

# The Chattooga Quarterly

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Spring \*\*\* 2003

# Celebrating Conservation Solutions



A clump of Dwarf irises greets the spring. photo by Kathryn Kolb

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# **Director's Page**

## **Buzz** Williams

Our rapidly changing world presents new challenges that threaten our environment and quality of life. We at the Chattooga Conservancy believe conservation will play a vital role in solving some of these problems. Inside you will learn what we have discovered about fuel efficient cars, "green" building, and sustainable agriculture. We would also like to invite you to help us celebrate the return of spring and the coming of summer. Read about and please attend our spring Conservation Fair, bird walks, and Summer Solstice Celebration and Fundraiser. Also, don't forget to check the update page for latest happenings and what you can do to help protect the Chattooga watershed.

First, some thoughts about spring. Last quarter I wrote a satire about the "Bush" regime. As predicted some liked it

and some didn't. As reactions shook out, it seemed that those who are pushing for strong reform liked it, but some thought it sounded more like ranting and raving (hey, you should have seen the unedited version).

But this spring has caused me to pause and reflect about the coming challenges. The lush, white dogwood blooms dominate across this spring's landscape of wildflowers and verdant new growth in the forest. The melodic song of the wood thrush from the deep groves inspires pause for reflection and rededication to protecting the natural world so vital

to our own existence. The threats to this world that I know lie veiled beneath the overwhelming beauty of spring are a sobering reality. Yet, the power of nature gives me great hope for the future.

While enjoying the dogwoods, it would be easy to lie back and ignore the proliferation of the pests that threaten our forest, the unchecked land disturbance that pollutes our waters, or the corporate exploitation of our natural resources. It was only a few years ago that forest pathologists were predicting that up to 90% of our wild dogwoods would be killed by a virulent strain of anthracnose. Indeed, if one looks closely into the more shaded forest there are many dogwoods that have already succumbed to the disease. But, right now the beauty of those that remain make it hard to dwell on the negative. For all things there is a season, as the old verse tells us. So we should all take this season to appreciate what is still beautiful and to reflect—while not forgetting that the disease still lurks beneath the flowers.

This "rite" of spring, to celebrate and appreciate nature, has

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ultimate provider.

deep roots in ancient human culture. From the dawn of our existence people have intuitively believed that control over cosmic forces by a "transcendent providence" sustained the universe. In other words they believed that honoring the forces of nature as the ultimate provider of food, shelter, and beauty was an essential "sustainer" of life. These early people celebrated in the spring on the closest full moon to the vernal equinox, when the beauty of spring gave them new bounty and a time to pause and give thanks to natural forces.

This notion of sustainability in our modern society has often been the central concept in defining conservation, yet the term has been so abused and ill defined that the real power of the word has become obscured and even vilified as an empty generality. Aldo Leopold defined conservation as living in harmony with nature. Like the ancients, Leopold

> had discovered the meaning of sustainability in terms of looking to nature as the ultimate provider. His landmark work, A Sand County Almanac, has gone largely unheeded in our world of big corporations that dominate the political landscape by proliferating a philosophy, largely through campaign contributions and institutional grants, that substitutes a free market system for a reverence of nature. In a world where most people live in urban areas where obvious connections to nature are less apparent, people have lost touch with nature and begun to believe in the artificial systems of

technology and money as a panacea for problems that <u>are</u> becoming more apparent such as deforestation, global warming and pollution. In doing so, we have become less cognizant of the damage we are inflicting on the Earth by measuring quality of life by the NASDAC instead of air and water quality, and biological diversity.

Maybe this spring we can simplify our lives and get back to basics. First, let's take time to reflect and appreciate the bounty of nature while keeping in mind that the idea of conservation is ancient and as embedded in our collective conscience as the morality of being good to one another. We should also refuse to succumb to the easy path of denial. Appreciating what we have should make us more adamant about protecting nature. During this season of celebration and reflection I think we should recommit to offering solutions based on the time honored principles of natural resource protection while fighting the forces that irreverently exploit the very thing that sustains us all. Let's keep it simple: a healthy human society is dependent upon a healthy Earth.

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CONSERVATION FAIR

Saturday, May 31st 10 a.m. to 5 p.m. RAIN OR SHINE! 2368 Pinnacle Drive Clayton, GA 706-782-6097

- 10:30 Lloyd Ameach Cherokee Storytelling
- 11:30 Carolina Kids' Conservancy Wonders of Wildlife Presentation featuring live animals
- 12:30 Marie Mellinger Conservation Award
- 12:45 Music Will & Betsy Dean
- 1:30 Llyod Arneach Indian Artifacts
- 2:30 Wonders of Wildlife
- 3:30 Music by Joanne Steele

Kids Activities - Make projects from recycled materials with Enviro-Scope Refreshments by Inger's Fine Foods Arts & Crafts Show Local Produce - Simply Homegrown Community Market Meet Conservation Groups from around the Southeast

# Chattooga Conservancy's Solstice Celebration Saturday, June 21st 5 p.m. to 10 p.m.

Community Conservation Center 2368 Pinnacle Drive Clayton, Georgia on the corner of Warwoman Road 8/10 mile from Hwy. 441

JOIN US FOR A FUN FILLED FAMILY EVENT

MUSIC - 2 LIVE BANDS DANCING LIVE AND SILENT AUCTIONS AWARD WINNING BBQ HOME MADE CAKES GAMES & MORE!

