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Pacific Spirit — The Forest Reborn

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Thank you for the opportunity to speak to you today. I hope to give you a different perspective on some of the forest issues that we've all read and learned about over the past years.

My main thesis is that the thrust of much of the environmental movement's policy on forests and forestry is logically inconsistent, and runs counter to their more reasonable positions on biodiversity protection and climate change.

If we look at what came out of the Earth Summit in Rio, and out of the recent Earth Summit Plus 5 in New York, we find that climate change, biodiversity, and forests are without a doubt the top three environmental issues in the world today. Most people have focused on one or the other of these three subjects, yet they are inextricably linked, one with the other. It's these important linkages among the subjects that will lead us to a logically consistent approach to land use, energy use, resource policy, agriculture policy, and forestry policy.

TREES

Consider the image of a single tree. Trees are the individual units—the individual organisms—that make up a forest. We need to remind ourselves that it was about 350 million years ago that plants evolved the ability to grow long wooden stems, and hence became what we call "trees." When they did that, they weren't thinking about our desire to cut them up into two-by-fours. They had only one purpose in mind. That was to get the crown of the tree, with its needles or leaves, up above the other plants, where the tree could then monopolize the sun's energy for photosynthesis.

Foresters create clearings in the forest so that the new tree seedlings can be in full sunlight. A tree is basically a plant that wants to be in the sun, and with few exceptions, this is the case. If trees had wanted to grow in the shade, they would have been shrubs instead. They would not have bothered to develop this long wooden stem to get their "heads" up high.

BIODIVERSITY

I believe the most important general ecological fact about forests is that forested ecosystems—not the oceans, not the plains, not the deserts—are home to the majority of all known living species. There's a simple reason for this. The living bodies of the

trees create an environment that doesn't exist if trees aren't present. The canopy above is now home to millions of birds and insects, and beneath the canopy, in the interior of the forest, the environment is protected from frost in cold climates, from hot sun in warm climates, and from wind in all climates. In combination with living trees, this creates thousands of new habitats, niches, in which species can evolve. These species could not have existed were it not for the existence of the trees themselves.

When my Grandfather came to the rainforest at Winter Harbour on the north end of Vancouver Island just after the turn of the century, he settled as a logger. He began in the 1930s to clear-cut everything that can be seen from my house by the sea. It's all grown back since then by natural regeneration. More recently, a 15-year-old clear-cut in the rainforest of northern Vancouver Island, where the moist mild climate creates a vegetation which is thick and lush, grows back quickly. We can't make a desert out of the rainforest just by cutting the trees down.

A common belief is that forestry, by its very nature, results in a loss of biodiversity, a reduction in the number of species on the landscape. That's certainly easy to do. If we cut down a native forest, replace it with a monoculture of exotic trees all planted in rows, and spray pesticides on it to kill the "bugs," we will reduce the biodiversity of that landscape. But sustainable forestry with native tree species and a good understanding of other native species in that forest can result in an increase in biodiversity across many landscapes. This is because we can plan for a finer mosaic of forest age classes and ecosystem types than would normally occur in the absence of human intervention.

One of the reasons for this is that many species of flowering plants in particular just don't grow in the shade. We can't walk into a forest and find fireweed or pearly everlasting growing there, but we will find them in open sunlight. Therefore, a landscape that has all different age classes, including newly cleared areas, young forests, medium forests, and old forests, tends to have a higher biodiversity than a landscape that has a single age class of forest across an entire area.

Inevitably, though, as forests grow back from clearing, whether by fire or by logging, the plants that require sunlight die out. The ones that do well in shade—the same species that were in the original forest—come back in again. This is a cyclical process called "forest ecological succession," in which the composition of species changes through time as a forest grows back from a cleared area to a new closed-canopy forest again.

THE SPIRIT OF THE FOREST

Second-growth, or new forests, are commonly portrayed as not only lacking the biodiversity of mature forests, but also lacking their very beauty—indeed, the spirit of the forest. Now that the evil men have come with their chainsaws and cut the trees, God has left the land and will never return. All manner of biblical metaphors are brought forward about sacrilege, desecration, rape, pillage, and plunder to describe the cutting of trees. This makes excellent headlines, but, fortunately, there isn't any truth in it. I know this, because I can walk through forests which my Grandfather clear-cut logged in the 1930s. When he logged them, he didn't know the word "biodiversity," because it hadn't been invented yet. And he didn't talk about ecology at the breakfast table, before he went out in the pouring December rain to drag the huge trees that were growing there down to the sea, half the time taking the soil with them. And yet, without any reforestation or any intervention at all, the forest is growing back thickly and

quickly. There are ravens and deer and wolves and owls and bears living in that forest today. The spirit of the forest has returned, in 60 short years. The beauty has, too.

