

# TREES ARE THE ANSWER

by Patrick Moore, Ph.D.

**I believe** that trees are the answer to a lot of questions about our future. These include: How can we advance to a more sustainable economy based on renewable fuels and materials? How can we improve literacy and sanitation in developing countries while reversing deforestation and protecting wildlife at the same time? How can we pull carbon out of the atmosphere and reduce the amount of greenhouse gases emissions, carbon dioxide in particular? How can we increase the amount of land that will support a greater diversity of species? How can we help prevent soil erosion and provide clean air and water? How can we make this world more beautiful and green? The answer is, by growing more trees and then using more wood, both as a substitute for non-renewable fossil fuels and materials such as steel, concrete and plastic, and as paper products for printing, packaging and sanitation.

The forest industry stands accused of some very serious crimes against the environment. It is charged with the extinction of tens of thousands of species, the deforestation of vast areas of the Earth, and the total and irreversible destruction of the ecosystem. If I were one of the urban majority, and I thought the forest industry was causing the irreversible destruction of the environment I wouldn't care how many jobs it created or how many communities depended on it, I would be against it.

I have spent the last 15 years trying to understand the relationship between forestry and the environment, to separate fact from fiction, myth from reality. Since 1991 I have chaired the Sustainable Forestry Committee of the Forest Alliance of British Columbia. This has provided an ideal opportunity to explore all aspects of the subject. This presentation is the synthesis of what I have learned. But first, let me give you a little background.

I was born and raised in the tiny fishing and logging village of Winter Harbour on the northwest tip of Vancouver Island, in the rainforest by the Pacific. I didn't realize what a blessed childhood I'd had, playing on the tidal flats by the salmon spawning streams in the rainforest, until I was shipped away to boarding school in Vancouver at age fourteen. I eventually attended the University of BC studying the life sciences:

biology, forestry, genetics; but it was when I discovered ecology that I realized that through science I could gain an insight into the mystery of the rainforest I had known as a child. I became a born-again ecologist, and in the late 1960's, was soon transformed into a radical environmental activist. I found myself in a church basement in Vancouver with a like-minded group of people, planning a protest campaign against US hydrogen bomb testing in Alaska. We proved that a somewhat rag-tag looking group of activists could sail a leaky old halibut boat across the north Pacific ocean and change the course of history. By creating a focal point for opposition to the tests we got on national TV news in Canada and the US, building a ground swell of opposition to nuclear testing in both countries. When that bomb went off in November 1971 it was the last hydrogen bomb ever detonated on planet Earth. Even though there were four more tests planned in the series, President Nixon canceled them due to the public opposition. This was the birth of Greenpeace.

Flushed with victory and knowing we could bring about change by getting up and doing something, we were welcomed into the longhouse of the Kwakiutl Nation at Alert Bay near the north end of Vancouver Island where we were made brothers of the tribe because they believed in what we were doing. This began the tradition of the Warriors of the Rainbow, after a Cree legend that said that one day when the skies are black and the birds fall dead to the ground and the rivers are poisoned, people of all races, colors and creeds will join together to form the Warriors of the Rainbow to save the Earth from environmental destruction. We named our ship the Rainbow Warrior and I spent fifteen years on the front lines of the eco-movement as we evolved from that church basement into the world's largest environmental activist organization.

Next we took on French atmospheric nuclear testing in the South Pacific. They proved a bit more difficult than the US Atomic Energy Administration. But after many years of protest voyages and campaigning, involving loss of life on our side, they were first driven underground and eventually stopped testing altogether.

In 1975 we set sail deep-sea into the North Pacific against the Soviet Union's factory whaling fleets that were slaughtering the last of the sperm whales off California. We put ourselves in front of the harpoons in little rubber boats and made it on CBS, ABC and NBC evening news. That really put Greenpeace on the map. In 1979 the International Whaling Commission banned factory whaling in the North Pacific and soon it was banned in all the world's oceans.

In 1978 I was arrested off Newfoundland for sitting on a baby seal without permission of the Canadian Minister of Fisheries. I was trying to shield it from the hunter's club. I was convicted; under the draconianly named Seal Protection Regulations that made it illegal to protect seals. In 1984 baby seal skins were banned from European markets, effectively ending the slaughter.

Can you believe that in the early 1980's, the countries of Western Europe were pooling their low and medium level nuclear wastes, putting them in thousands of oil drums, loading them on ships and dumping them in the Atlantic ocean as a way of "disposing" of the wastes. In 1984 a combined effort by Greenpeace and the UK Seafarer's Union put an end to that practice for good.