If you would like to donate an item for auction, bake a cake or cookies, or help in any way - please call 706-782-6097

# **Restoring Food Systems**

#### Eric Orr

"Growing your own food is better I guess, but I believe it's cheaper just to go to BI-LO." I was getting our garden ready at the Chattooga Conservancy office when a guy stopped to see what I was doing. I told him I was trying to get folks interested in buying and growing sustainably produced food, and that's what he said. Yep, it's true. Growing food is a lot of work. And buying locally grown produce sometimes costs a little more. Besides, the grocery store is full of cheap stuff. But it's really not that cheap.

In fairly recent years food trade has eroded from local, community-based markets into the flood of global commerce. Better storage systems and cheap gas allows food to be kept "fresh" longer and shipped farther. Today, produce in this country typically travels between 1,500 and 2,500 miles before it reaches the grocery store. That distance is 25 percent farther than it was in 1980, and distances are 50 percent farther in the United Kingdom.

Much of the food sold on the global market is relatively low in nutrition when compared with the high water content that makes shipping inefficient. The caloric value of fresh fruits and vegetables, for instance, is a small fraction of the energy required to transport them. According to the Worldwatch Institute, when a head of lettuce is shipped from California to Washington D.C., it uses 36 times more energy to travel than the caloric energy it provides. When the same lettuce ships to the United Kingdom, it uses 127 times more energy. To survive such long trips, food often depends on chemical preservatives, wasteful packaging, and excessive energy for cold storage. In addition, much of the original flavor and nutritional value is lost in transit, and extensive handling means food is subject to more potential for contamination by toxins like E. coli. In many cases food is unnecessarily transported due to the distribution policies of large grocery store chains. These chains have centralized facilities that process all produce to be sold by the stores. So food is frequently sent hundreds of miles to a distribution center and then sent back and sold in the city where it was grown. When buying produce from the grocery store, the average consumer has no idea where it originated, how it was grown, or what happened to it as it made its way across land and water.

Not only is food quality compromised by global food trade, but it simply does not make sense economically. Large corporations seem to be the only beneficiaries. When a company like Wal-Mart, the world's second biggest food retailer, moves into a community, the impact shakes that local economy, as well as the farm economies that supply the mammoth grocery sellers. They strangle local businesses by purchasing massive quantities of produce and selling it cheap. Money that would otherwise support local farmers helps feed a corporate giant and ultimately large commercial farms, both domestic and foreign. Since buying In an effort to raise awareness about the benefits of community-based sustainable food systems, the Chattooga Conservancy has started a sustainable agriculture program. Please join us for Patricia Howell's presentation on June 5th (see below), and watch for future seminars and workshops on organic gardening and community supported agriculture (CSA). As part of the program we have built a garden at our office and will be participating in the Simply Homegrown Community Market this summer. We are also compiling a directory of local CSAs; please contact our office at if you are interested in starting or joining a CSA.

Please join us June 5th, 7:30 pm at the Chattooga Conservancy office. Patricia Kyritsi Howell, president of Georgia Organics, will speak about local sustainable food systems.

The **Simply Homegrown Community Market** will begin its second season at our Conservation Fair on Saturday, May 31<sup>st</sup> (see p. 3). Simply Homegrown will continue every Saturday through Labor Day at the Hambidge Center Gallery (located on highway 441 across from the Rabun Gap-Nacoochee School), from 9am until noon. This year the market will be open to South Carolina growers in addition to Georgia growers. For more information call the Chattooga Conservancy office at 706-782-6097.

## More Farmers' Markets

## **Cleveland Farmers' Market**

Saturday 8 am to 12 noon, through October 455 Cantrell Rd., Cleveland, GA, sign for "Featherwood Gardens;" *for more information contact Liz Simmons* 706.219.4437 *or Johnna Puttle* 706.348.6709

## Morningside Farmers' Market

Saturdays, 8-11:30 am, thru Christmas, weather permitting 1397 N. Highland Avenue, NE, Atlanta, in the parking lot next to Indigo Coastal Grill *for more information contact Margaret Putnam*, 770.787.7300, hazelb@mindspring.com

## **Farmers Market at Spruill Gallery**

August 28 through December, EVERY WEDNESDAY, 8am to 1pm. 4681 Ashford Dunwoody Road, Atlanta— Spruill Gallery. Locally grown, organic, fresh fruits, vegetables, herbs and flowers.

for more information: 770.394.4019 www.spruillarts.org

from several small suppliers is inefficient for a huge company like Wal-Mart or McDonald's, they rely on a few big commercial farming enterprises. Farm communities are weakened as the farms utilize outside resources and services, causing local money to slip away. In 1910, over 40 cents for every dollar spent on food in the U.S. went back to the farm community. By 1997 the share had slumped to 7 cents. The delicate economies are further degraded as the large operations make it difficult for smaller

# **Restoring Food Systems**

## farmers to compete.

Aside from the immense quantities of pollution generated by shipping foodstuffs across the world, big farms geared for global markets severely degrade the environment. These farms generally grow only one or two crops, which requires the use of chemical fertilizers, pesticides and herbicides for marketable harvest. And the chemical residuals get passed on to the consumer. Diversity is key for successfully growing food without unnatural additives. Growing a wide variety of plants ensures that the entire crop will not succumb to predation or disease. It is also easier on the soil, as it preserves nutrients for future generations of plants.

