

GCA CONSERVATION WATCH

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Breadfruit

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PLANTING BREADFRUIT TO FEED A HUNGRY (TROPICAL) WORLD

Something good is happening in Hawaii that's worth knowing about. It involves a tree, a garden, and an institute. But most of all, it is a story about a woman with a lifetime of knowledge and a vision of how to use it to feed a hungry world. This is her story and the story of the breadfruit tree.

Breadfruit (*Artocarpus altilis*) was domesticated in the Pacific and has nourished Pacific islanders for more than 3000 years. It is a key component of sustainable livelihoods throughout the Pacific and Caribbean Islands and on a smaller scale in Latin America, Africa and

Southeast Asia. The starchy fruits can be baked, roasted or boiled to prepare delicious main dishes, breads, desserts, and more. The tree provides timber, medicine, and insecticides, as well. Though grown in almost 90 countries, breadfruit is still an underutilized crop.

Enter Diane Ragone, Director of the National Tropical Botanical Garden's (NTBG) Breadfruit Institute. Ragone first encountered breadfruit as a botany student at the University of Hawaii and collected a number of varieties during her PhD fieldwork in 1985 and 1987. Her specimens joined the 30 others collected by NTBG in Tahiti in 1987 and were subsequently planted at their Kahanu Garden on Maui. This collection has become the world's largest repository of breadfruit, with over 200 specimens and 120 varieties from 18 Pacific nations, Indonesia, the Philippines, and the Seychelles Islands. Among the collection are varieties rare or extinct in their home islands.

Over the last two decades, Diane and her team have done molecular studies to assess genetic diversity, evaluated and described tree and fruit characteristics such as size, weight, yield estimates, and seasonality, and analyzed selected varieties for fruit quality and nutritional composition through a collaborative partnership with University of Hawaii researchers. In fact, the doctoral candidate doing this research received the Garden Club of America Award in Tropical Botany. The researchers found what islanders have known for millennia: Breadfruit is highly nutritious. It is high in carbohydrates, a good source of dietary fiber and

low in fat. It is also a good source of calcium, copper, magnesium, potassium, thiamin (B1), Vitamin C, and carotenoids (Vitamin A).

In addition, the trees require little attention, do well under a wide range of ecological conditions, begin bearing fruit in three to five years, and are productive for many decades. Farming breadfruit entails none of the hard work associated with planting, tending, and harvesting a field crop. It requires only digging a hole, planting, mulching with leaves and other organic material, and protecting the young tree from foraging animals. Multiple trees can also be interplanted with subsistence and cash crops. Breadfruit trees create important forest cover. They grow well on hillsides and, because they require no plowing, they create no erosion or loss of topsoil, thus protecting watersheds. This is especially significant since so many tropical areas have been denuded by slash-and-burn agriculture.



Artocarpus altilis

Courtesy of National Botanic Garden

Given all these positive attributes and given that more than 80 percent of the world's hungry live in tropical and sub-tropical regions, it became clear that the Breadfruit Institute's collection held a potential key to alleviating hunger in a large part of the world. But how could the varieties grown at Kahanu Garden be delivered to the people who need them?

Traditionally, breadfruit trees are propagated from root suckers, but the number of root shoots produced by a tree is limited and international quarantine restrictions on shipping root material are rigorous. Could tissue culture be the answer? Tissue culture is a simple technology and a powerful tool for plant conservation. Not only is it a way of banking plant materials for the future, but it is also a way to produce sufficient quantities of plantable material that are free of viruses, bacteria, and fungi. Tissue culture was already being used to conserve, multiply, and distribute other Pacific crops such as bananas, taro, and kava. Diane Ragone and the Breadfruit Institute partnered with the premier research labs at the Secretariat for the Pacific Community Regional Germplasm Centre (RGC) in Fiji and the Universities of Guelph and British Columbia in Canada to investigate the possibilities to add breadfruit to their research portfolio.

Now, twenty years on, Diane and her team have twenty breadfruit varieties in tissue culture production with a mechanism for transporting them anywhere in the world. These form the basis for the Breadfruit Institute's current humanitarian effort to sup-

ply tropical nations with ready-to-plant breadfruit varieties. Its pilot project is with Sustainable Harvest International, a non-profit organization working with Central American farmers.