By the mid-1980's Greenpeace had grown from that church basement to an organization with an income of over US\$100 million per year, offices in 21 countries and over 100 campaigns around the world, now tackling toxic waste, acid rain, uranium mining and drift net fishing as well as the original issues. We had won over a majority of the public in the industrialized democracies. Presidents and prime ministers were talking about the environment on a daily basis.

For me it was time to make a change. I had been against at least three or four things every day of my life for 15 years; I decided I'd like to be in favor of something for a change. I made the transition from the politics of confrontation to the politics of building consensus. After all, when a majority of people decide they agree with you it is probably time to stop hitting them over the head with a stick and sit down and talk to them about finding solutions to our environmental problems.

All social movements evolve from an earlier period of polarization and confrontation during which a minority struggles to convince society that its cause is true and just, eventually followed by a time of reconciliation if a majority of the population accepts the values of the new movement. For the environmental movement this transition began to occur in the mid-1980s. The term sustainable development was adopted to describe the challenge of taking the new environmental values we had popularized, and incorporating them into the traditional social and economic values that have always governed public policy and our daily behavior. We cannot simply switch to basing all our actions on purely environmental values. Every day 6 billion people wake up with real needs for food, energy and materials. The challenge for sustainability is to provide for those needs in ways that reduce negative impact on the environment. But any changes made

must also be socially acceptable and technically and economically feasible. It is not always easy to balance environmental, social, and economic priorities. Compromise and co-operation with the involvement of government, industry, academia and the environmental movement is required to achieve sustainability. It is this effort to find consensus among competing interests that has occupied my time for the past 15 years.

Coming from British Columbia, born into a third generation forest industry family, and educated in forestry and ecology, it made sense that I would focus on the challenge of defining sustainable forestry. After all, forests are by far the most important environment in British Columbia and they are also by far the most important basis of economic wealth for families and communities.

I soon discovered that trees are just large plants that have evolved the ability to grow long wooden stems. They didn't do that so we could cut them up into lumber and grind them into pulp; they actually had only one purpose in mind and that was to get their needles or leaves higher up above the other plants where the tree could then monopolize the Sun's energy for photosynthesis. When foresters create openings or clearcuts when they harvest trees, one of the reasons for doing it is so the new trees growing back can be in full sunlight. Trees are basically plants that want to be in the sun. If trees wanted to be in the shade they would have been shrubs instead, they would not have spent so much time and energy growing long wooden stems.

Forests are home to the majority of living species; not the oceans, nor the grasslands, nor the alpine areas, but ecosystems that are dominated by trees. There is a fairly simple reason for this. The living bodies of the trees themselves create a new environment that would not be there in their absence. Now the canopy above is home to millions of birds and insects where there was once only thin air. And beneath the canopy, in the interior of the forest, the environment is now protected from frost and sun and wind. This, in combination with the food provided by the leaves, fruits and even the wood of the trees, creates thousands of new habitats into which new species can evolve, species that could never have existed if it were not for the presence of the living trees.

This gives rise to the obvious concern that if the trees are cut down the habitats or homes will be lost and the species that live in them will die. Indeed, in 1996 the World Wildlife Fund, at a media conference in Geneva, announced that 50,000 species are going extinct each year

due to human activity. And the main cause of these 50,000 extinctions, they said, is commercial logging. The story was carried around the world by Associated Press and other media and hundreds of millions of people came to believe that forestry is the main cause of species extinction.

During the past three years I have asked the World Wildlife Fund on many occasions to please provide me with a list of some of the species that have supposedly become extinct due to logging. They have not offered up a single example as evidence. In fact, to the best of our scientific knowledge, no species has become extinct in North America due to forestry.

Where are these 50,000 species that are said to be going extinct each year? They are in a computer model in Edward O. Wilson's laboratory at Harvard University. They are electrons on a hard drive, they have no Latin names, and they are in no way related to any direct field observations in any forest.

It's not as if humans have never caused the extinction of species; they have and the list is quite long. There are three main ways by which humans cause species extinction. First, and perhaps most effective, is simply killing them all, with spears, clubs, and rifles. The passenger pigeon, the dodo bird, the Carolinian parakeet, and back in time, the mammoths and mastodons, are all examples of species that were simply wiped out either for food or because they were pests.

Secondly, the vast clearance of native forests for agriculture. There may have been an orchid in that valley bottom that was found nowhere else. If all the forest is cleared away, burned, plowed, and planted with corn the orchid may disappear forever.

