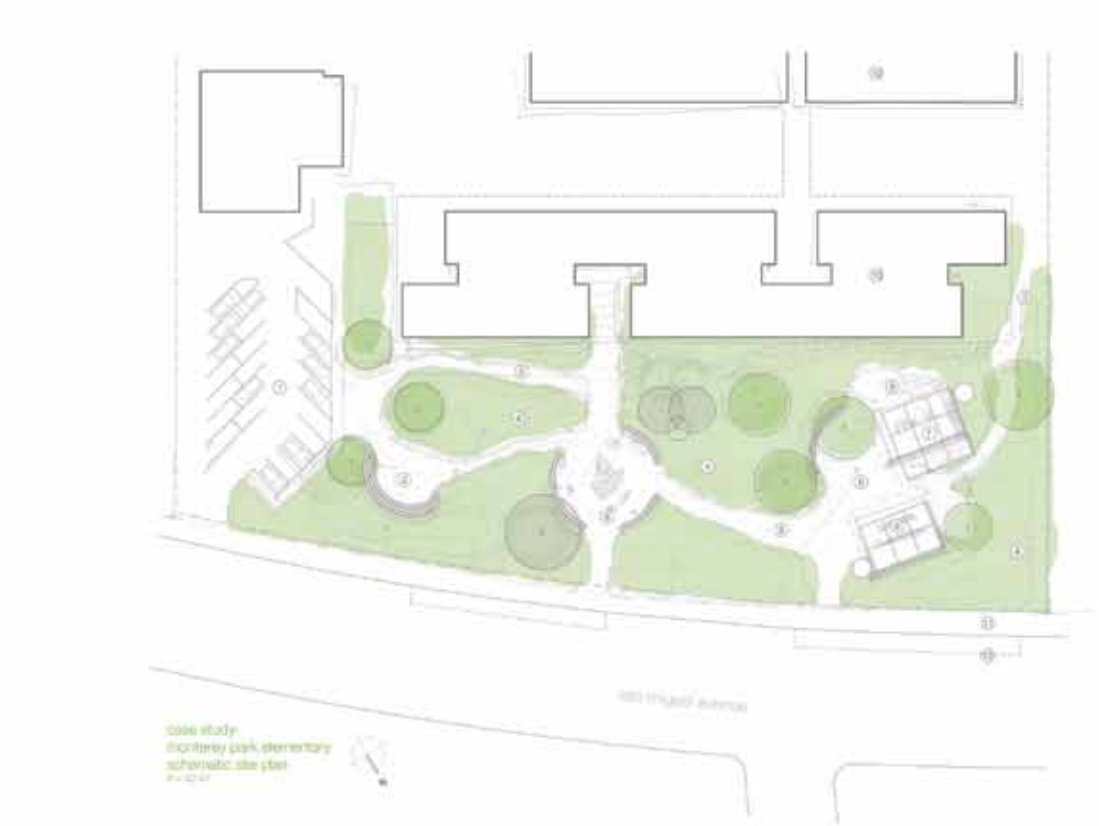
This project was awarded *Most Innovative*

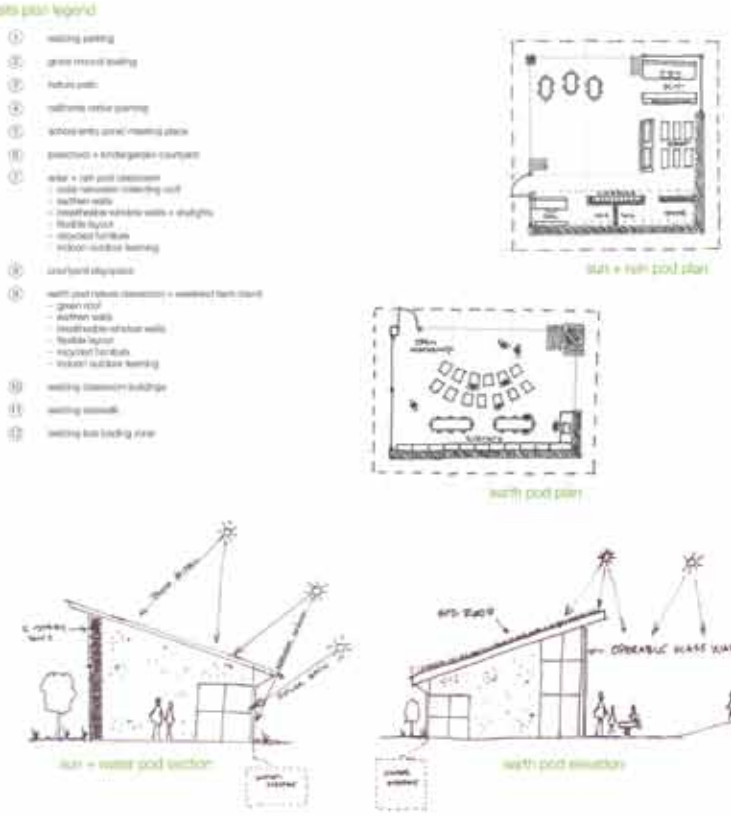
THE GERMINATION PROJECT MONTEREY PARK ELEMENTARY SCHOOL, SALINAS

re-envisioning + transforming the california public schoolscape by **April Allard, Peter Quintanilla, Noel MacNamee, Eefje Theeuws**

MAIN GOALS:

- bring nature into the california public school experience
- create healthier, safer and more natural places for children to learn, grow and evolve
- introduce sustainable and regenerative practices, systems and technologies into all aspects of education
- save money while conserving non-renewable energy resources and reducing atmospheric emissions of pollutants and greenhouse gasses
- educate future generations through green building, living and learning





The Germinators (from left) **April Allard, Peter Quintanilla, Noel MacNamee, Eefje Theeuws**

GREEN SYSTEMS + APPLICATIONS:

rammed earth construction – natural materials, with absorbent thermal mass naturally release day's heat when internal temperature decreases

breathing walls – 50% recycled content, PEFC certified wood with eco-friendly finish integrates outdoor space with internal learning space, enhances acoustic quality and improves air quality

recycled materials – giving new life to old things (flooring, furniture) – promotes a healthy learning environment while conserving non-renewable resources

GREEN SYSTEMS + APPLICATIONS (con.):

grid-tied photo voltaic solar array – reduces dependency/spending on municipal energy

green roof – reduces energy use, provides habitat for wildlife, increases lifespan of roof, increases on-site water retention

occupancy sensors & programmable thermostats – regulate lights and heating when room is actually occupied, reduces energy use

rainwater catchment – reduce municipal water supply cost by using rainwater in landscaping and for toilet water, cleans water before recharging groundwater

graywater recycling – reduces cost of municipal water supply, reduces need for energy and chemicals to treat water, recharges groundwater and reclaims otherwise lost nutrients

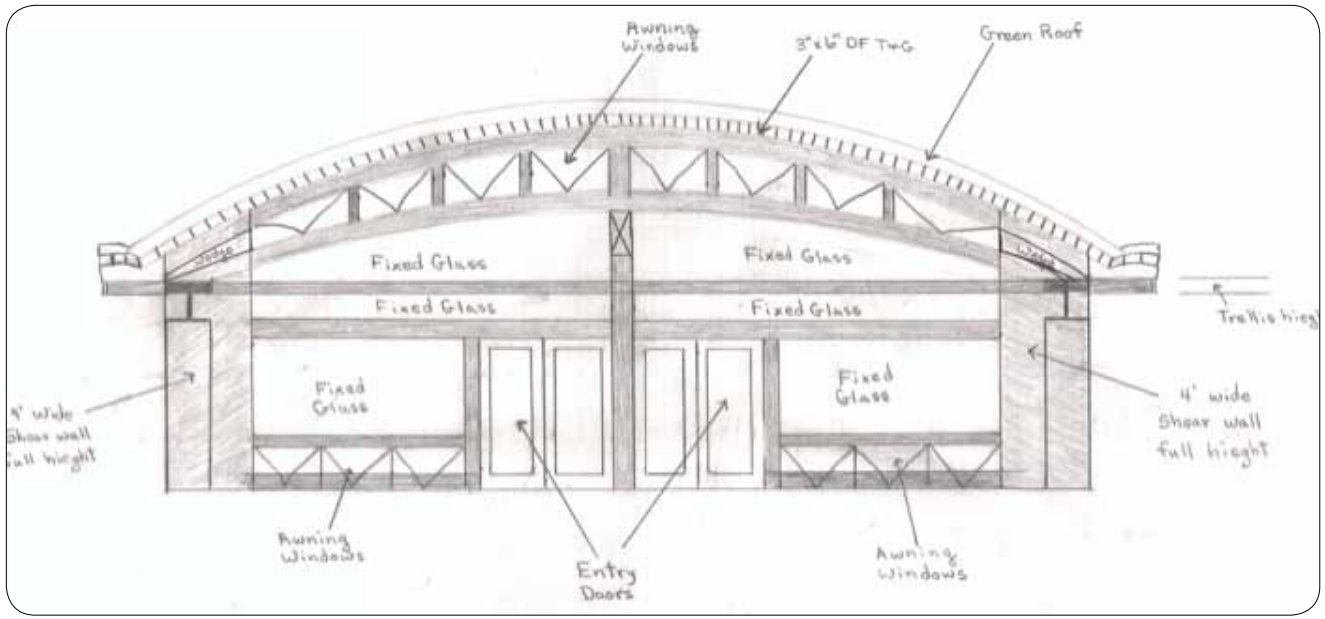
regenerative landscaping – native and edible plants provide form and function in landscape while reducing use and cost of water

community development – creates opportunities for greater community involvement, sustainable campus becomes a tool for illustrating sustainable living incorporated into daily lives.