Diane with Breadfruits
Photo by Jim Wiseman

It is the hope of Diane Ragone and the Breadfruit Institute to share the bounty of breadfruit to help develop more sustainable agriculture, increase crop diversity, and feed hungry people throughout the tropics.

Jessie Schilling
Woodside, CA

The text of this article drew heavily on Diane Ragone's article, "Milestone Agreement Signed to Distribute Breadfruit, In vitro trials a success," published in the Bulletin of the National Tropical Botanical Garden, Volume XXIV, No. 4.

For further information about the organizations and about opportunities to support these programs, please see the following web sites:

The National Tropical Botanical Garden (www.ntbg.org) (see especially the section on Kahanu Garden)

The Breadfruit Institute (www.breadfruit.org)

Marion Thompson Fuller Brown: Going Strong at 90

Have you ever visited Maine? When you traveled there, did you wonder how Maine managed to have billboard-free vistas all across the state?

GCA member Marion Thompson Fuller Brown, who is celebrating her 90th birthday this May, will tell you how—and she'll tell you it wasn't easy. She knows, because she sponsored the law banning off-premise outdoor advertising while serving two terms in the Maine House of Representatives between 1966 and 1972. Thus Marion began a lifelong vigil against the ugliness and intrusion of billboards and other outdoor advertising.

“They took the last one down in 1977,” Marion proclaimed in a recent phone conversation. She is proud to say that Maine was the first state to pass legislation prohibiting billboards. Today Vermont, Hawaii, and Alaska have followed Maine's lead with their own laws.

Marion then expanded her battleground to include the rest of the country. In 1982 she and GCA member Ellie Kelly from Baltimore, Maryland, plus Barbara Sanderson from the Roadside Council of New Jersey and Charles Floyd of North Carolina, founded the National Coalition to Preserve Scenic Beauty. It became the forerunner of

Scenic America, which continues today to carry out Marion's vision from its office in Washington, D.C. President Nixon appointed Marion to an advisory panel on billboard issues.

Marion follows a long line of GCA members who have fought billboards since they first began encumbering the views of America's scenic land. She was a GCA director for Zone I and served as a vice president, sharing her strong voice and many talents on various fronts. She also served on the Conservation and National Affairs & Legislation (NAL) Committees as a member or advisor from the 1980's until September 2000 when she and Irene Davis, the GCA Conservation Chair, hosted the Conservation Fall Trip in Maine.

Marion suffered an unexpected setback right before that meeting—a slight heart attack. Undaunted, she communicated by phone from the hospital in York, Maine. As she had invited most of the speakers and chosen the study topics (from lobster fishing to forest management), participants felt her presence in every place they visited.

Her activities weren't limited to political action. Garden Clubs who present GCA small flower shows are familiar with the requirements for the Marion Thompson Fuller Brown Conservation Award. A club must apply for the award and then jack up the conservation committee to put on a first rate educational exhibit that is aesthetically pleasing. A panel of judges, made up of two knowledgeable conservationists and a horticulture judge, give it a close examination. Not all pass. Marion Brown felt that conservation

should be represented at flower shows along with horticultural exhibits and flower arrangements.

Although not as mobile as she used to be, Marion continues to serve GCA as a member of the NAL Resource Committee. She serves on Maine's Travel Information Advisory Committee and is deeply involved in the Mt. Agamenticus to the Sea Conservation Initiative (MtA2C). Marion also is co-chair of "Lands for Maine's Future" campaign, which raises money to buy land.

At 90 Marion is still fighting for the land, for its scenic beauty and its preservation. What a remarkable lady! Conservationists from Maine to California salute you and in chorus say, "Fight on, Marion Thompson Fuller Brown!"

*Jane Henley
NAL Resource Committee Member
Dolley Madison Garden Club (VII)*



A Look at the Future through the Past

Attendees at the annual National Affairs & Legislation meeting in Washington, D.C. in late February 2007 were fortunate to hear a presentation by William A. DiMichele of the National Museum of Natural History. He spoke on the arcane subject of fossil plants of (in the case of Dr. DiMichele) the late Paleozoic. His focus is the ecology and ecosystem organization of plants of this era and its relationship to changing climate and evolution.