Third, and actually the major cause of species extinction by humans during the past 200 years is the introduction of exotic predators and diseases. In particular, when Europeans colonized Australia, New Zealand, and the other Pacific Islands, including Hawaii, they brought with them rats, cats, foxes, pigs, sheep, goats, chickens and cows, and all the other domestic animals and plants, including their diseases. This resulted in the extinction of hundreds of ground dwelling marsupials and flightless birds, as well as many other species.

We have long lists of species that have become extinct due to these three types of human activity but we do not know of a single species that has become extinct due to forestry.

The spotted owl is one of the many species that was never threatened with extinction due to forestry, and yet in the early 1990's, 30,000 loggers were thrown out of work in the US Pacific Northwest due to concern that logging in the National Forests would cause the owl's extinction. Since that time, in just a few short years, it has been shown by actual field observations that there are more than twice as many spotted owls in the public forests of Washington state than were thought to be theoretically possible when those loggers lost their jobs. More importantly, it is now evident that spotted owls are capable of living and breeding in landscapes that are dominated by second growth forests. Over 1000 spotted owls have been documented on Simpson Timber's half million acre second growth redwood forests in northern California. And yet, in reporting on the settlement of the Headwaters redwood forests nearby, the New York Times described the spotted owl as a "nearly extinct species" despite the fact that there are tens of thousands of them thriving in the forests of the Pacific Northwest.

So the general public is being given the impression, by supposedly reputable sources such as the New York Times and National Geographic that forestry is a major cause of species extinction when there is actually no evidence to support that position.

There is a reason why forestry seldom, if ever, causes species to become extinct. We tend to think that forests need our help to recover after destruction, whether by fire or logging. Of course this is not the case. Forests have been recovering by themselves, without any assistance, from fires, volcanoes, landslides, floods and ice ages, ever since forests began over 350 million years ago. Consider the fact that 10,000 years ago all of Canada and Russia were covered by a huge sheet of ice under which nothing lived, certainly not trees. Today, Canada and Russia account for 30 percent of all the forests on earth, grown back from bare rock. Go to Alaska where the glaciers are retreating due to the present warming trend, and you will see that from the moment the rocks are laid bare to the sun, it is only 80 years until a thriving new ecosystem is growing there, including young trees.

It follows from this that every species which lives in the forest must be capable of re-colonizing areas of land that are recovering from destruction. Indeed, forest renewal is the sum total of all the individual species returning to the site, each in their turn, as the forest grows back. In ecology, this is known as dispersal, the ability to move from where you are and to inhabit new territory as it becomes available. In humans, we call this migration, but it is the same thing. Dispersal is an

absolute requirement for natural selection and the survival of species. No species could exist if it were not capable of dispersal. Therefore, so long as the land is left alone after the forest is destroyed, the forest will recover and all the species that were in it will return.

Fire has always been the main cause of forest destruction, or disturbance, as ecologists like to call it in order to use a more neutral term. But fire is natural, we are told, and does not destroy the forest ecosystem like logging, which is unnatural. Nature never comes with logging trucks and takes the trees away. All kinds of rhetoric is used to give the impression that logging is somehow fundamentally different from other forms of forest disturbance. There is no truth to this. It is true that logging is different from fire, but fire is also very different from a volcano, which in turn is very different from an ice age. In fact, no two fires are ever the same. These are differences of degree, not kind. Forests are just as capable of recovering from destruction by logging as they are from any other form of disturbance. All that is necessary for renewal is that the disturbance is ended, that the fire is out, that the volcano stops erupting, that the ice retreats, or that the loggers go back down the road and allow the forest to begin growing back, which it will begin to do almost immediately.

If you don't think fire destroys the ecosystem, you should try counting the species left alive after a severe forest fire. A hot wildfire in a dry pine forest not only kills every living thing above the ground, it also burns the soil, killing the roots and seeds, basically sterilizing the site and leaving it lifeless. Yet it is often only a few years after such a fire that the land is alive with grasses and flowers again. Everywhere in the world there are pioneer plants which produce seeds with fluff on them. They can carry for 100 miles on a light breeze, looking for a place to settle in the open sun and germinate. A recently burned forest is a perfect place for these seeds; the shade of the trees is gone allowing full sun to reach the ground, and the ash from the fire provides nutrients for new growth.

