



THE MAINE WOODS

A Publication of the Forest Ecology Network

“In wildness is the preservation of the world.” Henry David Thoreau

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With sea levels and temperatures on the rise, time is running out to reserve your ocean view lot in lovely Westbrook, Maine!

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“Only after the last tree has been cut down. Only after the last river has been poisoned. Only after the last fish has been caught. Only then you will find that money cannot be eaten.”

Cree Indian Proverb

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A Voice in the Wilderness by Jonathan Carter

THE CLIMATE CHANGE AND FOREST RESTORATION CAMPAIGN

With global climate change threatening the ecological underpinnings of the Maine Woods, the case for protection and restoration as a means to mitigate the impacts of global warming has never been greater. The stark reality is that unless greenhouse gas emissions are reduced, the forests of Maine will likely be changed beyond recognition in the next hundred years. It is already possible to see signs in the forest of declining health attributable to climate change. FEN is currently in the process of launching a new initiative, The Climate Change and Forest Restoration Campaign, to promote the Maine Woods as a crucial defense mechanism against global warming.

Stephen Wofsy, an atmospheric chemist at Harvard has documented that temperate forests continue to increase carbon uptake with age. The average age of the 17.6 million forested acres in Maine is about 58 years - on the 10.2 million acres of industrial lands, which comprise the North Woods, the age is less

than 40 years. On average, Maine forests uptake about 0.3 tons of carbon per hectare per year. Current harvest practices are resulting in a younger forest and reduced stocking levels, both of which reduce the carbon sequestration potential - or simply put, the ability of forests to store and withdraw carbon from the atmosphere. Harvest cycles in Maine average 30 years on industrial lands. Research has documented that for many years after a clearcut, a re-sprouting forest emits more CO₂ than it absorbs. This is a result of soil microbes becoming more active due to the greater abundance of dead organic matter in the form of tree roots and slash.

I believe there is an excellent opportunity to promote the Maine Woods as a critical component of a northeastern carbon reduction plan. This plan will promote the re-growing of mature forests and the re-establishment of permanent wildlands. Thomas Peterson, founder of the Center for Climate Strategies at Penn State University, using his Forestry Carbon Calculator, has determined that the two most effective ways of maximizing carbon storage in Maine forests are 1) increasing stocking levels and 2) expanding forest protection. Maine forests could easily double or triple their annual carbon uptake with the implementation of longer growing rotations and the setting aside of large wilderness reserves. Enhancing carbon sequestration not only reduces atmospheric CO₂, but it has the added benefits of improving land use practices, enhancing wildlife habitats, increasing water and air filtration, and generally, just improving overall forest health.

FEN has had a long-standing interest in the connection between climate change and forest restoration. The Climate Change and Forest Restoration Campaign will be a proactive effort. It will focus on educating and activating the public. It will reach out and build a coalition of support. FEN will meet with all stakeholders

and present state and federal officials with compelling reasons why support for forest restoration in the face of certain climate change is critical. FEN is proposing a groundbreaking campaign. It is going to take a major amount of planning and development. However, the time for a recharged effort, using the carbon card, in support of forest restoration is now.

Global climate change threatens the ecological underpinnings of the Maine Woods. FEN's mission to protect, restore, and conserve demands that FEN focus its energy and resources on alleviating the greatest threat ever to the Maine Woods - global warming. As part of the solution to this crisis, it is critical a strong public policy is implemented that promotes protection, restoration, and conservation. The launching of The Climate Change and Forest Restoration Campaign is long overdue. I hope FEN can count on your help and participation.



FEN director Jonathan Carter in a Plum Creek clearcut north of Flagstaff Lake.

photo by Janet LeClair



Editor's Note

With my generation having failed miserably in our stewardship of Earth's ecosystems, I feel strongly that one of the most important things environmentalists of my generation can do is to foster an understanding and a sense of caring and responsibility among young people for the Earth and its wild creatures. We face tremendous environmental challenges in the years ahead, global warming high on that list, and it is among our young people that we are most likely to find the energy, creativity, and determination to tackle those challenges. For those reasons, we have frequently encouraged young people to contribute to *The Maine Woods*. In this issue you will find articles by two exceptional young people, *Why I Became a Vegetarian* by Julian Solano on page 18 and *A Fourteen Year Old's Opinion on Global Warming* by Olivia Tenzing on page 19.

Paul Donahue



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Maine Forests and Carbon Sequestration

by Jonathan Carter

Forests are critically important in the fight to reduce greenhouse gases and mitigate climate change. Forests are part of the human-generated carbon footprint because stored carbon is released as a result of harvesting, forest-land development, and soil damage. On the other hand, the ability of forests to sequester carbon (capturing carbon through the process of photosynthesis) is of major importance in removing human-caused emissions. In the United States forests absorb about 12% of the carbon from fossil fuel emissions. On a global basis, forest carbon sequestration may be as much as 30%.

Maine, as the most forested state in the nation, has the potential to make a significant contribution in the effort to mitigate global warming. In order to maximize this contribution, it is not only necessary to stop high carbon-releasing forest practices, but it essential that best management practices foster carbon sequestration. Unfortunately, current forest practices in Maine are designed to maximize bottom-line profits, and not bottom-line carbon sequestration. This must change.

Negative Carbon Forest Practices

Clearcutting

Clearcutting has the greatest negative impact. Recent research indicates that for up to twenty years after a forest has been clearcut there is a net carbon loss to the atmosphere. While some of the biomass from the wood may be tied up in wood products, the vast majority is turned into paper products and wood chips which have a very short carbon retention time frame – landfills, biomass plants and incinerators. Normally 30% of the biomass is left behind (roots and slash) for soil microbes to decompose. This results in an increase in carbon dioxide release. The most recent data indicates about 18,700 acres are clearcut each year.

Shelterwood

Shelterwood cuts involve the removal of biomass through multiple harvests over time. Ideally, shelter-

woods would be practiced over the natural life cycle of a stand (100-200 years) However, in Maine the logging industry has redefined shelterwood harvest to mean total forest removal over a 5-10 year period – really nothing more than a clearcut over a short period of time. This type of shelterwood is the dominant forest practice utilized in the Maine Woods today. Data from 2006 indicates that 5-10 year shelterwood cuts are undertaken

on about 233,000 acres annually. Industry has simply renamed a clearcut a shelterwood cut. The CO2 releases, while reduced, still are huge.

Overcutting

Overcutting is defined as cutting more than is growing back on an annual basis. Theoretically, if the volume cut is equal to the volume grown, then the carbon tied up in the harvested forest biomass would be equal to the carbon sequestered in the annual growth. Maine forests are currently being cut faster than they are growing back. Recent data indicates that the overcut annual may be as much as a 100 million cubic feet. Therefore, carbon loss is significant.

Pre-commercial Thinning

Pre-commercial thinning is a practice used to enhance merchantable timber growth rates. By thinning a stand, this allows the remaining trees to grow faster This results in an immediate reduction in carbon stored and can also have a negative impact on biodiversity.

Plantations

Plantation forestry involves the clearcutting of a forest and the planting of a monoculture of native or exotic tree species. Carbon loss from the initial clearcut is huge.

The plantation virtually eliminates natural biodiversity and reduces potential carbon sequestration. Plantation forestry also often requires the application of pesticides and herbicides. Plantations have declined significantly in recent years (due in large part to the high costs and slow growth rates), but still three to four thousand acres are planted each year.

Herbiciding

Herbicides are use to kill regenerating hardwoods so that softwood species can dominate a site. These poisons are not only a threat to humans, but also may have negative impacts on the soil microbes – a key indicator of below ground carbon storage potential. While herbiciding has declined in recent years,

11,700 acres are still sprayed annually.

Soil Damage

Forests store about twice as much carbon below ground as above. Soil compaction, reduced soil oxygen levels, and reduced water percolation all result from current logging activities. Erosion from logging roads damages aquatic systems and reduces their carbon storage capacities. The loss of carbon and the potential to store carbon in soils as a result of logging damage has not been quantified, but there is no question that it must be immense, perhaps even greater than all the carbon lost from harvest practices.

Development/Land Use Changes

Development and land use changes result in significant reductions in carbon storage capacity. Between 1982 and 2003 over 800,000 acres of forests

were converted to a non-forested state. Plum Creek's plan for the Moosehead Lake Region would have a large carbon footprint not just from the 11,000 acres of development sites converted from forest to non-forest, but also from the carbon released as a result of construction, increased traffic, and higher energy demands.

Positive Carbon Forest Practices

Selective Cutting

Selective cutting is the only harvest practice that has the potential to increase and maximizing carbon storage. Selective cutting involves a tree-by-tree choice. It involves lighter harvesting over the normal life cycle of a particular forest stand. Selective cutting could be designed to maximize carbon storage capacity. Growing forests for high quality timber would result in significantly greater amounts of carbon being tied up longer in the resultant wood products. While most small landowners already practice selective cutting, large industrial and non-industrial landowners, by and large, view selective cutting as labor intensive and expensive. Using selective cutting requires foresters to practice forestry – assessing each tree rather than making decisions on a stand or landscape scale.

Increased Stocking

Because of the massive amount of clearcutting and overcutting during the last several decades, Maine forests have been severely depleted. The most recent data suggests that over 500,000 acres are poorly stocked and even a larger number of acres only moderately stocked. Increased stocking levels equates directly into higher carbon storage levels. While the presence of such vast under stocked acreage is a sad indictment of logging practices, the potential for increasing carbon storage by allowing natural restocking to proceed is huge.

Reduced Erosion/Soil Disturbance

Since maintaining soils is key to enhancing carbon storage in forests, reducing the current level of erosion and disturbance is of great importance. The expansion of permanent logging roads (over 30,000 mile in the last 25years) needs to be halted. Not only should the current road network be evaluated for road removal, but any future harvests plans should be required to include reclamation of road ways.. In addition, logging activities should only be allowed when the ground is frozen, which will minimize soil disturbance

Increased Rotation Length

The average age of Maine forests is declining. This

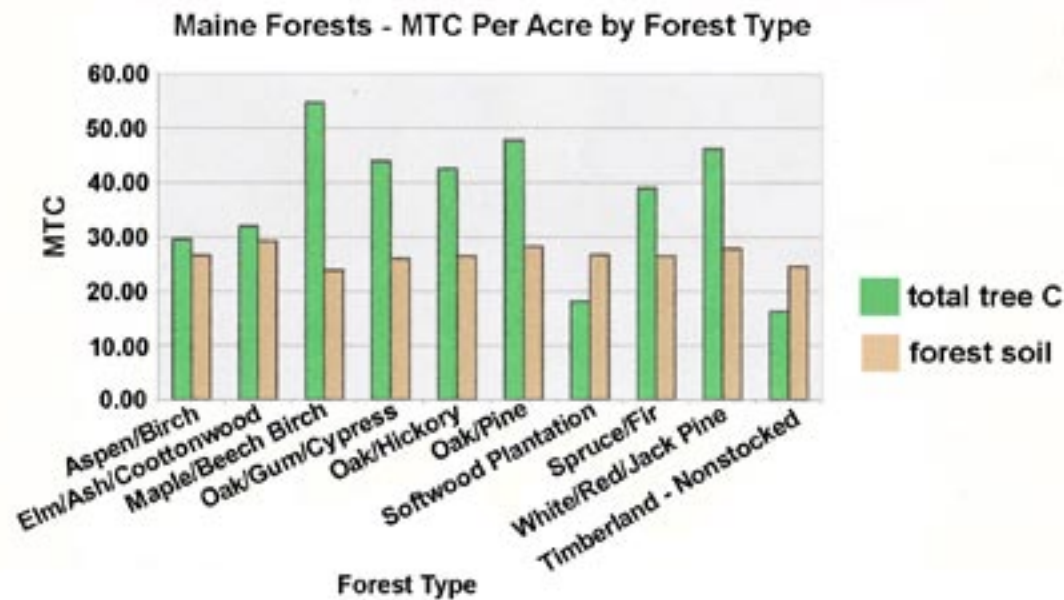
FEN Launches the Climate Change and Forest Restoration Campaign



A clearcut along Route 16 outside Bungham, Maine.

photo by Jonathan Carter

Carbon densities by stand type



carbon sequestration value. This has been particularly true in terms of hardwood forests where a tremendous acreage of beech/maple/birch has been destroyed in order to promote softwoods. Carbon densities by stand type indicate that on a per acre basis beech/maple/birch forests store at least 20% more carbon than a spruce/fir forest. The more fertile soils and longer lived species in northern hardwood stands would favor greater carbon storage capacity.

Conservation/Restoration

Conservation and wildlands restoration pose the greatest opportunity for increasing carbon sequestration in Maine forests. The longer forests grow, the more carbon they store. It is critical to preserve all our old growth and late successional forests. It is equally critical to promote the recovery of the forest, which has been severely depleted in recent years. On public lands the state should halt all logging activities which do not enhance carbon storage. While this represents a drop in the bucket, it sends a strong message that the policy makers in Augusta understand the dire consequences of global warming and that they recognize that forest protection, restoration, and conservation are critical in the fight to mitigate the crisis. "Business as usual" is not the solution. In addition, for-

means that Maine's forest carbon sink is being reduced. It has been well documented that forests increase carbon uptake with age. This uptake continues well into maturity. Currently less than .1% of the forest in Maine can be classified as old growth and less than 3% as late successional. The large landowners harvest on 30 year cycles – well before any tree species in the forest have come close to reaching their maximum carbon uptake rates as well as their carbon storage potentials.

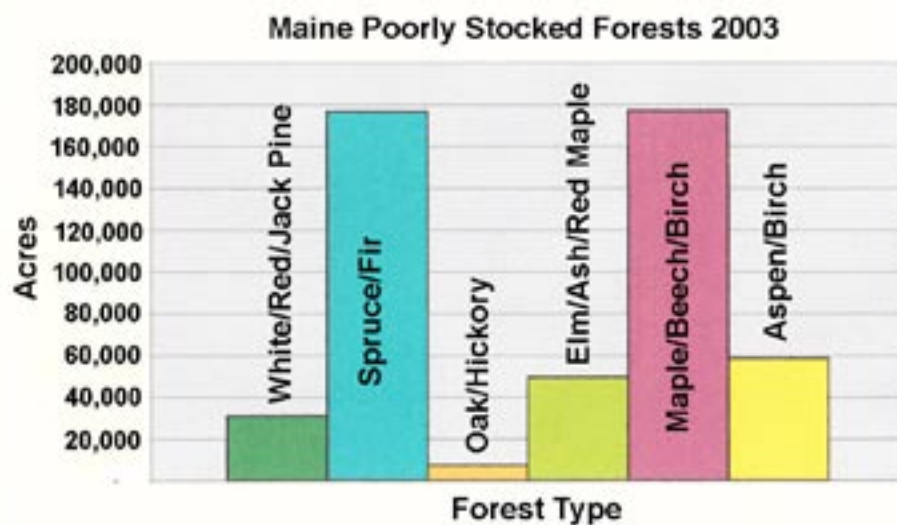
Uneven Aged Management

Due to the cutting regimes of the past several decades and the desire for shorter and shorter rotations, Maine forests have become not only younger, but more even aged. This is particularly true in the softwood component. Multi-age stands not only enhance biological diversity and enhance forest health, but the increase in the average age results in greater carbon uptake and storage. Selective cutting can be used to move the forest toward a natural multi-aged condition.

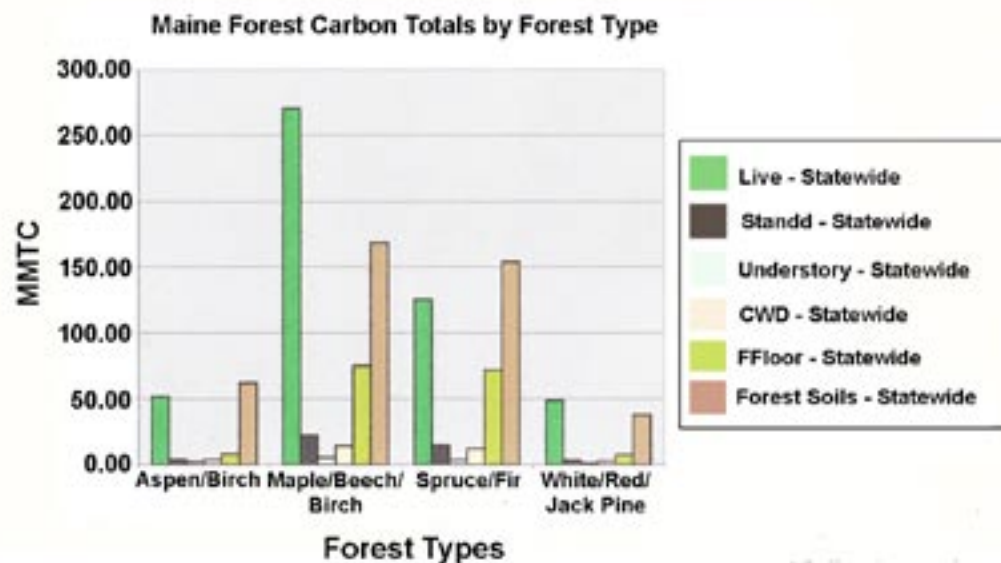
Non-Manipulation Forest Stands

One of the biggest goals of forest managers has been to manipulate the composition of a natural forest to one that has more commercial value – not necessarily more

Poorly stocked acres v. species



Carbon accounts for major types



est practices need to be regulated so that all harvesting enhances carbon sink capacity. While financial incentives/compensation may be worth considering, there needs to be a mandatory participation requirement.

The Maine Woods have the potential to play a significant national role in carbon reduction – not as offsets or carbon credits which allow big carbon emitters to continue to pollute. It is time for the federal government to recognize that the preservation and restoration of wild forests is one of the most important tools for dealing with climate change. Designating the Maine Woods as a National Carbon Sequestration Forest and supporting the creation of the 3.2 million acre Maine Woods National Park and Preserve would result in a vast carbon sink capable of storing millions and millions of metric tons.

The bar graphs above are from the report Maine Forestry Greenhouse Gas Mitigation Options, by Peterson et al, March 2005. The full report is available online at http://soilcarboncenter.k-state.edu/conference/Poster_pdfs/Peterson.pdf

How Forests Sequester Carbon

The cycling of carbon in forest ecosystems is well understood (see Forest Sector Carbon Pools and Flows diagram). There is a constant flux and exchange between a forest ecosystem and the atmosphere. In temperate regions like Maine the amount of exchange and flux varies according to season.

The Earth's atmosphere is composed of about 0.04% carbon dioxide (CO₂). In order to understand the cycling of carbon in forest ecosystems, the processes of photosynthesis and respiration first need to be understood. Forest ecosystems remove CO₂ from the atmosphere through the process of photosynthesis. In this process, green

stores of carbon, which is further decomposed by soil microbes. Harvest residues and leaf fall also enter the ground decomposition phase. The litter, woody debris, and logging residue are broken down to form soil organic matter. Root systems are also broken down. Eventually the soil organic matter is completely decomposed and much of the original carbon that was fixed during photosynthesis is returned to the atmosphere.

The time between the initial trapping of the atmospheric carbon through photosynthesis and its eventual release back into the atmosphere varies depending on the longevity of the plant species concerned, the climate (principally temperature and moisture), the composition of the detritus, soil chemistry, and the degree of

Canadians Ponder Cost of Rush for Dirty Oil

by John Vidal

As oil prices continue to reach record highs, the search for new sources of energy has led the world to Alberta, Canada, and its vast oil sands. The country famed for its wilderness and clean living finds itself caught between fueling the world's oil-hungry economy and the ecological devastation and soaring greenhouse gas emissions that exploiting the tar sands produces.

The Caterpillar 797B heavy hauler is the world's biggest truck. It's taller than a four-storey house, as wide as a tennis court and it removes nearly 35,000 tonnes of oily sand a day from a deep open cast mine in northern Alberta in western Canada. Truck number 108 is driven by Norman Johnson, 63, a long-time Shell man who is planning to spend his retirement fishing, camping and "hunting the critters" in the vast boreal forests and bogs that stretch across the region. "It's just like driving your car. Couldn't be easier - once you get used to its size," he says from his cab, 40ft off the ground. He won't let the Guardian start up either of its two great engines. But the future of northern Alberta's aspen and pine woods, its rivers and animals are in doubt as the world's greatest modern oil rush accelerates. Shell, Chevron, Exxon, Total, Occidental, Imperial and most other oil majors have so far invested nearly \$100bn Canadian dollars (£50bn) in the 1,160 square mile (3,000 square kilometre) "bitumen belt", which is being called the "new Kuwait".