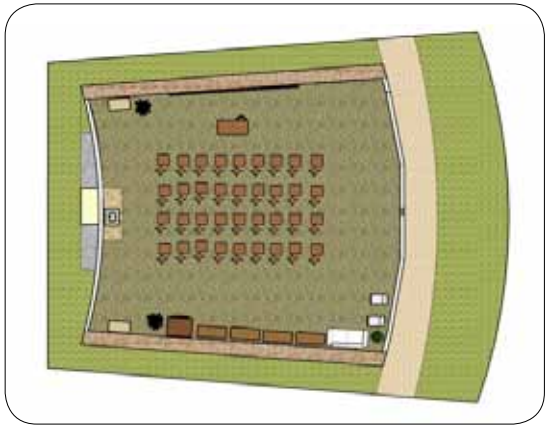
This project was awarded *Most Sustainable*

Tularcitos Eco-Learning Lab - Interactive Education

Teaching Our Children Ecological Values in a Healthy Environment by **Chelsea Frost Williams, Bob Nelson, Paris Vogelpohl, Michael Lapin**



Mission: *To create an interactive learning environment that demonstrates environmental responsibility while providing a comfortable place to learn and teach.*



Tularcitos Elementary School, located in Carmel Valley, currently needs to replace two temporary portable buildings with a new permanent structure that is ecologically friendly, safe, and capable of providing an interactive environment for the children. Principal **Karen Camilli** suggested that the structure be designed for students in grades 3 - 5 with approximately 30 to 35 students from seven to ten years old. According to elementary school teacher **Stacy Williams** the room should be interactive because children learn best when they can see and touch what they are learning about. Having the kids at their desks for the whole school day is not the best way to facilitate learning. Active children get dirty so a sink with a water fountain is a necessity. Separate areas for different activities can also aid in learning.

Maintaining a good temperature in the portable has really been challenging. It is too cold in the morning then sometimes stuffy and hot in the afternoon. The air blown in by the heater really causes problems for some of the students with allergies. Fresh air in the room is a necessity but often the windows of the portables do not open.

Our green building designs will include strawbale construction with oriented strand board decking, a fly-ash cement foundation, a living roof and wall, a water catchment system, radiant heating, recyclable eco-solution carpet tiles, low VOC paint, LED lighting, recycled wood furniture, recycled glass tile, natural ventilation systems, and a water feature.

Straw bales will be obtained locally and built into the structure as a non-load bearing system. A steel post and wooden beam structure made of FCS lumber will support the living roof. Eight foot long photovoltaic solar panels are to be located on top of the trellis offering additional energy savings from a natural source. The frame will bear the weight of the roof and the straw will provide insulation. This technique is also called the in-fill method. Straw bale construction offers numerous benefits including energy efficiency, reduction of wood consumption, cost benefits, demonstrating alternative building methods to children, utilizing otherwise wasted material. By acquiring building materials locally we will minimize pollution caused by modes of transportation. Also, considering the climate at Tularcitos School, hay bale walls coated with earth plaster are durable and rarely have problems with mold and mildew. Photo voltaic panels will offer additional energy savings from a natural source. The children will enjoy viewing the hay bale construction through a truth window.

Living Roof

A living roof will adorn the top of the edifice. The roof will be insulated with 12" of soy-based foam insulation. The roof structure will consist of 3 X 6 Douglas Fur 'T & G' over a 'glue-lam' system in order to meet roof load requirements. Carrot, Yarrow and native species and succulents will be utilized on the roof to support native wildlife and reduce demands for water and plant food required for exotic species of plants. Green roofs provide significant energy savings, particularly during the summer cooling season. The living roof will require a soil depth of 5" to 6". Tularcitos School can expect a 25% reduction in air conditioning. energy use during the hot summer months. The lifetime of the roof can be extended by 200% to 300% by protecting it from UV rays. A living roof can be installed in just a few days. It will be aesthetically pleasing and will reduce storm water runoff.

Indoor Living Wall

The indoor living wall will be made from ICF construction filled with fly ash cement and will offer a beautiful interactive element for the children to experiment and learn about vegetation. It will also enhance air quality. Living wall plants will include spider plants and philodendrons at the base of the wall and geraniums, hibiscus, fuchsia and ivies higher up on the wall.

Water

Underground rainwater tanks will catch water from the roof and the ground which can be used to supply water for the classroom sink and garden. The tanks and living roof will help facilitate the elimination of storm water runoff into city drainage systems. The water will pass through an extensive filtering system and a pump and pressure regulator will monitor water levels. In the event of a power outage or insufficient water supply, the system automatically diverts to the school's main water system.

An interactive water feature will operate in the classroom providing a "hands on" learning tool for the students, psychological benefits and a much needed break from traditional desk education. The children will gain knowledge about how to conserve water through the use of this system.

Heating

The building will be heated by a radiant heating system. The water will be heated in a boiler and transported through pipes into the floor, releasing heat into the room. Benefits of this system include reduction in indoor air pollution (forced-air heating systems blow dust into the air).

Carpet, Paint and Tiles

Designweave EcoWorx Carpet Tiles were selected for the classroom. The carpet tiles are a great option for a school environment because they are very durable and it is easy to replace stained sections. Designweave EcoWorx Tiles contain 25% recycled materials and once you are ready to replace the product the carpet can be recycled into more EcoWorx carpet. EcoWorx carpet has received the 2003 Presidential Green Chemistry Award from the Environmental Protection Agency, is also a 'Silver' certified product under MBDC's Cradle-to-Cradle program, and contributes to an Innovation in Design point for LEED, the US Green Building Council's rating system.

Benjamin Moore Nature Paints were chosen to paint the South interior wall in Tulle, Glass Slipper for the remaining three walls and Pearlescent White for the ceiling and trim. These paints have zero volatile organic compounds in an odorless formula. Families can be assured of the safety of their children. The formula has superb adhesion and is extremely durable.

For around the sink and water feature Sandhill Industries Recycled Tile was selected. When young people are dealing with water messes can quickly happen. It is essential to have waterproof tile around running water in a classroom as water can quickly cause damage to a building. Sandhill Industries creates their tile from 100% postindustrial glass. Their recycled glass tile uses half the energy that it takes to produce a ceramic tile and less than a quarter of the energy it takes to produce a cast glass tile. Sandhill has received the SPA Evergreen award for their environmental excellence and leadership.

Ventilation and Lighting

Plenty of ambient light will enter the building through clerestory windows, awning windows, and French doors. All windows are fully operable creating cross air circulation throughout the structure and reducing indoor air pollution. Occupants will also enjoy first-rate ventilation with the implementation of a ceiling fan. LED lighting will be employed in the building design for recessed adjustable fixtures, reading lamps, and exterior lighting. LED lighting is highly efficient and will result in significant savings. LED's have a projected service life of about 100,000 hours. They are also available in a wide range of colors.

The living roof, living wall, and water feature will make the classroom come to life. The students will not only learn about nature but they will be able to see it before their eyes. Students will begin to look beyond recycling only cans and bottles and begin to think of other creative options to conserve resources.

Chelsea Frost Williams studied International Relations and Spanish at Lehigh University. After graduation she began working at Jordan Design Crew and started taking design classes at Monterey Peninsula College. In fall of 2009, she will begin her Master's of Fine Arts at the Academy of Art in San Francisco.

Michael Lapin graduated from U.C. Berkeley in 1972 . He taught at Canada Jr. College in Redwood City, Ca. and apprenticed as a ships carpenter for three years. He has been licensed as a general building contractor for the past twenty-nine years. Michael designed and built his own home, shop, and decks in Carmel Valley, Ca. while working on many other projects including residential and commercial design and cabinetry.