In Yellowstone National Park, fire burned over one million acres in 1988. Even after eight years, the most severely burned areas off the park have very little vegetation growing back. This is partly due to the very short summers at 8000 foot elevations, but also because extremely hot fires not only remove nitrogen from the soil but also vaporize the phosphorous, thus depleting the soil of two of the three most essential nutrients. While nitrogen is returned to the soil relatively quickly through the action of nitrogen fixing bacteria, phosphorous must be weathered from the minerals in the soil. This

may take 50 or 100 years but eventually the soil will heal and a new forest will emerge.

In some areas of the Yellowstone fire the soil was wet at seepage sites, and even though everything above the ground was killed, the seeds of the pine and other species survived in the soil. Here a new forest is growing back quickly and the new pines will produce seeds in 10 or 15 years. These seeds will gradually march across the landscape, reforesting the land where the seeds were burned.

In order to witness total destruction by nature, there is no better place to go than Mount St. Helens in Washington State. When this volcano blew up in 1980 it destroyed over 150,000 acres of forest, much of it old growth growing on the flanks of the mountain. Interestingly, the forest that was destroyed was in two distinct jurisdictions. Part of it was federal public lands, the Gifford Pinchot National Forest, controlled from Washington DC. Part of it was private timberlands owned by the Weyerhaeuser Corp. based in Tacoma, Washington.

The US government re-designated the portion of their land that was destroyed the Mount St. Helen's National Volcanic Monument, "where nature will be permitted to recover, unaided by human beings, for the discovery of science." 18 years after the initial blast the Volcanic Monument still looks like a desert. The dead trees are still lying where they were blown over or had their tops blown off by the initial blast. A thick layer of volcanic ash then settled out, making a very sterile seed bed for seeds blowing in on the wind. Only a few hardy nitrogen-fixing plants, such as slide alder, have been able to take root in the poor soil.

Weyerhaeuser took a completely different approach. First they salvage logged 85,000 three-bedroom homes worth of timber from their land in two years following the eruption. By bringing in heavy equipment and dragging the big logs around, they broke through the volcanic ash everywhere, exposing the fertile soil beneath it. This created a much more fertile seed bed for seeds blowing in on the wind, a classic case of site disturbance, or site preparation as it's called when we do it on purpose, increasing the fertility of the site. Something every farmer who plows their fields knows. Then they planted two-year-old Douglas fir seedlings that were advanced enough to get their roots down through the ash into the healthy soil beneath. Today these seedlings are over 20 feet tall and will produce a commercial crop of timber in the year 2026. The contrast between the National Volcanic Monument and Weyerhaeuser's land offers proof that a couple of interventions by

people can make a dramatic difference to the way in which an ecosystem recovers after a natural disaster such as a volcano.

My grandfather, Albert Moore, clearcut large areas of coastal rainforest on northern Vancouver Island in the 1930s and '40s. He didn't know the word ecology, and the word biodiversity would not be invented for another 50 years. And you can be sure they weren't talking about the environment at the breakfast table on a dark, cold winter morning before they went out and worked hard six or seven days a week, to get the big timber down to the sea, sometimes taking half the soil with it due to the primitive logging methods of the day. Today these areas are covered in lush new forest in which bears, wolves, cougar, deer, owls, eagles ravens, and hawks have found a home again. These species have dispersed back to the site as the environment became suitable for them again.

We have all been taught since we were children that you should not judge a book by its cover, in other words that beauty is only skin deep. Yet we are still easily tricked into thinking that if we like what we see with our eyes, it must be good, and if we don't like what we see with our eyes, it must be bad. We tend to link our visual impression of what is beautiful and what is ugly with our moral judgment of what is right and wrong. The Sierra Club says, "You don't need a professional forester to tell if a forest is mismanaged - if a forest appears to be mismanaged, it is mismanaged." They want you to believe that the ugly appearance of a recently harvested forest is synonymous with permanent destruction of the environment. And yet, the unsightly sea of stumps is not nuclear waste or a toxic discharge, it is 100 percent organic, and will soon grow back to a beautiful new forest again. All the same, the fact that recently harvested areas of forest appear ugly to our eyes makes for very effective images in the hands of anti-forestry activists.