He explained how the late Paleozoic was characterized by change from a cold to a warm climate. The fossil record shows what happened when the earth warmed in a short period of time. The spore-producing plants that dominated the earth were replaced by seed producers (gymnosperms), which now dominate the earth's plant life.

While Dr. DiMichele did not compare the present threats of a warmer climate to the events of an age 350 to 245 million years ago, it is true that dramatic and sudden changes in climate affect all life on Earth and

that the plant fossil record is a particularly rich record of these past events.

Since the geologic and paleontologic record of climate change is the best source of information on the Earth's climate system, it is not out of the question for us to study the long record of Earth's climate deposited in fossils and draw conclusions relevant to the current era. It provides a record of trends in mean climate and variability in the recent past that can extend beyond the small human time scales on which climate has been measured by observation.

*Diane Stoner
Litchfield Garden Club (II)*

ZONE WATCH

Recycling in Our Community Zone I

The facts about the disposal of inkjet cartridges and cell phones came to the attention of the Chestnut Hill Garden Club's Conservation Committee when we started to investigate recycling in our community in 2004.

We learned that since the late 1980's an estimated 300 million cartridges are thrown away each year, since 56 percent of Americans throw them out rather than recycling them. Every year inkjet and laser cartridges add more than two hundred million pounds

of solid waste to our landfills. The cartridges will take more than a thousand years to decompose.

We also discovered that, like inkjet printers, cell phone use has grown dramatically. Until the late 1980's, most mobile/cell phones were too large to be carried, so they were often installed in cars. But with the development of smaller components, mobile or cell phone use has grown exponentially along with the problems of their disposal. The numbers are staggering. In 1985, there were an estimated 340,000 mobile phone users, and by 2001 there were 128 million mobile phone users. By 2004, there were more than 153 million people using cell phones. In the United States 50 percent of children own mobile phones. The average life of a phone is eighteen months to two years. In 2005 about 130 million cell phones weighing about 65,000 tons were retired. Many of these retired phones are thrown out, ending up in landfills.

As a result of our study, our Conservation Committee started an inkjet and cell phone recycling program in Chestnut Hill, Massachusetts. The program was featured at the mini-zone meeting at Tower Hill in Boylston that year, and other garden clubs began to participate in an online recycling program called EnviroSolutions. All the information necessary to understand the program can be obtained from its website: www.envirosolutionsllc.com. This company, like others similar to it, will provide postage-paid envelopes for recycling cell phones and inkjet cartridges. Our Conservation Committee supplies local businesses, schools, and our members with the recycle bags and ask that

they distribute them. To date, we have recycled 1,206 inkjet cartridges, and 108 phones. We are adding a laser jet recycling program this year. Won't you join us?

*Abby Coffin, Club Conservation Chair
Chestnut Hill Garden Club (I)*

Central Green Park Madison, New Jersey Zone IV

Community involvement, focus on conservation efforts and educational programs has greatly benefited the Garden Club of Madison's restoration of its Central Green Park.

Central Green, a small 2.4 acre park in town, was rescued from development by neighborhood residents in 1992. The land is ecologically diverse, ranging from very wet to well-forested areas, making it an excellent piece of land to use to study the interaction of biodiversity with plant varieties. Some time ago, a neighbor mistakenly planted Japanese knotweed, which spread quickly and began to kill native plants. Inspired by Garden Club of America information on invasive plants, the Conservation Committee and the Department of Public-Works developed a plan to remove invasive plant materials and reintroduce appropriate plant material to the area. Two grants totaling \$8,000 were applied for and received from the New Jersey Committee of GCA.

Among the highlights of the project was the

construction of a deer enclosure in the fall of 2006.