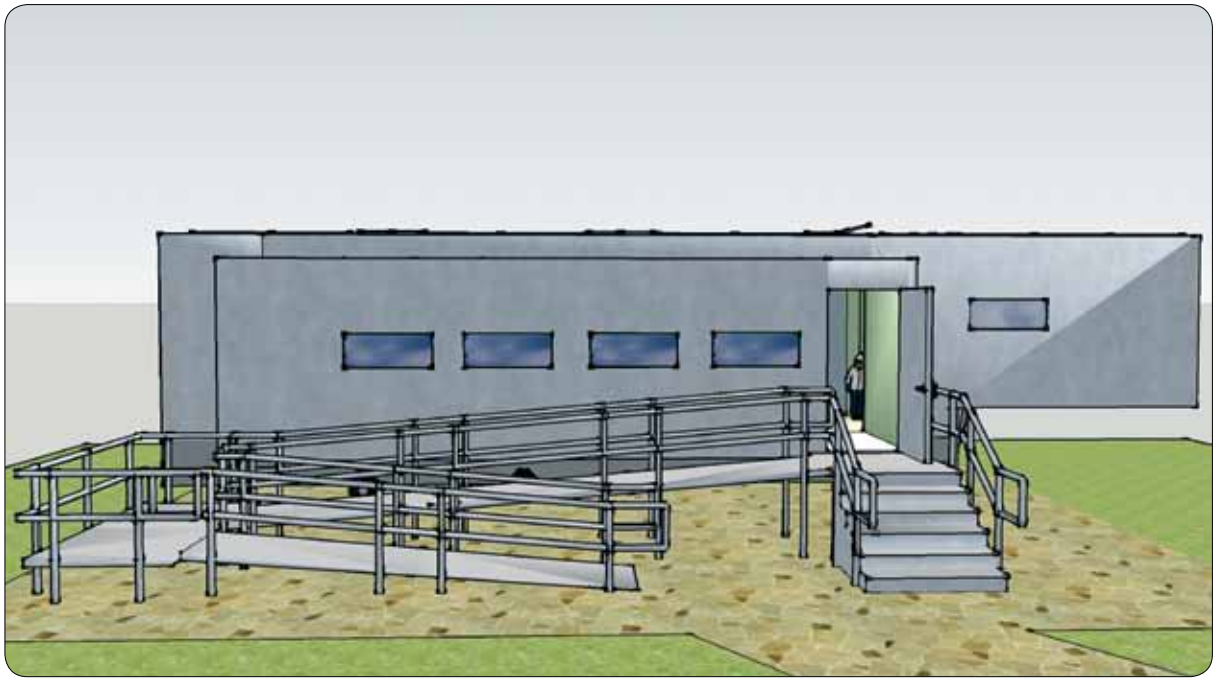
Bob Nelson is a Building Contractor (License # 768423) in the Monterey area.

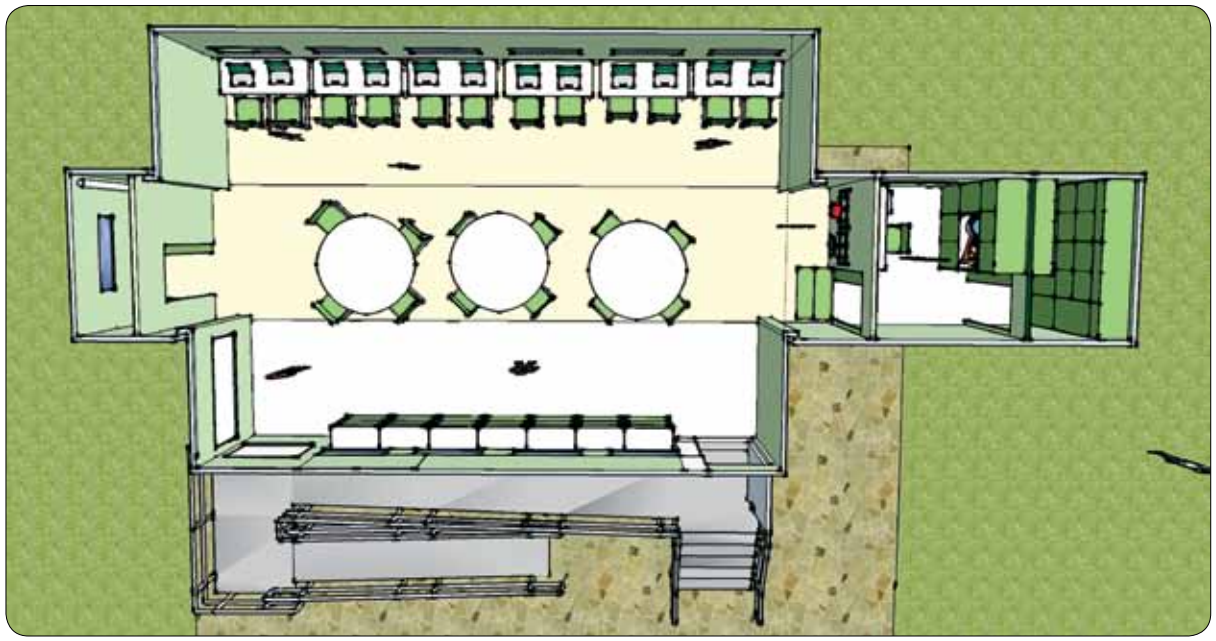
Paris Vogelpohl is an Interior Design Student at MPC. From 1997 - 2009 she worked as a Marketing Financial Analyst for CTB McGraw-Hill. She earned a Bachelor of Science in business and marketing. Since January 2009 she has worked as an interior design intern at Kremer Design Group.

This project was awarded the *Audience Award*

Mobile Study Center for Southside Elementary School Hollister, Ca.

by **Left Field Design: Rémi Webster and Nancy Lombard-Gay**





The Mobile Study Center is designed for a group of kids whose parents are migrant farm workers. During the summer and fall these students attend the Southside Elementary School in Hollister Ca. In the winter and spring the students move to Yuma, Arizona. The Mobile Study Center is designed to travel with them.

Comments by the Judges:

"Specific need addressed. This helps tie down the design and make it concretely specific in form. Very Good." **Polly Osborne**, AIA, LEED AP

"Good Explanation of the 'why' behind your project. Great thought behind your 'sustainable' aspects - light and air. You made it as 'realistic' as possible. Very well researched and your research was apparent. Well organized, easy to follow thought pattern." **Sunshine Giesler,** MPC, Department Chair, Family and Consumer Science; Coordinator, MPC Interior Design Program

"Excellent feasibility study, concept follow through and presentation." **Niklas Spitz,** Executive Director, EcoLogic Design Lab

"Most workable, fairly good presentation but needs more invention and fun." **Christopher Williams,** Architect

"Great name 'Left Field Design'. Very practical if not totally beautiful, great art work and solid research. Good situational match." **Laura Strohm,** PhD.

Left Field Design

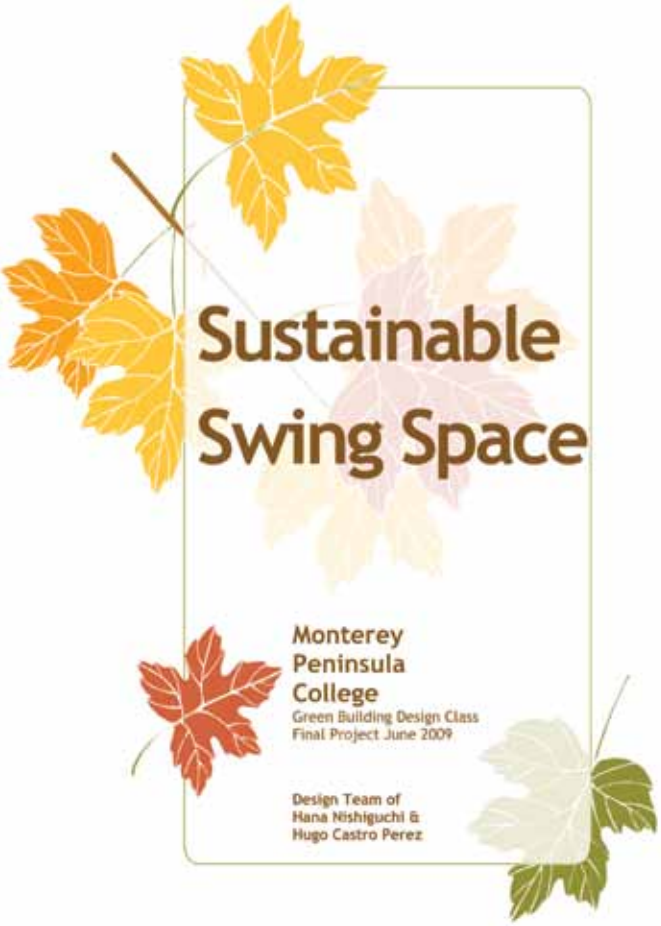
Rémi Webster (left) has been drawing since she could wrap her chubby little fist around a crayon, and will continue to do so until the undertaker pries the stylus out of her fingers. She is currently a General Ed major at MPC, because she has not yet decided what she wants to be when she grows up.

