

In Nova Scotia we have

- doubled the timber cut in 20 years
- doubled the area clearcut in 10 years
- used clearcutting 99% of the time
- lost almost all our old forests
- lost 24% of forest jobs in relation to volume
- lost much of our forest value

There is a better way ... read on

Forest Accounts

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Reporting on the state of Nova Scotia's forests

Counting the true value of our forests

Right up to the eve of the Atlantic groundfish collapse, the fishing industry appeared to be booming. We were fooled into thinking the fishery was healthy because we mistakenly rely on economic growth measures like the Gross Domestic Product (GDP) to tell us how well off we are.

GDP measures the total quantity of all goods and services produced, and the total money earned and spent. But GDP gives no value to natural resources, unless they are harvested and sold. So long as people spend money, the economy grows. So car accidents, crime, pollution, disasters, and even cancer can be 'good' for the economy, because money is spent. Under a sane accounting system, in which environmental and social well-being are taken into account, these things would register as costs.

And while we mistakenly count a lot of costs as if they were contributions to prosperity and wellbeing, we ignore genuine contributions to wellbeing, like volunteer work, simply because no money is exchanged. The GDP can grow while most people are getting poorer, and while the gap between rich and poor continues to grow.

The GDP counts fish exports and timber sales as growth but it completely ignores the depletion of our fisheries and forests – the natural wealth or 'capital' on which these industries depend. Forests are valued only when they are cut for timber. Economic growth statistics tell us nothing about the value of what's left in the forest. The more trees we cut down and the faster we cut them, the more the economy will grow. This is like a factory owner selling off his machinery, or 'capital', and counting it as profit. We clearly need a better way to value our natural wealth.

So GPI Atlantic, a non-profit research group, is constructing a new measure of wellbeing for Nova Scotia – the **Genuine Progress Index** – to give us a more accurate and realistic picture of how we are really doing as a society. In the Genuine Progress Index, our natural resources are seen as natural wealth. If we use them carefully, we can leave them in good condition for the

benefit of our children and future generations. If, on the other hand, we degrade and deplete our forests, fisheries, soils and other resources, we are creating a massive debt that our children will inherit.

Here in Nova Scotia, the forests have not been used with care. Over the last four centuries, clearcutting, high grading, burning, and clearing have exhausted our forests. We're left with fewer high quality trees for lumber, many younger trees, and fewer long-lived trees, such as sugar maple, hemlock and oak.

And the situation isn't improving. We're cutting twice the volume of trees as we did 20 years ago. In the last decade alone, we've doubled the acreage of our yearly clearcuts. In 1997, for instance, 99% of all wood cut was clearcut. We also have a much younger forest today than we did 40 years ago, with the near disappearance of old growth forests (see page two).

The loss of old forests and valuable species and the degradation of natural ecosystems are invisible in our current economic accounting system. But they represent a decline in natural wealth, and an economic cost that will continue to affect us and our children. Our forests can no longer perform their vital functions as effectively as they once could, like protecting soils, watersheds, and biodiversity; regulating the climate; storing carbon; and providing habitat for wildlife and recreation for visitors. Even the timber they yield isn't as valuable as it could be if we still had older forests with more valuable species.

Our timber industry isn't providing as many jobs as it could. Since the 1980s we've seen a 24% decline in employment per 1000 cubic metres of wood harvested, and we keep cutting more and more wood to maintain each forest industry job. If we were to manage our forests sustainably, using selection harvest methods instead of clearcutting, we could double the employment on half the harvest.

If we use the Genuine Progress Index to value our forests, we'll get a much more accurate picture of the condition of our natural forest wealth. We can then create the incentives needed to restore the value of our forests. Healthy forests that provide high quality timber, habitat, recreation, and valuable ecosystem services, are the legacy we owe to future generations of Nova Scotians.



A spectacular stand of pine and spruce in the threatened Ship Harbour Long Lake area on the Eastern Shore

What's a natural forest worth?

"Economic estimates ignore the fact that many ecosystem services are literally irreplaceable."

– Costanza et al. 1997

How do you put a price tag on clean air and water, biodiversity, and healthy forests? We often call these things 'priceless'. But when a forest or other ecosystem is degraded and no longer able to provide essential goods and services our economy should count that loss as a cost, not a gain.

Our natural wealth performs a wide range of ecological, social and economic functions, providing people and the economy with both direct and indirect services. In other words, forests supply goods and services 'for free'. Soil formation, habitat conservation, watershed protection, flood control, natural pest control, climate regulation, and carbon storage are just a few examples of what forests do. They also provide us with wood, wild foods, pharmaceuticals, and a place to relax and rest our minds.

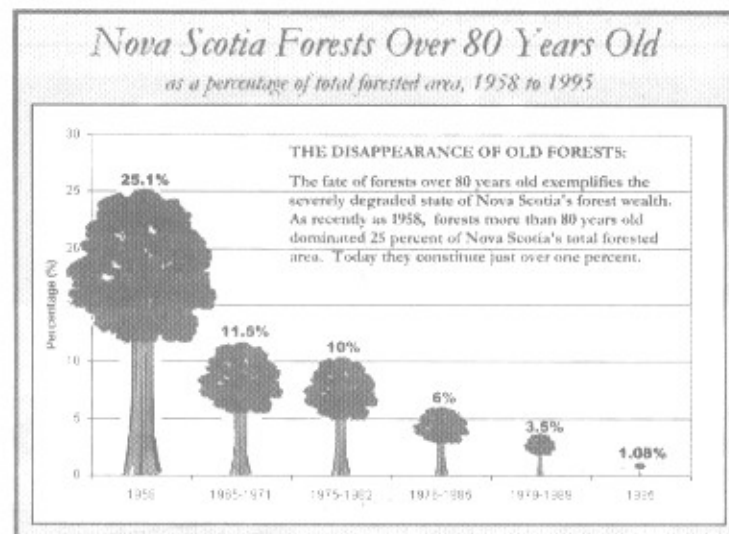
In 1997, an international team of scientists headed by Robert Costanza of the Maryland Institute of Ecological Economics conservatively estimated the average annual value of all ecosystem services to be US\$33 trillion – almost twice the total annual GDP for all the countries on Earth.