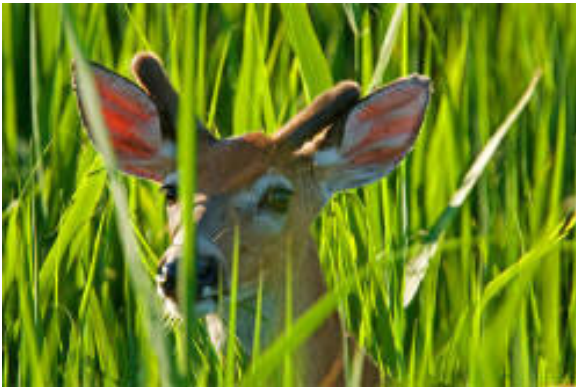
Community involvement has been extensive. The project has been advanced through partnerships with numerous groups, including Boy Scouts, Drew University students, Garden Club of Madison members, Madison Parks Committee members, and Borough of Madison employees. The Sheriff's Labor Assistance Program, has helped several times, and many neighborhood children have participated in planting and maintaining the site. Central Green is within walking distance of two schools, so it is ideal for environmental studies. Our Conservation Committee has reached out to these schools to develop programs for studying the area and using it as an outdoor laboratory. The deer enclosure is a place where the school children can observe a healthy forest free of the negative influence of deer overpopulation.

The Conservation Committee has worked very closely with Dr. Sarah Webb, a professor of Ecology at Drew University, to develop an appropriate plant material list, and she is a continuing source of information for us. To date, 15 two to three inch caliper trees have been planted, more than 100 ferns and wildflowers, and 25 native shrubs appropriate to the area. All plantings are evaluated for deer resistance. Last fall, a local landscaper volunteered to plant 500 daffodil bulbs.

Removal of the invasive plants, particularly the Japanese knotweed, has yielded quick recovery of the land, and the new native plants are developing nicely. Going forward, the committee will purchase and plant more of

the successful native plants, and continue an energetic program of community outreach.

*Lois Wolkowitz, Club Conservation Chair
The Garden Club of Madison (IV)*



Deer in the Natural Landscape Zone V

The deer population in Delaware, as in other states, today far exceeds that of colonial times. In some areas a Department of Natural Resources and Environmental Control (DNREC) flyover reported 200 deer per square mile—ten times the optimal population. This population explosion threatens not only our gardens but our forests and open lands. As we fence and spray to protect our gardens, we force the herds onto unprotected land, where they threaten native plant populations and the animals that rely on them for food and shelter. As stewards of the land, we need a comprehensive plan that doesn't simply shift the burden to the next garden, town, or unprotected forest, but considers regional environmental,

social and economic factors.

“Deer and the Natural Landscape” was the subject of a symposium held by the Garden Club of Wilmington in October 2006 to start a dialogue to address this problem. Howie Scott, chair, reported that about 100 people attended the all-day meeting at the Delaware Nature Society's Ashland Nature Center. Among the participants were speakers with expertise in wildlife biology, deer management, habitat protection, and woodland restoration from Delaware, Pennsylvania, and New Jersey. They included:

Dr. Emile D. DeVito, Manager of Science and Stewardship at the New Jersey Conservation Foundation;

Eugene G. Moore, Wildlife Section Administrator for the Delaware Division of Fish and Game;

Dr. Christopher S. Rosenberry, Deer Management Section Supervisor of the Pennsylvania Game Commission; and

Dr. Jake Bowman, Assistant Professor of Wildlife at the University of Delaware.

The symposium not only resulted in a deeper understanding of the extent of the problem but fostered the beginnings of a solution. The attendees developed an on-going relationship with Jeannine Tardiff-Fleegle of the Pennsylvania Game Commission, who offers advice on deer management and reports on trials conducted with a deer feeding station donated by the Garden Club of Wilmington. The Game Commission also utilizes the Garden Club of Wilmington as a means to get their message out as they try to address differing deer management needs across the state.

Gardeners appear to be very concerned about these issues. Discussions continued in April 2007 at the Stroud Water Research Center in Avondale, Pennsylvania, where the Brandywine Conservancy and the Cheshire Hunt sponsored a discussion entitled "Restoring Vitality to the Eastern Forests: Solutions for the Deer and Invasive Plant Dilemma."