Nancy Lombard-Gay (right) is an Interior Design student at Monterey Peninsula College - a significant new direction after 20 years in the computer industry as a programmer, instructor, and all-around tech support professional.

Nancy and Rémi met in a Drafting class when Nancy had a panic attack over two-point perspective. She's much calmer now, and they have been collaborating on projects ever since.

Team Portrait by **Rémi Webster**

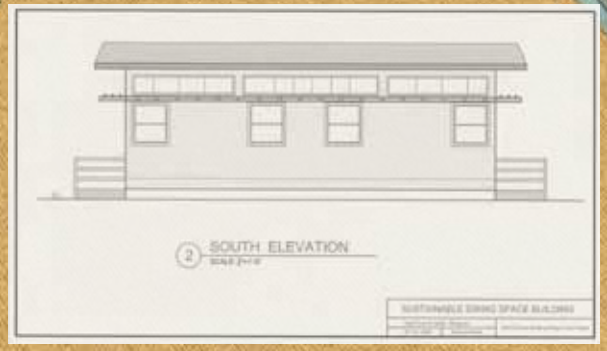
This project was awarded *Best Presentation*



by **Hana Nishiguchi** and **Hugo Perez**

The portable **Sustainable Swing Space** for Monterey Peninsula College will function as a temporary solution for transitioning departments while at the same time inspiring students and faculty with its holistic approach to design and minimizing impact on the environment.

- **SIPs** (Structured Insulated Panels) are used in the walls of the structure. They are made of an inner core of rigid insulation, sandwiched between two wood pulp panels made from fast growing softwood trees. SIPs provide 2–3 times the strength of conventional wall framing, use 35% less wood, and reduce energy costs by about 60% while being highly termite and fire resistant.
- **EcoRock drywall** is used in place of conventional gypsum drywall. It uses 80% less energy to produce, is made of 80% post-industrial recycled waste, and is designed to be fully reutilized at end of life.
- **EcoClad** is a bio-composite exterior cladding material composed of FSC certified fiber that is a 50/50 blend of bamboo and post-consumer recycled paper and is VOC and benzene free.



Sustainable Swing Space

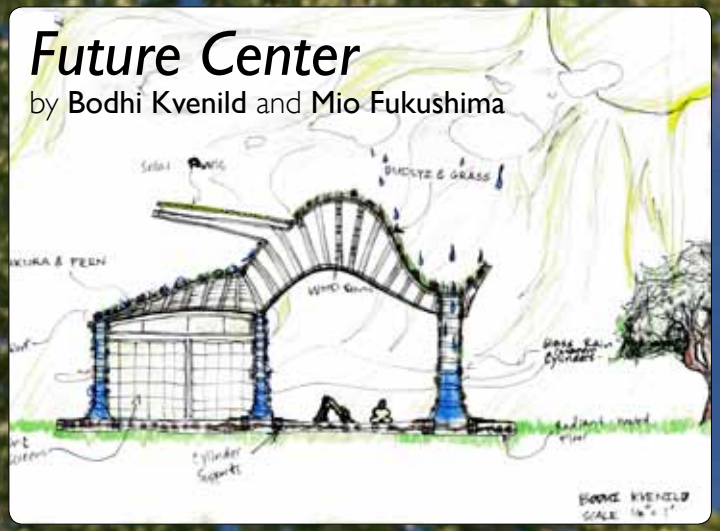
The building is made up of 3 modules of 12' x 40', which combine to a 36' x 40' structure. We wanted to take into consideration the concerns of the staff in the Support Services Department and incorporate that input into our design.

- Soundproofing and acoustic quality were the primary concerns for all of the staff, therefore we designed the movable office partitions to account for that.
- The issue of lighting is addressed in our design by providing plenty of natural light, using light shelves to minimize glare and maximize reflective light, and installing task lighting in work areas. This allows individuals to use lighting only as needed and reduces the number of overhead fixtures needed.
- Air quality is enhanced by installing operable windows for cross ventilation, using an energy efficient heat/air pump and low VOC materials and furnishings.
- Specific indoor plants that are known for their removal of chemical toxins in the air have been placed throughout the building, dramatically improving not only the air quality, but the overall look and feel of the space.
- To offset most, if not all, of the building's energy usage, photovoltaic laminate modules are installed on the curved standing seam roof, which is constructed of recycled steel.

This project aims to create a highly efficient building that utilizes natural daylighting, provides good air quality, and uses recycled materials in the building structure and furnishings.

Future Center

by **Bodhi Kvenild** and **Mio Fukushima**



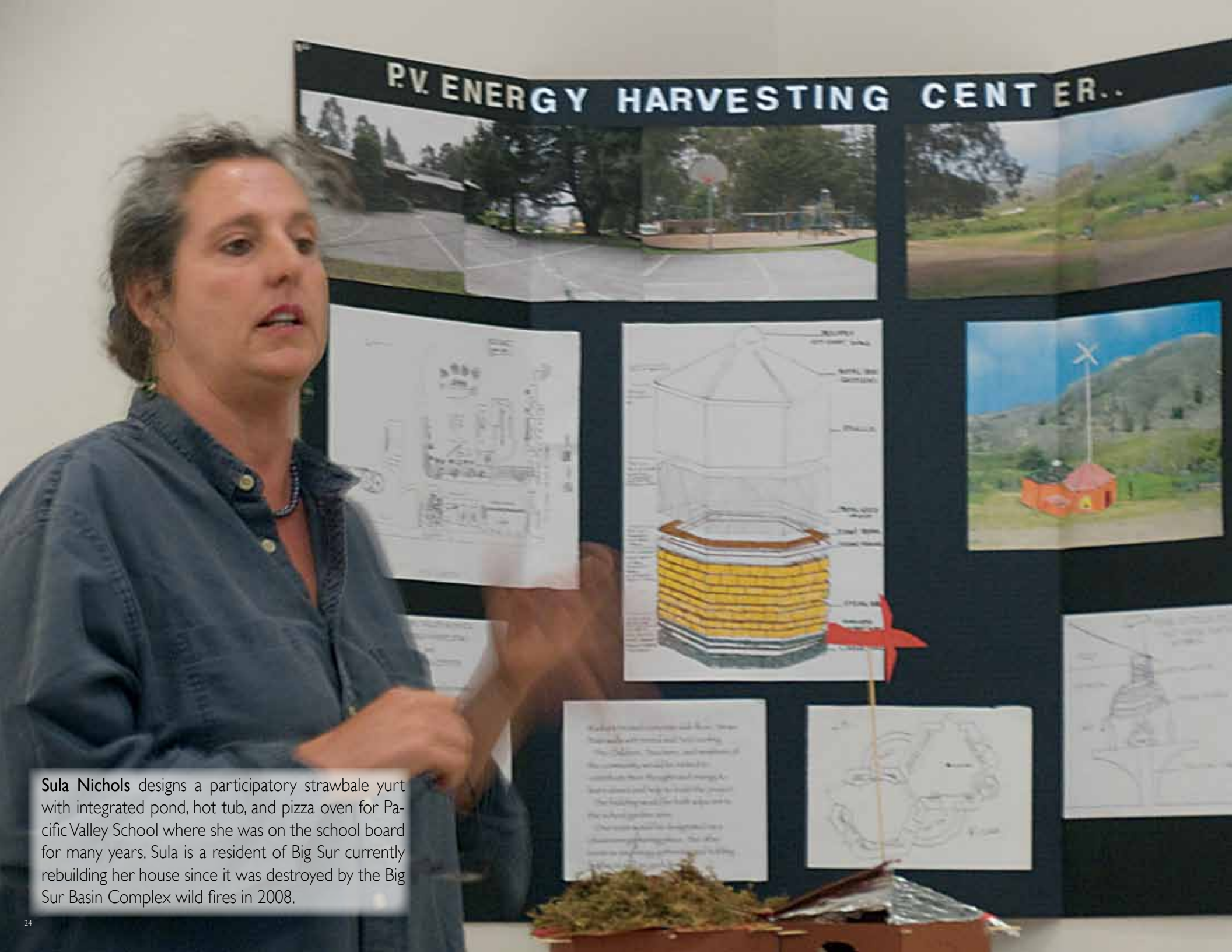
Bodhi Kvenild and **Mio Fukushima** presented the most diverse material and formal investigations of their tea house meditation space called Future Center.

The focus for the Future Center design at Monterey Peninsula College is to create a small functional space that would provide a peaceful sanctuary for students and community to access. Future center seeks to promote a sustainable living design and main goals include creating a comfortable environment, provide and enhance biodiversity, and to be imaginative and inspire.

