STANFORD
NEWS SERVICE

NEWS RELEASE

April 13, 2004

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Editor Note:
Photos of the new building are available at http://newsphotos.stanford.edu

Relevant Web URLs:

- Carnegie Institution Department of Global Ecology
- The Carnegie Institution of Washington

Built to last: Global Ecology building showcases sustainability

On April 12, the Carnegie Institution dedicated a new, environmentally innovative building on campus to house its Global Ecology Department, established in 2002 for interdisciplinary study of Earth's ecosystems. Built to last a century, the $5.5 million facility maximizes energy efficiency, minimizes waste and uses recycled materials -- including redwood siding from 100-year-old wine barrels and crumbled concrete from other buildings.

"The building reinforces the philosophy of the department, which is to find a scientific foundation for a sustainable future," Christopher Field, director of the Global Ecology Department and a Stanford professor, by courtesy, of biological sciences, said in an interview before the grand opening.

The 11,000-square-foot research center is located at 260 Panama Street next to Carnegie's Department of Plant Biology, which has been on campus since 1929. It will accommodate about 45 faculty members, undergraduate, master's and graduate students, postdoctoral fellows and sabbatical visitors using a range of tools -- from satellites to molecular biology -- to understand the complicated interactions among Earth's land, atmosphere and oceans.

Stanford President Emeritus Donald Kennedy, who chaired the Department of Biological Sciences in the late '60s and early '70s, told an audience of about 100 well-wishers at the building's dedication that without the strength provided by Carnegie's plant sciences laboratories on campus, Stanford's biology department would not enjoy the reputation it does.

"The selection of this project and this building and the terrific people that Chris Field and his colleagues will bring here converges with such important developments elsewhere on the campus -- the newly developing environment institute, the fact that Jasper Ridge has turned into an ever more important and valuable research institution, starting with Paul [Ehrlich] and Hal [Mooney] in the early days and now being utilized so brilliantly by Chris and his collaborators," he said. "So many things are coming together that this enterprise is really something to celebrate, not just for those of us who love Carnegie, but for all of those of us who love Stanford."

Humanities and Sciences Dean Sharon Long, a plant biologist who first visited Stanford to speak at a Carnegie seminar series and ended up with a job offer in the biology department, concurred. "This is a key moment, and Stanford is the right place for this to happen," she said. "The new environmental initiative that Don has mentioned, the Global Climate and Energy Project and other projects at Stanford are all going to be moving forward in a way that is uniquely and distinctively Stanford -- very interdisciplinary, low barriers and top excellence."

Esherick Homsey Dodge and Davis, the San Francisco architecture and design firm that created the plans for the Monterey Bay Aquarium, designed the building. DPR Construction completed the building in about eight months. Field also credited the contributions of Gil Masters, an emeritus professor (teaching) of civil and environmental engineering renowned for exploring the interrelationships between environmental quality and energy consumption, and H. Ruth Todd, associate university architect in the University Architect/Planning Office.

"Our new building sets an example, showing that an ecologically sound complex can be beautiful, economical, safe and efficient," Field said.

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Cool, efficient, flexible

One-third of global energy use is for building construction and -- especially -- operation. Several features of the new building are aimed at minimizing energy use -- its long, skinny shape; orientation along an East-West axis; extensive use of heat-reflective coatings on windows and roofs; natural ventilation and oversized air ducts; motion sensors that detect if rooms are occupied and a control system that turns lights on and off accordingly.

"At Stanford, the climate is really nice most of the year, so you want to minimize the difference between the temperatures outside and inside the building," Field said. To that end, Rumsey Engineers designed and modeled a heating and cooling system that uses 54 percent less energy than standard systems.

About 90 percent of energy use goes into cooling, Field said. Ceilings and floors contain metal panels that remove heat and radiate coolness. Cool water flows through the backs of the panels during the day, collecting heat. Later, the water is irradiated to kill microbes and pumped to the roof, where it forms a thin film that dumps its heat into the cool night sky.

A cooling tower lowers the temperature of the lobby, which is encased in glass that slides up, to create a covered patio effect, or down, to form a sun room. Its specially designed "windcatcher" captures breezes from above the roofline, evaporatively cools the air with a fine spray of water and directs the downdraft of cool air into the lobby.

Recycled materials were used whenever possible. Old carpet was reincarnated into small carpet squares, which are easier to replace if damaged than are larger rugs. Recycled doors were used to make furniture. In cases where new wood was used, it was certified as sustainably harvested by the Forest Stewardship Council, a nonprofit encouraging responsible management of the world's forests. Concrete with a large volume of fly ash reduced carbon emissions from building materials from 186 tons to 93 tons.

Planners considered safety as well as sustainability. The air filtration system is so high in quality that some come to the building to escape their allergies, Field said. Carpets are formaldehyde-free. Field worked with companies to find alternatives to the polyvinylchlorides often found in plastic pipes and furniture moldings that release dioxin when burnt and are toxic to manufacture.

Flexibility is an important aspect of the work environment, Field said. Legs of lab benches adjust to create work-surface heights that are ergonomically correct. Cabinets are on wheels for easy exchange of components. Internet and electricity connect from above, and the building is set for wireless communication.

Water conservation is a priority. Evidence includes dual-flush toilets, low-flow faucets, even a waterless urinal. Native plants -- valley and blue oaks, irises, blue-eyed grass, California lilac, manzanita -- minimize water use and invasion by less hardy nonnative plants. Minimal use of "hardscaping" means more water drains directly into dirt; less gets routed over concrete to be dumped in the bay.

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From form to function

The new facility was funded by the Carnegie Institution's Centennial Campaign with support from the David and Lucile Packard Foundation. In it, scholars will tackle issues including the global carbon cycle, the role of land and oceanic ecosystems in regulating climate and the interaction of biological diversity with ecosystem function. The scientists also will play an active role in the public arena -- from presenting congressional testimony on global climate change to using satellite imagery to sense environmental "hotspots."

The two-year-old Global Ecology Department is already making its mark, Richard Meserve, president of the Carnegie Institution and a graduate student at Stanford 30 years ago, said. "The Institute of Scientific Information in Philadelphia has indicated that this department is in the top one percent of departments in the ecology environment area across the whole country, which is amazing when you consider the small number of people who are here."

That "small number" is three faculty members, with a pending hire of a fourth, an oceanographer, and plans to hire a fifth scientist soon. Current faculty include Joe Berry, a Stanford professor, by courtesy, of biological sciences, who studies carbon balance on the scale of ecosystems, in part through experiments at Biosphere2 in Arizona, and on the scale of continents; Greg Asner, a Stanford assistant professor, by courtesy, of geological and environmental sciences, who uses satellites to assess rainforest destruction and drought; and Field, who conducts experiments at Jasper Ridge to explore the effects of climate change, the global carbon cycle and the interactions between humans and climate.

Their main collaborators are environmental scientists in the departments of Biological Sciences (such as Peter Vitousek, Harold Mooney, Brendan Bohannan and Stephen Schneider), Geological and Environmental Sciences (Rob Dunbar and Adina Paytan) and Geophysics (Kevin Arrigo).

Such partnerships are vital, Meserve said before using gardening shears to cut the ribbon -- green, of course -- surrounding the new building. "It is obvious that man has had an impact on climate, on biodiversity, on availability of clean air and clean water, a whole range of areas. We're going to be judged on how well we have dealt with those problems, and in order to do that task sensibly we're going to require fundamental scientific information of the type that this department and others like it can provide."

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BY Dawn Levy