A decade ago, the vast landscape of forests and lakes around Fort McMurray and the Athabasca River provided a fairly minor and barely profitable sand oil industry. But it is now pitted with hundreds of square kilometres of toxic waste ponds, mines that are 300 feet deep, hundreds of miles of pipes and burgeoning petrochemical works. Every day brings a bumper to bumper stream of lorries carrying the world's largest plant, pipes and machinery to the area, as well as young men seeking fortunes, and, say critics, the devastation of a pristine land.

The companies are now mining 1.3 million barrels a day of heavy crude oil from the sands, which are saturated with bitumen. But they expect to spend another £50 billion to more than double production to 3.5 million barrels by 2011. The surge is expected to attract 100,000 more workers to the northern wilderness where the wolf and bear are still common.

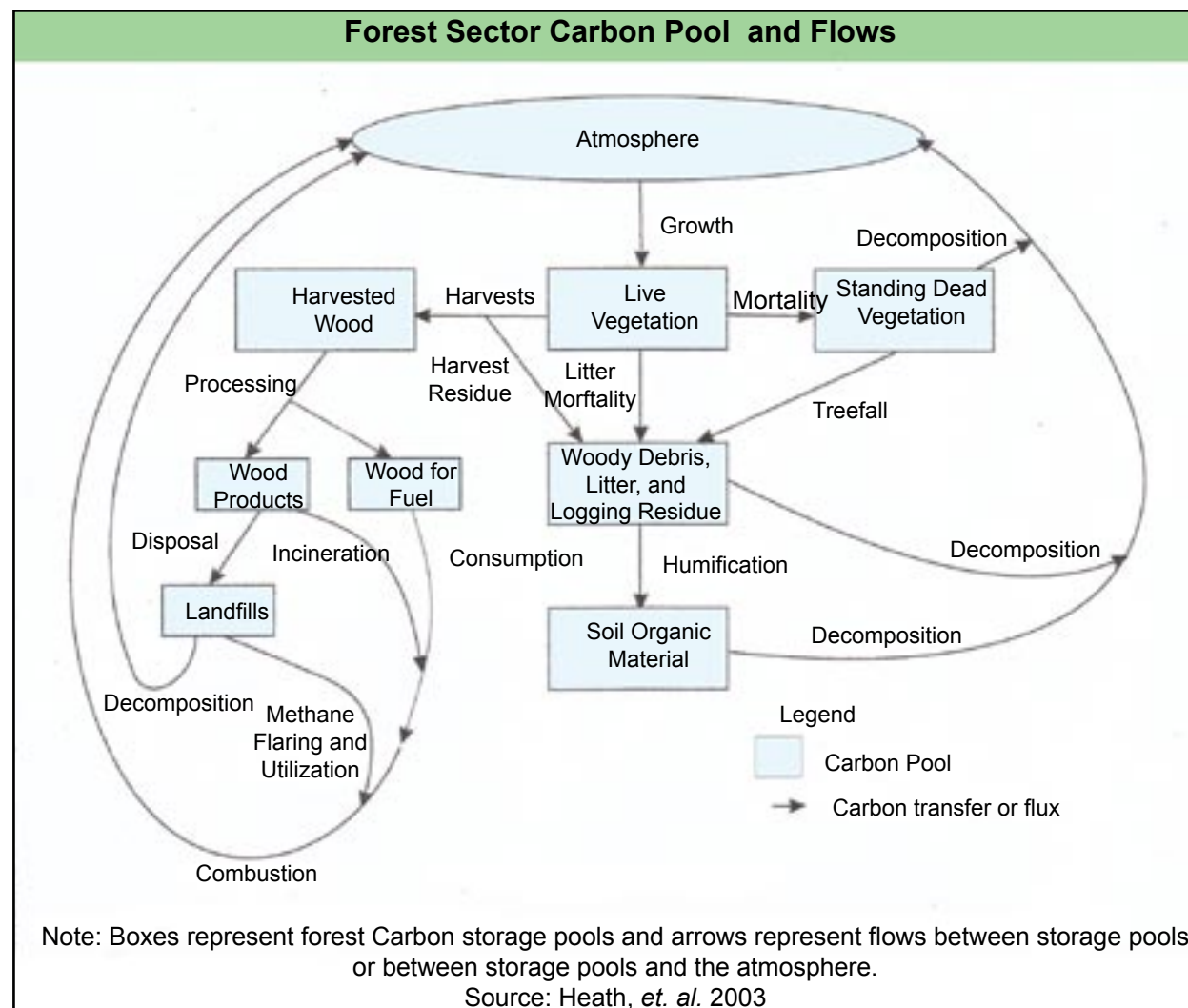
And that would just be the start. By 2030 they plan to produce at least 5 million barrels a day, and export more than Nigeria, Venezuela or Norway, which would make Canada one of the world's largest oil producers.

If the oil price stays high and new technology permits, oil companies will move, with the Canadian government's blessing, to extract the estimated 180 billion barrels of crude to be found far deeper under 140,000 sq km of Alberta in what are the world's largest proven oil deposits after Saudi Arabia.

By 2050 Canada could be the second largest oil producer in the world, shifting the global energy security equation but exacerbating global climate change in a way that has scarcely been considered.

The tar sands industry could pump vast amounts of

continued on page 9



leaves utilize energy captured from sunlight to chemically combine water and carbon dioxide to produce sugars and oxygen. The sugars are used to produce carbon-based cellulose, the primary structural component of all plant cells. As a result, the carbon is tied up in all of a tree's tissues – in its roots, stems, and leaves.

Carbon is given off from forest ecosystems through respiration in which oxygen and sugars are converted to carbon dioxide and water – the reverse of photosynthesis. In the process, energy is produced which is needed for a tree's metabolic activity.

As a tree grows, it will continue to tie up more and more carbon. In fact, trees will continue to store more carbon than they give off until maturity or old age at which time a homeostasis is reached. When a tree experiences natural mortality it will start losing carbon through the process of decomposition. Microorganisms break down the dead organic matter to produce energy. In the process, some of the locked up carbon is released back into the atmosphere.

When the tree eventually falls over it still contains vast

soil microbial activity. Carbon in temperate forests can remain stored for virtually hundreds of years in pools of live vegetation, standing dead vegetation, woody debris or soil organic matter.

In the absence of harvesting, the cycling of carbon between a forest ecosystem and the atmosphere continues, with a gradual increase in the carbon stored in the forest until an old growth stage is reached. At that point, the exchange of carbon reaches homeostasis, with as much carbon being released back to the atmosphere as is being locked up by the plants.

Harvesting results in carbon removal from a forest ecosystem. Depending on the use of the wood, the carbon removed can be held for varying lengths of time. If the wood is used for fuel, the carbon is released immediately. If it is used for paper products, the carbon generally remains fixed for a short period of time before it is released through incineration or decomposition in a landfill. However, if it is used for durable wood products such as construction materials or furniture, the carbon can remain stored for centuries.

What Do You Know About Global Warming?

by Paul Donahue

The vast majority of climate scientists now agree that global warming represents the greatest threat to life on our planet (a FAR greater threat than that posed by terrorism) and will be the greatest challenge humanity has ever faced. Even United Nations Secretary-General Ban Ki-moon has described climate change as one of the major issues facing the world. How much do you know about it?

What is a greenhouse gas and why is it called by that name? ANSWER: Greenhouse gases are the gases present in the Earth's atmosphere which reduce the loss of heat into space, trapping the heat in the atmosphere and therefore contributing to the rise of global temperatures through the greenhouse effect. It is called the greenhouse effect because the gases act in much the same way as do the glass walls of a greenhouse.



Hurricane Katrina as it approaches the Louisiana coast. Climate researchers predict that rising temperatures will spawn stronger hurricanes.

Is there still legitimate scientific debate on the validity of the concept of whether or not global warming is caused by human activity? ANSWER: No, there is no longer any legitimate scientific debate on the validity of the concept of whether or not global warming is caused by human activity. When a sampling was done of the peer-reviewed articles in the science which mentioned the words climate change, 100% of them agreed with the basic philosophy that humans are responsible for the majority of climate change...not a single one expressed doubt. But when a survey was done of articles in the popular media (newspapers, magazines), 53% expressed doubt as to the causes of climate change. The journalists of the popular media have done us an enormous disservice by misleading and confusing us!

We frequently hear of carbon dioxide as being responsible for global warming. However, a number of gaseous compounds contribute to global warming and some are considerably more potent, thousands of times more potent, in that regard than carbon dioxide. The Kyoto Protocol covers six of these gases. Can you name one other gas that contributes to global warming? ANSWER: The Kyoto Protocol covers six greenhouse gases: carbon dioxide, methane, nitrous oxide, hydrofluorocarbons, Perfluorocarbons (PFCs) and sulfur hexafluoride. Chlorofluorocarbons and even water vapor also act as greenhouse gases. In fact, any molecule with more than two atoms will trap heat.

Carbon dioxide (CO₂) in the atmosphere is measured in parts per million (ppm). There is a very close correlation between the temperature and the amount of CO₂ in the atmosphere - the more ppm of CO₂, the more heat is trapped and the warmer the planet becomes. Most scientists now agree on the number of ppm of CO₂ we must remain below if we want to avoid catastrophic warming and "climate chaos". What is that number of ppm, are we currently above or below it, and is the ppm of CO₂ in the atmosphere going up or down? ANSWER: Most scientists now agree that we must remain below 350 ppm of CO₂ to avoid catastrophic warming and "climate chaos". As of May 2008 the level of CO₂ in the atmosphere stood at 387 ppm and was increasing at 2.15 ppm per year. Obviously, we're in trouble. In the words of climate activist Guy Dauncey, "We are heading into unknown territory - beyond the bounds of our knowledge and experience."

Rising temperatures are melting ice around the planet and this melting ice is raising the sea level. If the Greenland ice sheet slips into the ocean, a distinct possibility in the not so distant future, how much will the level of the sea rise? ANSWER: If the Greenland ice sheet melted or slipped into the sea, it would cause sea levels to rise by about 6.5 to 7 meters or 21 to 23 feet. The West Antarctic ice sheet is also at risk of disappearing, and that represents another 6 meters or 20 feet of sea level rise. Unfortunately, melting ice is not the only factor affecting the sea level. As the oceans warm, their water expands, and this expansion also contributes to sea level rise. Anyone interested in buying some nice ocean front property in Florida?

Which areas of the globe are currently experiencing the fastest warming, the equatorial regions or the poles? ANSWER: Over the past 100 years Arctic temperatures have been rising at almost twice the global average.

What is ocean acidification, what causes it, and is it a good thing or a bad thing? ANSWER: Ocean acidification is the name given to the ongoing increase in acidity of the Earth's oceans, caused by their uptake of carbon dioxide from the atmosphere. The increased atmospheric carbon dioxide (CO₂) due to human activities increases the amount of CO₂ dissolved in the oceans. Carbon dioxide gas dissolved in the ocean reacts with water to form carbonic acid resulting in ocean acidification. Since biological organisms and systems are adapted to a narrow range of acidity, this is a serious concern - definitely a bad thing.

Global warming is causing the rapid retreat of glaciers all over the world. How will this affect mountain communities near these glaciers, such as in the high Andes of Peru and Bolivia? ANSWER: Many of these communities depend on glacial meltwater to supply their water needs. When this supply of water disappears, it is not clear where these communities will get their water.

What do climate researchers have to say about extreme weather and global warming? ANSWER: According to climate researchers, as global warming advances we can expect to see more and more extreme weather - stronger hurricanes, stronger electrical storms, drier and longer droughts, heavier and more prolonged rains.

What country is responsible for the emission of the greatest amount of CO₂? What country is number two? ANSWER: China is number one, the United States is number two.

What country is responsible for the greatest per capita emissions of CO₂? ANSWER: The United States, by a wide margin.

What percentage of the world's CO₂ emissions come from the United States? ANSWER: The U.S. is responsible for about 21% of the world's CO₂ emissions. China now accounts for nearly a quarter of global CO₂ emissions, but as much of China's industry is now geared towards producing many of the products we use in the United States, the effective emissions of the U.S. are actually much higher than 21%.



The U.S. southwest is already a very dry region, but climate researchers predict the region will see even less rainfall as global warming advances. This will make life difficult in places like Arizona and New Mexico.



photo © R. Larocque

The American Lobster and other marine invertebrates whose shells contain calcium will be adversely affected by ocean acidification.

What percentage of CO₂ emissions come from transportation? ANSWER: World-wide, the transportation sector is responsible for about 25% of CO₂ emissions. Within the U.S., transportation-related carbon dioxide emissions account for about a third of total CO₂ emissions and represent the second largest source of CO₂ emissions. Electricity generation is the largest source of emissions within the U.S.

What is the relationship between the gasoline we burn and the amount of CO₂ produced? ANSWER: Burning one gallon of gasoline produces 24.97 pounds of CO₂ emissions.

If we were to burn all the world's fossil fuels, apparently the goal of most of our politicians, what kind of a rise in average global temperature could we expect? ANSWER: We could expect a rise in average global temperature in the range of 12° to 13° Celsius (21.6° to 23.4° F) - a completely unthinkable rise in temperature. The last time in Earth's history that the average global temperature was only 3° Celsius (5.4° F) warmer, the sea level was 25 meters (82 feet) higher than it is today!

What percentage of CO₂ emissions come from deforestation? ANSWER: Approximately 25% of global emissions of CO₂ come from deforestation.

Of the fossil fuels commonly available to us - oil, coal, natural gas - which contributes the most CO₂ to the atmosphere and which contributes the least? ANSWER: All fossil fuels contribute to global warming, but coal is the dirtiest. In the hydrocarbon family, coal is also the least efficient energy source, providing only half as much energy as oil, while producing twice as much CO₂, and it also emits double the CO₂ per energy unit produced as compared with natural gas.

Does nuclear power contribute to global warming? ANSWER: A false myth often propagated by the nuclear lobby is that nuclear energy is carbon free. In reality, several steps in the nuclear fuel cycle, from uranium mining to enrichment to reprocessing, emit copious amounts of greenhouse gases. (from the report Nuclear Power: No Solution to Global Warming, by M. V. Ramana, July 2005)

Would switching from gasoline to ethanol to run our cars help slow down global warming? ANSWER: In the Feb. 29 2008 edition of Science, researchers estimated that corn-based ethanol production will nearly double greenhouse emissions over 30 years because it will mean the conversion of grasslands and forests into cropland. That is because these habitats sequester tremendous amounts of carbon in their root systems. When the land conversion effects are taken into account, burning corn and soy-based ethanol actually contribute about twice the greenhouse gas emissions of gasoline.

What is a cap-and-trade system and what is a carbon tax, and which would be more effective at reducing CO₂ emissions? ANSWER: A cap and trade system, also known as emissions trading, is an approach used to control greenhouse gas emissions by providing economic incentives for achieving reductions in the emissions of such gases. A central authority, usually a government or international body, sets a limit or cap on the amount of a pollutant that can be emitted. Companies or other groups are issued emission permits and are required to hold an equivalent number of allowances or credits which represent the right to emit a specific amount. The total amount of

allowances and credits cannot exceed the cap, limiting total emissions to that level. Companies that need to increase their emissions must buy credits from those who pollute less. The transfer of allowances is referred to as a trade. In effect, the buyer is paying a charge for polluting, while the seller is being rewarded for having reduced emissions by more than was needed. Thus, in theory, those that can easily reduce emissions most cheaply will do so, achieving the pollution reduction at the lowest possible cost to society.

A carbon tax is an environmental tax on emissions of CO₂ and other greenhouse gases. The intention of a carbon tax is to reduce emissions of CO₂ and thereby slow climate change. It can be implemented by taxing the burning of fossil fuels (coal, petroleum products such as gasoline and aviation fuel, and natural gas) in proportion to their carbon content. The merits of the two systems, cap-and-trade and carbon taxing, are debated, but a carbon tax would be more effective at reducing CO₂ emissions.

Most of the western United States, particularly the southwest, is a fairly dry region. As global warming advances, is it predicted that these areas will receive more or less rainfall? ANSWER: The predictions are that the U.S. Southwest will receive even less rainfall as global warming advances. This is not exactly good news for the residents of Tucson and Phoenix.

The world's largest land carnivore was just recently listed as an endangered species by the U.S. because of changes to its habitat caused by global warming. What animal is that? ANSWER: The Polar Bear was recently listed by the U.S. Dept. of the Interior under the Endangered Species Act. Global warming is causing a significant loss of the sea ice that the bears need for hunting.

Does the U.S. Environmental Protection Agency (EPA) have a legal obligation to set emission standards for CO₂? ANSWER: Yes, according to a recent Supreme Court decision, the EPA is obligated to set emission standards for CO₂. However, this Supreme Court decision has not stopped the Bush administration from abdicating its responsibility, and to date the EPA has failed to set emission standards for this pollutant and greenhouse gas.



Disappearing alpine glaciers will pose a serious problem for many mountain communities that depend on glacier meltwater for their water supply.

What is the albedo effect and how does it relate to global warming? ANSWER: Albedo is the percentage of incoming radiation reflected off a surface. Bright surfaces, like ice and snow, reflect solar radiation back into space. However, as ice sheets melt due to the Earth's rising temperatures, the removal of this highly reflective surface and the resultant increase in the surface area of less-reflective oceans and tundra could cause a decrease in the Earth's albedo and a consequent further warming of the planet.

What is a positive feedback loop and how does this concept relate to global warming? ANSWER: A positive feedback loop is a self-reinforcing system, a process that creates conditions that make that process quicken or intensify. The "positive" part of the term has nothing to do with positive outcomes, and that is especially true when it comes to global warming. Common expressions referring to a positive feedback loop include: vicious cycle, snowballing, or run-away situation. Global warming is proving to be affected by a growing number examples of positive feedback loops.

- Example 1: The albedo effect (see above) is one example of a positive feedback loop. As the planet warms, more ice and snow melts, exposing more ocean water and tundra. These darker surfaces absorb more incoming solar radiation, causing the planet to warm further, which in turn causes more ice and snow to melt, and so on.
- Example 2 - Higher temperatures in the Arctic cause the permafrost to begin melting. This melting causes the decomposition of organic material that has been frozen in the soil. This decomposition releases into the atmosphere both methane and carbon dioxide, two greenhouse gases. The increase in the atmosphere of these greenhouse gases causes the atmospheric temperature to rise further, which causes increased melting of the permafrost, and so on.
- Example 3 - Water vapor is the most prevalent greenhouse gas on the planet. As the Earth heats up, the relative humidity is able to increase, allowing the planet's atmosphere to hold more water vapor, which causes more warming, which allows the atmosphere to hold still more water vapor, and so on.
- Example 4 - Methane clathrate, also called methane hydrate or methane ice, is a solid form of water that contains a large amount of methane within its crystal structure. Significant deposits of methane clathrate have been found under sediments on the ocean floors, particularly under the Arctic Ocean. As the oceans warm, these methane clathrates can melt, releasing methane into the atmosphere. This causes further warming of the atmosphere and oceans, which releases still more methane, and so on.
- Example 5 - Due to global warming-induced droughts, diseases, pest activity, wildfires and metabolic changes, some forest areas, including parts of the Amazon rainforest and the boreal forest of Canada, are now releasing more carbon than they are absorbing. Large areas of forest may be moving in this direction. Forests turning from a carbon sink to a carbon source causes further warming of the planet, which leads to still more global warming-induced droughts, diseases, pest activity, and metabolic changes, and so on.
- Example 6 - In the Antarctic seas populations of krill have plummeted by 80% in the last few years due to the loss of sea ice. Krill are the single most important species in the marine food chain, and they also extract massive amounts of carbon dioxide from the atmosphere. Less krill means more carbon dioxide stays in the atmosphere, which means warmer seas, which means less ice, which means less krill and so on.



Polar Bears, dependent on the Arctic Sea ice for hunting seals, are falling victim to global warming as the sea ice melts.

If our society could magically stop all emissions tomorrow of CO₂ and other gases that contribute to global warming, would the planet begin to cool off, remain at the current temperature, or continue to warm? ANSWER: Even if all human-created greenhouse gas emissions could be somehow magically stopped tomorrow, because of the greenhouse gases already in the atmosphere and the delayed warming reaction of the planet, things would still continue to warm for decades to come. On top of that, some climate researchers now believe that because of the positive feedback loops described above global warming may now be self-perpetuating.