Carmel Valley High School Ecological Learning Classroom

by **Nico Rivetti, Boj Tepenelenov, Roy Clark**

(from left) **Nico Rivetti, Boj Tepenelenov, Roy Clark**



Sula Nichols designs a participatory strawbale yurt with integrated pond, hot tub, and pizza oven for Pacific Valley School where she was on the school board for many years. Sula is a resident of Big Sur currently rebuilding her house since it was destroyed by the Big Sur Basin Complex wild fires in 2008.

Final Review Panel of Judges

Polly Osborne, AIA, LEED AP

An architect's job is to change the environment; therefore they have a specific responsibility to respect it. Polly Osborne, the principal of Polly Osborne Architects, focuses on site-specific, green architecture, her roots being in the environmental design movement in California. She has been in private practice since 1987. Her architectural career began in 1977 when she went to work for Ray Rector in Napa Valley, California. While working for Rector, she gained knowledge of adobe, earth-sheltered, and rammed earth as well as conventional design and construction methods. She earned a Masters of Architecture at Southern California Institute of Architecture. Polly Osborne has been published in many magazines and newspapers, and the books *Designing with Spirituality, West Coast Rooms,* and *Outdoor Rooms*. Her designs have won awards from the American Institute of Architects and sustainable design organizations. She is a member of the AIA Committee on the Environment, the USGBC and the Society for Architectural Historians. She has lectured, or guest critiqued, at Southern California Institute of Architecture, California Polytechnic Institute, Build it Green, Southern California Gas Company Energy Center, Eco Expo, University of Calgary and Occidental Collage. Polly is also a fine artist, working mainly in watercolor. Her painting series on the 911 tragedy is in the Yale Medical Library Permanent Collection. Polly's work can be found on **www.osbornearchitects.com**

Christopher Williams - Architypes - Architecture, Industrial Design, Design Theory, Indigenous Design, Form and Function

Christopher was educated at Pratt Institute, Brooklyn N.Y. , the New School for Social Research, N.Y.; Antioch College, the Union Graduate School, Ohio, and the University of Heidelberg, Heidelberg, Germany. He has taught at UCLA, Los Angeles, CA., Cornell University, Ithaca, N.Y. , Southern California Institute of Architecture, Santa Monica, Ca., the University of Alberta, Alberta, Canada, and the Cleveland Art Institute, Cleveland, Ohio. His practise focuses on residential architecture in California, New York, Maine, and Canada and his publications include *Origins Of Form: The Shape Of Natural And Man Made Things* published by the Architectural Book Publishing Company (1994) and *Craftsmen of Necessity,* published by Vintage Books (1974) as well as numerous magazine articles on architecture and design.

Ken Principe, Landscape Architect

Ken Principe has gained, in his thirty years of experience working in horticulture, civil engineering, surveying, GIS, and landscape architecture, a deep understanding of the need for environmental sustainability in planning, design, construction and maintenance of constructed landscapes. While working in various corporate design firms throughout California he has always strived to bring innovative ideas and technical BMPs to his projects.

Final Review Panel of Judges *continued*

Laura A. Strohm, Ph.D.

Prof. Laura Strohm founded The Sustainability Academy in 2005 at Monterey, California. This public benefit (501c3) organization brings experts together to work on applied sustainability challenges on the California Central Coast. The mission of this "think-do-teach" tank is to accelerate the mainstream practice of innovative solutions for economic success, ecological health, and community benefit. Experience-based education about sustainability is the organization's core business.

Dr. Strohm taught International Environmental Policy (IEP) at the Monterey Institute of International Studies for 12 years. She designed the curriculum for the graduate program in IEP, a dual degree in business and environment, and special career training in that field. She has authored articles on the international waste trade, trade and environment, and comparative environmental policy. Previous academic appointments include the School of Public and Environmental Affairs at Indiana University, Harvard, UCLA, and the International Union for the Conservation of Nature (IUCN) in Geneva, Switzerland.

Before taking her graduate degree (Ph.D.) at the Fletcher School of Law & Diplomacy in Boston in 1991, she worked for both the County of Santa Cruz and the US Soil Conservation Service in watershed management and soil conservation in California. That work encompassed environmental planning, regulatory enforcement, and community education.

Sunshine Giesler, MPC Department Chair, Family and Consumer Sciences; Coordinator, Interior Design Program, MPC

Sunshine Christensen Giesler is a relative newcomer to the green building field as well as Monterey Peninsula College. She joined MPC in August of 2008 as the Interior Design Program Coordinator/Instructor and is pleased to be working on the "greening" of a program so integral to the local economy.

Prior to moving to Monterey, Sunshine lived in Spokane, WA while working on her Masters of Interior Design at the Interdisciplinary Design Institute of Washington State University. While at the Institute, she worked collaboratively with architects and landscape architects on numerous sustainable projects and competitions and has witnessed firsthand how important education is to the movement.

The buffet (right) at the final review sponsored by MPC Biodegradable cutlery and paper products sponsored by Passion Purveyors.

Course Instructors

Thomas W. Rettenwender, M.A., Mag. Arch., LEED AP, Architect

Thomas is co-founder of the Ecological Design Lab, an architectural design and research firm, and President of Realitree: Ecology and Architecture, a 501(c)3 non-profit organization with offices in Santa Cruz and Monterey. He is adjunct professor at the Monterey Peninsula College and University of California, Santa Cruz, teaching the course titled Green Building Design. His educational background is in Philosophy and Mathematics (B.A. Trinity College, Dublin, Ireland), Philosophy (M.A. Trinity College, Dublin) and Architecture (Mag. Arch., University of Applied Arts, Vienna, Austria and SCIArc, Los Angeles, California). He has studied with internationally renowned architects Zaha Hadid, Wolf D. Prix, Lebbeus Woods and Greg Lynn. Thomas is a licensed Architect and a LEED AP ('Leadership in Energy and Environmental Design Accredited Professional').

Professionally, he focuses on incorporating an ecological approach to architectural design, achieved through a thorough study of the existing site ecology, an analysis of ecological functions being performed on the site, and ultimately a translation of these functions into architecture.

Thomas apprenticed with Big Sur architect Mickey Muennig from 2003-06, was the resident architect at Rana Creek Habitat Restoration from 2006-08, and has practiced architecture in Frankfurt, Vienna, Beijing, Big Sur, Monterey, and Los Angeles. His professional work includes design of the Monterey Bay Shores Ecoresort, Google Living Architecture Analysis, Redwood Gateway Interpretive Center, Slotover Residence, Bonny Doon, and the Wavecrest Ecology Education Center, Halfmoon Bay, Ca..

EcoLogic Design Lab

Niklas Spitz, Executive Director, *Ecologic Design Lab*

Niklas is Executive Director and co-founder of the EcoLogic Design Lab along with other landscape and graphic design companies in England and Spain. Niklas is acting assistant to Thomas Rettenwender at MPC and UC Santa Cruz.

His background education is in Building (HND, H&WL College, London), Architectural Conservation (Post Grad Dipl., Architectural Association, London) and he apprenticed with John Davies and Associates Landscape Architects, London in the early 80's.

Niklas says his objective "is to be an effective part of the solution in a world gone quite mad, by contributing functional beauty and interconnectedness wherever possible."

Monterey Bay Shores Ecoresort

designed by Thomas Rettenwender and Brent Bucknum for Rana Creek Habitat Restoration and BSA Architects.

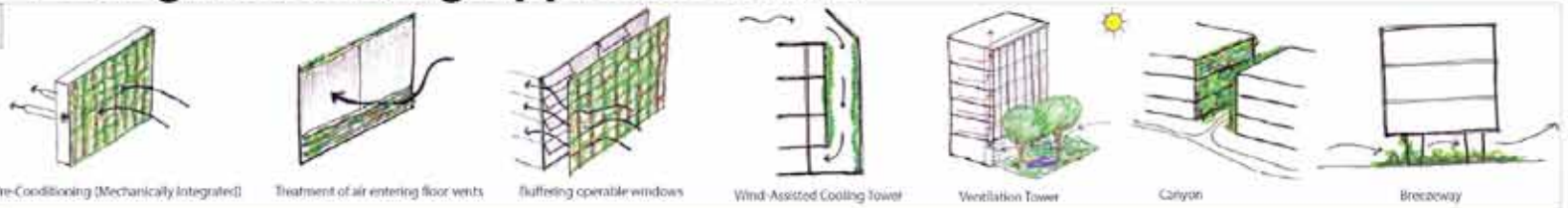
The degraded site is restored with living architecture that covers 90% of the site with native flora and fauna, captures 100% of the stormwater and reduces the potable water usage by 50%. With daylighting techniques and passiv solar design the design reduces fossil fuel use by an estimated 53%.

Ecological Building Applications (cont.)