MONOCULTURE

Unfortunately, the word "monoculture" has been borrowed from agriculture and applied to forestry as if it meant the same thing, but it usually means something very different. In farming, a monoculture means that we clear away the original ecosystem, usually a forest, pile all the debris into a heap and light it on fire, plow the soil every year, and plant the seeds of an exotic food crop such as corn or wheat. That never happens in the absence of human intervention.

In forestry, a monoculture is a forest which is dominated by a single species of tree. Monocultures occur in nature quite frequently. In my home province of British Columbia, about 30 percent of the original forest would be described as natural monocultures—lodgepole pine, Douglas-fir, some of the spruces, western hemlock. A natural monoculture forest is a perfectly full-functioning ecosystem. Shrubs and plants grow below the canopy; nobody weeds them out. Birds and insects and squirrels live in the canopy above; nobody sprays them to kill them. There's nothing unnatural about monoculture forests of this type. And yet, because of the association with wheat fields and farming, it is easy to use the term "monoculture" in a propagandist way.

OLD GROWTH

I've looked into it very carefully and there's no getting around the fact that it takes 500 years for a tree to become 500 years old. That is what we call a "law" of nature. Fortunately, it doesn't take 500 years for the characteristics required by species described as old growth dependent to re-emerge in forests growing back from clearing.

Take, for example, a 90-year-old, second-growth forest on the south end of Vancouver Island. It already has all or most of the characteristics needed by old-growth-dependent species. Let's use cavity-nesting birds as a fairly extreme example. These birds need standing dead trees, large enough and rotten enough to allow them to dig a hole and go in to have their babies out of the rain. That doesn't happen automatically after a forest is cleared. It takes some time. But it doesn't take 500 years—50–100 years will usually do just fine.

There's another side to this, though. You can't do everything in 100 years. A huge cathedral-top cedar snag was left standing, already dead, when my Grandfather clear-cut the surrounding forest in the early 1940s. When the cedar died, it was about 1,500 years old. (It's about 14 feet in diameter.) When it falls over, if people leave it alone, it will take about 1,000 years to decay into an unrecognizable form. That's 2,500 years for a tiny cedar seed to germinate on the forest floor and grow into this incredibly complex and beautiful form, and then die and decay—all the while providing habitat for millions of individuals of hundreds of species of insects, birds, and plants.

We can't expect foresters to plan on 2,500-year cycles. Cycles on the order of 250 years are hard enough to think about—never mind what we're going to do next week-end. Therefore, if we want some of the long-term natural cycles to continue across landscapes, there's no real option other than to set aside large areas as protected parks and wilderness. That's why I'm very pleased that in my province of British

Columbia we are now embarked on a process of doubling the amount of land in protected parks and wilderness, and we're doing it on as representative an ecosystem basis as we possibly can.

Long-term cycles cannot coexist over landscapes with intensive forest management, in which we cut trees every 40–100 years. We need to have wilderness set aside if we want the long-term cycles to continue.

ECOLOGY AND AESTHETICS

Most of our Moms taught us not to judge a book by its cover, or, to say it another way, beauty is only skin deep. Nonetheless, we are easily tricked into thinking that, if we like what we see with our eyes, it is good, and, if we don't like what we see with our eyes, it is bad. We tend to link our visual aesthetic to our ethical or moral judgment of things, particularly landscapes.

The Sierra Club helps us make this linkage by saying in their book, *Clearcut: The Tragedy of Industrial Forestry*, "You don't have to be a professional forester to tell if a forest is mismanaged anymore than you have to be a doctor to tell if a person has ill health. If a forest appears to be mismanaged, it is mismanaged." Of course, they're wrong on both counts. You do have to be a doctor in many cases to tell what a person is infected with, and you do have to be a professional forester to tell if a forest is healthy. The Sierra Club says that because they want us to think that a recently logged area is bad because it is ugly, wasted looking, and dead. There's no question that it's ugly. But what is it really? It's actually just large lumps of dead wood lying on beautifully fertile forest soil. It's not toxic waste. It isn't nuclear. It's 100 percent organic. And, in fact, many types of forests require site disturbance in order to grow back quickly and healthily. But, we're told, we should judge clear-cuts to be wrong, because they look ugly to our eyes.

Taken in the right light, even clear-cuts can look pretty. Think for a moment, metaphorically, of the clear-cut as a temporary meadow. It's temporary because it's not going to stay this way. It's going to grow back into a forest again. But it's meadowlike for the time being. The trees have been removed, and light can stream in to the ground and foster the growth of plants and other species unable to grow in the shade of the forest.

Meadow and clear-cut used in the same sentence? That's ridiculous. Meadows are beautiful, pleasant places. Clear-cuts are ugly, awful places. Our judgment of meadows and clear-cuts has nothing to do with biodiversity. Meadows are nice places, because they are easy to walk across, sunny, and we can lay our picnic blankets down for a nice time. Clear-cuts are awful places, because we're likely to break a leg within the first 10 feet of trying to get through the jumbled-up, broken limbs and tops and stumps.