Taken in the right light, clearcuts can actually look quite pretty. Think, for just a moment, of the clearcut as a temporary meadow. It is temporary because it will not stay that way; it will grow back into a new forest again. But it is meadow-like for the time being because the trees have been removed and now the sun can reach directly to the ground, fostering the growth of plants that could never grow in the shade of the trees. We never think of meadows and clearcuts in the same breath. After all, meadows are lovely places which you can walk across easily in the open sun, find a dry smooth place, lay your picnic blanket down and have a lovely afternoon. Clearcuts, on the other hand, are ugly places full of twisted, broken wood and stumps, and

there is no nice smooth, dry place to put down a picnic blanket. These distinctions have nothing to do with biodiversity or science, they are purely matters of human aesthetics. Meadows are actually small deserts where it is too dry for trees to grow. That's why they are so smooth. Meadows are only capable of supporting drought-resistant grasses and herbs. Clearcuts, on the other hand, can support a wider variety of grasses and herbs, as well as woody shrubs and trees. Within a year or two of harvesting, clearcuts will generally have far higher biodiversity than meadows. And within a decade or so they begin to look just as good too.

In the space of a few short years, a clearcut that is very ugly to look at can be transformed into a beautiful sea of blossoms growing from seeds that blow in on the wind after fire. Was the clearcut bad when it looked ugly? Is it good now that it looks beautiful? The fact is, it is a serious mistake to judge the environmental health of the land simply by looking at it from an aesthetic perspective.

The way we think the land should look often has more to do with personal and social values than anything to do with biodiversity or science. We tend to idealize nature, as if there is some perfect state that is exactly right for a given area of land. There are actually thousands of different combinations of species at all different stages of forest growth that are perfectly natural and sustainable in their own right. There is nothing better about old trees than there is about young trees. Perhaps the ideal state is to have forests of all ages, young, medium, and old in the landscape. This will provide the highest diversity of habitats and therefore the opportunity for the largest number of species to live in that landscape.

Deforestation is a difficult subject for the forest industry because it certainly looks deforested when all the trees are cut down in a given area. Unfortunately for the public's understanding of this term, cutting the trees down is not sufficient in itself to cause deforestation. What really matters is whether the forest is removed permanently, or reforested with new trees. But the unsightly nature of a recently harvested forest, even if it is going to grow back eventually, can easily give the impression of environmental destruction and deforestation.

On the other hand, a rural scene of farmlands and pasture looks pleasant to the eye and is neat and tidy compared to the jumble of woody debris in a clearcut. Yet it is the farm and pasture land that truly represents deforestation. It has been cleared of forest long ago and the forest has been permanently replaced by food crops and

fodder. More important, if we stopped plowing the farmland for just 5 years in a row, seeds from the surrounding trees would blow in and the whole area would be blanketed in new tree seedlings. Within 80 years you would never know there had been a farm there. The entire area would be reforested again, just by leaving it alone. That's because deforestation is not an event, that just happens and then is over forever. Deforestation is actually an ongoing process of continuous human interference, preventing the forest from growing back, which it would if it was simply left alone. The most common form of interference with forest renewal is what we call agriculture. That's why deforestation is seldom caused by forestry, the whole intention of which is to cause reforestation. Deforestation is nearly always caused by friendly farmers growing our food, and by nice carpenters building our houses, towns, and cities. Deforestation is not an evil plot, it is something we do on purpose in order to feed and house the 6 billion and growing human population.

The scene of cattle grazing in a lush green pasture is pleasant to the eye. Yet it wasn't that many years ago when McDonald's restaurants, bowing to heavy public pressure due to concern about deforestation in Central and South America to grow cows for hamburger, promised they would never buy another tropical cow. It was apparently fine, however, to continue buying cows grown in North America. Is this because we have a higher standard for deforestation in North America than they do in Latin America? No, it is a complete double standard. Deforestation is deforestation regardless of where it is practiced. The forest is completely removed and replaced with a monoculture pasture on which exotic animals that were not present in the original forest graze.

If you go to Australia, you'll find that most people think the worst deforestation is occurring in Malaysia and Indonesia, when in fact about 40 percent of Australia's native forest has been destroyed for agriculture. The same is true in United States; about 40 percent of the original forests have been converted to farming. We always like to think that the bad people are long way away and speak another language. We often fail to realize that we are doing exactly the same things we accuse them of doing.

And if you don't eat meat, you must eat vegetables in which case you will cause the creation of monoculture cabbage plantations and other such food crops where there once were forests. Now it's true that cabbages are prettier than stumps, unfortunately true for the public's understanding of deforestation. Birds and insects are not welcome in

areas of monoculture crops. If they wish to avoid being shot or poisoned they had best retreat into a forest nearby where they are more likely to be left alone.