Perhaps the most ridiculous characteristic of international trade occurs when a nation imports and exports equivalent amounts of the same commodity. Trade agreements and transportation subsidies encourage and even oblige U.K. farmers to sell their products to outside buyers, while the country buys equal amounts of the same goods. The practice of international trading simply for the sake of

trading is wasteful and unnecessary.

Buying locally grown food gives the customer the distinct advantage of knowing where that food originated. It also means truly fresh, flavorful produce free of handling by unknown hands and the pollution associated with excessive transportation. It establishes a direct connection between grower and consumer and instills a sense of community that encourages stronger bonds. A farmer who knows his customers personally has more of a



Laura Brams, Jason Mann, and Daron Joffe show off some of their hard work at Full Moon Farms in Athens, Georgia.

vested interest in his neighborhood. He will likely treat his crops and the land that supports them with greater reverence and care. More money is cycled back through the local economy. The result is a healthier economy, a healthier environment, and healthier and happier people.

Communities throughout the world are helping to rebuild their foodsheds through community supported agriculture (CSA) schemes. The CSA model cultivates sustainable agriculture by bringing together responsible farming and strength of community. A CSA farm sells subscriptions in advance to members of the local community. The members are then guaranteed a regularly scheduled share of produce. This way the risk of an under-productive growing season isshared by the whole community. But growing a diverse assortment of crops helps diminish the risk. Diversity also means less dependence on chemicals, which is easier on the land and the consumer. The membership fee can be in the form of money, labor, or a combination of both. Some CSAs use sliding price scales based on income, which makes fresh healthy produce available to anyone. Members have personal connections with food by getting to know the farmer, the land, and the growing methods. The bonds of community are thus strengthened, and a higher percentage of food money stays in the local economy. Chemical pesticides, herbicides, and fertilizers are in most cases eliminated, while fossil fuel pollution is drastically reduced. And the food retains more of its original nutrient value and taste. The CSA concept helps create a socially, economically, and environmentally sustainable community.

There are now over 1,000 CSAs in the United States, a big jump from just 1 in 1985. However, the Southeast, still largely dependent on an agricultural economy, has been slow to catch on. There are currently less than 10 CSA farms in Georgia. Full Moon Farms, a recently established research farm in Athens, GA, has dedicated a small portion of their land to CSA farming in an effort to demonstrate the

> viability of local sustainable agriculture. Their objective is to utilize 3 acres to supply 30 families with a weekly share of fresh vegetables, herbs, and cut flowers throughout a 22 to 24 week growing season. Five additional acres are planted with cover crops in anticipation of a growing member base in coming years. A full share costs \$495 (about \$22.50 per week) and provides enough fresh produce to feed 2 vegetarians or a family of 4 who eat vegetables daily. A half share costs \$325 (about \$15 per week.) All shares must be paid in full by June 1 and can be picked up weekly in Athens or

Atlanta. The farm also offers a worker share program.

A drastic change in agricultural practices is essential to restoring the ecological integrity of our planet, and it could establish stronger foundations for local economies. Changing status quo on a grass roots level is not nearly as difficult as it may seem. A simple change of habit makes a powerful statement for what we choose to accept. So as a bountiful summer approaches, take the time to visit a local farmers' market and support a local farmer. Taste the difference and make a commitment to incorporate local produce into as many meals as possible. Build a garden or consider joining a CSA if you have one nearby. Or think about starting a new CSA. Lasting change does not have to occur overnight, so plant a seed today and watch it grow.

## Carol Greenberger

The fuel of the future is a topic in the news daily, spurred on by rising gasoline prices, dwindling fossil fuel supplies and the threat of terrorism and war. While it is clear that generations to come will drive vehicles powered differently than ours of today, it is not clear what technology will ultimately fuel the average motorist's automobile. The array of different technologies being explored and researched to move our cars and trucks down the road ranges from solar power to fuel cells to biodiesel, and even straight-out-of-the-fryer used vegetable oil. The good news is that almost anything currently being researched is more environmentally friendly than our gas-guzzlers of today. Not only is the actual energy efficiency of each type of fuel important, the environmental cost of producing each type of fuel is crucial as well. The ultimate test will be which technology can run the cleanest while still being affordable, practical and feasible to produce and use.

motorists after the gasoline-powered vehicle was developed. Today, batteries are still heavy and expensive and the cars cannot be driven long range without recharging. However, in terms of energy efficiency, total electric vehicles top the list of vehicles in use today. The electric vehicle has an energy efficiency of approximately 72 percent. This means that 72 percent of the electricity used to power the vehicle is converted into mechanical work. The problems with range and recharging in total electric vehicles led to the development of the more practical alternative, the hybrid electric vehicle.

Hybrid electric vehicles (HEVs) combine the standard internal combustion engine of a gasoline-powered vehicle with the battery and electric motor of an electric vehicle. The combination provides drivers with extended range and quick refueling as well as energy and environmental benefits. Instead of plugging the battery in to recharge it, power comes from the vehicle's engine itself, by recovering energy when the

The history of the automobile includes some of the alternatives that are being explored once again today. New technology is available that can solve some of the problems that made these alternatives unworkable earlier. The realization that our supply of fossil fuels is finite is also turning researchers back to methods that worked but were left by the wayside when oil prices were low and environmental concerns were not an issue.



Though short-lived, the first cars were powered by steam.