Meadows are actually small deserts. The reason most of them exist is that the site is too dry to support trees. That's why it's easy to walk across meadows. In contrast, clear-cuts are full of trees, because they are wetter environments. Clear-cuts will, in fact, support a far higher amount of biodiversity, a much wider range of species, than will meadows, which can only support drought-tolerant species such as grasses.

Sometimes our eyes tell us the truth about our values. A young Douglas-fir seedling growing in a logged-over area looks beautiful. It is good, because we want it

to be there. Sometimes our eyes tell us the truth, and sometimes they lie. That's why we can't trust our eyes, our visual aesthetic, to judge the ecological health of the land.

Fifteen years after clear-cutting, even as the trees begin to come up and dominate the land, the land still "thinks" it's a meadow. The sun still reaches the ground, and fosters the growth of beautiful flowers. As those trees continue to grow up and gradually shade the land, as the trees in older forests have done, all of that beautiful biodiversity will perish in the shade. All of those flowers will die. Would it make sense to go out now, quickly, and snip off those trees with a chainsaw to save the flowers from certain death? Well, no, because we want a new forest to grow there. But you go to some places in this world—Sweden, Germany, Scotland, New Zealand, even Canada—where people are campaigning in the name of conservation to prevent the reforestation of land that was cleared for agriculture centuries ago, because they want to maintain the natural character of the landscape as they have known it since they were born. They don't want a dark spruce forest shading out all the wildflowers on the sheep pasture.

It's important for us to differentiate whether or not the way we think the land should look is based on social, cultural, and personal values as opposed to anything to do with biodiversity or science. There'd be nothing wrong with cutting trees down and leaving a piece of land in a meadowlike state. It's perfectly biodiverse and beautiful in its own right. There's also nothing wrong with letting the trees grow back and shade out the flowers, because there are other species that would rather have the trees there. There is no perfect ecosystem for any given piece of land. In fact, there are many different assemblages of biodiversity that are perfectly sustainable on any given piece of land.

SPECIES EXTINCTION

To listen to some groups, particularly my friends in Greenpeace and the World Wildlife Fund, you'd think that species were going extinct by the hundreds every day in the forests of the world. In 1996 in Geneva, the World Wildlife Fund used, as a platform, the first meeting of the Intergovernmental Panel on Forests to make a big press announcement that was carried around the world on AP wire. They said that 50,000 species were now going extinct each year as a result of human activity. Most importantly, they said the main cause of that rate of species extinction is commercial logging. Those are the words they used. Since then, I have challenged them to name a single species that has gone extinct in Canada as a result of forestry activities, where forestry is the main use of the land, and they have not provided me with a single Latin name. They have suggested that the ivory billed woodpecker is a species that went extinct because of forestry in the southeast United States. They haven't been able to name one species for the U.S. Pacific Northwest.

Extensive clearing of land for agriculture in the U.S. Southeast is no doubt the main cause of habitat loss and destruction, and probably the main cause of the ivory billed woodpecker's demise. Forestry may have had a small amount to do with it. But where are the lists of thousands? If 50,000 species a year are going extinct and the main cause is logging, surely we can require that more than one species of bird, which had a questionable relationship with logging, is named.

The spotted owl is one of the species that I do not believe is endangered with extinction because of logging. But in the early 1990s, as you may know, 30,000 people lost their jobs in the US Pacific Northwest as a result of the concern that the northern

spotted owl might go extinct if forestry were allowed to continue in the public forests in this part of the world. Since that time, in a short 5 years, a number of things have been discovered. For example, the reassessment of owls on public forests in Washington state has shown, by actual field observation, that there are more than twice as many of these creatures as were thought possible to exist theoretically. It has also now been shown that the belief that spotted owls can grow only in pristine ancient forests is a myth.

Over 350 recorded spotted owls have been found to live on Simpson Timber's redwood forests in northern California, where no old growth, except a few remnant trees, remains. All of these owls are happily mated and breeding in various ages of second-growth redwood. Even though we've gained knowledge that there are far more owls than we thought there were, and that they can live in landscapes that have a large component of second growth, the policy hasn't changed. The public is still told that the owl is threatened with extinction even though logging has been reduced to less than 20% of what it was in the early 1990s.

A species that is truly endangered, one that we don't hear much about, is the Vancouver Island marmot, endemic to Vancouver Island. Only 220 of these animals exist, and only 20 of these are breeding females. This animal is so close to extinction that six of them have been taken out of the wild for a captive breeding program. That way, if the marmot does go extinct, we will be able to do re-introductions. You don't hear people campaigning in huge fund-raising efforts to save this species from extinction, yet the spotted owl is on the front page of every newspaper in the nation.