What are CAFE regulations? ANSWER: The Corporate Average Fuel Economy (CAFE) regulations, first enacted by Congress in 1975, are federal regulations intended to improve the average fuel economy of cars and light trucks (trucks, vans and sport

utility vehicles) sold in the U.S. in the wake of the 1973 Arab oil embargo. Raising the fuel efficiency standards of our vehicles, especially light trucks, vans and SUVs, would be one of the more effective things we could do to combat global warming, but due to pressure from the auto industry, Congress has proven very unwilling to make the necessary adjustments to the CAFE regulations.

What role does our diet play in global warming? ANSWER: The production of beef, pork and poultry is a bigger part of the climate problem than the cars and trucks we drive, indeed of the whole transportation sector. The United Nations recently published a report titled *Livestock's Long Shadow*. It concludes that eating meat is "one of the most significant contributors to the most serious environmental problems, at every scale from local to global." And it insists that the meat industry "should be a major policy focus when dealing with problems of land degradation, climate change and air pollution, water shortage and water pollution, and loss of biodiversity." According to that report, almost a fifth of global warming emissions come from livestock production. Over 50 percent of forests worldwide have been cleared to raise or feed livestock for meat-eating, and deforestation is a major contributor to global warming. And the world's 1.3 billion cattle release tons of methane, a very powerful greenhouse gas, into the atmosphere. It is also far more efficient to eat low on the food chain. Producing a calorie of meat protein means requires more than ten times as much fossil fuel - and spews out more than ten times as much heat-trapping carbon dioxide - as does producing a calorie of plant protein. Over 70 percent of U.S. grain and 80 percent of corn is fed to farm animals rather than people, so there would be an enormous savings in energy by switching to a meat-free diet. (Also see the following two questions.)

Which action is more effective in countering global warming, switching from a standard car to a Toyota Prius or switching from a meat-eating diet to a vegetarian diet? ANSWER: Switching to a vegetarian diet is the more effective action. A cow produces more CO₂ equivalent than a car, when you count the oil used to grow it, the methane the cow produces, the nitrous oxide from the fertilizer used to grow the feed crops, so a meat diet contributes substantially to global warming. (Also see question above.)

Many people say that eating locally produced food is an important step in combating global warming. At present, what is the average distance food travels in the U.S. before reaching our dinner plates? ANSWER: In the U.S. the average calorie of food travels 1500 miles from the farm to our plate.

The majority of the oil produced by the Alberta tar sands project is being shipped south to the United States, pushing Canada ahead of Saudi Arabia in oil shipments to the U.S. What are the tar sands, how do they relate to global warming, and why has the project been called the "environmental crime of the century"? ANSWER: Tar sands or oil sands are naturally occurring mixtures of sand or clay, water and an extremely dense and viscous form of petroleum called bitumen. They are found in large amounts in many countries throughout the world, but are found in extremely large quantities in Canada and also in Venezuela. Alberta is currently experiencing a huge boom in tar sands development, so much so that it has pushed Canada into the position of number one foreign supplier of oil to the U.S. Over 99% of Canada's oil exports are sent to the United States. Unfortunately, producing oil from tar sands requires vast quantities of water, has decimated large areas of the boreal forest and is responsible for the emission of vast quantities of greenhouse gases. By the year 2020 the production of oil from tar sands in Alberta is expected to contribute 25% of the whole country's greenhouse gas emissions. For this reason the Alberta project has been called the "environmental crime of the century".

What is mountaintop removal and how does it threaten the atmosphere and the environment, in general? ANSWER: Mountaintop removal (MTR) has been called strip mining on steroids. It is a relatively new type of coal mining that began in Appalachia in the 1970s as an extension of conventional strip mining techniques. Primarily, mountaintop removal is occurring in West Virginia, Kentucky, Virginia and Tennessee. Coal companies in Appalachia are increasingly using this method because it allows for almost complete recovery of coal seams while reducing the number of workers required to a fraction of what conventional methods require. MTR involves clear cutting native hardwood forests, using dynamite to blast away as much as 800-1000 feet of mountaintop, and then dumping the waste into nearby valleys, often burying streams. MTR is a destructive and unsustainable practice that annihilates ecosystems, transforming some of the most biologically diverse temperate forests in the world into biologically barren moonscapes. With coal responsible for such a tremendous quantity of CO₂ emissions, it would be far better just left in the ground.

How does the World Bank contribute to global warming? ANSWER: The World Bank is the world's largest multilateral lender for fossil fuel projects. It currently funds oil and gas industries to the tune of some \$1 billion per year and growing. In 2006,

oil, gas, and power commitments accounted for 77 percent of the World Bank's total energy program. Only about 6 percent went to renewable power such as wind, solar, and mini-hydro. In April 2008, the Bank approved a \$450 million loan for a massive 4,000 megawatt coal project in India, expected to be one of the 50 largest greenhouse gas emitters in the world.



photo by Paul Donahue

The raising of cattle contributes tremendously to global warming.

The Kyoto Protocol is a protocol to the international Framework Convention on Climate Change. It is the only existing international agreement with the objective of reducing the emissions of CO₂ and other gases that cause global warming. As of May 2008 182 countries had ratified the agreement. Is the United States one of these countries? ANSWER: No, the U.S. has not ratified the Kyoto Protocol.

The Kyoto Protocol will expire in 2012. In December 2007 the nations of the world met in Bali for two weeks in the largest climate gathering ever to negotiate an international agreement to replace the Kyoto Protocol when it expires. Given its tremendous importance, what was the final result of this gathering? Were any emission targets or limits set? ANSWER: The final result of the Bali meeting was very disappointing, with no emission targets or limits set.

Our politicians, the so-called leaders, talk of reducing CO₂ emissions but simultaneously they also talk endlessly of the need to "grow" our economy. What is the basic flaw in their thinking? ANSWER: The tremendous and ever-increasing greenhouse gas emissions of the U.S. are basically the result of an endlessly growing economy. There is a very strong correlation between economic output and greenhouse gas emissions. Hopefully, with the so-called "green economy" that will change in the future, but it is certainly not where we are now, with industrial activity accounting for approximately 15% of greenhouse gas emissions. Deforestation, driven in large part by industrial use of resources such as wood products, accounts for another 25% of greenhouse gas emissions. So, one very important way to reduce greenhouse gas emissions is for us to reduce the amount of industrial and commercial activity - but don't expect any politician to tell you that anytime soon. The conventional wisdom of politicians and economists is that industrial growth and expansion serve the best interests of society and that increased production of material goods and the ready consumption of those goods are the keys to creating healthy societies. The following paragraphs are from an article titled "Contributions to Accelerating Atmospheric CO₂ Growth from Economic Activity, Carbon Intensity, and Efficiency of Natural Sinks" by J. G. Canadella, et. al. and published in the November 20, 2007 issue of Proceedings of the National Academy of Sciences.

"The growth rate of atmospheric CO₂ depends on three classes of factors: global economic activity (generated from the use of fossil fuels and land-use change), the carbon intensity of the economy, and the functioning of unmanaged carbon sources and sinks on land and in oceans. Since 2000, a growing global economy, an increase in the carbon emissions required to produce each unit of economic activity, and a decreasing efficiency of carbon sinks on land and in oceans have combined to produce the most rapid 7-year increase in atmospheric CO₂ since the beginning of continuous atmospheric monitoring in 1959. This is also the most rapid increase since the beginning of the industrial revolution.

"We estimate that 35% of the increase in atmospheric CO₂ growth rate between 1970-1999 and 2000-2006 was caused by the decrease in the efficiency of the land and ocean sinks in removing anthropogenic CO₂ (18%) and by the increase in carbon intensity of the global economy (17%). The remaining 65% was due to the increase in the global economy."

World CO₂ at Record High

by David Adam

The concentration of carbon dioxide in the atmosphere has reached a record high, according to new figures that renew fears that climate change could begin to slide out of control.

Scientists at the Mauna Loa observatory in Hawaii say that CO₂ levels in the atmosphere now stand at 387 parts per million (ppm), up almost 40% since the industrial revolution and the highest for at least the last 650,000 years.

The figures, published by the US National Oceanic and Atmospheric Administration (NOAA) on its website, also confirm that carbon dioxide, the chief greenhouse gas, is accumulating in the atmosphere faster than expected. The annual mean growth rate for 2007 was 2.14ppm – the fourth year in the past six to see an annual rise greater than 2ppm. From 1970 to 2000, the concentration rose by about 1.5ppm each year, but since 2000 the annual rise has leapt to an average 2.1ppm.

Scientists say the shift could indicate that the Earth is losing its natural ability to soak up billions of tons of carbon each year. Climate models assume that about half our future emissions will be re-absorbed by forests and oceans, but the new figures confirm this may be too optimistic. If more of our carbon pollution stays in the atmosphere, it means emissions will have to be cut by more than currently projected to prevent dangerous levels of global warming.

Martin Parry, co-chair of the Intergovernmental Panel on Climate Change's working group on impacts, said: "Despite all the talk, the situation is getting worse. Levels of greenhouse gases continue to rise in the atmosphere and the rate of that rise is accelerating. We are already seeing the impacts of climate change and the scale of those impacts will also accelerate, until we decide to do something about it."

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Canadians Ponder Cost of Rush for Dirty Oil

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money into the local and national economies. Alberta is the fastest growing Canadian province, and more than 40,000 people have moved to the oilfields in the last five years.

Only 20 years ago Fort McMurray was a homely, tumbleweed-blown place with a population of 25,000 people. It is now at the epicentre of the rush and its newfound wealth is visible everywhere with its casino, upmarket bars and new hotels. It is expected to grow to a city of 250,000 people within 20 years.

"There are four-hour traffic jams and companies can't give away jobs. Kids out of school can earn \$100,000 a year; people pay \$400 a week to share a room; companies pay people \$4,000 a month to lodge and \$80,000 to just come here," said one estate agent in Fort McMurray. "There's money galore but the town can't cope." The average price of a three-bedroom house, she says, is nearly \$650,000 [£320,000] and rising.

The downside is ecological devastation and soaring greenhouse gas emissions on a scale that is beginning to alarm Canadians and other western countries trying to reduce the intensity of their carbon economies to counter climate change. Canada, alone, of developed countries, is expecting to increase emissions for 30 years and ignore its commitments to Kyoto.

So far, nearly 180 sq miles (470 sq km) of forest have been felled by tar sands miners and giant lakes of toxic waste water cover a further 130 sq km. Environmental campaigners, first nation groups, and doctors accuse the companies of creating massive air pollution, threatening river ecologies and killing fish, and even causing human cancers.

"This is the dirtiest source of oil anywhere in the world and there are barely any regulations," says Simon Dyer, a researcher for the University of Alberta's Pembina Institute.

He says the greater energy needed to produce a barrel of oil from the sands means three times more greenhouse gas emissions than producing a barrel of conventional oil. The greater energy is needed because the oil has to be dug out and then separated from the sand, and because it is low grade it has to be heavily refined. Tars sands mining "is

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What Do You Know About Energy?

by Paul Donahue

Energy is the basis of all life on Earth and is the lifeblood of our society and economy. Our use of energy is also inextricably linked with global warming. What do you know of energy and our use of it?

Our society has grown to today's tremendous proportions because of the availability of relatively cheap and abundant fossil fuels. What are the three types of fossil fuels in most common usage? ANSWER: The three types of fossil fuels in most common usage are oil, natural gas and coal. Peat is a fourth type of fossil fuel, but it is much less commonly used. Peat, a sort of pre-coal, becomes coal when it undergoes several changes as a result of bacterial decay, compaction, heat, and time.

Why are they called fossil fuels? ANSWER: They are called fossil fuels because they are fuels derived from ancient plant and animal remains.

What country consumes the most oil? ANSWER: The United States.

What percentage of the world's oil supply is consumed by the U.S.? ANSWER: The United States, with about 5% of the world's population, is responsible for about 25% of the world's oil consumption.

How much oil does the U.S. consume each day? ANSWER: The U.S. consumes about 21 million barrels of oil per day.

What percentage of the oil consumed by the U.S. is imported? ANSWER: The United States imports more than 65% of the oil it consumes.

What countries are the three largest suppliers of oil to the U.S.? ANSWER: In descending order of importance they are Canada (a recent arrival in the number one position because of the Alberta tar sands or oil sands), Saudi Arabia and Mexico.

What percentage of the energy consumed by the U.S. comes from oil? ANSWER: About 40% of the energy consumed by the United States comes from oil.

What percentage of the energy we use in the United States comes from sustainable sources, such as wind and solar? ANSWER: Renewable energy resources provide just over 6% of the total energy used in the U.S. today. Of this amount, over 70% comes from hydropower.

How much oil does the U.S. military consume each day? ANSWER: The U.S. military is the largest consumer of oil in the world - about 300,000 barrels per day, more than the entire nation of Sweden. In Iraq the U.S. military uses the equivalent of about 16 gallons of oil per soldier per day. In 2007, the oil companies Exxon Mobil, Shell, Total, BP, and Chevron were paid \$4.1 billion by the Department of Defense, with Shell leading the way at \$2.1 billion.



Soldiers of the US military's elite Oil Protection Force (OPF) respond to a report that a barrel of light sweet crude has been smuggled out of US control by Al-Qaeda, but arrive too late to recover the oil.



High tech oil discovery - this specially equipped AWACS aircraft is capable of detecting as little as a single drop of oil from an altitude of 30,000 feet. Once oil is detected, the accompanying fighter jets can immediately begin the bombing of the surrounding civilian population to secure control of the area and bring democracy to the people.

What is the phenomenon of peak oil and how does it threaten life as we know it? ANSWER: Peak oil is the point in time when the maximum rate of global petroleum extraction is reached, after which the rate of production enters terminal decline. Whether or not peak oil will occur is not in doubt - the only question is in its timing. Given that our society is based almost completely on relatively cheap and abundant oil, the consequences of peak oil are potentially catastrophic.

Have we already passed peak oil? ANSWER: Some analysts believe that peak oil occurred a couple of years ago and that now we are in a plateau phase before the inevitable decline begins. Other analysts believe that peak oil is still lies a few years in the future. In any case, the outlook is grim.

Is the discovery of new oilfields keeping pace with the rate at which we are using oil or with the growth in world demand for oil? ANSWER: No, in both cases. The size of new oil discoveries has been declining for some time. On average, oil companies have discovered a little less oil each year since 1961. Through this same period the world demand for oil has steadily increased

The U.S. Department of Energy commissioned a report examining the likely consequences of the impending global peak in oil production. Have you heard of this report and what is its most alarming conclusion? ANSWER: The report titled *Peaking of World Oil Production: Impacts, Mitigation and Risk Management*, commonly known as the Hirsch Report, was released in February 2005. The report's Executive Summary begins with the following paragraph, "The peaking of world oil production presents the U.S. and the world with an unprecedented risk management problem. As peaking is approached, liquid fuel prices and price volatility will increase dramatically, and, without timely mitigation, the economic, social, and political costs will be unprecedented. Viable mitigation options exist on both the supply and demand sides, but to have substantial impact, they must be initiated more than a decade in advance of peaking." Note the use of the word "unprecedented" twice in the same paragraph. Also note the time frame. For their "viable mitigation options" the authors assume a "crash program rate of implementation." The full report is available online at <http://www.netl.doe.gov/publications/others/pdf/Hirsch042506.pdf>.

World demand for oil is increasing. What country is experiencing the greatest rise in demand? ANSWER: Due to its rapid industrialization and growing middle class, China is experiencing the greatest rise in demand for oil. Industrializing countries such as India and Brazil are also experiencing significant growth in demand.

Which three countries have the world's largest remaining reserves of oil? ANSWER: In terms of so-called conventional oil, Saudi Arabia, Iran and Iraq have the world's largest remaining reserves. If so-called unconventional oil is included, such as the Alberta tar sands or oil sands, Canada and Venezuela are very large players.

Plastic is everywhere in our modern society. From what substance is plastic made? ANSWER: Oil.

Nitrogen fertilizers are responsible for a large percentage of world food production. What substance is used as the feedstock for these fertilizers? ANSWER: Natural gas.

If oil production has peaked or will peak in the near future, what is the future of natural gas? ANSWER: The world peak in natural gas production lies only a decade or so behind that of oil.

Which three countries have the world's largest remaining reserves of natural gas? ANSWER: Russia, Iran and Qatar have the world's largest remaining reserves of natural gas.

What are tar sands? ANSWER: Tar sands or oil sands are naturally occurring mixtures of sand or clay, water and an extremely dense and viscous form of petroleum called bitumen. They are found in large amounts in many countries throughout the world, but are found in extremely large quantities in Canada and Venezuela. Alberta is currently experiencing a huge boom in tar sands development, so much so that it has pushed Canada into the position of number one foreign supplier of oil to the U.S. Unfortunately, producing oil from tar sands requires vast quantities of water and is responsible for the emission of vast quantities of greenhouse gases. For this reason the Alberta project has been called the "environmental crime of the century".

What African countries currently experiencing serious civil conflict have significant reserves of oil? ANSWER: Nigeria, Sudan, and Somalia, all experiencing serious civil conflict, have significant reserves of oil. Nigeria is our fifth most important foreign oil supplier.

What is AFRICOM and how does it relate to oil? ANSWER: AFRICOM is the United States Africa Command, a new Unified Combatant Command of the U.S. Department of Defense, to be responsible for U.S. military operations in and military relations with 53 African nations. It joins CENTCOM, responsible for the Middle East and Central Asia, SOUTHCOM, responsible for South America and other Unified Combatant Commands. AFRICOM is supposed to be operational by late September 2008. With African countries holding a significant amount of the world's remaining oil reserves and growing civil unrest in some of the more important oil nations, AFRICOM would seem to be a clear signal that the Pentagon is planning on having to fight future oil wars on the African continent.

How much does the U.S. spend to protect and control the world's supply of oil? ANSWER: The U.S. spends about \$150 billion per year to protect our access to oil and control the world's supply.

The Bush administration has nothing but negative things to say about Hugo Chavez, the left-leaning president of Venezuela. They have also been involved in unsuccessful coup attempts and meddled in equally unsuccessful electoral campaigns attempting to unseat him. Why do they lavish so much more attention on him than on other left-leaning Latin American leaders? ANSWER: Because Venezuela is our fourth most important foreign oil supplier. Among Chavez' first acts as president was halting the planned privatization of the oil sector, and he has since used Venezuela's oil shipments to the U.S. as a bargaining chip with this country.

What is "clean coal" technology and is it really clean? ANSWER: Clean coal is a term used to describe methods and technologies intended to reduce the environmental impact of using coal as an energy source. These efforts can include chemically washing minerals and impurities from the coal, coal gasification, treating the flue gases with steam to remove sulfur dioxide, and other proposed technologies to capture the carbon dioxide from the flue gas. Coal industry groups claim that clean coal technology is a solution to global warming. Many environmental groups, however, oppose the concept, calling "clean coal" an oxymoron because emissions and wastes are not avoided, but are simply transferred from one waste stream to another.

U.S. politicians talk of switching from gasoline to ethanol as a path to greater energy independence? What are the problems with the production of ethanol for fuel? ANSWER: There are several problems with the production of ethanol for fuel. First of all, there are minimal savings, if any in either oil use or greenhouse gas emissions as it takes almost as much energy (supplied by oil) to produce a gallon of ethanol as the energy that gallon of ethanol will ultimately yield. Second, the production of ethanol for fuel requires a lot of land. University of Minnesota researchers report that if all corn currently grown in the U.S. were used to make ethanol it would displace only 12% of current U.S. gasoline consumption. To meet the current demand for ethanol, farmers in the U.S. are removing acreage from the Conservation Reserve Program to plant the land to corn, and in tropical countries the demand is driving deforesta-

tion. Third, if farm land is devoted to ethanol production, it is not producing the food needed to feed a hungry world. The amount of grain needed to make enough ethanol to fill a 25-gallon SUV fuel tank would feed one person for a full year. Fourth, the demand for ethanol is one of the prime reasons for the worldwide rise in food prices, contributing greatly to the growing world food crisis.

Many U.S. politicians have advocated the opening up of the Arctic National Wildlife Refuge (ANWR) for oil development as a way to reduce our dependence on foreign oil supplies. If we were to do this, at current rates of consumption, how long would the oil from ANWR last us? ANSWER: If ANWR has 10 billion barrels of oil, and our current consumption is 21 million barrels per day, then the ANWR reserves represent a bit less than 16 months worth of oil...and that's if all the oil were sold in the U.S. and not exported overseas, something the oil companies could easily do.

photo by Paul Donahue



At present, windpower may be the best available alternative to ever scarcer, greenhouse gas-producing fossil fuels.