The first vehicles on the road were powered by steam engines. Passenger vehicles powered by steam were experimented with in the 1800s. They proved impractical because they were hard to start and operate, as well as frightening, with their dependence on an open fire and hot steam. But steam powered vehicles are still around, and instructions for converting a Volkswagen Beetle to run on steam can be found on the Internet. The British Steam Car Challenge, a project to design and construct a steam powered vehicle capable of setting a land speed record, is working to promote education and awareness of clean burning fuels and ecologically sound technologies.

The electric car became the most popular vehicle in America during the late 1890s and early 1900s. They were easy to operate, quiet and did not emit the stinking fumes that came from the burning coal used to power steam vehicles. However, due to limits in battery technology, electric vehicles' batteries had to be recharged every 50 miles and the vehicles could not travel faster than 20 miles per hour. These drawbacks made electrics less attractive for driver's foot is lifted from the brake pedal, or another gear is engaged in a manual transmission vehicle. Drivers of HEVs say that it is barely noticeable when the motor shuts off and restarts.

electric motor restarts the engine when the

The HEV is not a zero emission vehicle because of its internal combustion engine, but it does cut harmful emissions by a third to a half. The environmental cost of driving an HEV is also determined by where the electricity to power the vehicle was generated. Hydroelectric plants, solar power and wind power generate electricity cleanly and do not use any fossil fuels. Power plants using a combustion process are only 40 percent fuel-efficient. The whole picture, including fuel production, vehicle production, and the vehicle's use of fuel, must be considered as relevant.

Currently, Honda and Toyota market HEVs in the United States. In the next few years Ford, GM, Chrysler and Lexus will also have models available. In 2002 electric vehicles

numbered 19,755, up dramatically from 4,453 only five years earlier.

Solar powered vehicles use photovoltaic (PV) cells to convert solar energy to electricity. The electricity produced can be directly used to power an electric motor or to charge batteries. When the sun is not shining a solar powered car must use the electricity stored in its batteries. PV cells are being experimented with in some prototype electric vehicles to extend the vehicle's driving range. This auxiliary use of PV cells in vehicles is more practical today than the concept of a solely solar powered engine.

The gasoline automobile with its internal combustion engine gradually replaced steam and electric vehicles. Gasoline was first produced as a by-product of kerosene. Originally there was no known use for gasoline and it was often dumped into creeks and rivers by the refineries. With the advent of the internal combustion engine, gasoline was in demand. Processes that were introduced to increase

gasoline production also improved the quality of the fuel. America's love affair with the car and dependence on oil had begun.

The fuel efficiency of today's gasoline powered vehicle is surprisingly low. Only about 15 percent of the fuel put in a gas tank is used to move the car down the road and run comfort accessories such as air conditioning and power steering. The rest of the energy is lost. Where does it go? About 62 percent is lost to

engine friction, engine pumping losses and waste heat. In city driving, 17 percent is lost idling at stops or in traffic. Driveline and accessories account for another 7 to 8 percent of losses. The remaining energy is used in braking, aerodynamic drag and rolling resistance. All of these uses of energy offer opportunity for improvement in fuel economy. Lighter weight materials, advanced tire designs and smoother vehicle shapes are all being worked on to improve overall fuel efficiency.

Diesel engines power heavy trucks, construction and agricultural equipment, some cars and most commercially operated boats. Invented in 1895 by Dr. Rudolph Diesel, the compression ignition engine was originally designed to run on peanut oil. Diesel demonstrated the engine at the World Exhibition in Paris in 1900. In 1912 Diesel said, "The use of vegetable oils for engine fuels may seem insignificant today. But such oils may become in the course of time as important as the petroleum and coal tar products of the present time." After Diesel's death, the design of his



The internal combustion engine is highly inefficient due to energy loss through friction.

engine was modified to run on diesel fuel, a cheap byproduct of petroleum. Clean vegetable oil was forgotten as a renewable source of power until the oil crisis of the 1970s. Rising gasoline prices and fear of being cut off from oil supplies led to a renewed interest in Diesel's original ideas. European researchers perfected the chemical process to make biodiesel fuel from vegetable oil. Biodiesel is now sold commercially in America, Europe and Australia. Currently more than 100 commercial fleets use biodiesel. Biodiesel is made from vegetable oil, alcohol and a catalyst. The fuel is easy to make, can be used in any diesel engine, and drastically reduces tailpipe emissions. Biodiesel can be made from any vegetable oil including soy, canola, sunflower, hemp, coconut, and even used cooking oils or animal fat. Using biodiesel requires absolutely no engine modifications; it is just poured into the fuel tank. It even mixes with conventional diesel fuel. And best of all. exhaust from vehicles run on biodiesel smells like popcorn or French fries.

> Use of vegetable oil has been taken one step further. Kits are available to convert a diesel vehicle to run on straight vegetable oil, eliminating the need to make biodiesel. The converted vehicle is started using diesel or biodiesel and a heater warms the vegetable oil up to an operating temperature of 160 degrees. After a few minutes, when the oil is warm enough, the engine switches to the extra tank containing vegetable oil. The vehicle is switched back

to diesel or biodiesel to clear the lines of vegetable oil before being turned off. In the summers of 1997 and 1998, author and filmmaker Joshua Tickell drove his "Veggie Van" over 25,000 miles across America, fueling up with used oil from fast food and small restaurants. His book, *From the Fryer to the Fuel Tank - The Complete Guide to Using Vegetable Oil as an Alternative Fuel*, chronicles his experience and includes instructions for converting a vehicle and producing biodiesel.