There is a simple reason why forestry generally does not cause extinction. We tend to think that forests need our help to grow back after logging. Of course, they don't. Forests have been recovering from destruction far worse than logging ever since forests began. Ten thousand years ago, 30 percent of the existing forests in the world didn't exist—Russia, 20 percent; Canada, 10 percent. All were covered by a sheet of ice right down to mineral and bedrock, with nothing living there. Yet, when the ice retreated, the forest grew back. The same occurs after fires, volcanoes, floods, landslides, and so forth.

If forests were not capable of recovering from total destruction, they wouldn't have been there in the first place. The corollary to this statement is that every single species in the forest must be capable of recolonizing areas of land that have been devoid of forest as the forest renews itself—or they wouldn't have been there in the first place either.

Forest renewal is the sum total of each of the individual species reoccupying that piece of land, as the land becomes suitable for each of them, in turn. It takes a while for cavity-nesting birds to be able to breed in a new forest, but most of them can feed there very quickly, as berries grow back in the sunshine. This is really why forestry doesn't generally cause the extinction of species. As long as we let the forests grow back, the species will come back into and recolonize those areas.

FIRE

Fire has been the major agent of forest destruction—or disturbance, as ecologists like to call it—since forests began. That's OK, we're told, because fire is natural; it does not destroy the forest ecosystem. Logging is unnatural. Nature never comes in with logging trucks to take the trees away.

But nature does come in and take the trees away. The black smoke that blows downwind when fire goes through a forest is the carbon that came out of the trees. All the ash that remains on the forest floor, and washes into the streams with the first rainfall, contains the minerals that were in the trees. Every day, as litter on the forest floor decomposes, the silt washes into creeks and rivers, and goes downstream to form fertile deltas where we grow most of our good food. Those deltas are made out of the bodies of the trees that were living farther upstream and farther up the hillside. Nature does take the trees away. Every day. And sometimes in a cataclysmic fashion, as with fire. Just not with logging trucks.

If you think fire doesn't destroy the ecosystem, count the species after a hot forest fire. Not only are all living things above the ground killed but, in very hot fires, the soil is sterilized right down to bedrock or mineral. The seeds are killed, too. So, basically we're left with a sterilized landscape, something that forestry rarely, if ever, accomplishes.

A good example of this can be found in the Grand Prismatic Basin in Yellowstone National Park, where fire burned a million acres and resulted in the biggest effort—U.S.$125 million—to put out a forest fire in the world's history. Seven years after that fire, there are no young pine trees growing up under the dead ones, because the soil was damaged so badly.

There are some green plants growing there, but not from seeds that were in the soil after the fire—rather from seeds that have blown in subsequently on the wind. Seeds of species such as cottonwood, dandelion, and fireweed, i.e., seeds that will travel for 100 miles on light air, will settle out on a place like this, germinate, and begin the process of healing the soil and getting some carbon and organic matter back into it again. But it will be a long time before pine trees grow there again, because there are no seeds around, and pine seeds don't travel 100 miles on a light wind. Yet, they may come back quicker than we think. It was Thoreau, in fact, who figured out over 100 years ago, being about 100 years ahead of his time in understanding forest ecological succession, that pine trees hold onto many of their seeds right into the dead of winter, and don't let them go until February. What kind of crazy tree would drop its seeds onto the snow? A tree that "knows" that those seeds will blow across the slick surface of the snow for miles, across frozen lakes and frozen rivers, and disseminate far wider than they ever could if they simply fell on the ground and got stuck there.

Close by, a healthy new pine forest is coming up quickly. Here the soil is wet, because it's a seepage site, and, even though everything aboveground was burned to death, the seeds survived the fires. Up comes a new forest, thicker than the hair on a dog's back.

Fire can be extremely destructive, and result in a tremendous set-back in ecological succession. Fire can also be less destructive, and result in a rapid renewal of the forest. And, of course, on many occasions, fire just burns the lower vegetation and doesn't even kill the trees.

Logging is no different in that sense. If we do forestry in a way that damages the soil severely and causes erosion and the like, we will cause a set-back in ecological succession similar to that caused by fire. But, if we do forestry properly, we may have rapid recovery of the forest, and no set-back in the productivity of the site.

INSECTS

In British Columbia insects are the next major cause of forest death after fire. The bark beetle is one insect that is completely uncontrollable, and sometimes, in the period of a few years, will kill thousands of hectares of trees over broad areas of the landscape. We have a choice when this happens. We can do what they did in northern Idaho, where there was a campaign against salvaging timber, and just let the dead trees dry out in the sun. Soon lightning will strike, and the whole thing will go up in a conflagration, damaging soils, killing millions of creatures, and usually taking out adjacent areas of healthy forest. At the end of that process, we have a damaged ecosystem and no money.