Garden club members who live in regions affected by overpopulation of deer can make an important contribution to finding solutions to this complex problem by becoming involved in this kind of local study and dialogue.

*Ann Biggs, Club Conservation Chair
Garden Club of Wilmington (V)*

The Garden Club of Norfolk's Conservation Forum Zone VII

After attending the Garden Club of America's 2006 NAL Conference in Washington, D.C., members of the Garden Club of Norfolk decided to bring the issue of global warming back to the Hampton Roads community in the southeastern region of Virginia. The Conservation Committee of the Garden Club of Norfolk joined with the Harborfront Garden Club Conservation Team to create a forum entitled "Global Warming: Should Hampton Roads Be Concerned?" This very successful event, held

at Saint Patrick's Catholic School in Norfolk, Virginia in January 2007, educated close to 400 guests, including residents, students, activists and public officials.

The forum's panel was made up of experts including Dr. Brenda Ekwurzel, a climate specialist with the Union of Concerned Scientists, who presented *A Global Overview*; Dr. Carl Hershner from the Virginia Institute of Marine Science, who addressed *The Local Picture: Impacts of Change on Hampton Roads*; Lisa Carter Moerner from Dominion Virginia Power who discussed environmental policy to reduce emissions; Rob Jones from the Virginia Climate Initiative who addressed *Virginia's Market Based Solutions to Climate Change*; Clay Bernick discussing *Virginia Beach's Commitment to U.S. Mayors' Climate Protection Agreement*; and John Deuel from the City of Norfolk, who presented *Local Initiatives to Promote Energy Conservation*. Pat McReynolds, the evening new anchor from WTKR Channel 3, served as the moderator for this panel.

The consensus of this balanced panel was that Hampton Roads should definitely be concerned about global warming. Potential for local problems ranged from increasing ocean levels and flooding which would result in moving major infrastructures within the region to earlier springs, warmer summers, and changing migratory patterns of birds, fish and wildlife.

After a spirited question and answer session, the forum concluded. However, local media brought concerns raised at the forum to the attention of the public. Two television sta-

tions aired interviews with our speakers on the evening news, and several articles appeared in the press emphasizing the need for planning, as well as suggestions concerning how each of us can preserve and protect our natural environment.

*Gillian Cady, Club Conservation Chair
Ruth Acra, Club Bulletin Chair
Garden Club of Norfolk (VII)*

“How Green Is Your Mansion?” Zone VIII

This spring the Founders Garden Club of Sarasota staged a small flower show at the Girl Scout Headquarters in Sarasota, Florida. Because the Headquarters is one of the first green buildings in the area, our conservation committee decided to do something about green buildings for the show’s conservation exhibit. I guess “How Green Was My Valley” and “Green Mansions” must have been in the back of my mind, because I came up with the title “How Green Is Your Mansion?” While I was wondering how to carry out the idea, I found a wonderful small Victorian dollhouse in Maine and back I came to Florida with this little gem. Perfect! We mounted the dollhouse on a 2 ½-foot turntable and made a wonderful, “shell lawn” with trees to shade the house, a composter, solar panel and natural plants. We added renewable wood flooring, old appliances to be updated, insulated attic walls, fluorescent light and many other articles on the inside. Tiny signs in the same colors as the sections on a 3-panel educa-

tional screen pointed out some of the features that we listed in accompanying notebooks.

The notebooks were the result of our research. My committee and I cut out articles from newspapers and magazines, searched the Internet, called and visited knowledgeable people and realized that the subject of “green” had burgeoned to such a degree that it was hard to know where to start and stop. We summarized our findings on a screen with three panels color-coded to the following sections:

Energy Efficiency: A Bright Idea (yellow)

1. Catching rays—saving energy and money
2. Be power smart—reduce your “carbon impact”

3. Get fired up about heat
Home Green Home (green)

1. Sick building syndrome
2. Toxics around the house
3. Toxics outside the house

Conserve Nature’s Products (blue)

1. Use products made from renewable woods
2. Save water inside and out
3. Recycle

Our notebooks were made with a colored page for each of the above sections and short lists of ways to improve “your own mansion.” We hope that our little house will inspire gardeners and flower arrangers to use our research to green up their properties as we did our little house.