Liquefied petroleum gas (LPG), commonly known as propane, is the third most common fuel used in vehicles today, after gasoline and diesel. Propane is chiefly used by commercial fleets, thanks to federal regulations established in the Energy Policy Act (EPAct) of 1992, requiring fleets in designated metropolitan areas to purchase alternative fuel vehicles. EPAct authorized alternative fuels must be substantially non-petroleum and offer an environmental benefit. Included is methanol and ethanol, biodiesel, propane, natural gas, hydrogen, electricity and coal derived

liquid fuels. Propane burns cleanly, producing 60 percent less ozone forming emissions than gasoline burning vehicles. LPG vehicles can be designed to run solely on propane or as bi-fuel vehicles that can operate on either propane or gas. Propane is the most accessible alternative fuel today. In 2002 there were over 280,000 on-road propane vehicles. In 2000, Georgia had 14,309 alternative fuel vehicles (AFVs); 58 percent of these were propane. North Carolina had 11,171 AFVs, including 81 percent propane, and South Carolina trailed with 4,847 AFVs, 78 percent propane. Not surprisingly, California led with over 67,000 AFVs, 47 percent of which were propane. In total, United States motorists drove 455,906 AFVs in 2000; 60 percent of those were propane. vehicles (FCVs) themselves. A fuel cell operates like a battery in principle. However, unlike a battery, a fuel cell will produce energy as long as fuel is supplied, without requiring recharging or running down. A fuel cell is made up of two electrodes surrounding an electrolyte. Oxygen passes over one electrode and hydrogen over the other, generating electricity, heat and water. The reaction in a single fuel cell produces about 0.7 volts. In a vehicle, many separate cells must be combined into a fuel cell stack. The oxygen needed for the process comes from the air outside and the hydrogen must be stored on-board. The vehicle is propelled by electric motors. A typical configuration would include a highly pressurized hydrogen tank in the rear of the vehicle, a fuel cell stack, a battery and an electric motor.

Compressed natural gas (CNG) vehicles succeed in burning cleanly, but still rely on a fossil fuel. These, like propane vehicles, can be single or bi-fueled vehicles. In 2002 there were 126,341 CNG vehicles on our roads. Liquefied natural gas (LNG) is also produced from natural gas that is extracted from underground reserves, composed primarily of methane. These fuels are mostly used in heavy-duty trucks and transit buses.



This schematic shows the layout of a pure hydrogen fuel cell vehicle. The hydrogen is stored in a highly pressurized tank.

Fuel cells are in the

forefront of energy stories today. President Bush, in his State of the Union address, announced a \$1.2 billion hydrogen fuel initiative to spur the development of fuel cell powered vehicles. "A single chemical reaction between hydrogen and oxygen generates energy, which can be used to power a car producing only water, not exhaust fumes," Bush said in his speech. While this is certainly true, there are major obstacles to consider before we can begin using fuel cells in our vehicles. The President's initiatives recognize the current cost and technical barriers for fuel cells; hydrogen is four times as expensive to produce as gasoline, new technology is needed to create adequate hydrogen storage systems, and fuel cells are now ten times as expensive as an internal combustion engine. The other questions concern the energy used and pollution created in producing hydrogen.

First, let's understand fuel cells and fuel cell powered

much less than what a gasoline powered vehicle produces. While on-board reformers add to the cost of a vehicle's fuel cell system and can affect the performance of the cell over time, being able to use gasoline would not require a new fueling infrastructure to be built immediately. It does however greatly affect the vehicle's fuel efficiency. A FCV powered with pure hydrogen is 80 percent efficient. That means that 80 percent of the energy content of the hydrogen is being converted into electrical energy. When a reformer is added to the equation, the efficiency of the vehicle drops to about 25 to 30 percent.

FCVs fueled with pure hydrogen do not emit pollutants. Only water and heat are produced. The vehicles using hydrogen rich fuels and a reformer produce only small .

FCVs can be

fueled with pure

hydrogen or with

hydrogen-rich

fuels, such as

natural gas or

even gasoline,

that have been

converted into

hydrogen gas

board reformer.

breaking the fuel

hydrogen for the

fuel cell. carbon.

water. Although

is generated, it is

·carbon dioxide

using an on-

The reformer

acts as a

miniature

refinery,

down into

dioxide and

methanol,



Whether the vehicle of the future is powered by electricity, hydrogen, the wind, sun or vegetable oil, it is clear that change is coming.

amounts of air pollutants. But the environmental cost of producing hydrogen must be taken into account. Where does hydrogen come from and how is it produced? Hydrogen is an energy carrier that exists mostly in chemically bonded forms, such as water or organic material. Energy is required to release hydrogen from its binding in order to use it as fuel. Hydrogen production involves tapping into primary energy sources, such as water, sunlight, wind or fossil fuels.

Today, the most common source that hydrogen is produced from is natural gas. The process, called steam methane reforming, involves heating natural gas within a catalytic reactor in order to strip the hydrogen atoms and introducing steam to free more hydrogen from the remaining carbon atoms. The process is 70 to 80 percent energy efficient and is used to transform about 5 percent of the natural gas used in the United States into hydrogen. About half of this hydrogen created is used to produce ammonia for the fertilizer industry. The next biggest user of this hydrogen is the petroleum industry, which uses it to improve the quality of petroleum fuels. While the efficiency level is high, this method still relies on a fossil fuel to create hydrogen and produces carbon dioxide in the conversion process.