We take a different approach in British Columbia. We do what's called "chasing beetles." As a forest is infested with beetles, we quickly change our forest plans. Quite often we can refocus within a period of weeks or months, and start cutting the trees as they die. That way we get some jobs. And we produce some wood. And we get some chips for pulp. And we make some money. We use some of that money to reforest the area cut—quickly. The soil has not been damaged. Not as many creatures have lost their lives. And the surrounding forest is intact. This approach makes more sense to me.

The Sierra Club has a picture of a particular clear-cut in the Matthew River Valley on the western slopes of the Caribou Mountains in British Columbia in the book, *Clearcut: The Tragedy of Industrial Forestry*. The area was logged after beetles killed the trees. The caption for the picture talks about the greed of the multinational forest corporations and the destruction of the temperate forests of North America. The Sierra Club conveniently forgot to mention the beetle.

Beetles refuse to recognize the maximum clear-cut size of 60 hectares in B.C.'s Forest Practices Code. And so we do sometimes end up with rather large openings as a result. It doesn't make much sense to us to leave big strips of dead trees in the middle. But it's not fair to characterize this as forest policy in British Columbia unless the beetle is mentioned. The beetle is the reason we do this, not because we favor 2,000-hectare clear-cuts.

VOLCANOES

Of course, one of the best places to go to see the effects of nature, and the destruction of the forest by nature, is Mount St. Helens in Washington State. When Mount St. Helens blew up in 1980, the mountain took out 150,000 acres of adjacent forest to the north of the cone. Interestingly, that forest was in two main jurisdictions: federal forest, part of the Gifford Pinchot National Forest controlled from Washington, DC, and private forest, owned by Weyerhaeuser. The U.S. government redesignated their part the Mount St. Helens National Volcanic Monument, where "nature would be permitted to recover, uninhibited by human beings, for the study of science." Sixteen years after the volcano erupted, nature, recovering uninhibited by human beings, still looks pretty much like a wasteland. Dead trees lie where they were blown over or had their tops ripped off by the blast, and there is a 1–2-foot thick layer of volcanic ash, which makes a very sterile seed bed. Only a bit of slide alder, which is a nitrogen-fixing plant, has been able to come in and establish itself in those number of years.

Weyerhaeuser took a completely different approach. First, they salvaged all the dead timber. Sites on Weyerhaeuser land originally looked just like those on federal

land. Eighty-five thousand three-bedroom homes worth of timber was taken off during two hot summers of intensive salvage operations. They had to invent a carbide-tipped chainsaw, because the ash was so abrasive to normal chains they couldn't use them. They had to put a breathing apparatus on all their workers, because of the dust. But they did it.

Almost inadvertently, bringing in the heavy equipment and dragging around the old-growth timber, they disturbed the site so dramatically that it stirred the underlying organic soil to the surface. This classic case of site disturbance, or "site preparation," as it's called when it's done on purpose, created a more fertile and productive area than would have been there with no disturbance. Of course, every farmer knows that plowing the field makes the crops grow better.

Then Weyerhaeuser planted 2-year-old Douglas-fir and noble fir, nice big seedlings, which were able to get their roots established before they died of drought or starvation. In 2024, there'll be a crop of timber off this land, while the national volcanic monument will still be barely recovering.

I'm not making a value judgment about which approach is good or bad. It's interesting to see how nature works, too. But isn't this dramatic evidence that a couple of interventions by human beings can make a really big difference in the way in which an ecosystem recovers after a natural disaster?

NATIVE TREE SPECIES

With all the talk about monoculture pulp plantations and fiber farms, we might easily forget that people in many countries don't even use native tree species for commercial forestry. The classic case is New Zealand, where almost 100 percent of the forestry is done with exotics, mostly radiata pine from California. What's the matter with the kiwis? Don't they like their own trees?

They do, actually, like their own trees. Their own trees have very good wood qualities. Unfortunately, not a single species of native New Zealand tree grows fast enough to be useful for commercial purposes. They can't wait 150 years for an 8-inch sawlog. That's why 80 percent of New Zealand was deforested before they started their exotic reforestation program. When they cleared forests in New Zealand, it wasn't worthwhile to put new trees on that site, if they were native species. New Zealanders turned these sites into sheep farms, instead. Now they are reforesting 100,000 hectares a year with exotic species, and creating the underpinnings of the economic turnaround in New Zealand. Those new forests aren't very similar to the native forests that once grew there.

In Scotland, people use larch from China, Douglas-fir from Oregon, and spruce from the Queen Charlotte Islands for most of their reforestation. In Sweden, they are using lodgepole pine from British Columbia. They like it a lot. It grows faster than the native Scots pine. And straighter, too. In Brazil, they use Eucalyptus from Australia for most of their pulp and paper plantations.