*Fluff Thayer, Club Conservation Co-Chair
Founders Circle of Sarasota (VIII)*

Gulf Stream Reef Rescue Zone VIII

Coral reefs around the world are declining, to the consternation of those who are aware of the problem. The coral reefs of the planet are challenged with a complex mix of threats. From remote Pacific islands to the South Florida coast, coral bleaching and disease are degrading reef systems.

The coral ecosystems of Palm Beach County (PBC) have escaped many of the negative impacts seen elsewhere. The Gulf Stream current passes close to shore in PBC. The near-shore reef systems are bathed in and replenished by water from the open ocean and are less effected by terrestrial pollutants than are the counties to the south. As a result, south Palm Beach County's reefs are healthier, suffering from limited and more manageable impacts.

The most obvious and immediate threats to the reef systems are recurring algae blooms. Off the beaches of south PBC, *Lyngbya cyanobacteria* has been killing soft corals since 2002. The blooms are a consequence of excess nutrients in the water and are found down-current of sewage treatment plants' ocean outfalls.

PBC Reef Rescue has documented the *Lyngbya* blooms and compiled four reports chronicling its spread and relationship to nutrient concentrations discharged from the sewer plants. Reef Rescue is working with multiple governmental agencies to control this threat to the local coral reef ecosys-

tems.

PBC Environmental Resources Management officials cited the economic value of the reef, which is estimated to bring \$194 million per year to PBC and to sustain 6,000 jobs.

Ed Tichner, director of Palm Beach Reef Rescue and a retired environmental scientist, identified the outfall from the South Central Regional Wastewater Treatment Plant as a likely source of the nutrients fertilizing the deadly algae bloom. The discharge pipe, which releases about 13 million gallons of treated wastewater, is directly up-current of the reef. It is one of six sewer pipes discharging into the ocean off South Florida. Tichner points out that damage to the reef is isolated to the area crossed by current traveling from the outfall.



Delray Outfall
(Courtesy of Surfrider Foundation)

In February 2007 scientists launched a new phase of tests they say will help them determine what is killing the reef system south of the Boyton Beach Inlet. Delray Beach and

Boynton Beach are paying \$600,000 for the testing as a condition for a permit allowing them to discharge partly treated sewage into the ocean through a pipe south of the reef, even though they have decided to close the pipe in two years. The testing remains a requirement for a permit to operate the pipe for the next two years.

The cities of Boynton Beach and Delray Beach will spend \$17 million over the next two years to build a deep well on the Central Regional Wastewater Treatment Plant's site to dispose of highly treated waste. This unanimous decision by members of the utility will make the outfall pipe obsolete.

This decision was the culmination of a four-year struggle by the non-profit Palm Beach Reef Rescue to draw attention to the effects of the outfall in the nearby coral reef system. Grass River Garden Club joined this effort when Ed Tichner, the director, was invited to present his slide show at its November 2006 meeting.

*Julie Rodawig, Club Conservation Chair
Grass River Garden Club (VIII)*

Sound Bite Zone X

In this day of sound bites and in the interest of brevity, I submit the following. Check out: <http://www.environmentaldefense.org/page.cfm?tagID=1104>. If by chance it doesn't work, google: The BioDaVersity Code – Environmental Defense. It is a

wonderful take on what we have all been talking about. This website recommendation came to me from India Clarke who is the club conservation chairman for The Garden Club of Dayton.

*Joan Gretter
Zone X Conservation Representative
Shaker Lakes Garden Club (X)*



Chartwell School Zone XII

What can increase a student's reading and math skill by 25%? How can sickness among students, including asthma, be reduced by 35%? Can the environment help with students' learning?

All of the above can be accomplished by greening our schools. A green school uses natural daylight and fewer toxic materials in its buildings, and produces energy savings.

A California non-profit organization is working to raise the standards of the state's school facilities. Called The Collaborative of High

Performance Schools (CHPS), its mission is to create “environments that are not only energy efficient but also healthy, comfortable, well lit, and containing the amenities needed for a quality education.”