Hydrogen can also be produced from renewable sources, such as the sun, wind and biomass. In Japan a study is being conducted using wind power to convert seawater into hydrogen. Solar and wind power can be converted into hydrogen by electrolysis, the process of separating water into hydrogen and oxygen. Analysts have determined that solar energy could easily supply enough hydrogen to fuel the nation's entire fleet of over 200 million vehicles. Biomass and solid waste can be converted into hydrogen by gasification (extracting gas through extreme heat.) The National Renewable Energy Laboratory is researching producing hydrogen from Georgia peanut shells. Unfortunately, along with the request for funds for the hydrogen initiative, President Bush cut funding for some renewable energy alternatives. Bush also touted nuclear fusion as a promising source for clean and safe hydrogen,

not mentioning the nuclear waste byproduct.

The storage and delivery of hydrogen fuel are the next hurdles to be overcome. Hydrogen production centers will have to be built and storage systems developed. The low energy density of hydrogen gas makes storage and delivery difficult. Hydrogen can be liquefied and delivered to refueling sites with minimal start up costs. But, a large amount of electricity is used in liquefaction, negating the energy saving of using hydrogen. Hydrogen gas can be moved through a pipeline system similar to the natural gas pipelines. This infrastructure would cost hundreds of billions of dollars and several decades to construct. Reforming natural gas into hydrogen is the most likely method of delivering hydrogen for fuel in the near future. Manufacturers plan to produce a limited number of FCVs in the next few years. But these vehicles are not expected to reach the mass market before 2010. Hopefully by then the questions surrounding hydrogen production and storage will have been answered.

America's love affair with the automobile has impacted lifestyles, art, values and music. A 1960s hit song by the Beach Boys about a big, powerful engine, "She's real fine my 409" is a blast from the past. Will tomorrow's tunes declare, "Split my atoms baby, make my motor purr" or "Sun, shine down on me. I've got miles to go"? Whether the vehicle of the future is powered by electricity, hydrogen, 'the wind, sun or vegetable oil that your French fries were cooked in, it is clear that change is coming.

For more information on alternative fuel vehicles, please visit the following websites:

www.propanevehicle.org Propane Vehicle Council

www.veggievan.org Lots of info about biodiesel

www.fueleconomy.gov Fuel efficiency comparisons and tips

www.ngvc.org The Natural Gas Vehicle Coalition

www.biodiesel.org National Biodiesel Board

www.afdc.doe.gov Alternative Fuels Data Center

www.energy.gov/transportation/sub/altfuel.html Department of Energy Alternative Fuels Vehicle site

# "Green" Building

## Stephen Morrison

Conservationists and builders are often thought of as being in conflict with each other. In this day and age there are too many people who do not consider their impact on the environment or longevity of their actions. However, builders are now learning that they can take steps to protect the environment while creating structures that are commercially desirable as well as more durable. Sustainable building is feasible and is a growing industry, especially in commercial construction.

Developed to promote sustainable building, the Leadership in Energy and Environmental Design (LEED) program was created to establish a voluntary, national standard for developing high-performance, sustainable buildings. Members of the U.S. Green Building Council, which represents all segments of the building industry. developed LEED. The entire building process, from site use to energy efficiency and water consumption to the selection of materials and indoor environmental quality, is assessed for building performance and sustainability. Using a rating system, points are awarded for prerequisite and voluntary requirements. Reduced site disturbance, water efficient landscaping, and carbon dioxide monitoring are all examples of credits available to the builder. Commercial builders who attain LEED certification on a building project may qualify for state and local government incentives, as well as contributing to a growing green building. knowledge base.

When building "green" the importance of the planning phase cannot be over emphasized. Each decision to be made offers an opportunity to choose environmentally friendly products and

methods. Spending some time initially researching options can save time and money once the project is begun. The effort applied during pre-planning is directly proportional to the final outcome of the project—both in terms of quality and cost. Not all designers are familiar with what "green" building entails, so it is important to find one who is in order to achieve the benefits of this type of construction.

The residential builder or homeowner can also enjoy the benefits of sustainable building techniques. The Earthcraft House is the residential counterpart to the commercial LEED program. This program was created and is run by the Southface Institute, an Atlanta based non-profit that promotes sustainable building. Earthcraft houses are designed to create healthy, comfortable, affordable homes that cut energy and water bills while protecting the environment. Earthcraft builders receive training, one-onone design and construction advice, marketing materials and direct referrals. Earthcraft specifies sustainable standards for every aspect of the residential building process, each of

which is worth a point value. In order to be certified as an Earthcraft House, each structure must achieve a minimum of 150 points by the completion of the project. The process starts with erosion control and tree planting and moves through a wide range of energy standards, water use, durability, air quality and waste management (building material waste). There is flexibility for the builder/ homeowner to pick and choose which aspects are most applicable to their particular project. For example, a tree preservation plan is worth 1 point, installing an energy efficient refrigerator is also 1 point, and recycling construction waste varies from 1 to 3 points for each type of item recycled. Bonus points are awarded for building within one-quarter mile of mass transit, handicap accessibility, using solar power to meet at least 20% of energy needs or having a charging station for electric vehicles. There are a growing number of trained member-builders and around 850

Earthcraft homes in the Atlanta area already.