Many people talk about hydrogen as an important energy source of the future. Is this true? Where would the hydrogen come from and how would it be produced? ANSWER: Hydrogen is made by splitting water molecules into hydrogen and oxygen. The oxygen-hydrogen bond is strong and the process requires lots of energy. From the Second Law of Thermodynamics we learn that it takes more energy to split a molecule of water into hydrogen and oxygen than the amount of energy you will get from burning that hydrogen. Therefore, it's more appropriate to think of hydrogen as a battery than as an energy source. If renewable energy is used to split the water molecules, then hydrogen fuel could be a good thing. If fossil fuels are used instead, then from the point of view of greenhouse gas emissions, we would be better off just burning the fossil fuel directly. Regardless of the type of energy used, about 20-30% of the energy is lost in the transition. So, if natural gas or electricity is being used, in terms of energy efficiency we would be better off just using those sources directly for our power.

At present, what sustainable energy source would be most capable of providing a significant percentage of our electrical energy? ANSWER: Wind power and solar power are both quite viable sources of energy. At present, wind power probably has the edge.



From Population Crisis to Sustainable Solutions

by George Plumb and Joe Bish

In 1950, the world population was 2.5 billion. The great Amazon rainforest basin was whole and healthy. Maine had just over 914,950 citizens and New England had 92,000 miles of roads.

Today, global population has ballooned 146% to 6.7 billion people and continues to increase at 200,000 people per day. Maine's population is up 44% to 1,320,000. Global deforestation occurs at a rate of 36 football fields per minute.

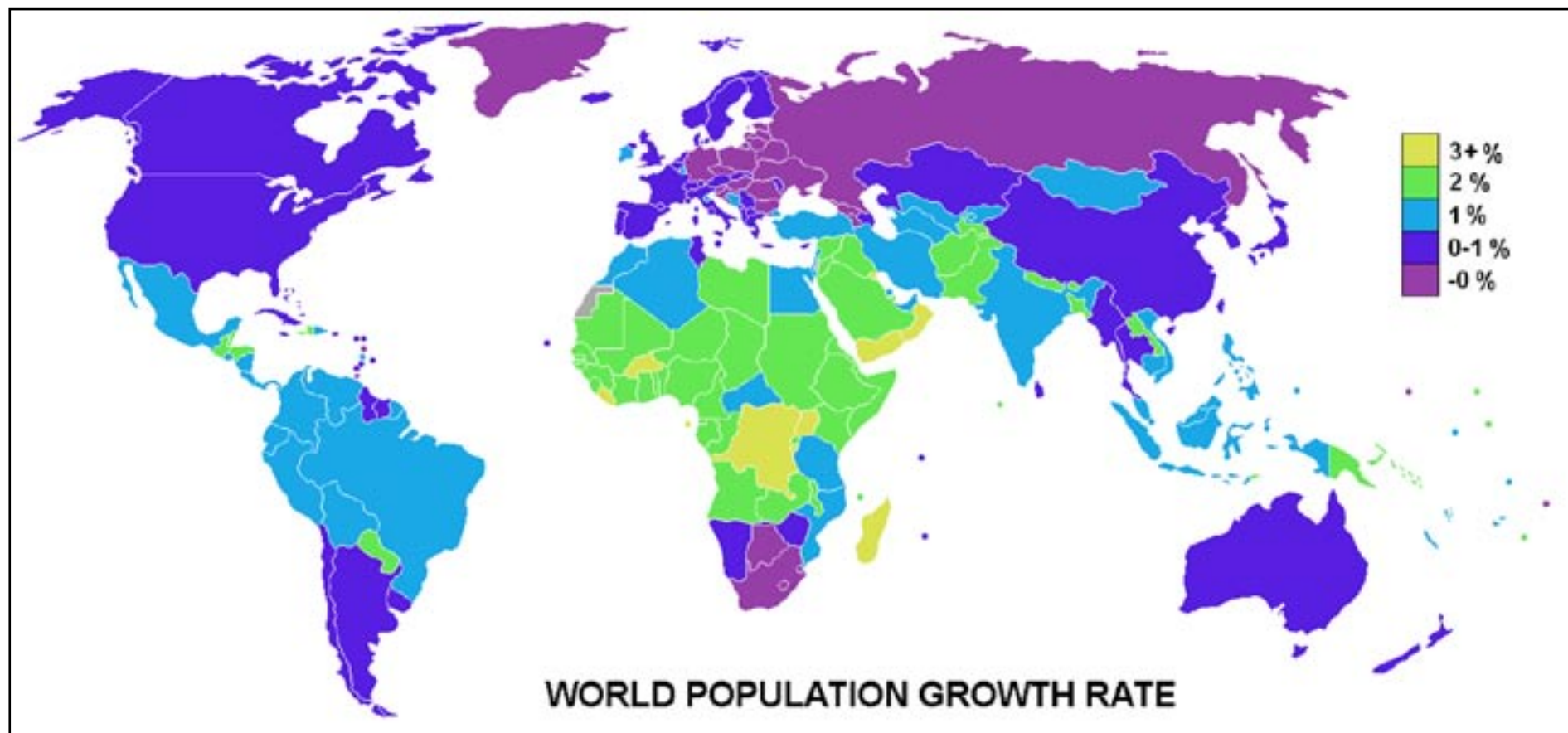
For instance, as Maine's population grew from 1950 onwards, there was never a decade where less than 40,000 new homes were built in the state. In the 1970s and 1980s alone there were over 160,000 new homes constructed. Meanwhile, the six New England states have added almost 22,000 miles of roads since 1950 - more than enough road to go round-trip from Augusta to Los Angeles. Three times.

Meanwhile, citizens of developing countries are understandably striving to be like the U.S., and many are succeeding to an astonishing degree. But the Earth can't afford one U.S., let alone a planet full.

Think about China, which appears to be advancing economically along the same path as did Japan, South Korea

would extend 62 miles upwards into the sky. A stack of 3 billion dollars would reach over 186 miles high. That's a lot of dollars alright, but in terms of additional people on the planet - all of whom deserve a fair shake in terms of natural resources, education and opportunity, it's a burden the Earth surely should not be asked to provide for.

Having a child creates a fundamental and profound impact on the environment. If a woman of 25 decides to change her lifestyle to live as frugally as possible, giving up her car, not flying, buying local, etc. she will reduce her consumption by 60%. If she also decides to have a child, having that child will counter her reduction by the same amount over the course of her lifetime - and that is assuming that the child lives as frugally as its mother.



These amazing figures are only a few in a litany of converging ecological, economic and social crises - global warming, melting sea ice, rising gas prices, food and water shortages. Unfolding in eerie unison, they have finally roused serious concern in the public-at-large.

Unfortunately, media talking heads and most "politically correct" environmental organizations offer only band-aid solutions, telling us to buy a new light bulb and install a new low-flow shower head. Or, if we can afford it, drive a Prius. These actions will purportedly solve all our problems.

Meanwhile, the fundamental cause of these problems is thoroughly and painstakingly ignored.

It's the 6.7 billion people, folks.

Each person on the planet naturally wants to survive and achieve prosperity. As such, they aspire to use one heck of a lot of resources and energy - and produce one heck of a lot of waste. And, it all adds up. The Carrying Capacity Network estimates that every American child born today will consume 3.7 million pounds of minerals, metals and fuels in the course of their lifetime.

As a society in general, the United States doesn't think twice about this sort of growth.

and Taiwan before it. That sounds wonderful, but there is just one problem. If China achieves the same level of fish consumption as its Asian neighbors, the entire sustainable wild fish production of all the world's oceans would be required just to supply China's fish needs. By the way, China adds 8.3 million people per year, equivalent to adding another Maine, New Hampshire, Vermont, Connecticut and Rhode Island combined.

What's more, the United Nations uses very optimistic assumptions about falling fertility to project a global population of 9.2 billion by 2050 - already a 268% increase since 1950. If current fertility rates continue unabated, the projection becomes 12 billion instead. The only way fertility will fall as much as the United Nations assumes is if governments around the world make the right investments and assure the necessary health care and contraceptives are available to all who want them. Currently, that is not the case.

Some may wonder what the big difference between 9 or 12 billion is. For instance, it probably doesn't make a great deal of difference if you have 9 houses on your street or 12. Same as if you have 9 cents in your pocket or 12 cents. Whose counting?

But a billion of anything is an order-of-magnitude many fail to grasp. Remember that if you stacked one billion dollar bills on top of each other, the resulting tower

If the combination of disappearing forests, loss of wildlife species and global climate change are not enough to get you concerned about population size and growth, you may want to consider that the maximum crude oil production across the entire globe may have already peaked - or will very soon. In 2006 world oil production fell from 84.631 to 84.597 million barrels per day. Factoring in ever increasing human population, oil production per capita has dropped from 5.26 barrels per year in 1980 to 4.73 barrels per year in 2006.

In the U.S., oil production peaked over 35 years ago, which is why we now import about two-thirds of our oil. With rapidly growing economies and populations of places like China (and India and Brazil and Egypt and Philippines and on and on) adding to global demand, Americans have already paid dearly for rising fuel oil and gas prices. Without cheap fossil fuels, how are we and future generations going to heat our homes, power our tractors and other machinery, ship our food from thousands of miles away, and get to work and school?

Many experts suggest that without a steady supply of cheap fossil fuels, society will only be able to support a long term population much less than its current size. One way to think about this is to go back in time when we did not depend heavily on fossil fuels. Back in the year 1900, for instance, New England's population was about one third of what it is now: 5.5 million people. So is that

what a sustainable population size is today?

Some will argue that with new alternative energy sources and greater technical efficiencies, New England could ecologically sustain a population larger than 5.5 million - but it seems unlikely to be much larger. Consider that we may well have to grow more of our food locally due to prohibitive transportation costs, and much of our best agricultural lands have already been replaced with sprawl and development.

The solution to most of our problems, environmental or

an eco-system are interdependently co-evolving. We need each other. Take honey bees for example: Albert Einstein once wrote that "If the bee disappeared off the surface of the globe, then man would have only four years of life left. No more bees, no more pollination, no more plants, no more animals, no more man." The same thing could be said about our relationship with earth worms, intestinal bacteria, and forest decomposers. The human propensity to see the rest of the world as "not us" is a propensity towards utter ignorance and self destruction.

of you. And in that sense, no one knows at what point human population growth and profligate consumption will permanently wound the Earth's ecological capacities - maybe they already have. One thing is not in doubt however: we are foolishly playing roulette with our own health and prosperity and the continued existence of countless species, including our own.

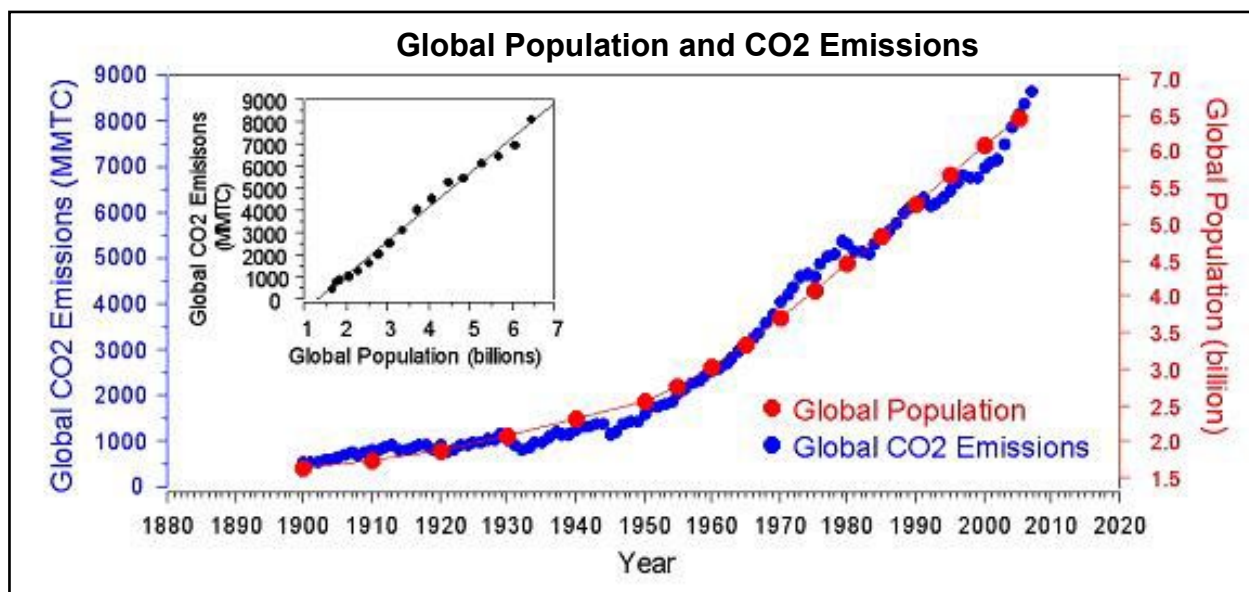
And so, in order not to fail as stewards of our home planet, we must immediately address two subjects with intense local, national and global resolve: the stabilization of human population and the dramatic easing of the negative ecological impacts we impose on the Earth.

You remember that back in 1950 the Amazon rainforest was whole and healthy?

Well, the bad news is that if the status quo continues, the Amazon will have lost 55 percent of its forests by 2030. Global carbon emissions are accelerating rapidly. And, the 200,000 net gain of human beings on the day you read this will far surpass the total combined number of gorillas (100,000), polar bears (50,000), tigers (10,000), giant pandas (2000) and California condors (200) alive on the Earth.

The good news is that we already know how to move population towards stabilization - providing unconstrained access to family planning and contraceptive services to every woman and man who desire them. By doing so, fertility tends to move towards replacement level all by itself. There need be no coercion, no "control", no one child policies. There only need be reproductive liberty for all.

George Plumb is the President of Vermonters for a Sustainable Population (www.vspop.org) and a member of the board of directors of the New England Coalition for Sustainable Population. He is a life long environmental activist and a co-founder of several Vermont environmental organizations. He does not fly or travel far for vacations but looks forward to spending a week on the Maine Coast each year and loves to stay at the off the grid Cobscook Bay Cottages. Joe Bish is the Executive Director of the New England Coalition for a Sustainable Population (www.necsp.org)

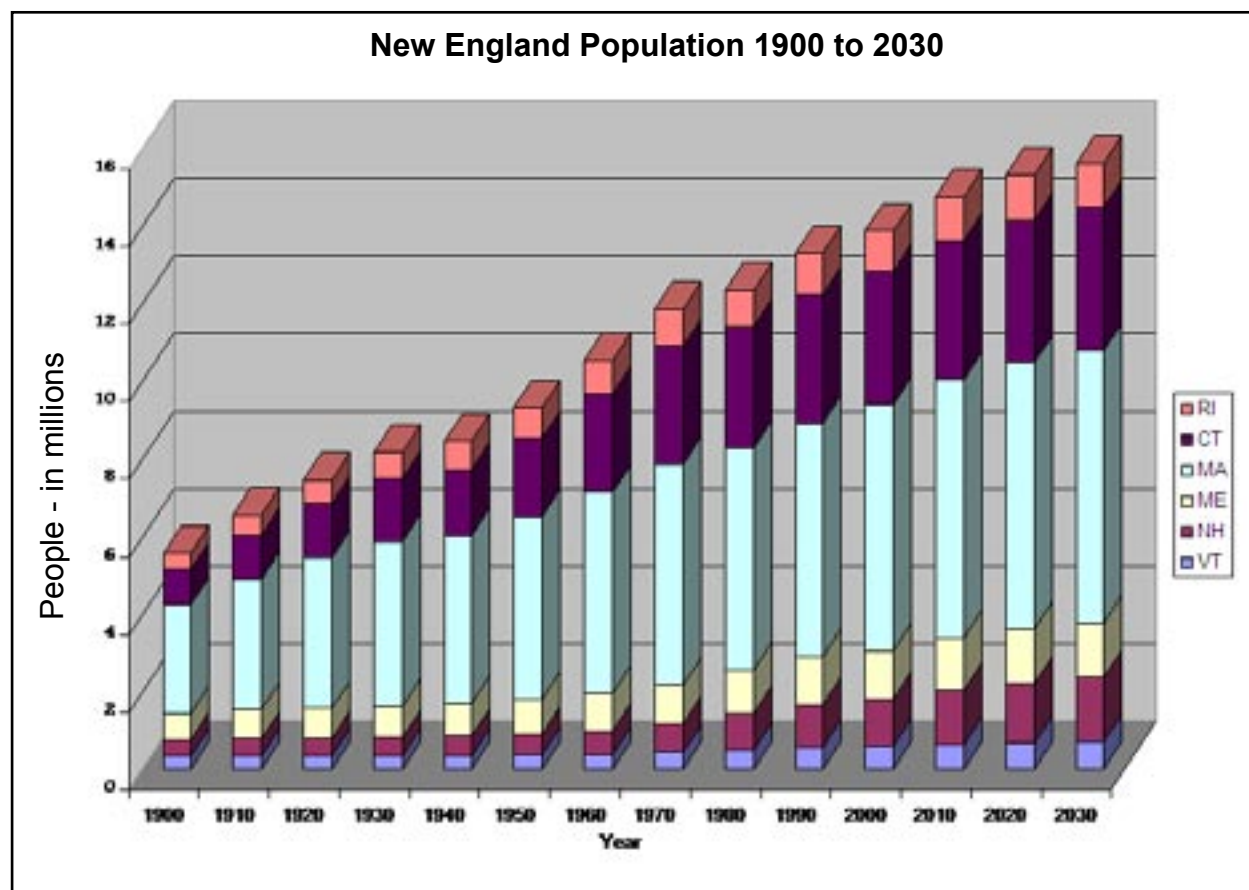


otherwise, is relatively simple. We need to realize that we are part of nature and not separate from it. We then need to behave in accordance with three of the basic laws of ecology.

- The Law of Diversity. The health of an ecosystem lies in the diversity of species with it. Weaken the diversity, as we are doing now (with the lost of an estimated 20,000 species per year) and the entire system will be weakened and eventually collapse.
- The Law of Interdependence. All of the species within

- The Law of Finite Resources. There is a limit to the population growth of any particular species because there is a limit to the carrying capacity the Earth can sustainably provide that species. Human populations are exceeding the ecological carrying capacity of Earth and along the way diminishing non-renewable resources, the diversity of species, and our prospects for a sustainable future.

If you've ever bet on the outcome of a sporting event, invested in a company, or even raised a child you know that predicting the future is very likely to make a fool



Carbon Sequestration Facts

Forestland in the Northern Forest has an average carbon content of 106 metric tons per acre. This includes all carbon in the forest, including live biomass, dead trees and fallen trees,



photo by Paul Donahue

Old-growth forests, like this Coast Redwood forest in northern California, look up vast amounts of carbon.

Trees are roughly 50% carbon (dry weight). Increases in standing timber are directly correlated with increases in bound carbon.

Following a harvest, an estimated 32.5% of forest carbon is released to the atmosphere within five years. Another 32.5% is stored in long-lived forest products, with an average annual loss of 2% to decay or disposal and an estimated 35% of forest carbon remains stored on-site, either in unharvested material, forest soil, or coarse woody debris.

About 67% of the forest carbon is not stored in forest products following a clearcut

From a carbon standpoint wood as a construction material has a smaller carbon footprint than aluminum, steel, plastic, and concrete. This is true because production of wood products is often less energy-intensive.

To grow a pound of wood, a tree uses 1.47 pounds of carbon dioxide and gives off 1.07 pounds of oxygen. An acre of trees might grow 4,000 pounds of wood in a year, using 5,880 pounds of carbon dioxide and giving off 4,280 pounds of oxygen in the process.

Most Americans realize that cars, trucks, and industry are a major source of CO₂ emissions, but the clearing and degradation of forests is also a major factor. Deforestation accounts for approximately 25 percent of annual CO₂ emissions worldwide. This is roughly equivalent to the amount of CO₂ produced by the entire transportation sector (cars, trucks, airplanes) worldwide.

The U.S. carbon sink absorbs 1.1 to 2.6 million metric tons of CO₂ each year, which is equivalent to 20 to 46 percent of total U.S. global warming emissions.

Estimated costs for sequestering up to 500 million tons of carbon per year - an amount that would offset up to one-third of current annual U.S. carbon emissions - range from \$30 to \$90 per ton. On a per-ton basis, these costs are comparable to those estimated for other climate change mitigation options such as fuel switching or energy efficiency.

The total amount of carbon in the atmosphere is about 750 billion metric tons.