AIR TREATMENT

Living wall systems can be integrated with mechanical and natural ventilation systems. They can be used for particulate and VOC removal, and to drive air movement.

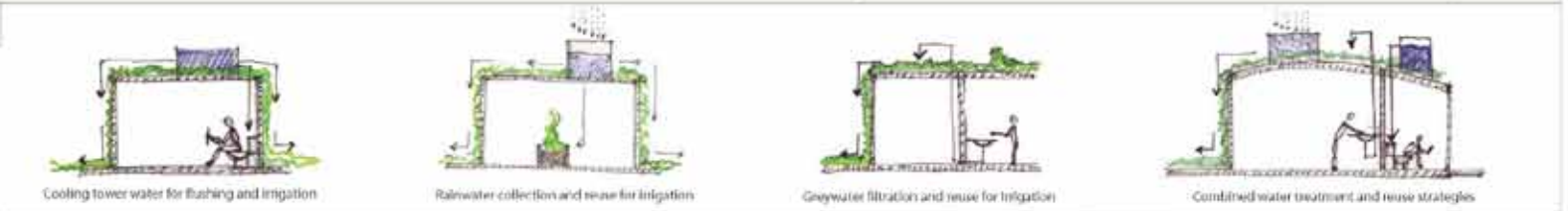
Also see: *Mechanical*



WATER FILTRATION

Living walls can be used to treat grey, black, and storm water. Treatment systems can be integrated with plumbing systems in many ways. Means of conveyance based on desired functions: type of vegetation, water treatment method, evapotranspiration, etc.

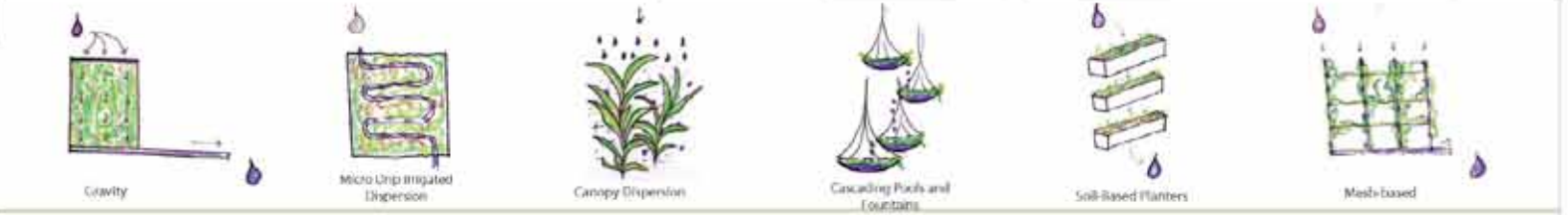
Also see: *Plumbing, Mechanical, Capture and Reuse, Landscape*



WATER DISTRIBUTION

Several means are available to distribute water throughout the building's living systems for irrigation and filtration.

Also see: *Plumbing, Capture and Reuse*



LIVING INTERIORS

Living systems on the building interior can provide biophilic benefits to employees while cleaning the air, cooling and humidifying the space, attenuating sound and treating and circulating water.

Also see: *Plumbing, Mechanical, Daylighting, Capture and Reuse, Biophilia*

HABITAT

- Buildings extend and preserve local habitat
- Buildings create unique new habitat
- Urban living buildings become habitat islands or connect habitat networks
- Building vegetation hosts pollinators

Also see: *Landscape*

William McDonough + Partners - Arup - Loisos + Ubbelohde
SWA - Rana Creek - Sandis - J.H. Heerwagen & Associates
IPD - Charles M. Salter Associates

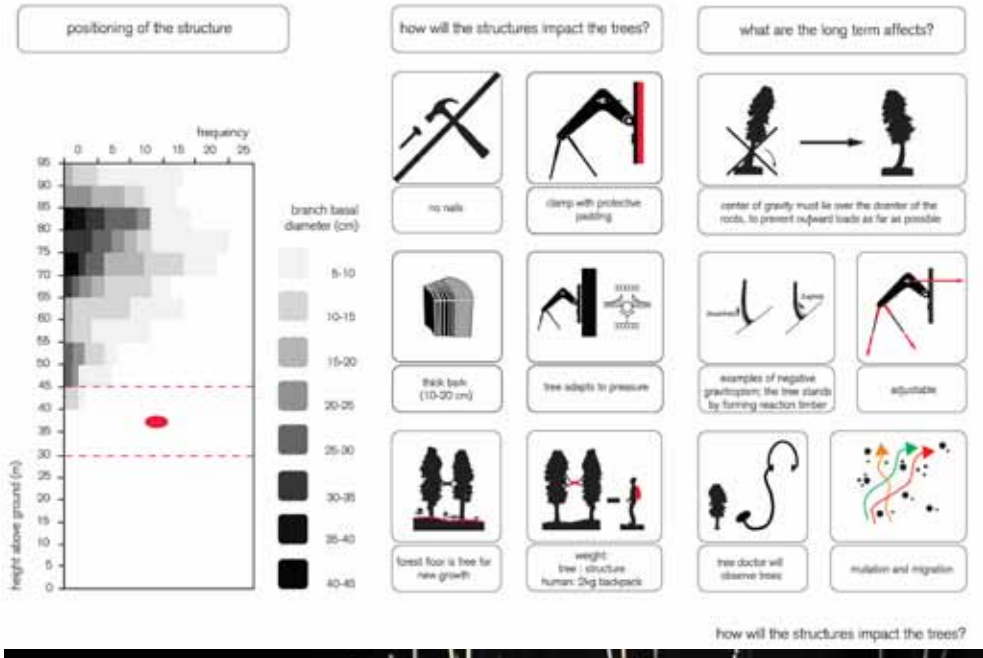
Google Pre-Design Building Systems Research