The High Performance Schools achieve these goals by using integrated design strategies that incorporate the best of today’s ideas and technologies into a whole school building.

Along with CHPS guidelines, the buildings utilize the U.S. Green Building Council’s standards for Leadership in Energy and Environmental Design (LEED), a nationally accepted benchmark for the design, construction and operation of high performance green buildings.

A report by the Ashkin Groups, LLC documents the financial costs and benefits of green schools compared to conventional schools. This national review of 30 green schools demonstrated that green schools cost less than two percent more than conventional schools, or about \$3 per square foot, while they provide financial benefits 20 times as large.

The Carmel-by-the-Sea Garden Club visited the new campus of the Chartwell School on the old Fort Ord officer’s club site in Seaside, California, in March 2007. Chartwell is a K-8 school for students with special needs. Its mission is to educate children with a wide range of language-related visual and auditory learning challenges in a way that can return them successfully to mainstream education. The

student’s health and learning took the highest priority in the design of the campus.

The design was based on both CHPS and LEED principles. The tour of the buildings introduced club members to various “green” features. Large windows and skylights provide natural daylight, which diminishes the need for electricity. The school incorporated solar panels to conserve energy while reducing pollution and operating expenses. Photovoltaic panels blend into the roof and require no storage batteries. Radiant floor heating, excellent insulation and glass selected to conduct light but not heat conserves energy. When fully operating, net electricity use will be zero since the buildings will use 60 percent less electricity than regular school buildings. Water use will also be economical. Chartwell’s buildings will use 60 percent less water than conventional buildings through state-of-the-art fixtures, water-efficient landscaping and a cistern for rainwater storage. This cistern, which has a large exterior gauge, will also serve as a learning tool. In the slide/jungle gym area, cushioning was made from shredded tires fused together over a bed of gravel to create a wonderfully soft surface with adequate drainage.

The entire campus is constructed for future re-use. At least 80 percent of the materials from the demolished officer’s club were recycled instead of sending them to the local landfill. Many of the materials used were designed with the idea of deconstruction. For instance, floorboards from the old Fort Ord buildings were used for interior walls. The boards were planed and then slid into aluminum tracks instead of being nailed. This al-

lows a wall to be disassembled and repositioned to accommodate changing space needs in the school. Exterior walls were made from redwood wine vats. New lumber used in the buildings was sustainably harvested.



“The library is located on the stage during Phase I, with large barn doors connecting to the Multi-Use. The T & G wood paneling was milled from deconstructed barracks at Fort Ord.”

(Courtesy of the Chartwell School)

Environmentally sound elements also contribute to a healthful environment for children and their teachers. For example, by using “green” concrete, CO₂ emissions were cut by more than 60 percent. (Conventional concrete production causes greenhouse gas emissions worldwide.) All materials and furnishings used in the buildings were designed to eliminate the air pollution from volatile organic compounds.

Acoustics are especially important for Chartwell students, since some have difficulty hearing sounds accurately, and others

must work hard to focus attention. The campus was designed and built to eliminate or greatly reduce mechanical and outside noise, and to improve communication within each classroom.

The structural elements of McMahan Hall, the assembly hall, were left exposed so that children could be shown how it was constructed. Tension rods on the ceiling allowed roof beams to be ¼ the thickness of normal beams. Framing was done 24” on center instead of the usual 16” this greatly reduced waste by eliminating cuts as well as using less wood.

In the case of the Chartwell School, building costs ran approximately ten percent above those of a conventional school design. Though the increased costs were significant the school remains resolute in its belief that the CHPS and LEED design makes a difference: “Using the life cycle cost analysis, which includes savings on operating costs, the high performance, green features of their new campus will eventually more than pay for themselves, and result in long-term savings in operating cost. They will also enhance learning outcomes for students.”

*Bonnie Brooks
Susan Osborne, Club Conservation Chair
Carmel-by-the-Sea (XII)*



BOOK REVIEW

Romm, Joseph J. Hell and High Water: Global Warming—The Solutions and the Politics—and What We Should Do. New York: William Morrow, 2007.