The question of added cost is obviously a major concern for most homebuilders. Habitat for Humanity projects may be used as an example. Building to Earthcraft standards increases the average cost of a Habitat house by around \$500, and in only two years the homeowner will recoup this cost in energy savings. The benefits of Earthcraft standards go far beyond money and energy savings. A home built to these high specifications will have cleaner interior air quality, both in terms of air pollution and pollen, as well as reduced off-gasing from interior finish products. Southface has received extremely positive feed back from Earthcraft homeowners who report

noticeable benefits in personal health, specifically those with asthma. Well-sealed homes are also much quieter, which can be very important in urban areas. Another longterm benefit of Earthcraft standards is durability. A building sealed as tightly as possible and ventilated correctly has fewer moisture and mold problems. Such structures have a longer lifespan and should require less maintenance than conventionally built homes. Although this certification is currently only available in the Atlanta area, the Earthcraft house program is an innovative model for green homebuilding techniques anywhere.

The beginning of any new construction project starts with the foundation. Many people might not realize that there is an opportunity to "go green" as soon as the ground-clearing phase gets underway. One option is to use fly ash, a byproduct of coal or oil burning that can replace some of the cement in making concrete. This makes the concrete stronger and reduces the air pollution caused by making



The Earthcraft House initiative offers a residential counterpart to the commercial LEED program.

# "Green" Building

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cement. After the foundation is intact, one might seek out sustainably harvested wood products (there are a number of organizations marketing wood as coming from "certified sustainable" forests, and research is merited before making your purchase). There are also many framing techniques that reduce the lumber usage. One simple example is using 24" stud spacing instead of 16" spacing on non-load bearing walls. There are also alternative corner framing techniques that use less lumber and allow better insulation into the corners while still maintaining appropriate strength.

Earthcraft House standards specify the need for a well sealed, air tight home. There are various house wrap products available, a sort of Gore-Tex for your home, and different types of insulation. Products such as blown-in cellulose, made from recycled newspapers, and Icynene foams have a much better insulation rating and help to slow air leakage more effectively than typical fiberglass insulation. Roof sheathing that comes with a reflective layer (like tin foil) reduces radiant heat coming in through the roof, thus reducing cooling needs. Attic-ventilating systems help push out excess hot air-again reducing cooling needs. To go along with the high performance insulation, insulated glass windows increase the efficiency of a home. Windows can be purchased with an insulating layer of inert gas between the pains and a glaze, which reduces U.V. penetration and heat gain/loss.

Other factors to consider in a home building project are: heating and cooling options, and water systems. A geothermal heat pump exchanges heat with underground water, in buried pipes or in a well, instead of using ambient air. Because the water holds more energy than air, it is a much more efficient system. With the house being so well sealed and insulated the heating and cooling system can be downsized; thus reducing both initial cost and operational expenses. Waterless urinals and composting toilets reduce wastewater. These options do not require a septic system or even electricity, so they can be an excellent solution in applications such as remote cabins or boathouses, as well as being an environmentally friendly option for conventional homes. An "on demand" water heater instantly heats the water when you need it, instead of storing large quantities of hot water that must be continually kept hot, even when you do not need it for hours or days at a time. This saves a great deal of energy and reduces costs to the homeowner.

Available "green" interior finishes include recycled flooring products, both wood and carpets as well as renewable products such as cork floors. While choosing paint colors is important to homeowners, another critical consideration is the type of paint to be applied. Low VOC (volatile organic compounds) paints are healthier for the painter, the environment and the homeowner.

It is important to note that the above mentioned products and techniques are not limited to new construction. There are fairly simple modifications that homeowners can do to improve the efficiency, durability and quality of existing homes:

- Air leaks can be sealed with various caulk & expanding foam products
- Blown-in insulation can often be used in existing homes
- Old windows can be replaced or covered with storm glass
- Duct work can be resealed to prevent heating and cooling crawl spaces.

Even just replacing incandescent light bulbs with compact fluorescents is a step worth taking. Although it is not yet complete, Southface is working on an Earthcraft house renovation program that will certainly serve homeowners and builders as a great guide.

This has been a brief and incomplete tour through the green home building process. It should be enough however, to show the possibilities for green building and provide some resource for further education and implementation. Theprimary ways these building techniques would affect homeowners is in reduced utility bills and improved interior air quality. However, professional homebuilders and contractors will only implement these ideas if the consumer demands them. No matter what we do, we all have an impact on the environment, but many ideas, methods and technologies can help reduce our negative impacts and total consumption. Building green can create healthier homes and a healthier environment.

For more information on green building check out these websites:

www.southface.org Southface Institute

www.southface-energycode.org Energy Update Seminars

www.usgbc.org US Green Building Council

www.ases.org American Solar Energy Society (ASES)

www.coolcommunities.org Cool Communities

www.eren.doe.gov U.S. Deparment of Energy -Energy Efficiency and Renewable Energy

www.envirosense.org Envirosense

www.psic.org Passive Solar Industries Council

# Watershed Update

## FOREST PLANS REVEALED PUBLIC REVIEW & COMMENTS ARE VERY IMPORTANT!

The draft revisions of the Land and Resource Management Plans for both the Sumter and Chattahoochee National Forests were released in mid-March for public review. In Georgia, comments are due on July 3<sup>rd</sup>, and in South Carolina, on June 21<sup>st</sup>. These Forest Plans will dictate the management of national forest land surrounding the Chattooga Wild and Scenic River Corridor for at least the next fifteen years. These draft plans are seriously flawed. The Sumter Plan calls for an outrageous 78.7 million board feet (mmbf) timber extraction quota, to be met through "even-aged" (*i.e.* clear-cutting) timber harvesting. Though this quota is less than the 1985 Forest Plan's, the number is still 18 mmbf greater than the highest harvest rates during the Reagan administration, when South Carolinians became outraged at the visual and ecological impact of Sumter's

timber program. The Sumter Forest Plan also fails to recognize areas unquestionably qualified for protection as wilderness study areas, including the Bee Cove, Big Mountain and Ellicott's Rock (Wilderness Area) Extension areas, opening these areas up for timber cutting and roads.