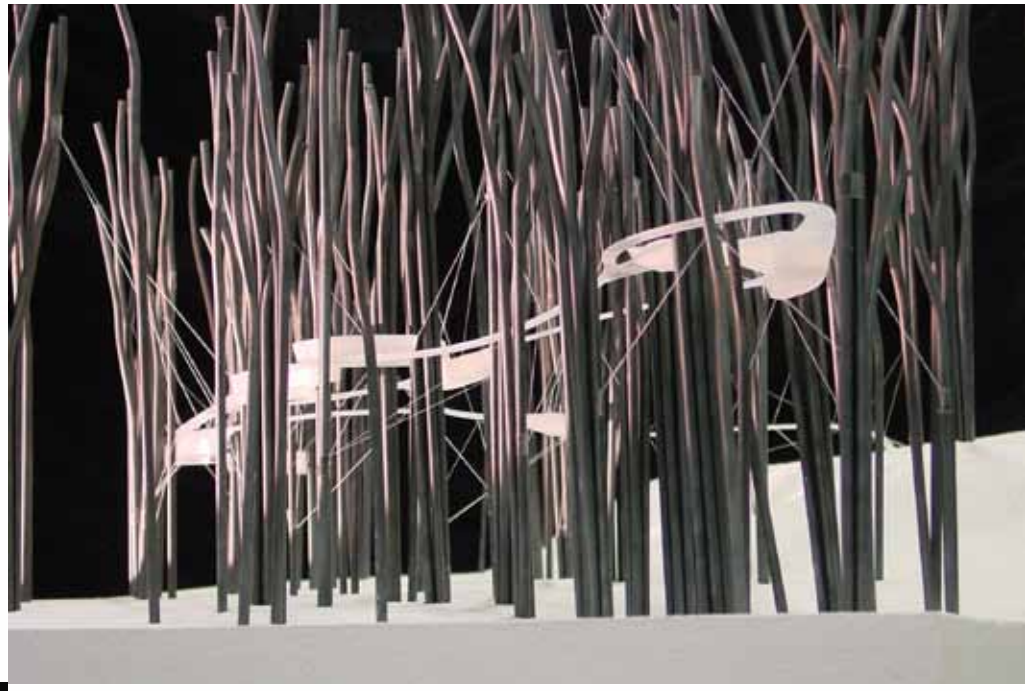
7.9

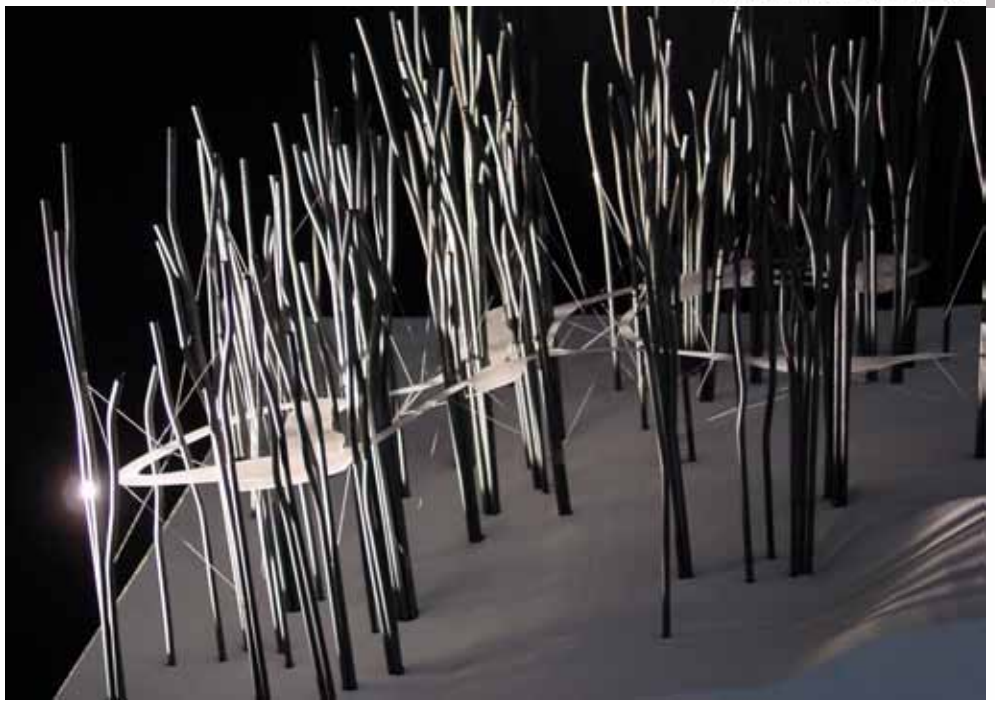
The Google Living Architecture Analysis

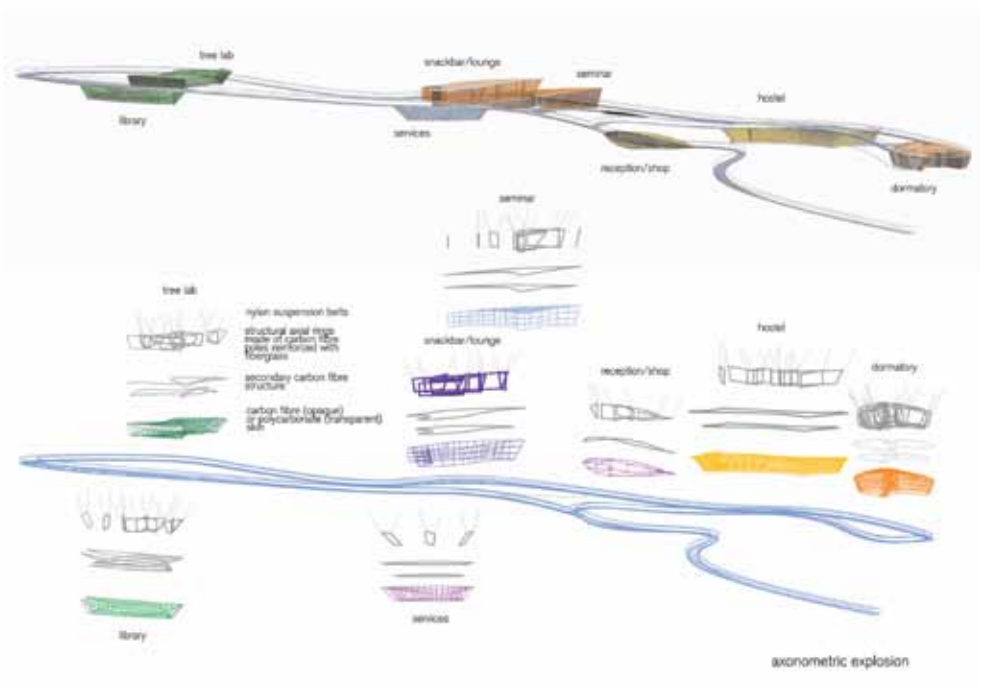
by Brent Bucknum, Thomas Rettenwender, and Kirstin Weeks for Rana Creek Habitat Restoration and William McDonough + Partners.

This Pre-design Building Systems Research analysis lays out a 'pattern language' - a categorical illustration and definition of living architecture techniques. This 15 page study serves as a pre-programming study for the planned expansion of the Google Campus in Mountainview, Ca. This study was part of a 170 page document that outlines the current state of the art of Green Building Design.





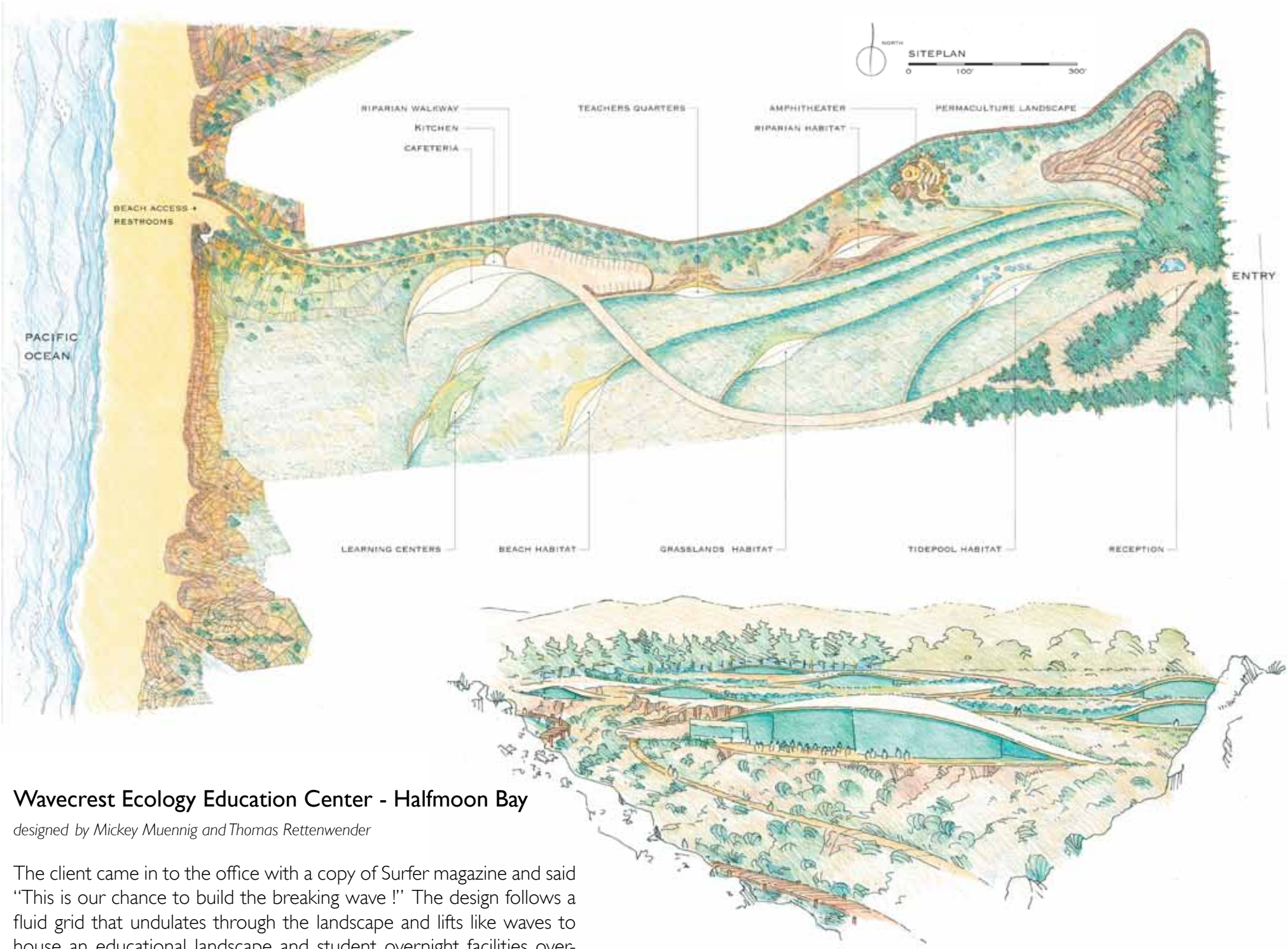




Redwood Gateway Interpretive Center

designed by Thomas Rettenwender for Save the Redwoods League in consultation with Prof. Greg Lynn, University of Applied Arts, Vienna and Prof. Stephen Sillett, Humboldt State University.

This design suspends lightweight volumes and a looping canopy walkway up to 100 feet above the forest floor to house an interpretive center where visitors can experience first hand what it feels like to be part of the redwood canopy at the Hartsook Inn site in Humboldt County, California.