Human activities - particularly the extraction and burning of fossil fuels and the depletion of forests - are primary sources of carbon emissions, totaling about 6.6 billion metric tons per year.

The oceans absorb about 2 billion metric tons and the terrestrial ecosystems about 1.2 billion metric tons more than they release.

The atmosphere is annually absorbing approximately 3.4 billion metric tons of carbon more than it is releasing.

If the current rate of carbon accumulation were to remain constant, there would be a net gain in atmospheric carbon of 25 percent over the next fifty years.

The rate of carbon absorption by terrestrial systems in the United States has been falling since 1960 and decreased by approximately 20 percent from 1990 to 2001. This decline in carbon absorption is due primarily to unsustainable forest practices and land use changes.



If left to recover from the ravages of industrial forestry, the northern Maine forest has the potential to store large amounts of carbon.

Maine Facts

Maine Forests uptake about 5.3 million metric tons of carbon each year (.3 metric tons per acre) and currently store about 2000 million metric tons of carbon.

A fifty-year-old forest on average absorbs .8 metric tons of carbon per acre per year. A 65 year old forest 1.6 metric tons per acre per year.

Doubling the age of the forest in the North Maine Woods could increase carbon storage by more than 1000 million metric tons. Currently, due to management practices, the age of the forest is declining.

Between 1982 and 2003 land changes resulted in the loss of 806,957 acres of forest. This represents a total loss to the carbon sink of about 242,000 metric tons per year and the removal of about 42 million metric tons of carbon.

Maple/Beech/Birch stands have the highest carbon density per acre, storing about 550 million metric tons. Tree plantations have the lowest carbon density per acre.

Doubling the stocking on the 550,000 acres of poorly stocked stands could increase carbon storage by as much as 500 million metric tons.

Maine emits about 5.1 million metric tons of carbon per year. This is about 4.1 metric tons per capita - 14th amongst all states.

Canadians Ponder Cost of Rush for Dirty Oil

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the fastest growing source of greenhouse emissions in Canada”, Dyer adds.

Environmentalists from round the world last month called for a moratorium on all new oil sand mines to impose higher standards. In the next 30 years, says Dyer, the oil works in Alberta could extend to an area as large as England. He says “hundreds of millions of extra tonnes of greenhouse gases will be emitted” just from the extraction process.

This month the province of Alberta and the federal Canadian government came under pressure to clean up the environmental mess already made and to urgently lower the carbon intensity of exploiting the oil sands. US presidential contender Barack Obama and, separately, hundreds of US mayors, have questioned the wisdom of making oil from bitumen.

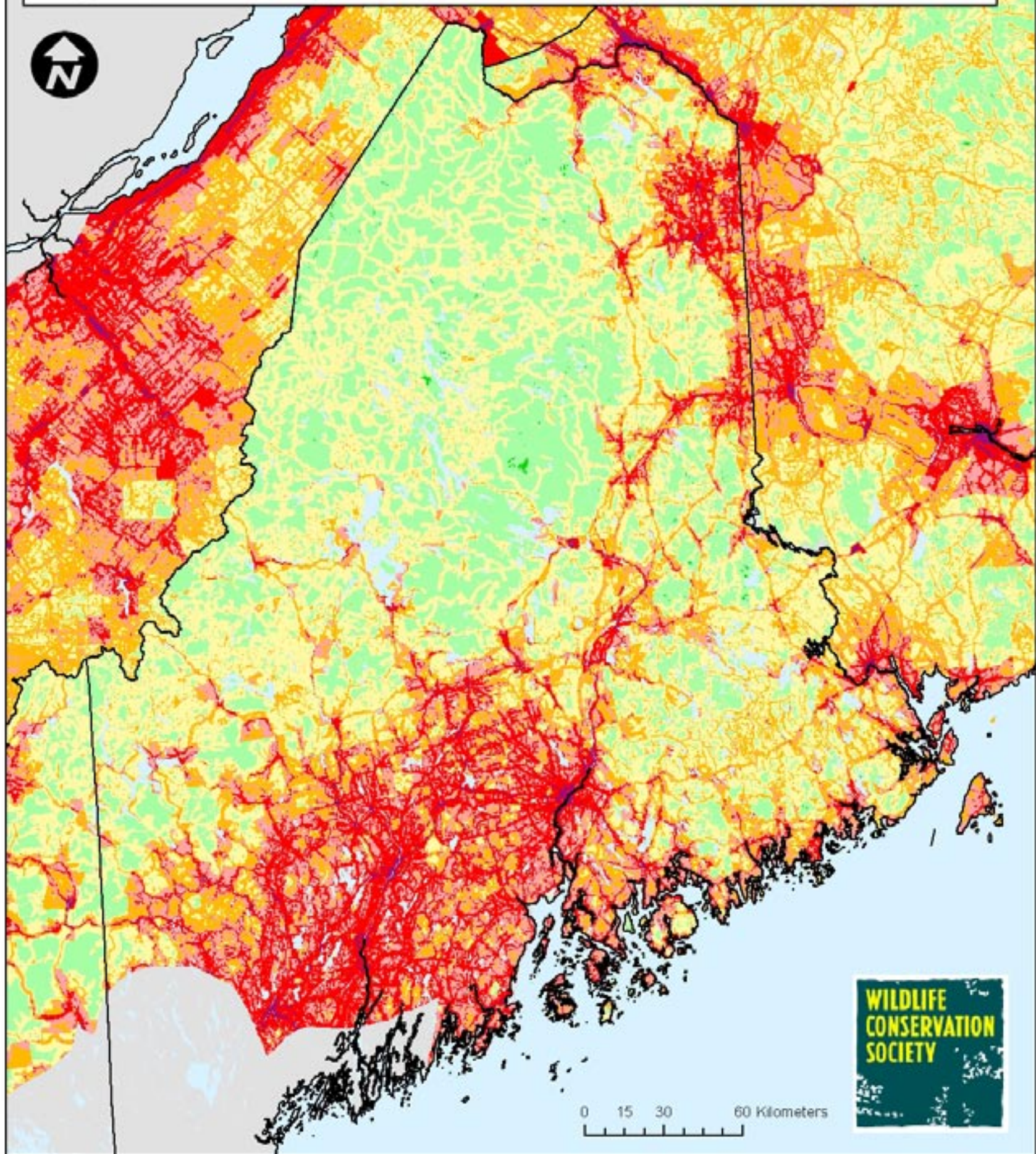
Jason Grumet, Senator Obama’s senior energy adviser, said the presidential candidate, if elected, intended to break America’s addiction to “dirty, dwindling, and dangerously expensive” oil.

“If it turns out that the only way to produce [resources] would be at a significant penalty to climate change, then we don’t believe that those resources are going to be part of the long term, are going to play a growing role in the long-term future,” he said.

His statement followed a direct attack on the oil sands by more than 1,000 mayors of large US cities who voted last month to boycott energy with a large carbon footprint.

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Regional Human Footprint of the Northern Appalachian Ecoregion : Maine



Human Footprint Score



Most Wild
Least Influenced



Least Wild
Most Influenced

Paper or Plastic? Neither!

by Teresa Wood

A list on how to reduce your energy consumption and combat global warming includes numerous important suggestions like unplugging your television, computer or radio until you are ready to use them, driving less, changing to compact fluorescent light bulbs, weather stripping your home, washing a full load of clothes and using a clothes line, stopping the use of disposable plastic water bottles, turning down your thermostat in winter and up in the summer. One more item on the list should be: use cloth shopping bags instead of paper or plastic bags.

Here are some facts related to plastic and paper shopping bags and their impact on the environment: Oil and natural gas are the major raw materials of plastics. Great



amounts of water and fossil fuels are used annually in the manufacture and subsequent transport of single-use plastic bags to stores and businesses worldwide. Worldwatch Institute says that four to five trillion plastic bags were produced worldwide in 2002 alone and that Americans throw away 100 billion polyethylene plastic bags each year. An estimated 12 million barrels of oil is required to make that many plastic bags. Most are used just once and discarded.

Contrary to popular thought, using paper bags is not less harmful to the environment than using plastic. It takes more than four times as much energy to manufacture a paper bag as it does to manufacture a plastic bag.

ENERGY TO PRODUCE BAG ORIGINALLY (BTUs)
Safeway Plastic Bags: 594 BTUs
Safeway Paper Bags: 2511 BTUs
(Source: 1989 Plastic Recycling Directory, Society of Plastics Industry.)

Of course, most paper comes from tree pulp and each new paper grocery bag you use is made from mostly virgin pulp for better strength and elasticity, so the impact of paper bag production on forests is enormous. In 1999, 14 million trees were cut to produce the 10 billion paper grocery bags used by Americans that year alone. Paper bag production delivers a global warming double-wham

A list on how to reduce your energy consumption and combat global warming includes numerous important suggestions like unplugging your television, computer or radio until you are ready to use them, driving less, changing to compact fluorescent light bulbs, weather stripping your home, washing a full load of clothes and using a clothes line, stopping the use of disposable plastic water bottles, turning down your thermostat in winter and up in the summer. One more item on the list should be: use cloth shopping bags instead of paper or plastic bags.

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Canadians Ponder Cost of Rush for Dirty Oil

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In addition, California's governor, Arnold Schwarzenegger, last month signed agreements which will cut the use of high carbon petroleum sources from Alberta and elsewhere. Ontario and British Columbia must now meet California's low-carbon fuel standard and other provinces and US states are expected to join the standard, shrinking the market for oil sands.

In late June, the Canadian federal and Alberta provincial governments joined the Canadian oil industry to play down the impact of the sands on the environment. "Canada only produces 2% of the world's greenhouse gas emissions, and the oil sands are only 8% of these [2%]," says a spokesman for the Canadian association of petroleum producers.

"We are only 15% more intensive with greenhouse gas on a lifecycle basis than conventional oil. We have to reduce emissions by 15% to get to parity. We are doing this by tree planting, installing carbon capture programmes and through hydrogen [mixed into bitumen in processing]," said a spokeswoman for Albian Sands, a consortium of Shell, Chevron and Marathon, which is working the 8 sq mile (20 sq km) Muskeg river mine 50 miles north of Fort McMurray.

The company produces 155,000 barrels of crude a day from the estimated 5 billion barrels of oil under the land the company has leased. In 2007 they extracted 250 million barrels of oil.

A Shell Canada spokesman in Calgary said that the company was planning to reduce its emissions by 50% and was seeking to develop carbon capture technology. But he admitted this was at least five years away and possibly much longer.

"We recognise that mining, extracting and upgrading bitumen has a significant footprint. Large areas must be cleared and excavated, while large volumes of water and natural gas are used to mine, process and upgrade it," said a spokesman. "Each project undergoes stringent environmental assessments," he said.

But green groups responded that although the companies were voluntarily reducing the carbon emissions associated with their operations, all the improvements were being undermined by the daily increase in the scale of their operations. "Every environmental parameter is worsening," said Dyer.

"The companies are seeking to blame drivers for the oil they burn. The reality is that producing each barrel of oil from oil sands emits between three and five times as much carbon dioxide as a conventional barrel of oil. [Producing] a conventional barrel emits about 30kg of CO₂, but the two biggest companies in the oil sands, Syncrude and Suncor, have said they emit 120kg a barrel," he said.

The companies last week also sought to minimise their impact on water. Oil sands need to be washed and more than 12,713m cubic feet (360 million cubic metres) are used a year - the equivalent used in a city of 2 million people.

"Our impact is near negligible," says an Albian spokesperson. "Yes, we use a lot of water but Canada has decided that 2.5% of the river is acceptable. We release no processed water into the environment." The water is held in settling pits for 20 years before being released.

But the companies' record on water is disputed strongly by environment organisations. "They may be taking only 2.5% of the water from the Athabasca river, but that's over the year. In late winter when the flows are the lowest, that can be 16% of the river. The river is already being affected, and this will be cumulative," says Dyer.

The speed and scale of the growth of oil sands mining have shocked Canadians who regard themselves as living in one of the most environmentally responsible countries in the world. But record oil prices are posing a serious dilemma between supporting today's oil dependent economy and moving to cleaner energy sources to avoid a future climate catastrophe.

"Sure, I am worried about the Alberta environment. We all are. Canada's image is all tied up with wilderness and clean living. Now we have to accept we depend on dirty industry. The oil sands are making us rethink who we are. But it's like no one can say no to oil," says John Davidson, a graduate mechanical engineer who moved to Fort McMurray to help build a new plant. "But if you can pay your mortgage off in five years, then I have to say I can't resist either," he says.

This article was originally published in the July 12, 2008 issue of the Guardian newspaper.

Are Boreal Forests Becoming a Carbon Source?

by Jill Sakai

Far removed from streams of gas-thirsty cars and pollution-belching factories lies another key player in global climate change. Circling the northern hemisphere, the conifer-dominated boreal forests - one of the largest ecosystems on earth - act as a vast natural regulator of atmospheric carbon levels.

Forest ecologists at the Univ. Wisconsin-Madison are studying how environmental factors such as forest fires and climate influence carbon levels in this forest system. Their most recent findings, reported in the Nov. 1 issue of the journal *Nature*, offer insight into the balance of carbon uptake and release that contribute to atmospheric carbon dioxide levels worldwide.

Second in size among forests only to the tropical rainforests, the boreal forests form a massive green band spanning the higher latitudes of Canada, Alaska, Siberia, China, and Scandinavia. Their sheer size, coupled with the fact that they are expected to experience the greatest warming of any forest biome as global temperatures rise, means that climate-related changes here are likely to resonate well beyond the forest boundaries, says S. Tom Gower, Univ. Wisconsin-Madison professor of forest ecology and management and primary investigator of the project.

In the new study, Gower and his colleagues used a computer model to simulate the carbon balance of one million square kilometers of the Canadian forest over the past 60 years, to determine the relative impacts of climate and disturbance by wildfire.

The group found that the effects of carbon dioxide and climate — temperature and precipitation — varied from year to year but generally balanced out over time and area. Instead, forest fires during the 60-year period had the greatest direct impact on carbon emissions from the system.

However, “because fire frequency and fire intensity are directly controlled by climate change, it doesn’t mean that we shouldn’t be focusing on climate change,” Gower says. “Climate change is what’s causing the fire changes. They’re very tightly coupled systems.”



Yellow-rumped Warbler, a common resident of the boreal forest.

The researchers believe that fires shift the carbon balance in multiple ways. Burning organic matter quickly releases large amounts of carbon dioxide. After a fire, loss of the forest canopy can allow more sun to reach and warm the ground, which may speed decomposition

and carbon dioxide emission from the soil. If the soil warms enough to melt underlying permafrost, even more stored carbon may be unleashed.

A trend toward hotter and drier conditions is likely to exacerbate the effects of fire by increasing the frequency, intensity, and size of burns. “All it takes is a low snow-pack year and a dry summer,” Gower says. “With a few lightning strikes, it’s a tinderbox.”

Historically, scientists believe the boreal forest has acted as a carbon sink, absorbing more atmospheric carbon dioxide than it releases, Gower says. Their model now suggests that, over recent decades, the forest has become a smaller sink and may actually be shifting toward becoming a carbon source.

“The soil is the major source, the plants are the major sink, and how those two interplay over the life of a stand really determines whether the boreal forest is a sink or a source of carbon,” he says.

Though the model is not currently designed to forecast future conditions, Gower says, “Based on our current understanding, fire was a more important driver (of the carbon balance) than climate was in the last 50 years. But if carbon dioxide concentration really doubles in the next 50 years and the temperature increases 4 to 8 degrees Celsius, all bets may be off.”

Other scientists involved in the research are Ben Bond-Lamberty, Scott Peckham, and Douglas Ahl. Funding for the work was provided by the National Science Foundation and the National Aeronautics and Space Administration.

This article first appeared on the website of the University of Wisconsin-Madison.

photo by Doug Backlund

How Will Global Warming Affect Northern New England’s Forests?

- In the most heavily impacted areas, the rates at which plant and animal species may be required to shift their ranges in response to global warming in the next 100 years may be as much as ten times faster than at the end of the last ice age. Unusually high migration rates are likely to affect more than 18,000 square miles of habitats (an area larger than Denmark) in Vermont, Maine, New Hampshire and New York, threatening some species with local extinction.
- Range changes brought about by global warming and climatic disruption are expected to change the character of the forests of northern New England and upstate New York. Climate models predict that in the longer term global warming will eventually transform the conifer forest of northern New England into the type of forest now found farther south – either the deciduous forest of the Mid-Atlantic States, or the mixed forests characteristic of southern New England.
- The conditions that currently support northern hardwood forests will shift up to 300 miles north during the next 100 years, causing the loss of these forests over much of the landscape. The distributions of White Spruce, Black Spruce, Red Spruce, Balsam Fir and other species of cool climates will move north and these trees are likely to disappear from most of their current ranges in the Northeastern United States. If disturbances such as fire or storms increase as has been predicted by some scientists, this would hasten the decline.

- Current modeling forecasts predict that Maple Sugar trees eventually would be completely eliminated as a regionally important species in the northeastern United States. Even where sugar maples are able to persist, changes in the freeze/thaw cycle are expected to reduce the quantity of syrup harvested. Maple syrup production is worth approximately \$20 million annually in New England.
- Milder winters are expected to increase the vulnerability of forests to insect pests including Eastern Spruce Budworm, Gypsy Moth and Pine Bark Beetle. The Hemlock Woolly Adelgid is also likely to be able to move northwards in New York and into Maine, New Hampshire and Vermont.
- The increased frequency or severity of droughts projected by some climate models would adversely affect the health of many forest species. The region’s magnificent stands of Paper Birch and American Beech are particularly vulnerable.
- Higher temperatures and more frequent droughts could be accompanied by an increase in forest fires. As a result, the number of early successional and more cosmopolitan species (such as Red Maple, Gray Birch and aspens) may increase in the forests at the expense of climax species. This would also help hasten the northward spread of southern species like oak and hickory.

- Warming temperatures could bring about an increase in the frequency of massive ice storms. In 1998 such a storm damaged more than 17 million acres of forests. Hardwood species are the most vulnerable to ice damage.
- Higher summer temperatures will contribute to greater ground-level ozone formation with the likely effect of reducing forest productivity and harming commercial tree species like red spruce and white pine. Ozone impacts are expected to be worst in southern New York and central and southern New England.
- Climate change may act in concert with other environmental stresses, including acid rain, ozone pollution, pests and drought, to reduce the productivity of forests.

The above information is from the fact sheet on Climate Change and the Northern Forest produced by Clean Air-Cool Planet, a New England based non-profit organization involved in finding and promoting solutions to global warming. The full fact sheet can be found at <http://www.cleanair-coolplanet.org/information/factsheets.php>. Their fact sheet is based on the report Global Warming and Terrestrial Biodiversity Decline by Jay Malcolm and Adam Markham, World Wildlife Fund, 2000.

Why I Became a Vegetarian

by Julian Solano

Have you ever thought about how being vegetarian is good for the earth and yourself? In 2006 the United Nations published a report called "Livestock's Long Shadow", in which they stated that, "The livestock sector emerges as one of the top two or three most significant contributors to the most serious environmental problems, at every scale from local to global."

One way that meat-eating can contribute to global warming is through the livestock's land use. According to the UN's report, "Ranching-induced deforestation is one of the main causes of ... carbon release in the atmosphere." Deforestation is responsible for 25% of all greenhouse gas emissions, and over 50% of all forests worldwide have been cleared for livestock. The UN's Food and Agriculture Organization (FAO) agrees, saying that "Expanding livestock production is one of the main drivers of the destruction of tropical rain forests in Latin America, which is causing serious environmental degradation in the region." For example, 70% of the former Amazon rainforest is used for livestock, and most of the remainder is used for the crops to FEED the livestock. The same livestock takes up 70% of all agricultural land, and 30% of ALL the Earth's land surface.

Another big problem with a meat-eating diet is the amount of fossil fuel used to produce meat. "Livestock

are responsible for 18% of greenhouse-gas emissions as measured in carbon dioxide equivalent," reports the FAO. This includes 9% of all CO2 emissions, 37% of methane, and 65% of nitrous oxide. Altogether, that's more than the emissions caused by all transportation



Julian Solano atop a 185 foot tall Coast Redwood.

worldwide. Fossil fuel is used for the pumping of water and cultivation of crops for cattle, transportation of cattle, processing the meat, and running the slaughterhouses. Producing one calorie of meat protein means

burning more than 10 times as much fossil fuels than producing 1 calorie of vegetable protein. According to an article in Environmental Health Perspectives, the typical feedlot raising of cattle requires an input of 35,000 calories of fossil fuel to produce 1,000 calories of food energy in beef, a lot more than needed to produce 1,000 calories of grains or veggies. Researchers at the University of Chicago compared the global warming impact of meat eaters with that of vegetarians and found that the average American diet results in the annual production of an extra 1.5 tons of CO2-equivalent (in the form of all greenhouse gases) compared to a no-meat diet.

photo by Paul Donahue

So think about that. Would you change your ways? Would you, if you could? Well, you can. Even taking a little bit of meat out of your diet can make a big difference. And, if every American was to eat one meat-free meal a week -- just one -- it would be equivalent to taking half a million cars off the road. Think about this all and know, for a fact, that you, yes YOU, can make a change.