Don't get me wrong, I'm not against farming. We all have to eat. But it is interesting to note that the three things we can do to prevent further loss of the world's forests have nothing to do with forestry. These three things are:

1. Population management. The more people there are in this world the more mouths there are to feed and the more forest we must clear to feed them. This is a simple fact of arithmetic.
2. Intensive agricultural production. Over the last 50 years in North America we have learned to grow five times as much food on the same area of land, due to advances in genetics, technology, and pest control. If we had not made these advances we would either have to clear away five times as much forest, which is not available anyway, or more likely we simply could not grow as much food. Again, it is a matter of arithmetic. The more food we can grow on a given piece of land, the less forest will be lost to grow it.
3. Urban densification. There is actually only one significant cause of continuing forest loss in United States; 200 cities sprawling out over the landscape and permanently converting forest and farm to pavement. If we would design our cities for a higher density, more livable environment, we would not only save forests, we would also use less energy and materials.

The sight of large bales of freshly mown hay placed evenly across a farm field is attractive to our eye in the late afternoon sun. The light and form of the hay bales is pretty to us, we tend to judge landscapes by how good a postcard they would make. The bales of hay are actually just large lumps of dead cellulose laying on a deforested piece of land. There is a very little biodiversity in a hayfield, yet it will more often catch the eye than surrounding forest land where biodiversity is high.

The same is true of the sight of a field of flowers in bloom. The bold, beautiful colors of a monoculture tulip plantation, sprayed regularly with pesticides to keep the petals perfect for the florist's shop, are attractive to our eye. We hardly notice the gray-green monotone of the native forest nearby, containing tens of species of native trees, hundreds of species of native birds, insects, animals and plants.

We need to give the public a new pair of eyes with which to see the landscape, to get beyond the immediate visual impression and to understand a little more about science, ecology, and biodiversity. This is perhaps the single most important task for the forest industry. The

lesson is not a difficult one, but it is not intuitively obvious to people. They simply tend to judge the health of the environment with the same eyes they use to judge the aesthetics of the land. If a person strongly believes that forestry is bad because it is ugly, no amount of technical and scientific information will cause them to change their mind. First they must understand that the look of the land is not sufficient, in itself, to make judgments about ecology.

A large parking lot is the ultimate in deforestation. The automobile is arguably the most destructive technology ever invented by the human species. Especially when you consider the black stuff that is usually found beneath them, asphalt. Why is it legal to take the toxic waste from oil refineries and spread it all over the earth, killing every living thing, so that cars and trucks may roam about freely? When crude oil is put into an oil refinery, (aprox 85 million barrels a day), we take the gasoline off the top to run the cars, then the diesel oil to run the trucks and trains. Near the bottom we extract the bunker C crude oil which is used to fire the boilers on big ships as they cross the sea. But in the very bottom, left over, is this black, gooey crud. If you took it to a licensed landfill in a truck they would turn you away at the gate because it's toxic, hazardous, and carcinogenic to boot. It is illegal to bury it, but perfectly legal to load it into huge fleets of trucks and dump it directly onto the earth in a thin layer, killing every living thing. This is the world's largest case of legalized toxic dumping, and we turn a blind eye to it because of our love affair with the automobile and our dependence on the transportation infrastructure it provides.

Think of a biodiversity on a scale from 0 to 100. You would have to admit that the parking lot is pretty close to 0. There might be a blade of grass poking through in the odd place. A farm field or pasture might rate 5 or 10, compared to the original forest that was cut down, burned and planted to make the farm. Forestry, the way it is practiced today throughout most of North America, is 96, 98, 100, even 102. Because in some landscapes forest management results in a wider range of age classes and ecosystem types than would normally occur in the absence of human activity.

All this controversy, political pressure, and near-hysterical rhetoric over a few percent of biodiversity, with the camera lens focused squarely in on the most recent, ugliest, burnt-out clear-cut available, as if it's going to remain that way forever. The real extreme is the parking lot and other areas of deforestation, not the recently cut forest that is soon going to grow back into a beautiful new forest again.

We have to help take the blinkers off people's eyes, and to give them a better appreciation of the full range of impacts caused by our various activities. When it comes to biodiversity conservation, there is no more sustainable primary industry than forestry.