For Georgia, the Chattahoochee Forest Plan is even worse. Public disclosure of the Forest Plan revision process ended in August of 2002, and significant changes were made behind closed doors that undercut native forest ecology, aquatic resources and conservation in general. For example, more than 400,000 acres of Georgia's national forests will be eligible for new ATV trails. "Natural areas" will allow establishing earlysuccessional habitat, where 80% of the forest canopy is removed. Remote backcountry recreation areas will allow the construction of  $\frac{1}{2}$  mile of new road per 1,000 acres, the continued maintenance of ATV trails as well as the construction of new trails through it.

Areas designated for mid to late successional forest habitats propose to maintain a forested canopy across only 50% of the area. Areas set aside for rare plant and/or animal communities offer the most protection of endangered and sensitive species, yet these areas are not named in the proposed Chattahoochee National Forest Plan. Like the Sumter Plan, nearly all areas eligible for protection as wilderness study areas are not recognized, including the Sarah's Creek and Three Forks areas in the Chattooga watershed. Also, the draft Chattahoochee Plan call for a timber harvesting quota of 61 mmbf, which is 12 mmbf higher than the greatest annual timber harvest under the old 1985 Forest Plan. In sum, the draft Chattahoochee and Sumter Forest Plans fail miserably to outline environmentally responsible public land management. *The Chattooga Conservancy will help citizens decipher these Forest Plans and compose comments.* The Sumter and Chattahoochee Forest Plans may be reviewed online, or by contacting the Forest Supervisor's offices and requesting a hard copy (SC 803-561-4000; GA 770-297-3000); public libraries also have paper copies. Comments must be sent to: Sumter National Forest<or>Chattahoochee-Oconee National Forest, Content Analysis Team, P.O. Box 221150 Salt Lake City, Utah 84122. Comments may also be emailed to sumter@fs.fed.us or chattahoochee-oconee@fs.fed.us

## ANOTHER SALVO FIRED AT RABUN COUNTY POWER LINE

The Chattooga Conservancy has filed an appeal opposing the Forest Service's decision allowing a 6-mile power line and a substation to be built in the Chattahoochee National Forest. Based on an independent expert engineer's study,

> existing electrical distribution systems can be upgraded to meet Rabun County's power needs without sacrificing public or private land. The proposed North Burton transmission line and substation would directly affect a number of private property owners and 60 acres of publicly owned national forest in Rabun County, affecting drinking water sources, plowing through old growth forest, numerous trout streams, and destroying scenic views of Glassy Mountain. The groups filing this appeal are asking the Forest Service to withdraw the project. "The Forest Service should not allow a major power line on our public forests when there are other, more suitable alternatives," said Sarah Francisco, attorney with the Southern Environmental Law Center, which filed the appeal on behalf of the Conservancy, Georgia ForestWatch and the Sierra Club:

ROAD PAVING PROPOSED FOR THE BURRELL'S FORD ROAD

The Tallulah Ranger District has proposed to pave the entire length of the Burrell's Ford Road—a very expensive and unneeded project that flies in the face of a Forest Service study entitled the "Van Lear Report." Here, Dr. Van Lear recommends only limited spot paving of this road, and using larger gravel to slow traffic speed and reduce rutting, vegetating erosive ditches, installing more water diversion structures, and closing all unnecessary spur roads in the area. Paving the entire length of this remote road, which bisects the heart of the Chattooga watershed, would simply create a high-speed thoroughfare and open up this area of the watershed as a developed recreation destination. Please send comments against this ill-conceived proposal to the Tallulah Ranger District in Clayton, Georgia, by May 12<sup>th</sup>.



The Chattahoochee and Sumter Forest Plans propose a return to industrial scale timber cutting, photo by Kathryn Kolb

# **Member's Page**

MANY THANKS to all who recently renewed their membership, or joined the Chattooga Conservancy. Your generous contributions will help us continue to work on all of the important conservation issues facing the watershed.

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# Chattooga Conservancy

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**Purpose:** To protect, promote and restore the natural ecological integrity of the Chattooga River watershed ecosystem; to ensure the viability of native species in harmony with the need for a healthy human environment; and, to educate and empower communities to practice good stewardship on public and private lands.

Made Possible By: Members and Volunteers Merck Family Fund Turner Foundation Patagonia, Inc. Frances A. Close The Sapelo Foundation Environmental Systems Research Institute



Goals:

Monitor the U.S. Forest Service's management of public forest lands in the watershed

Educate the public

Promote public choice based on credible scientific information

Promote public land acquisition by the Forest Service within the watershed

Protect remaining old growth and roadless areas

Work cooperatively with the Forest Service to develop a sound ecosystem initiative for the watershed

Chattooga Conservancy 2368 Pinnacle Dr. Clayton, GA 30525

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