Julian Solano is a 12 year old environmentalist, budding ornithologist and nephew of the editor, and resides in Pacifica, California.

Living With Solar, a Maine Primer

by Daryl DeJoy

So, you live in Maine. You consider yourself independent, hard working, well informed and looking to the future. You and your family are looking to become more energy efficient and lower your carbon footprint on our planet. You've changed your light bulbs to compact fluorescent's. You've changed your appliances, one at a time, to the most energy efficient ones you could find and you make sure the kids turn off lights and shut off power on games and computers when they're not using them. You've changed those energy hogging electric heater, electric stove and electric hot water heater to more efficient propane models, which also are cleaner from an environmental standpoint. You even bought an on-demand type water heater to really cut down on wasted power from keeping a tank of hot water heated all day. What's next?

You, and many others in Maine, are taking the steps we need to be more electrically energy independent in our state. I would suggest that at this point you would be excellent candidates for a solar electric (photovoltaic or PV) system.

There are basically three types of PV system. One, the simplest and most inexpensive (although that is a relative term) is the straight utility intertie. This is a series of solar panels which connect directly to an inverter,

through various safety devices, which then connects to your main house panel or meter, and finally to the utility. The utility, either Bangor Hydro or Central Maine Power, then credits you for the power you make from your PV array. For every kilowatt hour household uses, they subtract one from what you have "sold" them. This is referred to as "net metering". This type of system is used most in areas where the power rarely goes out or the user decides to use a generator for times of utility blackouts. Because of its lack of need for maintenance and straightforward installation, as well as the lower overall price per installed watt, it is the most popular type of PV system in use right now.

The second type of system is the utility intertie with battery backup. This system incorporates batteries into the system but also can sell excess power back to the utilities. The inverters used in these systems differ from straight utility intertie type inverters, but provide people with almost instantaneous backup power in the case of power outages. Because more components and the addition of batteries are necessary this system can be 20%-40% more expensive than the first type of system we talked about. It is easy to maintain, usually only needing to top off the batteries with distilled water three or four times a year. On this type of system we plan battery storage for the "critical loads" in the home, typically water pumps, refrigerators and some lighting, to lessen the size of the battery bank but still maintain the homes ability to remain livable in cases of power outages.

The third type of system is one we install in many backwoods locations where the utility grid is far from the home. These systems are referred to as "off grid". They generally provide the homeowner with the most independence, creating up to 100% of the homeowners electrical needs. In most cases the homes will also have small backup generators installed in case of long periods of cloudy weather which we can sometimes see in November and December particularly. We have over 120 of this type of system installed in Maine alone, some for as long as twenty years. These are the ultimate in energy independence, but are the most expensive to install and require the highest degree of energy efficiency in the home.

But, you ask, does Maine have enough sun for me to run my home? The short answer is yes! Many places in Tennessee, Pennsylvania, Ohio and so many other places in the country have less available solar insolation than we do in Maine. Solar Insolation is defined as the amount of solar energy that strikes a given area over a specified time. We in Maine have an average of 4.3 usable sun hours over the year, daily. It can be as little as 2.9 hours of sun in November or as high as almost 6 hours in July. A properly designed system, properly installed, can utilize this solar exposure to its maximum capabilities. It is possible to start small, say, with a system for as little as \$5000.00 which can be increased as time and budget allow. It is important to have a long range view of where you want to go when you start the process of working

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A Fourteen Year Old's Opinion on Global Warming

by Olivia Tenzing

At what moment do you stop and ask yourself what you are worth to this world?

Is your appearance on the face of this planet only to make an ideal life that supports you?

Or are there things that matter to you that go beyond your own self-centered needs?



Olivia Tenzing

photo by Paul Donahue

is left is trash and an uninhabitable planet? Is this what we want? We have to ask ourselves this question, for I fear this is the direction we are headed.

What matters most to me are the animals with whom we share this Earth. Everything has a life-force and needs fresh air and water to stay alive. We think of ourselves as indestructible, apart and separate from this essential fact.

We, as a species, think of ourselves as superior and better than animals because we have figured out how to control so much of nature with our technological advances. But somehow we have missed the point. We are destroying animals' habitat and causing species extinction at a rate unprecedented in the Earth's history. But what have the animals done to us to deserve this? They don't deserve this blatant disregard. There has to be another way.

What I am trying to say is that the opinions and motivations that people focus on and are thinking about and talking about have no impact on what really matters for the well-being of our planet

upon which our own very lives depend. The health of the planet directly correlates with our own health. Why can't people see that? We are so wrapped up in what is happening in our materialistic lifestyles, our focus on sports, our government gymnastics, and what is happening in Hollywood, that we are not focusing on what really matters. We are now so stuck in this routine system of materialism and consuming more, that we have missed the point. We have missed how the basic tenants of nature, our connection to it and its role in our own well-being are essential to our survival. We are destroying animals lives and their habitats daily without even realizing it. We owe it to them to prevent worse disasters that ruin life as they know it and have the potential to ruin life as we know it as well. That is just close behind.

We've come so far, but yet we've succeeded in destroying so much of the natural world. Is this really progress? How can someone ignore the evidence all around us....when it is so obvious? How can there be people who are still unsure of their personal responsibility and the roles they must take in reducing their own carbon footprint?

Global warming is a sensitive topic and the only way we are going to solve it is to become more realistic with our lifestyles, our opinions and focus, and take action towards saving the planet before our destruction of our natural resources has gone so far that there is no return. We now must work at the governmental level with each nation to make this a top priority in order to reverse the global warming effects we have created.

Will you now ask yourself what you are worth to this world? What are your children and grandchildren worth to this world? What are the animals worth to this world?

In knowing these answers, I hope you will decide to push yourself to that perhaps uncomfortable place of personal responsibility. I hope you will go beyond that self-centered place and do something that makes a difference for the greater good.

I invite you all to care. I invite you all to educate yourselves beyond what we hear in mainstream news and learn what is really going on. I invite you all to dedicate yourselves to making a difference.

The difference must begin with you. It must begin in your home. You must begin for your children. It must begin now.

I ask you what do you care about? Is your appearance on the face of this planet only to make an ideal life that supports you? Or are there things that matter to you that go beyond your own self-centered needs?

Mahatma Gandhi said, "We must become the change we want to see in the world."

I invite you to accept that challenge.

Olivia Tenzing is a 14 year old environmentalist from Pacifica, California. She is the grand-daughter of Tenzing Norgay, who, along with Sir Edmund Hillary, were the first climbers to reach the summit of Mt. Everest.



Living with Solar

continued from page 18

with your solar designer. Remember that you can't add new batteries to an old battery bank, if you decide to go with an off grid or battery based grid intertie system. Try to design the system for future expansion from the start, even if your expansion is only in small increments.

There are so many ways we can lessen our impact on our planet and in our beautiful state and they are all incremental. Simply working patiently toward our long range picture of where we want to be in the future is the best way to get there. Whether it's with the car we want (or don't want) to drive or envisioning our electrical independence with our own off grid solar electric system, the plan is the same. We have installed over 300 systems in Maine in the last twenty years with all our customers very satisfied. Many did not think they could achieve the independence they feel but are now avid supporters of the technology and the concept. Remember, living with solar is different and requires a bit of change in the lifestyles of many, but change is not sacrifice and can be exciting, even exhilarating. Going solar typifies the spirit of Maine and the "Yankee independence" we are known for. It is the best of both worlds when we can be ourselves and help the planet to be cleaner and healthier.

Daryl DeJoy is the owner of Penobscot Solar Design and is certified in Advance PV Design as well as a NAB-CEP certified PV installer. He has been designing and installing solar electric systems since 1988. For more info go to www.penobscotsolar.com or email Daryl at info@penobscotsolar.com

It seems to me that humans have been programmed to think that they need to fulfill their every craving, their every desire and this is why global warming is getting worse. In our conditioning as human beings we have set up societies that rely on these superficial needs and our lifestyles are comprised of actions that continually destroy the very part of the natural world that we all need to stay alive.

Sadly, our actions are at the expense of our own well-being and the planet and the other creatures we share it with. It is as if we are blind to our own destruction. It seems to me that human beings are hard-wired to be self-serving and lack much self-awareness. We as a species are selfish and short-sighted. We don't think of the big picture. We always want more....bigger, better, more. We never seem satisfied with what we have. When we meet a desire, we only appreciate it for a little while and then move quickly on to the next craving to be fulfilled. It is as if our needs are endless, bottomless pits and our emptiness is never satisfied. These are attitudes that are as outdated as prehistoric times. They do not match where we find ourselves in our global climate crises. We must change what we think is important and therefore what we value. And in truth, this change must occur in not just one of us on this Earth but in all of the almost seven billion human beings who now inhabit our planet.

Our lifestyles are directly contributing to not only our own demise but to the demise of the other creatures who share our Earth. Life on Earth as we have known it has to change. Have you seen the movie Wall E, where human beings use up every last bit of nature and all that

Global Warming Solutions That Work

Global warming is the defining challenge of our time. The latest climate science tells us that the United States must reduce its emissions of global warming pollutants quickly and dramatically if we hope to avoid the most catastrophic impacts of global warming. The rest of the world must take strong action as well. For the United States to make the emission reductions science tells us will be necessary—cutting emissions by at least 15-20 percent by 2020 and by 80 percent by 2050—will require major changes in many areas of America's economy, from the increased use of clean, renewable energy to dramatic improvements in the efficiency with which we use energy in our homes, businesses and vehicles. But solutions exist today that can get us much of the way there. And communities across the country—and around the globe—are making those solutions a reality.

This report details more than 20 examples of cutting-edge policies and practices that communities, states and countries are using to reduce global warming pollution. These examples show that while actions to reduce global warming pollution require commitment and creativity, they also bring with them other benefits—reduced dependence on fossil fuels, cleaner air and healthier communities, economic growth and new jobs.

America should learn from these initiatives by adopting public policy “best practices” that can achieve similar benefits nationwide. The United States—as well as individual states—should foster further innovation by adopting mandatory caps on global warming pollution, coupled with policies that will promote the transition to a cleaner, more efficient energy system.

Cities and states across America are achieving impressive results in the fight against global warming.

- Texas has added more than 4,000 megawatts of wind power generating capacity in the last decade. Once a marginal source of electricity in the state, wind power now produces about 3 percent of Texas' electricity, enough to avoid about 8 million metric tons of global warming pollution per year. *Global Warming Solutions that Work*
- New Jersey doubled its solar power generating capacity within just two years through aggressive public policies that promote solar panels on rooftops in the Garden State.
- California uses 20 percent less energy per capita than it did in 1973, thanks to strong energy efficiency policies for buildings and appliances.
- Wisconsin avoids about 200,000 metric tons of carbon dioxide pollution per year through its innovative programs to promote energy efficiency in industry—programs that also help save businesses money and keep jobs within the state.
- Portland, Oregon, has doubled the number of bicyclists on city streets in just six years through investments in bicycle infrastructure and bikefriendly transportation policies. The percentage of people who bike to work in Portland is now eight times the national average.
- In the Rosslyn and Ballston neighborhoods of Arlington County, Virginia, about 40 percent of residents take

transit to work and about 10 percent walk, thanks to investments in transit service to Washington, D.C. and smart land-use planning that has created

vibrant, compact, mixed-use communities around transit stops.

- Southeastern Pennsylvania saw a 20 percent increase in the number of riders on energy efficient trains linking Harrisburg and Philadelphia following investments that increased travel speeds along the line. A similar 20 percent ridership jump occurred recently on the Northeast's Acela high-speed train line.

Other nations have also made significant progress, with lessons for the United States.

- Germany recycles 60 percent of its municipal waste (compared to 32 percent in the United States) and has kept its garbage output steady for nearly two decades thanks to policies that put the responsibility for recycling waste on product manufacturers and not individual consumers and taxpayers.



Bicycling instead of driving is an excellent way to cut your greenhouse gas emissions.

- In Israel, more than 90 percent of homes use solar water heaters, which dramatically reduce the need for natural gas or electricity for water heating. Israel requires that all new homes come equipped with solar water heaters.
- Copenhagen, Denmark, has revitalized its downtown by giving pedestrians and bicycles preference over cars in large parts of its city center. Walking and cycling now account for more than 40 percent of all trips made in Danish urban areas.
- Spain has sparked the creation of new renewable energy industries through aggressive clean energy policies. Spain now ranks third in the world for installed wind power capacity and is the world's fourth leading market for solar photovoltaics. Spanish companies are increasingly taking a leading role in renewable energy development in the United States and elsewhere.

Communities and states across the country are laying the groundwork for even larger changes in the years ahead.

- Concentrating solar power, which uses heat from the sun to generate electricity, has the potential to serve a large Executive Summary share of America's electricity needs.

Southwestern states have enacted policies that are contributing to a solar power boom that could result in more than 4,000 megawatts of solar thermal power coming on line in the next several years.

- Plug-in hybrid vehicles can dramatically reduce carbon dioxide pollution from vehicles while weaning America from its dependence on oil. Austin, Texas, citizens and public officials are pushing for the development of plug-in hybrid vehicles and enlisting people from around the country in the effort.

- “Green” buildings and zero-energy homes could revolutionize America's building stock by providing pleasant, comfortable spaces with dramatically lower impact on the global climate. Pittsburgh and other cities are driving innovations in green building, while engineers, home builders and researchers are building the first wave of “zero energy homes” across the country.

- Addressing global warming will require efforts from people of all walks of life. Communities like Greensburg, Kansas—a small rural town nearly wiped off the map by a devastating tornado in 2007—and the South Bronx neighborhood of New York City are showing how residents can come together to weave efforts to reduce global warming pollution into strategies for community development.

Cities, states and the federal government should build upon the successes of these efforts by setting mandatory, science-based caps on global warming pollution, adopting strong clean energy policies, and investing in the transition to a low-carbon economy.

- Individual states and the federal government should adopt mandatory, science-based caps on global warming pollution. At minimum, those caps should be consistent with a national goal of reducing emissions by at least 15-20 percent below today's levels by 2020 and by at least 80 percent below today's levels by 2050. Revenues from any program that puts a price on global warming pollution should be used to aid in the transition to a clean energy economy and to reduce the cost of emission reductions to consumers.

- Cities, states and the federal government should make energy efficiency improvements and accelerated development of renewable energy the centerpiece of their environmental and economic development policies. Advanced building energy codes; strong energy efficiency standards for buildings, appliances and vehicles; and mandatory targets for renewable power generation and energy efficiency savings are among the policies that can reduce global warming pollution and put the nation on a clean energy path.

- Global warming and fossil fuel dependence should become central considerations in land-use planning and public sector investment decisions. America should increase its investment in public transportation and rail transportation to reduce emissions from transportation. All new public buildings should meet rigorous standards for energy efficiency and the use of clean energy.

This article is the executive summary from a longer report of the same title, published as a joint effort by Environment Texas and Environment America and available online at <http://www.environmenttexas.org/reports/global-warming/global-warming-reports/global-warming-solutions-that-work>

The Regional Greenhouse Gas Initiative

by Jonathan Carter

On June 18th the Governor of Maine signed into law a bill committing the state to a regional effort to cap and then reduce the amount of carbon dioxide power plants can emit. Currently the Regional Greenhouse Gas Initiative (RGGI) includes ten states – Maine, Connecticut, Delaware, Maryland, Massachusetts, New Hampshire, New Jersey, New York, Rhode Island, and Vermont.

While this has been touted as the first in the nation attempt to limit greenhouse gases through a mandatory, market based cap-and-trade program, it is going to have limited impact. RGGI's requirements are meant to cap fossil fuel power plants' emissions at current levels between 2009-2014 and then reduce those caps by 2.5% between 2015-2018 so that by 2019 levels are at least 10% below 2009 levels. While the intent of reduction is positive, it is extremely modest when considering that reductions need to be in the range of 80% below 1990 levels by 2050. While the mandatory reductions, as small as they are, should be applauded, the trade component of the carbon credits generated undercuts the effort to reduce and eliminate the carbon emissions. Indeed, a power plant will be able to buy back its reductions through an auction of the carbon credits accumulated by the various states. The first of the auctions is scheduled for September 25th, 2008

According to RGGI, each state will be required to spend at least 25% of its take from selling its allowances on energy or consumer benefit purposes. Possible expenditures could include ratepayer rebates, or investments in energy efficiencies and clean energy technologies. The rest of the allowance proceeds (75%) can be spent as each state wishes. While this may sound good, it must be remembered that the allowances are being bought by other companies because it is cheaper for them to buy the allowances rather than to clean up their act and stop polluting. The states are excited about this approach because it provides them with an additional source of revenue. At an estimated allowance price of \$5 per ton, Maine could conceivably generate 30 million dollars annually. While 7.5 million has to be spent on energy related benefits, what about the other 22.5 million? Shouldn't all the funds be used to reduce our carbon footprint?

My concern about RGGI and other cap and trade schemes is that they are really only a shell game. Yes, power plant A has to reduce its emissions of greenhouse gases but the greenhouse gases will not be eliminated because power plant B or C... or some other polluting industry can purchase back the reductions from the state. The system of cap and trade is also very complex. It requires huge oversight with independent verification and enforcement.

One thing that is good about RGGI is that at least the states are demonstrating a willingness to explore ways to reduce their carbon footprint. This puts them miles ahead of the federal government. What the state and federal governments do not seem to understand is that by not moving forward vigorously with a mandatory requirement of reducing emissions by 80% below 1990 levels by 2050 (California has set this target), the costs will be far greater both in ecological and economic terms. Moving away from a market based approach like RGGI is the only way it will be possible to achieve the necessary reductions. RGGI may make some environmentalists feel good, but in my opinion it just breeds a degree

of complacency. A complacency we can ill afford. Yes, mitigating global warming is going to require some significant economic hardships as well higher taxes. Unless government steps up to the plate and says no to emissions and is willing to admit to the economic pain and sacrifice necessary, the prognosis is not good. RGGI reminds me of the guy who thinks he can have his cake and eat it too. RGGI for all intents and purposes is "business as usual". "Business as usual" is exactly why we find ourselves in this crisis, and it is certainly not the answer. Albert Einstein once said "We can't solve problems by using the same kind of thinking we used when we created them".

Why Carbon Credits and Offsets Will Not Work

by Jonathan Carter

The simple answer is that we do not have enough time. In order to mitigate the impacts of global warming many experts believe that our greenhouse gas emissions need to be reduced 80% below 1990 levels by 2050. This reduction has no chance of being reached through a voluntary cap and trade system utilizing the free market system. With the projected population increase of at least three billion more people in the next fifty years, it is totally unrealistic to believe that carbon reductions on a large scale can be attained unless mandatory reductions are implemented and a full scale global effort to contain population is initiated.

Unfortunately, carbon credits (one credit equals a one metric ton reduction) and carbon offsets are the primary tools being used by national and international communities as a way to reduce emissions on an industrial scale. Credits can be exchanged between businesses or purchased and sold in the markets. The carbon credit/offset market is now well established. In 2006 about 5.5 billion dollars were purchased. Some experts expect this market to reach a trillion dollars within a decade. There are now at least five carbon exchanges operating global. The largest is the Chicago Climate Exchange. Why have these markets taken off? The simple answer is that there is huge amount of money to be made. However, these markets are simply the indulgence of societies which want to carry on with business as usual. The consequences of business as usual are ecological disaster.

Problems with Carbon Credits and Offsets

The carbon trading system works by allowing carbon reducing industries to accumulate credits which they can sell as carbon offsets to businesses which either voluntarily want to reduce emissions or whose regulator caps require emission reductions. The problem is that the polluting industries are NOT REDUCING THEIR GREENHOUSE GAS EMISSIONS!