Wavecrest Ecology Education Center - Halfmoon Bay

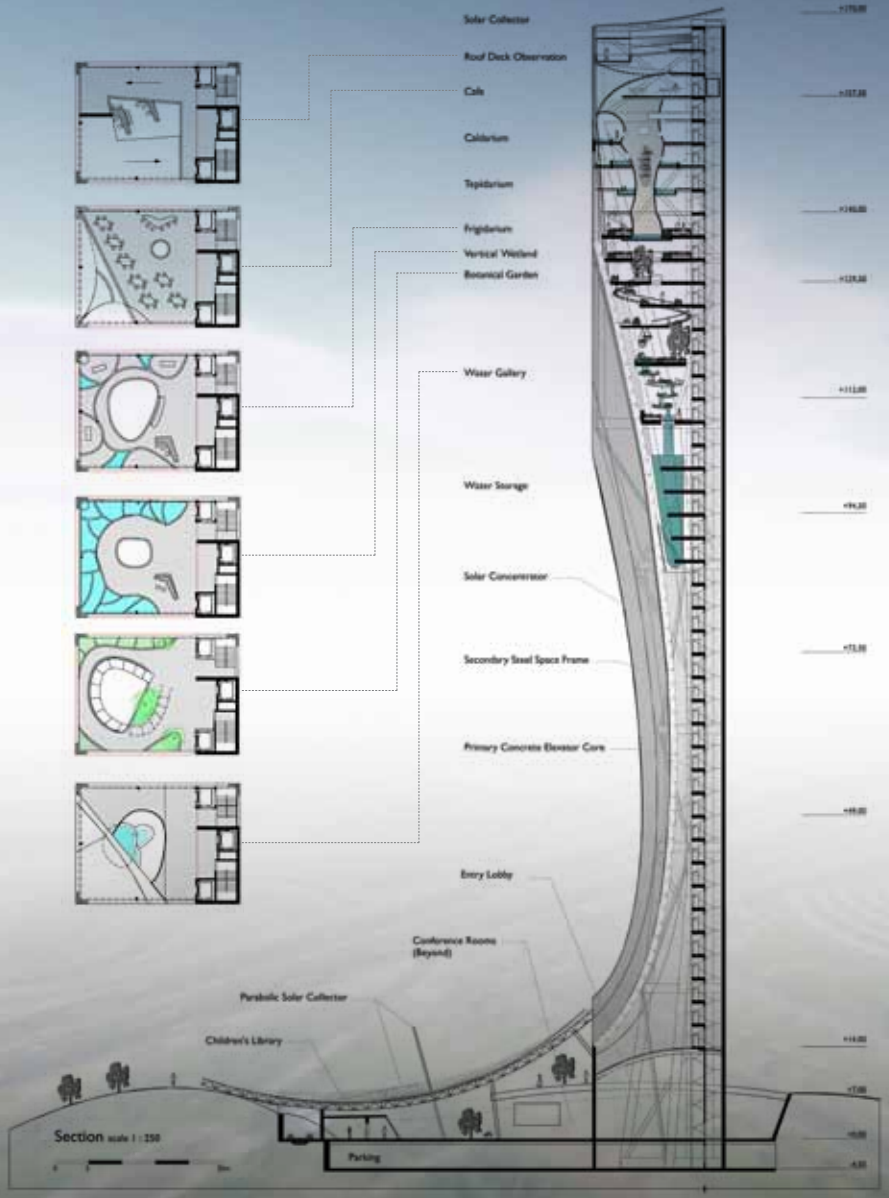
designed by Mickey Muennig and Thomas Rettenwender

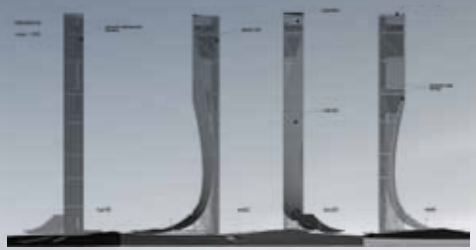
The client came in to the office with a copy of Surfer magazine and said "This is our chance to build the breaking wave !" The design follows a fluid grid that undulates through the landscape and lifts like waves to house an educational landscape and student overnight facilities overlooking Mavericks - the world famous surfing destination.

EcoLogic Design Lab

الشمسية قوس دبي

SOLAR ARC DUBAI





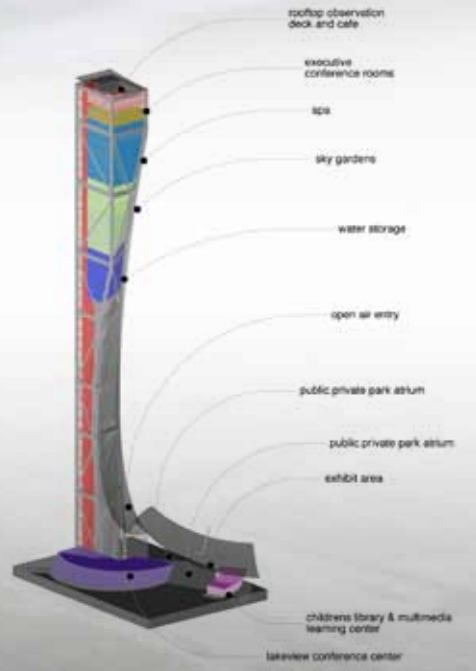


Diagram showing the generation of the form with a hyperbolic solar section

Solar ARC Dubai - International Competition Entry

by Thomas Rettenwender, Constantine Papachristopulous, Brent Bucknum, Niklas Spitz

This landmark tower is designed to serves as a large solar collector that is integrated into the form and structure of the building and produces 200% of the energy it requires. The tower also serves as a public spa and conference center.

Guest Speakers

Joe Rigney - Joe is the owner of Toyon Consultants, an environmental consulting firm based in Santa Cruz. His presentation to the class provided the environmental context for the multitude of permits required for construction projects in California and showed how some of the current trends in living archetecture might be used to overcome permitting issues and help reintegrate humanity back into the natural world. *joe@toyonconsultants.com*

Libby Barnes, Architect, LEED AP - Libby received her Masters in Architecture from Parsons School of Design and moved to Carmel, CA in 2003 taking a job with a local firm specializing in sustainable residential design and land use planning. Since coming to Carmel she has joined the US Green Building Council Monterey Bay and serves on the USGBC MBB advocacy team encouraging local municipalities to adopt green building ordinances. Libby is also an active member of the AIA of Monterey Bay.

Brent Bucknum - Brent is founder of the Hyphae Design Laboratory, an ecological engineering, research and design firm dedicated to bridging the gap between innovative architecture and hard biological sciences. Brent is also a regular collaborator of Greenmeme, a public art firm based in Los Angeles and is co-director of Urban Biofilter, a west oakland greenbelt project of the Earth Island Institute. From 2005-2008, Brent helped launch the Living Architecture department at Rana Creek Habitat Restoration based in Carmel Valley, California. *www.hyphae.net*

Marisha Farnsworth - Marisha Farnsworth teaches ecological building at Merritt College in Oakland, CA and works with students to design and build small structures made of earth, straw, bamboo and recycled materials. In addition to co-founding The Natural Builders, a contracting company based in the East Bay, Marisha has conducted research and design and has worked with organizations including Builders Without Borders, Architecture for Humanity, and Kleiwerks International. She is currently co-directing Urban Biofilter, a bourgeoning non-profit that designs, implements and advocates for green infrastructure in environmentally degraded urban communities.

Farrel Williams - Farrel is a solar energy designer and specializes in commercial and residential off-grid power systems. He has10 years of off-grid installation experience. His firm Apex Solar sells components as well as fully integrated energy systems based on solar, wind, hydro, backup generators and batteries throughout the USA, Canada and Mexico. *www.apexsolar.com*

David Messmer, P.E. - David is Principal at Messmer & Associates and has been practising engineering in the Monterey Bay area for over 30 years He has worked on landmark projects such as the Esalen Baths and the Post Ranch Inn. *damess@redschift.com*

Ken Principe - Landscape Architect (see Judges p. 25)

Cooper Scollan - Cooper has been in the landscape/nursery industry for over 19 years and currently works for a local landscape design/build company called Habitat Gardens. Habitat Gardens designs and builds landscapes, hardscapes, living walls and roofs, focusing on an ecologically minded approach using sustainable materials and California native plants as much as possible. *www.habitatgarden.com*

Tanja Roos - Tanja is Organic Garden Program Director/Teacher at the Hilton Bialek Habitat, an independent 501(c)3 non-profit organization, a unique community resource in the central coast region that inspires students of all ages, to understand, appreciate and protect the natural environment. With the imminent ground breaking of the Habitat's LEED certified classroom, the opportunities for experiential learning will be increased many fold. To learn more, volunteer or make a tax deductible donation visit: *www.carmelhabitat.org*

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Photo: Participants of the MPC Green Buidling Design course, Spring 2009, study the upcoming LEED certified classroom building at the Carmel Middle School Habitat with Tanja Roos.