You would think that since forestry is the most sustainable of all the primary industries, and that wood is without a doubt the most renewable material used to build and maintain our civilization, that this would give wood a lot of green eco-points in the environmental movement's ledger. Unfortunately, this doesn't seem to be the case. Greenpeace has gone before the United Nations Inter-Governmental Panel on Forests, calling on countries to reduce the amount of wood they use and to adopt "environmentally appropriate substitutes" instead. No list of substitutes is provided. The Sierra Club is calling for "zero cut" and an end to all commercial forestry on federal public lands in United States. The Rainforest Action Network wants a 75 percent reduction in wood use in North America by the year 2015. I think it is fair to summarize this approach as "cut fewer trees, use less wood". It is my firm belief, as a lifelong environmentalist and ecologist, that this is an anti-environmental policy. Putting aside, for a moment, the importance of forestry for our economy and communities; on purely environmental grounds the policy of "use less wood" is anti-environmental. In particular, it is logically inconsistent with, and diametrically opposed to, policies that would bring about positive results for both climate change and biodiversity conservation. I will explain my reasoning for this belief:

First, it is important to recognize that we do use a tremendous amount of wood. On a daily basis, on average, each of the 6 billion people on Earth uses 3.5 pounds or 1.6 kilos of wood every day, for a total of 3.5 billion tons per year. So why don't we just cut that in half and save vast areas of forest from harvesting? In order to demonstrate the superficial nature of this apparent logic it is necessary to look at what we are doing with all this wood.

It comes as a surprise to many people that over half the wood used every year is not for building things but for burning as energy. 60 percent of all wood use is for energy, mainly for cooking and heating in the tropical developing countries where 2.5 billion people depend on wood as their primary source of energy. They cannot afford substitutes because most of them make less than \$1000 per year. But even if they could afford substitute fuels they would nearly always have to turn to coal, oil, or natural gas; in other words non-renewable fossil fuels. How are we going to stabilize carbon dioxide emissions from

excessive use of fossil fuels under the Climate Change Convention if 2.5 billion people switch from a renewable wood energy to non-renewable fossil fuels? Even in cases where fuelwood supplies are not sustainable at present levels of consumption the answer is not to use less wood and switch to non-renewables. The answer is to grow more trees.

25 percent of the wood used in the world is for building things such as houses and furniture. Every available substitute is non-renewable and requires a great deal more energy consumption to produce. That is because wood is produced in a factory called the forest by renewable solar energy. Wood is essentially the material embodiment of solar energy. Non-renewable building materials such as steel, cement, and plastic must be produced in real factories such as steel mills, cement works, and oil refineries. This usually requires large inputs of fossil fuels inevitably resulting in high carbon dioxide emissions. So, for 70 percent of the wood used each year for energy and building, switching to substitutes nearly always results in increased carbon dioxide emissions, contrary to climate change policy.

15 percent of the wood harvested is used to manufacture pulp and paper mainly for printing, packaging, and sanitary purposes. Fully half of this wood is derived from the wastes from the sawmills which produce the solid wood products for building. Most of the remaining supply is from tree plantation's many of which are established on land that was previously cleared for agriculture. So even if we did stop using wood to make pulp and paper it would not have the effect of "saving" many forests.

Many of you have heard of the idea that we should stop using trees to make paper and use "alternative fibers" such as hemp, kenaf, and cotton. "Tree-free paper" made from "wood-free pulp" would supposedly be better for the environment than paper made from trees. I speak at schools and universities on a regular basis and have found that many young people believe that this is the right approach to improve the environment. I ask them "where are you going to grow the hemp, on Mars? Do you have another continent somewhere that we don't know about? No, the fact is we would have to grow the hemp on this planet, in soil where you could otherwise be growing trees.

Give me an acre of land anywhere on Earth, tell me to grow something there with which I can make paper, that would also be best for biodiversity, and I will plant trees every single time, without exception. It is simply a fact that even the simplest monoculture pine plantation

is better for wildlife, birds, and insects than any annual farm crop. It is ridiculous for environmental groups who say their main concern is biodiversity conservation to be advocating the establishment of massive monocultures of annual exotic farm crops where we could be growing trees.

It is therefore clear to me that the policy of "use less wood" is anti-environmental because it would result in increased carbon dioxide emissions and a reduction in forested land. I believe the correct policy is a positive rather than a negative one. From an environmental perspective the correct policy is "grow more trees, and use more wood". This can be accomplished in a number of ways.

First, it is important to place some of the world's forest into permanently protected parks and wilderness reserves where no industrial development occurs. The World Wildlife Fund recommends that 10 percent of the world's forests should be set aside for this purpose. Perhaps it should even be 15 percent. But then the question becomes, how should we manage the remaining 85 to 90 percent of the forest? I believe we should manage it more intensively for higher timber production, keeping in mind the needs of other species in the landscape. By just managing our existing forests better we could dramatically increase the world's supply of wood. In addition, we should expand the geographic extent of our forests, largely by reforesting areas of land that were previously cleared for agriculture. In particular, huge areas of forest have been cleared for domestic animal production to supply us with meat. A modest reduction in meat consumption would open up large areas of land for reforestation. This would be good for our health as well as the health of the environment.