Using the free market model, the polluters too often make the decision that the cost of reducing their emissions through the utilization of best technologies, conservation, and higher efficiency standards are prohibitive. It is cheaper to pollute and buy credits than it is to change their production processes. There are also examples of companies which for financial reasons have made cost saving technological changes, usually energy related. These changes have not only saved them money, but have also created carbon credits, which can be sold for huge profits. As an example, a company in China spent 5 million to build an energy-producing incinerator, which generated 500 million dollars of excessive profit through

carbon credits. While rewarding carbon-reducing technologies makes sense, a 495 million dollar profit is over the top!

Because credits and offsets offer the potential of profit, there can be a sort of perverse incentive for companies to maximize their carbon footprint so that they can latter get credit for cutting back. For instance, logging companies could determine that it is to their advantage to overcut and clearcut the forests. In the process they maximize short-term profits from the value of the wood and at the same time they can maximize their potential carbon credit profits as the forest grows back.

While there are several certification stands that attempt to create a baseline from which true carbon reductions can be measured, verification is lacking. There are widespread examples of organizations buying credits which have not resulted in reductions. In addition, as pointed out above, there are instances where companies have already benefited from efficiency changes, but can still reap windfall profits from carbon credits.

There are often potential secondary ecological and human impacts in the creation of carbon credits. The most striking example is a case involving a 220 square mile plantation of Eucalyptus and pine in Andean Ecuador. This carbon credit-generating plantation has resulted in the destruction of a native forest, the introduction of damaging invasive species, a reduction in biological diversity, the release of massive amounts of soil carbon, and the displacement of indigenous peoples. Many of the large hydro projects around the world also have similar devastating impacts.

The Solution

What is needed is a global mandate with caps and targets – a market-driven voluntary system will not work. However, since the U.S and China (responsible for over 40% of the emissions) have not bought into mandatory caps and reduction targets, the potential for meaningful reductions is unrealistic. Why would other countries strongly enforce caps and targets on their emissions if it puts them at a competitive disadvantage in the market place?

The fact is that if we are to save the planet from a devastating ecological meltdown, it is going to require an immediate, and I mean immediate, reduction in greenhouse gases through:

1. A massive switch from fossil fuels to wind, solar, geothermal, and small scale hydro, and hydrogen
2. An absolute commitment to maximum energy conservation and efficiency.
3. A global commitment to population reduction
4. A commitment to local food production
5. An immediate end to forest destruction and land use changes

These changes cannot take place tomorrow. They should have been implemented yesterday! The only way to achieve such goals in time to save the planet is to make them mandatory – and at the same time abandon the absurd notion that the invisible hand of the free market system will solve the crisis. The switch is not going to be cheap or painless, but what is the alternative – 120° F. days in Maine and the death of our forests? Mandatory reductions can be helped along through tax credits, outright subsidies, and other incentives, but the bottom line is that at the end of the day the human carbon footprint has to be eliminated.

Cutting Deals with Big Timber's Darth Vader

by Joshua Frank

The wild forests of North America have almost completely disappeared over the past century and a half, and so too have the great timber barons that stole these lands from the public trust. Even so, the corporate pillage continues to be celebrated, and the companies left standing are still being bailed out.

Several weeks ago Congress passed the engorged HR 2419, the "Food and Energy Act of 2008," better known to the rest of us lay folk as the annual Farm Bill. Along with the laundry list of lavish handouts to the agricultural industry, there were also two fat pork loins cooked up for timber companies, tucked deep in the 682-page sham of legislation.

Thanks to Montana Senator Max Baucus, a Democrat, timber giant Weyerhaeuser was granted \$182 million in tax breaks along with Plum Creek Timber, one of the largest private land owners in the state, which received a whopping \$500 million. On May 23, Sen. Baucus announced his backhanded deal with Plum Creek CEO Rick Holley standing by his side.

It was payback. Employees of Plum Creek have donated almost \$20,000 to Baucus this past year, and the company spent \$200,000 in lobbying fees during the period in which the Farm Bill was being debated in Congress.

The forest removal industry has for decades been rewarded for its bad behavior. They have been given unfettered access to log on our public lands, with subsidies aiding them along the way. Even when push came to shove they have always made out like bandits, sharing little of their uber-wealth with the public who helped finance their success -- not to mention ever giving back to the habitat they profited from by destroying.

If I sound bitter, it's because I am.

Plum Creek, after cutting virtually all the good trees on its Montana land, is about to be compensated for its loss by so-called conservationists. Last week The Nature Conservancy and the Trust for Public Land announced a backroom deal, brokered by Sen. Baucus himself, that would transfer up to 300,000 acres of the company's despoiled property over to the groups for the amount of \$510 million. It is to become the largest, most expensive conservation deal in U.S. history.

Nonetheless, all that money isn't going to be paid by the green groups alone. In fact, the Federal government will cover half of the tab, thanks to Sen. Baucus of course, with Montanans paying another \$100 million. The rest will be raised by the conservationists who claim they are actually saving the land from residential development.

It should be clear that Plum Creek doesn't deserve the hundreds of millions of dollars it's going to receive from taxpayers. Instead the company ought to be the one cutting checks for all the environmental damage they've caused to grizzly and fish habitat throughout the state over the years.

Here's a little information about Montana's non-forest policy that Plum Creek Timber and others have exploited: The state is essentially a resource treasure chest that has no acting forest practices in place to regulate private lands. In short, it's a deregulated, boondoggle, free-for-all. And Plum Creek, in this case, liquidated its assets

(trees) and is now selling off their land under the guise of conservation, paid in large part by the public.

However, what's being conserved is still up for debate.

"I recently flew over some of the Plum Creek land that the public will eventually get west of Seeley Lake, Montana, and it was mile after mile of clearcuts," says Michael Garrity, Executive Director of Helena, Montana based Alliance for the Wild Rockies. "That is probably one reason Plum Creek agreed to sell it and not develop the land into vacation subdivisions. Who wants a vacation home in a middle of a clearcut?"

So let's get this straight, Plum Creek, once dubbed the Darth Vader of the timber industry by a Republican congressman from Washington state, builds logging roads through prime grizzly habitat, pollutes rivers, and clearcuts forests just so they can sell it off at a huge profit, and somehow we're supposed to be excited about a deal that will stop some development, but not all of it?

Yes, that's right, Plum Creek can still log on some of this land, but they can only do so if certified "sustainable" by a third-party verifier.

"Many of these third party certificates are worthless if the public is not allowed to oversee them," says Garrity. "And it is not clear if the public will."

This fact alone should raise the hackles of taxpayers who are footing the majority of Plum Creek's bill. They may have little input about what actually happens on the land they helped pay for. The agreement will also allow the Forest Service, an agency wrought with a history of corruption and mismanagement, to oversee half of the land down the road.

It is just one more tale of environmental compromise that many greens have for far too long been forced to accept in Montana and the Pacific Northwest when dealing with resource extraction outfits like Plum Creek and conservationists such as The Nature Conservancy. These guys run the only game in town, which is fixed at the highest levels by senators like Max Baucus who operate behind the curtains of power with impunity.

So how good is this deal when all is said and done?

"Nothing is good about 150 years of corporate subsidies, but the unintended consequences are less evil than the subdivisions alternative," says veteran forest activist Steve Kelly of Bozeman, Montana. "Oh, there will still be subdivisions, just a lot fewer. Good, or excellent, is never an option in a rigged world limited to choosing between the lesser of two evils."

This article was originally published in Counterpunch in July 2008. Joshua Frank is the author of Left Out! (Common Courage Press) and the co-editor, with Jeffrey St. Clair, of Red State Rebels: Tales of Grassroots Resistance in the Heartland (AK Press). Visit the new Red State Rebels website at www.RedStateRebels.org.

Update on Plum Creek's Wilderness Sprawl Proposal

by Jonathan Carter

FEN remains committed to blocking Plum Creek's sprawling development around Moosehead Lake. It has been a long, arduous fight over the last three years. While the public participation in the process (please continue to write letters to the editor, your legislator, and the governor) has ended, FEN's lawyers, Lynne Williams and Phil Worden, are continuing to diligently engage in the complex internal decision making process of LURC.

As you probably are aware, the LURC staff last June (after the public comment period had closed and the technical sessions had ended) presented a proposal for amending the application based on what they felt would make the application acceptable for LURC review criteria under current statutes. These staff-generated amendments did not address any of the central issues of sprawl, water quality, traffic congestion, taxes, carbon footprint, wildlife habitat impact, etc. In fact, the overall size and configuration of the plan remains intact with a few minor changes. While they did reduce the number of acres for development around Lily Bay, the number of residential units was retained (404) as well as the resort and golf course. All this development in an area which has the highest population of the threatened Canada Lynx!

While FEN's lawyers and all the other interveners were allowed to submit comments on the amendments, Plum Creek was permitted in its responses to introduce new material into the record - when indeed the record was supposed to be closed. This represents the fourth alteration of their application in the last three years. In fact, the application is different from the one the public commented on and the interveners testified about. In a court of law this situation would be declared a mistrial, but LURC apparently believes it can disregard the right of citizens and interveners to due process of review.

It is clear that the LURC staff completely disregarded the standard review process in which an application is evaluated based on the petitioner's submissions. Instead, LURC staff is saying to Plum Creek that if you accept these changes, we think your petition will meet state criteria - implicit in this is that 'your application will be approvable'! It is an abomination that state government is using our tax dollars to support the largest development plan in the history of Maine around the crown jewel, Moosehead Lake!

There is still hope that the LURC board members will reject the staff recommendations. LURC members will meet to decide at their next meeting. If they do accept, we can anticipate that the LURC board will then move on in the next several months to make a final decision on the proposal.

However, judging from the way this process has been going, it would not be at all surprising if the decision-making were drawn out over the course of the next year. FEN will continue to monitor and participate. In the event that LURC approves the plan, the process has been so flawed that Phil and Lynne believe the courts would probably overrule such a decision. Let's hope LURC makes the right decision - a unified NO to Plum Creek. Updates on the situation can be found at savemoosehead.org.

See the Assessment of the Plum Creek Rezoning Application on the following page.

ASSESSMENT OF PLUM CREEK REZONING APPLICATION ZP 707

Standard	Pass	Fail	Incom- plete
LURC STATUTE 12 MRSA§685-A(8)			
Is consistent with standards for existing zones (LURC rules)		F	
Is consistent with LURC Comprehensive Land Use Plan (CLUP)		F	
Is consistent with LURC law		F	
Satisfies a demonstrated need in community/area		F	
Has no undue adverse impact on uses/resources		F	
Is more appropriate for existing uses/resources than current zoning		F	
LURC COMPREHENSIVE LAND USE PLAN			
Protects air resources		F	
Protects cultural, archaeological, historical resources			I
Protects forest resources		F	
Protects geologic resources			I?
Protects recreation resources		F	
Protects water and wetland resources		F	
Protects wildlife and fisheries resources		F	
Protects scenic resources		F	
Appropriate location of development		F	
Provides economic development			I
LURC RULES §10.08,A; §10.25,A; 10.23,H			
No undue adverse impact on natural and cultural resources		F	
No undue adverse impact on water quality			I
No undue adverse impact on traditional uses		F	
No undue adverse impact on regional diversity			I
No undue adverse impact on natural character		F	
No undue adverse impact on lake management goals		F	
No undue adverse impact on landowner equity			I
Conservation justifies adjacency waiver		F	
Strikes development-conservation balance		F	
Conservation measures apply in perpetuity			I

Maine's Mountaintops Abandoned by LURC

by Nancy O'Toole

The regulator, created to protect nature, is allowing fragile habitats to be destroyed.

The Maine Legislature created the Land Use Regulation Commission in 1971 to serve the people of Maine and act as the regulatory authority over 10.4 million acres of unorganized land — one of the largest contiguous undeveloped areas in the Northeast. Among LURC's responsibilities are promotion of orderly development, and protection of natural and ecological values.

In 1974, to ensure the protection of fragile and irreplaceable soil and habitat, Maine's mountainous areas above 2,700 feet were protected by LURC from ecologically damaging development. The agency was not "blowing in the wind" with their ideas. That protection stood the test of time until January 2008, when LURC reversed the protection of our fragile mountains.



Map showing the location of the Kibby Wind Project

Now, TransCanada's Kibby Wind project has its permits from LURC and the Department of Environmental Protection. This project will change the Western Maine mountains forever. It is so huge, it's difficult to sum the total environmental impact, but let me provide a brief overview. The information below is from the final plan submitted by TransCanada to LURC. The document is available on LURC's Web site.

There will be 47 intermittent and 38 perennial streams impacted by temporary bridgeways and culverts that will divert them up to 225 feet. For roads and towers, 423.6 acres will be permanently impacted. Another 310 acres will be cleared and changed from forest and wetland to right-of-ways for transmission lines.

There will be 30.5 miles of roads, which includes upgrading existing roads and new roads that need a carrying capacity of 100 tons. The width of the roads will range from 25 to 35 feet.

There will be new buildings; a temporary batch plant for

producing 700 cubic yards of concrete for each turbine pad, rock crushers, blasting for roads and turbine locations, and the filling of at least 20 acres by the unused rock and dirt from the blasting and road construction.

The Northern Bog Lemming is a threatened species, and the project will impact its habitat. The Atlantic Salmon and the Canadian Lynx, both listed as endangered, will also have their habitat damaged or permanently impacted.

Five plant species listed by the state as endangered have been identified in the project through the wetlands that will be impacted by transmission lines. This doesn't even include the hundreds of migratory birds, bats and raptors that will perish each year as a result of the 400-foot high turbines.

We are surrendering these fragile places to a development that could be decommissioned in as little as 25 years, as admitted by the developer. Twenty-five years! And the consequences will be with us into the indefinite future.

They insist on a TIF, will receive a huge federal subsidy, but they may well be gone by 2033?

The Governor's Task Force on Wind Power Development promoted 2,000 megawatts of wind energy in Maine by 2015, and 3,000 megawatts by 2020. It established an "expedited review and permitting area" in Maine to ease permitting requirements, an area that includes at least one-third of LURC's jurisdiction and a total area of 14 million acres. Rezoning would not be required in the expedited unorganized area and the permitting process should take only 185 days. Is this good for these special areas?

This task force abandoned the very idea of stewardship and capitulated to temporary commands of a very temporary administration. LURC has become foot soldiers for developers and surrendered the near-sacred trust placed in them by former legislators, and the people of Maine, who have a field of vision broader than what is either convenient or politically correct.

It is lonely at the top of the mountain, standing against the tide of state policy, public opinion, public interest groups and deep pockets willing to exploit mountains as sacrificial areas in trades and arrangements to benefit their interests.

LURC has made a bad decision. Generations from now will look back and shake their heads at these piles of metal and wonder why.

This article was first published in the Lewiston Sun Journal on 20 July 2008. Nancy O'Toole of Phillips is vice president of the Friends of the Boundary Mountains, a nonprofit that intervened in the TransCanada proceedings before LURC. She has a bachelor of science degree in environmental engineering from Montana Tech and ten years' experience with high mountain road construction and hazardous waste clean up of towns in Utah.

On Sears Island

by Harlan McLaughlin

We, the citizens of Maine, are about to lose what should be one of the most valuable parts of our future creative economy. Sears Island is a 941 acre, undeveloped, wild, public island connected to Searsport, Maine by a short but destructive causeway. There are no others like it. The island has been used by locals for centuries as a wild retreat from the stresses of life. But, during the same period, it has been the object of many a development scheme. So far, all attacks have been repelled but that is about to change. The problem today is that the Maine Dept. of Transportation (MDOT) has taken on a new strategy in their never-ending quest for a port facility on Sears Island.

They plan to win the approval (by law) for the location of a port on the island, long before any port is actually proposed. MDOT and Maine environmentalists, represented by The Maine Chapter of the Sierra Club, are only steps away from succeeding. Everything has been agreed upon and the committee charged with dividing up our wild island is preparing its report for the eager Maine Transportation Committee. Thus they eliminate any fight from the environmental community until it is too late. The Sierra Club, several land trusts and MDOT have all agreed a cargo port on Sears Island is APPROPRIATE - We think it is wildly inappropriate, no pun intended. After the port location has been written into the law, it is too late to argue about the appropriateness of a port free island. This agreement cannot stand without the green cover the Sierra Club provides the Baldacci Administration, longtime advocates of dual use.

The Sierra Club made the decision to support this agreement without consulting the membership and Ken Cline, a high level Sierra Club representative, admitted he had serious reservations about the agreement. But they continue to refuse to explain their rationale to the membership. This is a mistake that will cost the people of Maine dearly and a change in direction is indicated.

What can you do to help? Check us out at FairPlay-ForSearsIsland.org. You can sign our petition there asking the Sierra Club to withdraw their support for the agreement and asking Governor Baldacci to dissolve the committee.

We say let the people decide the fate of Sears Island. And at every opportunity, the public has indicated their support for a totally wild, undeveloped, public island. Why can't the Governor hear us? Please add your voice to ours and make him hear us. Make him understand the majority of Maine voters favor conservation of special, wild places. Make Sears Island the galvanizing event for Maine environmentalists in our fight against the destruction of wild places and in the pursuit of the creative economy. Let's place the emphasis on the non-consumptive use of our natural resources for a change. Let this be a training exercise for environmental battles to come. How can we expect to save the North Woods if we can't even save this small island? Please help us save this wild, wonderful island from destruction!

Harlan McLaughlin of Searsport is a member of Maine Fair Play For Sears Island, <http://FairPlayForSearsIsland.org>.

A Bad Plan for Maine - The Department of Transportation's Application to Establish a Federal Umbrella [Wetlands] Mitigation Bank for Transportation (UMBT) - with the Entire State as a Service Area

by Jody Spear

The federal UMBT would undermine the Clean Water Act. MDOT calls it "streamlining" of CWA, but it would simply make it easier to facilitate destroying wetlands at one site by creating, or restoring, or preserving wetlands at another site.

A new federal rule regulating wetlands mitigation banking (33 CFR, Sec. 332) leaves decisions about wetlands destruction and mitigation to the discretion of the US Army Corps of Engineers, the District Engineer for the region, and an Interagency Review Team of federal and state agency personnel (ACOE, EPA, US Fish and Wildlife Service, National Marine Fisheries Service, LURC, DEP), taking oversight opportunities away from concerned citizens.

moved from an "impact site," and net loss of wetlands is the inevitable result. (MDOT recommends "ecoregions" vastly larger than watersheds in its proposal.)

Economics are primary in consideration of data supplied by permit applicants (including state Departments of Transportation) as well: project proponents are "not required [by the new rule] to incur substantial costs to provide information [to secure permits]." As a result, they will be able to forgo costly watershed plans and instead develop data quickly and inexpensively, with as little public involvement as possible.

Federal umbrella mitigation banking has not yet been tried in New England, and it would set a dangerous precedent if MDOT were to succeed in registering Maine



It is the District Engineer who has the most influence in deciding whether to approve applications to create wetlands artificially (destroying uplands in the process, for example), or restore damaged wetlands, or simply preserve existing wetlands. None of these mitigation options can adequately offset the loss of natural wetlands, but the last of them -- preservation -- always leads to a net loss of wetland functions and values. The new mitigation-banking rule -- though advocating that preservation of existing wetlands be accompanied by restoration, creation, or enhancement of wetlands -- does allow for the preservation option alone. This would violate the Clean Water Act, the most important safeguard we have for protecting ecosystems and water resources, filtered through wetlands.

Optimally, mitigation for wetlands loss should take place IN KIND and ON SITE relative to the wetlands that have been destroyed, but the District Engineer can determine the size of the service area based on economic viability; therefore, a "compensation site" can be far re-

in a UMBT. It would mean that wetlands can be sacrificed anywhere in the state for transportation projects, offset simply by a conservation easement or by mitigation known to be unreliable for protection of wetlands, and the mitigation could be carried out with limited or no public oversight. We can expect that the Army Corps District Engineer will be under great pressure to circumvent the Clean Water Act in order to satisfy the demands of MDOT.

Investigations by the whistleblower group PEER (Public Employees for Environmental Responsibility, www.peer.org) have produced compelling evidence that the mitigation-banking shell game undermines land-protection efforts. Their monitoring of Army Corps mitigation projects shows an abysmal record of compliance with federal laws to assure that there be no net loss of the shrinking base of wetlands remaining in the U.S. Studies by the National Research Council, Government Accountability Office, and other scientists reveal "the actual amount of wetland impacts offset [to be] only about 20 percent, meaning ... an 80 percent net loss of wetlands" in areas

where mitigation has been done.