Now I'm not against those things. But surely we should examine, in perspective, what we're doing here, where we do use native tree species, and where more and more we use seed from the same place and try to create the same types of mixtures that were present in the original forests. The point is, managed forests in North America are more similar to the original forests than are those in nearly any other place in the world.

DEFORESTATION

My core message is about deforestation. Deforestation is described by the United Nations as "the permanent removal of the forest and the conversion of the land to another use, such as agriculture or human settlement." But, combined with the aesthetic problem, people are easily convinced that a recent clear-cut is a scene of deforestation. For some reason, our eyes don't like jumbled up, unorganized bits of woody debris lying about on the land. Of course, when the new forest grows back up above the jumble of wood, and provides a constancy of green across the land, it'll look fine to us. But, for now, we're easily convinced that an ugly clear-cut is deforestation.

Most people find farm fields quite pleasant—pastoral and lovely. Yet farm fields are a scene of deforestation. All that land was in native forest before the farms came in. If people were to stop plowing those fields for 5 years, seeds from the surrounding trees would blanket the area with new tree seedlings. Eighty years later we'd never know that a farm had been there.

Deforestation is not an event that just happens, and then is over. Deforestation is an on-going process of interfering with forest recovery, and preventing the forest from coming back. The commonest form of that interference is what we call "agriculture." That's why deforestation is seldom caused by evil corporate overlords in multinational forestry headquarters. Deforestation is nearly always caused by friendly farmers growing our food, and by nice carpenters building our cities and towns.

Remember when McDonald's promised they would never buy another tropical cow because of fears of deforestation in Central and South America? I'm sure the North American cattle industry thought that was a good idea. Do we have a higher caliber of deforestation up here than they do down there? Of course, we don't. A temperate rainforest turned into a cattle farm has lost its native biodiversity in a way no different than that in which a forest in Costa Rica or Brazil loses its biodiversity when it is converted to a cattle ranch. Those who don't eat meat have to have vegetables, and will cause the creation of monoculture cabbage plantations throughout the land. They look nicer than clear-cuts. They're quite pretty, in fact. But where is the biodiversity? All in the surrounding forests.

I'm not against farming, of course. I know that we have to clear part of the forest away in order to grow our food and house our population. But wouldn't it be a good idea if the first principle of biodiversity conservation were to minimize the amount of forest cleared for farms and towns, thus maximizing the amount of land that remains in forest, whether for timber production or protection? We don't do this. Instead, we sprawl our cities and towns across the land, as if it were endless. We usually cover up the best soils in the process, thus making it necessary to go deeper into the native forest to clear it in order to grow our food. We don't do what we should be doing to protect biodiversity. It has nothing to do with ending logging. It has everything to do with retaining forest cover.

Bales of hay are pleasant looking in the late afternoon light, but what are they really? Large lumps of dead cellulose, lying on a deforested piece of land. The native biodiversity will be found in a nondescript scrub hardwood in the background vegetation. Monoculture is often pretty; biodiversity is often nondescript.

A Zinnia plantation in Australia is gorgeous. Beautiful. Colorful. Yet it's also a monoculture, requiring pesticides every day. A nearby gray-green Eucalyptus forest has

over 20 species of Eucalyptus and other hardwoods, and hundreds of species of shrubs and herbs and insects and birds. The monoculture is gorgeous; the biodiversity is gray-green and bland.

LAND USE AND BIODIVERSITY

The automobile is arguably the most destructive technology ever invented by the human species, in terms of its impact on biodiversity. This is especially true when we consider the side effects, such as the black stuff they roll around on asphalt. Why is it legal to take the toxic waste out of oil refineries, mix it with gravel, and spread it all over the surface of the Earth so that cars and trucks can roam about freely? Think about it.

We put crude oil in an oil refinery. We take the propane off the top to run the taxi fleets, gasoline off next to run the cars, diesel from a little lower to run the trucks and trains, and bunker sea crude from near the bottom to run the big ships across the sea. Remaining on the very bottom is a black gooey crud—that's what we make asphalt from. If this material were taken to a government-approved landfill, it would be turned away at the gate. It's hazardous, toxic, and, in fact, carcinogenic. It's illegal to bury it, yet perfectly OK to spread it in a thin layer over the surface of the planet, killing everything in its path in the process. There's no EPA guideline for going out to stop trucks from dumping this material all over the surface of the Earth. If it were taken into a lab and tested, the rats would all die from a small dose of it. Funny double standard we have. It's very cozy for the oil industry, because the more asphalt we lay down, the more gas and diesel we need for more cars and trucks, and the more cars and trucks we have, the more pavement we need. It's a cyclical process, but not quite the same as forest ecological succession.