In the tropical developing countries there is a pressing need for sustainable fuelwood plantations as well as forest plantations to provide timber. We should direct more of our international aid programs towards this end. Relatively modest changes in fiscal and taxation policy could bring about a doubling of global wood supply within 40 years. All that is required is the political will to put these policies in place. But the general public and our political leaders have been confused by the misguided approach towards forestry taken by much of the environmental movement. So long as people think it is inherently wrong to cut down trees we will continue to behave in a logically inconsistent and dysfunctional manner.

I believe that trees are the answer to many questions about our future on this earth. These include - how can we advance to a more

sustainable economy based on renewable fuels and materials? How can we improve literacy and sanitation in developing countries while reversing deforestation and protecting wildlife at the same time? How can we reduce the amount of greenhouse gases emitted to the atmosphere, carbon dioxide in particular? How can we increase the amount of land that will support a greater diversity of species? How can we help prevent soil erosion and provide clean air and water? How can we make this world more beautiful and green? The answer is, by growing more trees and using more wood both as a substitute for non-renewable fossil fuels and materials such as steel, concrete, and plastic, and as paper products for printing, packaging, and sanitation.

By far the most powerful tool at our disposal to reduce carbon dioxide emissions from fossil fuel consumption is the growing of trees and the use of wood. Most environmentalists recognize the positive benefits of growing trees to absorb carbon dioxide from the atmosphere. But then they say "don't cut them down or you will undo the good that's been done". This would be true if you simply piled the trees in a heap and lit them on fire. If, however, the wood is used as a substitute for fossil fuels and for building materials whose production consumes fossil fuels, we can dramatically reduce the consumption of fossil fuels and carbon dioxide emissions. For example, consider a large coal-burning power plant. If we grow trees and use the wood as a substitute for the coal we are able to offset nearly 100 percent of the carbon dioxide emissions from the power plant. That is because sustainable use of wood results in a zero net release of carbon dioxide whereas coal combustion counts for the full 100 percent. If environmentalists would recognize this fact it would inevitably lead them to believe that the answer is in growing more trees and using more wood rather than in reducing our use of this most renewable resource.

To conclude, let me take you back to the rainforest of the West Coast of North America. About 300 feet from my house in downtown Vancouver is Pacific Spirit Park, 2000 acres of beautiful native forest, right in the heart of the city. It is not a botanical garden where people come and prune the bushes and plant tulip bulbs, it is the real thing, a wild west coast rainforest full of Douglas-fir, western red cedar, hemlock, maple, alder and cherry. But people who come by the hundreds each day to walk on the many trails in Pacific Spirit Park would find it hard to believe that all 2000 acres were completely clearcut logged around the turn of the century to feed the sawmills that helped build Vancouver.

The loggers who clearcut Pacific Spirit Park with double-bitted axes and crosscut saws long before the chainsaw was invented didn't know the words ecology or biodiversity any more than my grandfather did on the north end of Vancouver Island. They just cut the timber and moved on to cut more somewhere else. Nothing was done to help restore the land, but it was left alone. It became part of the University of British Columbia Endowment Lands, and was not developed into housing like the rest of Vancouver. It all grew back into a beautiful new forest and in 1989 was declared a regional park.

In Pacific Spirit Park, there are Douglas-firs over four feet in diameter and over 120 feet tall. All of the beauty has returned to Pacific Spirit Park. The fertility has returned to the soil. And the biodiversity has recovered; the mosses, ferns, fungi, liverworts, and all the other small things that are part of a natural forest. There are pileated woodpeckers, barred owls, ravens, hawks, eagles, coyotes and a colony of great blue herons nesting in the second-growth cedar trees. It is a forest reborn, reborn from what is routinely described in the media as the "total and irreversible destruction of the environment". I don't buy that. I believe that if forests can recover by themselves from total and complete destruction, that with our growing knowledge of forest science in silviculture, biodiversity conservation, soils, and genetics; we can ensure that the forests of this world continue to provide an abundant, and hopefully growing, supply of renewable wood to help build and maintain our civilization while at the same time providing an abundant, and hopefully growing, supply of habitat for the thousands of other species that depend on the forest for their survival every day just as much as we do. The fact is, a world without forests is as unthinkable as a day without wood. And it's time that politicians, environmentalists, foresters, teachers, journalists, and the general public got that balance right. Because we must get it right if we are going to achieve sustainability in the 21st century.