Sears Island would be the first "credit" in the wetlands mitigation bank for which MDOT has filed. The agency has stated its intention to use "preservation as a mitigation tool" on Sears Island (opportunities for restoration, enhancement, and creation of wetland areas there being negligible), despite the fact that it results in net loss of wetlands. According to the new rule on mitigation banking, a requirement for exercising the preservation option is permanent protection of a mitigation bank site through an easement, with title transfer to a state resource agency or land trust. Maine Coast Heritage Trust is now the provisional easement holder, and Maine Department of Environmental Protection is designated as "backup"; Maine Department of Conservation may have a management role, and Coastal Mountains Land Trust is the assigned "education manager." So all the prerequisites are in place for the joint use (industrial use and conservation use) of Sears Island that will make the project exempt from a critical protection under the Clean Water Act known as a 4F review.

If the MDOT application to the Army Corps is approved, and if the legislature's Transportation Committee approves the concept of joint use, we will not be able to stop development of Sears Island. We CAN stop it now by pressuring conservation partners on the Joint Use Planning Committee for Sears Island to withdraw their support for a plan that makes it possible for MDOT to secure the port permits it failed to get in 1996. It was the lack of a partnership with land trusts and a buffer easement that made it impossible at that time for MDOT to mitigate for damage that would have been caused by port construction.

The six JUPC conservation partners continue to insist that "the conservation agreement creates no conditions that enable development of a port on Sears Island," but the record shows otherwise: a document released by MDOT on 31 January 2008 states the agency's intention that "600 acres of Sears Island become the foundation for a federal mitigation bank via execution of a conservation easement." The most recent easement draft from JUPC states that "the protected property ... [could be used] as mitigation, by preservation, enhancement, creation, or restoration, ... to offset the environmental impact of transportation activities near Sears Island by the Maine Department of Transportation, in accordance with its federal wetland mitigation-bank prospectus."

Objections can be directed to one of the Joint Use committee partners, Sierra Club, through a petition at: www.mpjen.org/petitions.

The Army Corps has just given the green light to MDOT to go forward with its mitigation-banking instrument. No public hearing, no further public input will take place before the Corps rubberstamps the final draft. ACOE dismissed the ten recent public comments in opposition - all objecting that DOT's preliminary plan is inadequate (seven of requesting a public hearing).

A top environmental priority for the next administration should be legislation to remove from the new rule on mitigation banking (33 CFR, Sec. 332) sections that undermine the Clean Water Act.

If you have questions, call 207- 326-8764.

Defending Maine's Last Remaining Old Growth Forests

by the Native Forest Network

While to many people the eastern seaboard of the U.S. is a densely populated techno-industrial wasteland, northern Maine is still home to a few fragments of what was once a vast, wide-ranging, diverse mixed hardwood forest. This forest used to cover much of the East Coast, but now only exists in small pockets. Remnants of what used to be still exist on a few steep hillsides and out of the way places.



A large White Pine in the Big Wilson Stream old-growth.

In Ellitsville, Maine, at the southern edge of the Maine North Woods, lies a 220 acre parcel of old growth eastern forest. Towering White Pines, older than any of the private companies that own most of Maine, create a dense canopy that houses threatened species of lady slippers and the Canada Lynx. The parcel is bordered by Big Wilson Stream, and is scattered with, among many other species, 200-300 year-old Red Spruce, Eastern Hemlock, Sugar Maple, and birches. The steep slopes and remoteness of this area are probably exactly what have spared its existence for this long, as there are no signs of any human disturbances. However, these majestic giants happen to inhabit land that is "owned" by Plum Creek.

Plum Creek, the largest private landowner in the country, is awaiting the verdict on their massive land re-zoning proposal in the Moosehead Lake area from the Land Use Regulatory Commission (LURC). Part of this rezoning proposal is the sale of the development rights of about 400,000 acres of Plum Creek land to conservation groups who will hold easements on the land. These easements would allow Plum Creek to continue to practice "sustainable forestry," under an industry-run guideline called Sustainable Forestry Initiative (SFI). They would also potentially be allowed to develop commercial water extraction,

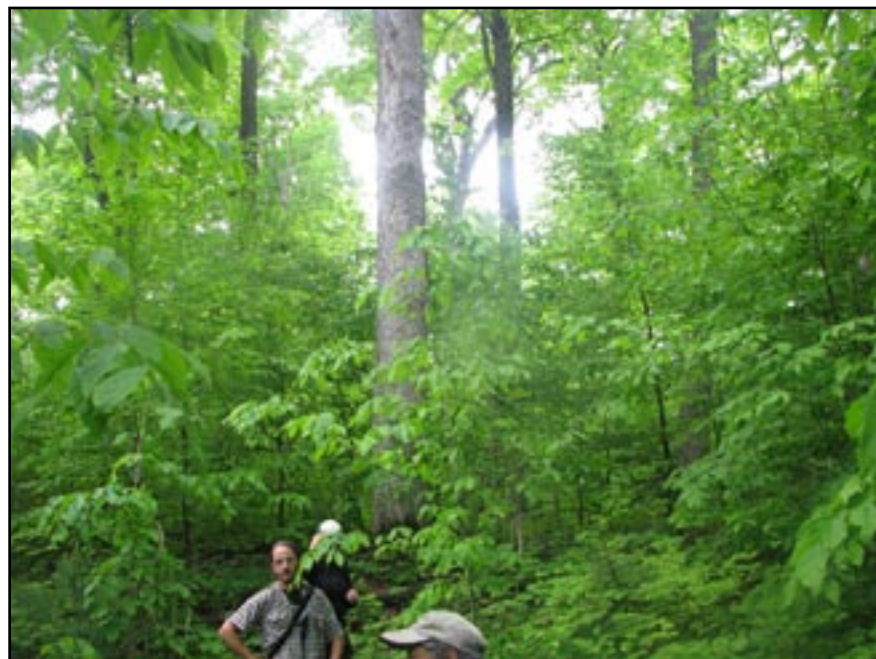
mine for gravel, spread municipal solid waste, or sludge and generally continue to wreak havoc on the natural world. The Big Wilson old growth is located within the proposed easement, allowing Plum Creek, if the concept plan is approved, to accrue double profit by harvesting the timber and then selling the development rights.

In the spring of this year, Plum Creek filed a notice to harvest and construct a temporary bridge to access the untouched area. According to the Plum Creek's forester, Mark Doty, the company had every intention of logging the parcel this summer as part of a 1,200 acre harvest plan.

The pristine late successional forest is a long time favorite recreational spot for locals who have hunted and fished this area for generations. The information of eminent doom for the big trees sparked local concern.

Native Forest Network--Gulf of Maine took an early and strong lead in raising public awareness about the old growth parcel on Plum Creek's land. Beginning with the Northeast Regional Rendezvous, Maine Earth First! and Native

Forest Network have worked closely together to explore the area, document the incredibly diverse ecology and impressive old trees in the area and share the area with lots of new people. The two groups have sponsored four public hikes on the parcel to date, bringing out many local residents, reporters from public radio and local newspapers, and a documentary film crew. Also attending public hikes have been professional ecologists, forest advocates, artists and activists. Diane Boretos is a biologist and tracker from Sangerville who has explored the Big Wilson parcel extensively. "This area is an important ecological feature in the region due to not only the 200 to 300 year old trees, but because of the flora and fauna diversity it supports. There is floodplain forest associated



Large Sugar Maples in the Big Wilson Stream old-growth.

with Big Wilson Stream, floodplain vernal pools and old soft and hardwood stands of hemlock, white pine and maples. All of these community features are providing unique habitat for many species of animals and plants. This area is an ecological treasure that should be preserved."

When the ecological value of this area was first noted by the public, Plum Creek agreed to delay their harvest plans so that the Maine Natural Areas Program and the Manomet Center for Conservation Sciences, a private group, could evaluate the ecological value and old-growth characteristics of the area. These evaluations are now complete, and the results are very clear. According to the Maine Natural Areas Program, "The Big Wilson Stream Forest is an excellent example of a late successional forest with characteristic old trees, stand continuity, and evidence of a long history of natural processes. In addition to the ecological values associated with late-successional forest, conservation of the Big Wilson Stream Forest could retain approximately one mile of pristine habitat along the Big Wilson Stream and provide the additional benefit of habitat connectivity as the parcel is contiguous to existing conservation lands to the north."

As a result of pressure from Native Forest Network, and the results of the evaluation by the Maine Natural Areas Program, Plum Creek is now in talks with conservation groups to attempt to find an agreement to protect this parcel by selling it to a preservationist landowner. However, this momentary attack of conscience on the part of Plum Creek is seen by some as a last ditch PR effort on Plum Creek's part in the lead up to LURC's decision on their rezoning proposal. NFN remains committed to fighting the rezoning proposal and protecting Big Wilson. Plum Creek should not be allowed to leverage their willingness to sell the Big Wilson old growth at top dollar to preservationists to curry favor for their development plans. If anything, the antics of Plum Creek around this parcel should be seen as a good illustration of what is wrong with Plum Creek's plan and the conservation easements.

'Green' Image Hides Poland Spring's Goal

by Walter H. Baily

The company wants to gain control of water rights in as many Maine communities as possible.

Nestle/Poland Spring is expanding in Maine, especially in York County. The 1-liter (16.9-ounce) or the 20-ounce bottle is the typical one sold as a single at many stores. The cost is usually \$1.39.

The price you pay just for the water, at the gallon rate, is \$10.52. And you thought gasoline was expensive? This is a spectacular marketing success for Nestle; remember, it's only water.

Nestle/Poland Spring wants more water. It targets small towns with low population and limited government; that's one reason why the company picked Shapleigh for a possible pumping station. There are many comparable towns in Maine where water can be removed.

The company says it is clean and green. Ask people who have to drive or live near their vast 22-wheel diesel trucks going 24/7, every single day. Then, after you drink from any small or medium-size plastic Poland

photo by Jonathan Carter

photo by Jonathan Carter

Spring container, fill it one-quarter full of a very dark liquid, then look at it. This is the amount of petroleum required to produce the container.

In addition, 2 liters of water are also required just to make the container. Then still more fuel is required to distribute the bottles. Roughly 20 percent of the containers ever get recycled. Plastic bottles in the landfill take 1,100 years to decompose.

Nestle/Poland Spring's extensive extraction might eventually interfere with the natural hydrologic cycle, since many millions of gallons of Maine water go hundreds, even thousands, of miles away. The loss of potable water is both local and worldwide. Water is the new gold – it will replace petroleum in value.

Residents of other communities, not only in Maine but also nationwide, have found that the two words brought to mind with this company are “misinformation” and “greed.”

Residents who wish to have a contract with Nestle/Poland Spring should take their time and find out all about the company. Two books, “Bottlemania” and “Blue Covenant,” have just been published, detailing all the problems with large-volume water extraction, and this company is mentioned numerous times.

The long-range, low-profile goal of all private water companies, whether involved in bottling – like Nestle/Poland Spring, Coke or Pepsi – or in system-wide water distribution – like Aqua America, Veolia, Suez, Thames and numerous others – is the complete, private control and sale of water to everyone.

Want to give up your water for 30, 50 or 100 years to Nestle? Once they take it, it is no longer your water, even though it's under your feet, under your property, under your neighbor's land. Unless, of course, the company removes too much water.

Be sure you know what you are choosing. If you don't like it, join the groups now protesting the depletion and privatization of our water. If Nestle/Poland Spring takes your water, will you lose “Maine: The Way Life Should Be”?

This article first appeared in the Portland Press Herald 17 June 2008. Walter H. Baily of Parsonsfield is a member of Preserve Our Water and Wildlife Resources.

Of Turbines, Mutilation and More Bad Energy Ideas by Ed Friedman

Far south of the Kibby, Redington, Stetson, Black Knubble and Mars Hill controversial wind projects, a similar and arguably more severe threat looms ahead for the depths of the Kennebec River and Gulf of Maine. An underwater field of 50 tidal in-stream generators is proposed for Merrymeeting Bay. The 2-bladed propeller-like units of up to 50 feet in diameter are untested technology to be set into the river bottom at its narrowest point, the “Chops”, like windmills clogging the only pass through a mountain range.

Merrymeeting Bay at the junction of the Kennebec, Androscoggin and four smaller rivers is a tidal riverine system and inland delta draining about 38% of Maine through a 280 yard bedrock slot called the Chops. It is the largest staging area in the northeast for migratory

waterfowl, is known for its rare mud plants, wild rice, Bald Eagle populations, endangered Atlantic Salmon and Shortnose Sturgeon and is the only water body in Maine to provide spawning and nursery habitat to all of the diadromous fish species in the Gulf of Maine. From the Chops, this 10,000 square mile watershed drains about 20 miles down the Kennebec to Popham Beach.

Back in 1998, Edwards Dam in Augusta was intentionally breached and became the first working hydroelectric dam in the country to be removed. While not without hidden costs to the environment, dam removal created a tremendous impetus and investment in fishery restoration efforts by the State as we inch ever so slowly towards meeting the long overdue goals of the Clean Water Act.

Millions upon millions of migratory Alewife, American Shad, Striped Bass, Blueback Herring, Atlantic Sturgeon, Sea Lamprey, American Eel and other migratory species move through the Chops to reach critical reproductive



habitat within the bay or farther upstream. Think of the proposed Chops Project like a meat grinder in a stockyard chute, or, if the blades revolve slowly enough to avoid major injuries to fish, then as a key broken off in a lock on the only door to your life.

In a spectacular land grab a couple of years ago, Oceana Energy, a Wyoming-registered energy company with possible ties to Dick Cheney and certainly to big oil, submitted identical proposals to the Federal Energy Regulatory Commission (FERC) to tie up hydro rights at 11 high energy sites around the country (this started a “gold rush” in Maine of applications to the DEP tying up tidal power sites). On the Kennebec, Oceana is operating as Maine Tidal Energy Corp.

Aided and abetted by the Governor and all of our natural resource agencies, state and federal, who usually discussed the resource value in their comments but never objected, FERC reviewed intervenor comments and just issued a Preliminary Permit for the project. This locks the company in as having priority for licensure at this site while they begin studies and trials.

Friends of Merrymeeting Bay (FOMB) and a competitor of Oceana were the only intervenors to object to the project (obviously for different reasons). Our take was that once the genie is out of the bottle, it never goes back in so let's stop this project before it gets a start.

If the purpose was to adversely impact every fish and marine mammal coming into and out of the Kennebec/Androscoggin/Merrymeeting Bay estuary, this would be the spot to do it. The bay is a gem unto itself but, as stated, vital as a spawning and nursery ground to the Gulf of Maine fishery. It's not as if the Gulf of Maine fishery is not already in trouble from over-fishing and loss of habitat. 90% of American Eel habitat in Maine for example, is blocked by dams. Only a slightly smaller percentage is blocked for Alewife, Blueback Herring and American Shad which along with the eel are forage fish providing critical food supplies to other fish in the Gulf of Maine.

Eels when very young can get out of the water for a spell and some actually climb over and around dams. This is not without great energy and predation costs. Up to 50 years later they attempt to out-migrate for their one shot at spawning in the Sargasso Sea. A small percentage of anadromous fish, like the river herring (Alewife and American Shad), are often artificially moved around dams to historical spawning areas.

When all of these fish attempt to return to sea they are typically met with unscreened turbines at each dam along the way. This is often the only method of downstream passage. A mature female eel carrying 10 million eggs can measure 4 feet long as can an adult Atlantic Salmon trapped and trucked upstream. Imagine putting your child or your arm into a metal fan. When was the last time you saw an un-screened fan for sale?

Turbine mortality at Maine's many hydro dams can be as high as 100%. Most rivers have multiple dams. Do the math for cumulative effects. FOMB is in court and the legislature trying to modify dam licenses (where else but FERC can you get a license for 30-50 years?!!) to provide safe up and downstream passage. Start with

100 fish above 4 dams (on the Androscoggin there are 16) and assume only 50% mortality. 100, 50, 25, 13, and ultimately only 7 fish left gain access to the ocean. This doesn't account for delayed mortality. A cut here, a nicked fin there, internal bruising, all of which will put the fish at an often critical disadvantage.

Along comes the Chops Project adding insult to injury. In our zest for cleaner energy we need to remember other values we cherish, consider all the costs. More often than not I suspect many of us will decide it is not worth the few extra kilowatt hours to destroy a crown jewel. Unfortunately this is a different choice than so many of our corporate-funded politicians will make. 60% of our wild species inhabit riparian corridors. We need to think of our rivers as the blood vessels necessary to sustain us as a species. Fish are the oxygen molecules. Cut off our oxygen and the results are predictable.

Ed Friedman is Chair of Friends of Merrymeeting Bay. FOMB uses research, advocacy, land conservation and education to preserve, protect and enhance the unique ecosystems of the Bay. FOMB has submitted comments on Plum Creek and has entered into the record extensive legal documents regarding endangered species and other fishery resources of the Kennebec River. The group welcomes member support from throughout the state and takes a holistic approach to the work they do. Check out their web site at www.friendsofmerrymeetingbay.org, particularly the “cybrary” link.

THE LAST WORD



"Oil depletion and climate change will create an entirely new context in which political struggles will be played out. Within that context, it is not just freedom, democracy, and equality that are at stake, but the survival of billions of humans and of whole ecosystems." - Richard Heinberg, author of *Powerdown*

"Saudi Arabian oil production is at or very near its peak sustainable volume (if it did not, in fact peak almost 25 years ago), and is likely to go into decline in the very foreseeable future. There is only a small probability that Saudi Arabia will ever deliver the quantities of petroleum that are assigned to it in all the major forecasts of world oil production and consumption." - Matthew Simmons, from his book *Twilight in the Desert*

"It is clear our nation is reliant upon big foreign oil. More and more of our imports come from overseas." - President George W. Bush

"We need an energy bill that encourages consumption."
- President George W. Bush, Trenton, New Jersey, Sept. 23, 2002

"First, we would not accept a treaty that would not have been ratified, nor a treaty that I thought made sense for the country." - President George W. Bush on the Kyoto Climate Change Treaty, Washington Post, April 24, 2001

"It would be helpful if we opened up ANWR (Arctic National Wildlife Refuge). I think it's a mistake not to. And I would urge you all to travel up there and take a look at it, and you can make the determination as to how beautiful that country is." -George W. Bush, at a White House Press conference, March 29, 2001

"By 2010 we will need [a further] 50 million barrels a day. The Middle East, with two-thirds of the oil and the lowest cost, is still where the prize lies" - Vice President Dick Cheney, 1999

"We're a nation of consumers. There's nothing wrong with that"
Discover card advertisement, August 2008

"Earth provides enough to satisfy every man's need, but not every man's greed." - Mohandas K. Gandhi,

"Nature provides a free lunch, but only if we control our appetites." - William Ruckelshaus

"Man has lost the capacity to foresee and to forestall. He will end by destroying the Earth." - Albert Schweitzer (1875-1965)

"Man has too long forgotten that the earth was given to him for usufruct alone, not for consumption, still less for profligate waste." - George Perkins Marsh (1801-1882)

"One of the weaknesses of our age is inability to distinguish needs from greeds."
- Don Robinson

"The poor tread lightest on the earth. The higher our income, the more resources we control and the more havoc we wreak." - Paul Harrison quoted in the London Guardian, May 1, 1992

"Through our inattention, we have wasted the years that we might have used to prepare for lessened oil supplies. The next ten years are critical." - Kenneth S. Deffeyes, author of *Beyond Oil: The View from Hubbert's Peak*

"We've embarked on the beginning of the last days of the age of oil." - Mike Bowlin, Chairman, ARCO

"The idea that we industrialized humans are immune to the natural laws that have restrained growth in other species—and humans in past social regimes—is to me so self-servingly blind as to be morally reprehensible." - Richard Heinberg, author of *Powerdown*



Join the forest ecology network

The purpose of the Forest Ecology Network is to protect the native forest environment of Maine through public awareness, grassroots citizen activism, and education. Your contributions and involvement are essential to the success of our efforts. Membership benefits include a subscription to our newspaper, The Maine Woods and educational field trips and workshops. Contributions to FEN (a 501 [c] [3] non-profit organization) are tax-deductible.

Membership Categories: \$25 Seedling \$35 Sapling \$50 Tree
 \$100 Grove \$500 Forest Other \$_____ Please sign me up for
the FEN Action/Email Alert List. I can't afford a donation but would like to be involved.

Name: _____

Address: _____

City, State, Zipcode: _____

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Make checks payable to the Forest Ecology Network or FEN. Please enclose payment and a note describing your interest in FEN. Let us know if you'd like to volunteer. Forest Ecology Network, 336 Back Road, Lexington Township, ME 04961. Phone: 207-628-6404. Email: fen@207me.com Website: <http://www.forestecologynetwork.org>