Think of biodiversity on a scale of zero to 100. You'd have to agree with me that asphalt is close to zero. Modern agriculture is maybe 5, 10, we'd be pushing it at 20, in terms of the number of species that were on that landscape before the original forest was taken down. Forestry, the way it's practiced in the Pacific Northwest in particular, is 96, 98, 100—102, if we increase landscape biodiversity through planning. All this argument and political heat over 2 percent, as far as I can see. It's time we took a broader view of land use and the impact of civilization on biodiversity. We've got to take more into account than a snapshot of a clear-cut 5 minutes after the trees are cut down, when in fact that area is going to grow back into a forest again. It's very unlikely that the asphalt parking lot will grow back; it's probably going to stay like that for a long, long time. That's why I'm glad I'm in wood, rather than in oil.

People are often surprised to learn that wood is, in fact, the most renewable of all the materials we use in human civilization. Why is it so renewable? First, and most people also find this hard to believe, wood is 99 percent air and water. Fifty percent from CO_2 in the air, 49 percent H_2O that falls as rain, and only 1 percent mineral that comes from the Earth's crust, which is very thick and not likely to wear out anytime soon.

And then there's sunlight. Apparently we have 5 billion years of that left over. That's why wood is so renewable, and why, when we remove a tree from a forest, we're not removing very much of the soil or the nutrient content. Only 1 percent of the tree is composed of those things. Mostly what we're taking away is air and water.

WOOD AND PAPER

I carry a little wedge of wood around with me to illustrate that every day, every person in the world uses this much wood—1.6 kilograms. All six billion of us. Six billion times 1.6 kilograms are taken every day from the world's forests. Think of this in terms of how much food we eat, and it's clear that we use far more wood than any other single type of crop or organic material. Just because we don't get hungry for wood every 3–4 hours doesn't mean that it isn't absolutely necessary for our daily existence. In fact, I think it's easier to go a day without food than it is to go a day without wood.

Nonetheless, it's a lot of wood. In North America we use four times that much every day per person. A family of four in the United States uses 40 pounds of wood every day, 365 days a year. So, you might say, there's the answer: use less wood. And this is where the thrust of the environmental movement comes in.

The Rainforest Action Network has a wood use reduction program to reduce the use of wood in the United States 75 percent by the year 2010. Sounds good. Use less wood, save more forests. Wouldn't that be wonderful? Unfortunately, it sounds good and it sounds logical, when in fact it is not. People are generally surprised to learn that over half of the wood used in the world is not for building things, but for energy—for cooking and heating, mostly in tropical, developing countries. Unfortunately, unregulated fuelwood gathering is a major cause of deforestation in the Tropics. If we were to take wood away from these people, they would die by the hundreds of millions. They depend on wood for their survival. People in these countries make less than $500 per capita per year, and cannot afford to buy energy substitutes. What are the substitutes? They are fossil fuels, so maybe it wouldn't be such a good idea, even if they could afford them. Switching from wood to fossil fuels would only exacerbate greenhouse gas emissions, and increase the amount of CO_2 in the atmosphere.

Thirty-five percent of all the wood used in industrial countries is for construction, solid wood of one sort or another. All the substitutes, and they are steel, cement, plastic, and brick, require a lot more energy to produce. "A lot more energy to produce" translates, almost invariably, into increased greenhouse gas emissions. Industrial countries have had an almost impossible time as it is in stabilizing greenhouse gas emissions. If we were to start fooling around with the 85 percent of the wood we use every year for fuelwood and solid wood construction, we're only going to make that problem worse.

Only 15 percent of wood use in the world is for pulp and paper. According to Greenpeace, when people blow their noses in England, they're blowing away the ancient rainforests of the Pacific Northwest. The Rainforest Action Network's goal of reducing wood use is to save the forests and save the planet. Most of the pulp and paper in the world is made from sawmill residues and from pulp plantations, most of which are established on land that was already cleared. A component of pulp and paper is made from native forests. There's no doubt of that. In northern Canada, for example, in the boreal forests, we're now basing large pulp mills on aspen in native forests. But most of it comes from these other sources.

If we don't make paper out of wood, what are we going to make it out of? There's a major movement, led by David Brower and others in the environmental movement, to substitute fibers other than wood for paper. "Tree-free paper" it's called, or "wood-free pulp." Again, this sounds like a great idea. If we use an alternative fiber,

such as hemp or kanaf, we won't have to cut the trees. One small problem: where are we going to grow the hemp and kanaf? We can't grow it on Mars. It has to be grown on the Earth. In particular, it has to be grown where we could be growing trees. Those crops won't grow in places where we can't grow some kind of woody vegetation, especially in this part of the world.

Why would an organization whose main purpose in life is stated as "the protection of biodiversity" advocate massive monoculture plantations of exotic annual farm crops such as hemp to produce paper when we could be growing trees? Everybody knows that birds and squirrels prefer trees to hemp farms. There is no sense to it at all.