Imagine a late 21st century America in which we had to choose how to allocate our resources in order to save Seattle or New York City, Boston or Miami. Such “urban triage” is the type of crisis toward which Joseph J. Romm, MIT graduate and former acting assistant secretary of the Department of Energy, fears we’re headed if we don’t act now to avert the tragedy. In *Hell and High Water*, Romm doesn’t back away from apocalyptic projections, considering the possibility that unchecked growth in greenhouse gas emissions might create “half a billion environmental refugees,” with a billion or more affected by shortages of food and water.

Romm believes that existing forecasts have likely underestimated the planet’s reaction to anthropogenic (human-caused) global warming. He points out that carbon dioxide levels are rising 200 times faster than at any time in the last 650,000 years and that nearly every major climate model shows global warming occurring faster than predicted. The earth is already hotter than at any time in the past 125,000 years. He worries that, left unchecked, global warming will plunge us into a “planetary purga-

tory” by 2025-2050. The kind of heat wave that was responsible for 35,000 deaths in Europe in 2003 might be the norm. On our current emissions trajectory, by 2200 we will be more than 3°C warmer than we are today. Romm warns that Earth hasn’t been 2° to 3°C warmer than it is now for some 3 million years, when sea levels were more than 80 feet higher.

Current emissions, he says, are forcing Earth to warm. Resulting “feedbacks” reinforce warming so that the planet heats up ever more quickly. How do “feedbacks” increase the rate of change? For instance, warming causes sea ice to melt and glaciers to retreat, then additional warming increases evaporation and water vapor in the air, which leads to the soil, tundra, and oceans to release carbon dioxide or methane. Although nearly 60 percent of our emissions stay in the atmosphere, Romm says that the 40 percent that gets absorbed by geological “sinks”—the oceans, vegetation, and soils—may be in danger. Oceans are becoming less efficient at absorbing CO₂ and some soils are beginning to release their carbon. Moreover, the Arctic permafrost, tundra, and frozen peat are warming, potentially ready to open “a locker of carbon” into the atmosphere.

How do we address a climate system poised for disaster? Romm proposes a clean energy future for America, which calls for adopting a California-style energy strategy nationwide. This would, he reasons, decrease our dependence on foreign oil, offer health benefits, and provide high-wage jobs. Romm updates and modifies a strategy published in 2004 by Princeton researchers. It calls for replacing

the growth in U.S. energy needs using existing technology. An “aggressive five-decade-long effort” could be adopted by America and the rest of the world, with solutions that include the implementation of California’s performance-based efficiency programs and building codes, increased efficiency and cogeneration of power, wind turbines, carbon capture and sequestration, a doubling of the nuclear power plants worldwide, an increase in fuel economy, and cessation of tropical rainforest deforestation combined with doubling the rate of new tree planting. Romm maintains that this plan would save “the world from mispending trillions of dollars in polluting, inefficient capital over the next quarter-century.”

If we have the technology to solve the problem right now, what is lacking? Romm spends much of the rest of the book attempting to underscore his answer: “political will.” He argues that conservative leaders, cast as either Denyers of the scientific legitimacy of global warming or Delayers of meaningful legislation to slow it, have been winning the public debate. Schooled by professional political strategists, they are superior rhetoricians, who can repeatedly emphasize key points that undermine public action on global warming. Whether it’s the Denyers conveying the false message that scientists disagree or the Delayers saying that we should wait for technological advances, their messages have succeeded in casting doubt.

Although Romm states, “Global warming should not be a partisan issue,” he may un-

wittingly contribute to drawing political battle lines. At times, he seems so consumed by the magnitude of the problem that his fear and frustration are palpable. This is a minor quibble, however, in a book that’s certain to become an important reference work on climate science and policy.

Romm aptly ends with Dante: “The hottest places in Hell are reserved for those who in time of great moral crises maintain their neutrality.” If there is, as Romm argues, only a decade to reverse course, we must act now to reduce global warming, and *Hell and High Water* provides an excellent beginning.

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Remember, Con Watch is *your* conservation publication. Your ideas, your contributions and your suggestions are needed and welcomed. *Sarah Swinerton, Editor.*