The position against using wood to make pulp and paper runs logically inconsistent and contrary to the position of protecting biodiversity. A couple of quotes from David Brower will indicate that this, in fact, is the thrust of the movement's position. First he says, "Now I'm not saying that we should never cut trees; I'm saying that we have probably overdone it. It's about time we did something else." I think he's saying that we should cut fewer trees. The next quote is, "I have nothing against greater forest growth; I have something against planting trees. Growing forests is quite different from planting trees."

I believe that the environmental movement's position on forestry is in fact anti-environmental in the sense that it runs counter to policies that would promote the protection of biodiversity and reduce the amount of greenhouse gas emissions. We cannot pretend that there are not six billion people waking up in the world every day with real needs for material, energy, and food. Those needs have to be satisfied somehow. In my estimation, the best way to satisfy them is not to reduce wood use and the cutting of trees, but to plant more trees, reverse deforestation, and help developing countries create sustainable fuelwood plantations close to the towns so that women don't have to walk 5 miles every day to collect enough twigs to cook food at night. Essentially, the best way is to increase the world's forest estate, to take some of the land that's been converted to agriculture and put it back into forest again. Densify the urban environment. Intensify food production. Make more land available for trees.

CLOSING

We're very fortunate in British Columbia, as you are here in the Midwest, to have wild native forests growing right by our cities. They are not botanical gardens, which somebody visits with clippers and prunes the shrubs every year. They are native forests of Douglas-fir, cedar, hemlock, birch, alder, maple, cherry, and so forth—all growing beautifully wild as ever. Nobody is interfering. People who come to Pacific Spirit Park, 800 hectares or 2,000 acres of beautiful wild forest right in the heart of Vancouver, would never suspect that in 1914 that very area was clear-cut to feed the sawmills that helped build the city of Vancouver. The men who cut the forest with double-bitted axes and crosscut saws didn't know the words "biodiversity" or "ecology" any more than my Granddad did. They did this and moved on. There was absolutely no reforestation afterwards. All the forest has returned—some in hardwood, some in softwood. All the beauty has come back to the area, as has the spirit and the fertility of the land. All the biodiversity, all the little things—the bugs, the fungi, the liverworts, mosses, and ferns. The only things missing are the large four-legged mammals, like bear, deer, cougar, and wolf. They've been replaced by the two-legged variety of mammals who

come for a stroll by the thousands on a sunny Sunday afternoon. This is an urban park. If Pacific Spirit Park were located farther out in the woods, though, it would provide perfectly good habitat for all those large mammals as well. It is what could be called "a forest reborn," reborn from what today is routinely described as "the total and irreversible destruction of the ecosystem." Because it is a park now, in 100 years from now, our great grandchildren will see an old-growth forest there again.

I believe that, given the tremendous increase in knowledge of biodiversity, conservation biology, forest science, protected areas, soils, and nutrition, we can continue to use our forests as a major source of wood and income base for families and communities, and at the same time make sure that those forests provide a home for all of the many species that require them for their survival. Its time that politicians, environmentalists, teachers, and the general public got that balance right, because we must get it right if we are to achieve sustainability in the 21st century.

May the Forest be with you!

ABOUT THE AUTHOR

Patrick Moore holds a B.Sc. in Forest Biology (Honors) and a Ph.D. in Ecology, both from the University of British Columbia

Dr. Moore has been a leader in the international environmental field for over 25 years. From 1971–1973 he served as Director of the Western Canada Chapter of the Sierra Club. He is a founding member of Greenpeace and served for 9 years as President of Greenpeace Canada and 7 years as Director of Greenpeace International.

In 1990, Dr. Moore founded and chaired the BC Carbon Project, a multi-stakeholder group that worked to develop a common understanding of climate change. He was a member of the BC government-appointed Round Table on the Environment and Economy from 1990–1994. As Chair of the Forest Practices Committee of the Forest Alliance of British Columbia, he led the process of developing "Principles of Sustainable Forestry" which have been adopted by a majority of the industry.

His book, *Pacific Spirit-The Forest Reborn*, was published in 1991 and has sold over 10,000 copies. As Director and Vice-President, Environment and Government Affairs for Waterfurnace International from 1995–1998, he worked to build awareness of the benefits of renewable earth energy technology (geothermal heat pumps).

In 1991 Dr. Moore founded Greenspirit, a consulting firm that focuses on environmental policy and public involvement in the resource and energy sectors. Since then, Dr. Moore has focused on British Columbia and sustainability and consensus building among competing concerns. He is a practiced facilitator of community round tables, in which he takes a consensus-building approach to resolving conflicts involving environmental, social, and economic issues.

Further information on Greenspirit and Dr. Moore can be found at his web site: *http://www.greenspirit.com/*

Dr. Moore's visit to Wisconsin was arranged through the Global Speakers Agency, Vancouver, British Columbia