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Where have all our old forests gone?

In a single generation, Nova Scotians have witnessed – many unknowingly – the loss of almost all remaining old forests in the province.



Over the past four centuries, most of Nova Scotia's forests have been logged, cleared for farming, or burned. Massive white pines – as tall as fifteen-storey apartment buildings – were the first to go, claimed by the British Royal Navy for masts. From the 1700s on, sawmills flourished and Nova Scotia exported lumber, squared timber, shingles, barrel parts, and ships.

In 1958, a province-wide inventory revealed the forests were in bad shape. The report, by the Department of Lands and Forests, showed that Nova Scotia had lost most of its original woodlands, much of which was replaced with non-commercial and low-value tree species. It also noted that forests were suffering greater insect damages due to losses in tree diversity.

Since that time, the province's forests have continued to change dramatically. In the last 40

years alone, the province has lost almost all of its remaining old forests.

For example, in 1958, nearly 60% of the province's forests were more than 60 years old. Today, that number is less than 12%. Forests 81 to 100 years old have dropped even further, from about 16% of total area 40 years ago, to just under one per cent by the mid-nineties. Century-old forests fared the worst, dropping 50-fold, from eight per cent in 1958 to less than 0.15% today.

The original Acadian forests of Nova Scotia were dominated by long-lived hardwoods and softwoods, such as beech, hemlock, yellow birch, sugar maple, red oak, red spruce, and white pine. Most of these species have dwindled since European settlement.

Today, low-value, short-lived hardwood and softwood stands dominate our forests. Premium-priced, large dimension clear wood that comes only from old forests has nearly disappeared.

Old forests are not just trees

From protecting against drought and flood to creating the air we breathe, old forests are crucial to most living things.

Hundreds of animals and plants, from orchids and lichens, to insects, salamanders, birds and mammals, depend on large trees and old forests to live. Consider, for instance, the Northern goshawk, a large hawk that nests almost exclusively in dense old-growth hardwoods. There are also many species that regularly use large dying and dead trees, standing and lying on the ground, for all or part of their existence. Some species, such as the now-rare marten – a relative of the weasel – depend on old coniferous forests, especially large dead fallen wood, for raising their young and hunting. Bears also need large dead trees for hibernating. Other animals, such as the barred owl, nest in large holes, or 'cavities', in large standing trees.

Old forests are made up of long-lived tree species, like sugar maple, yellow birch, American beech, white pine, red spruce, and eastern hemlock that can survive well in shaded conditions. Many can live for well over 300 years. Hemlock can be strong and healthy well past 400 years.

While large ancient trees are a major component of old forests, old forests also include a variety of trees of

different sizes and ages. When old trees die and fall over, gaps created in the forest canopy allow sunlight to stream through to the forest floor, allowing the regeneration of tree seedlings that have been struggling in the shade. This 'gap' formation is the major type of regeneration in the old forests of Nova Scotia. With continual additions of young trees in gaps, old forests can live indefinitely.

But old forests are not just trees. They include all the life below ground, such as root systems, worms, mites and moles, as well as all the life above ground, such as other plants, mosses, lichens, and all the animals that depend on the living and dead trees for food, cover, nesting, raising young and hibernating. All of these natural processes contribute to a healthy diverse forest that supports many different habitats for plants and animals.

In addition to providing wildlife habitat, well-developed older forests reduce the impacts of storms, floods, drought, and insect attacks. Trees provide shade, maintaining cooler water temperatures, while forest soils store water, reducing the effects of drought. Tree roots and fallen tree trunks stabilize stream banks by slowing down runoff, and forest canopies intercept rainfall, preventing soil erosion and nutrient losses.



An Old Growth forest in the Tobatic

The natural structural diversity of a forest with trees of many types and ages also greatly reduces the incidence of insect infestation and disease, which can devastate a plantation of only one type of seedling. Old forests also store more carbon than young forests, regulate the climate, and provide other vital life-supporting ecosystem services.

From Microbes to Moose: We aren't the only species that need forests

Biodiversity is a term used to describe all species, from a tiny spider mite, to a hummingbird, to an orchid growing under a tree. Old growth forests, rich in biodiversity, are home to many different species with specialized needs. Young, softwood plantations are low in biodiversity – they are simple places with only a few tree species.

Nova Scotia has already lost much of its original biodiversity. Since European colonization, almost every stand of old-growth forest in the province has been cut and/or burned. As a result, the habitat of plants and animals that depend on old-growth forests, including large standing or fallen dead trees has almost disappeared, causing declines in many species.

The sidebar (at right) lists Nova Scotia species that are dependent upon or partial to older and old growth forests. While these species still exist in Nova Scotia, many are much less abundant in today's fragmented, young forests, and appear to be in serious

decline across much of their range.

We have degraded our remaining forests by cutting them up into little 'islands,' or 'fragments' of forest surrounded by roads, clearcuts, power corridors, fields, and houses. The abrupt transition from forest to open areas is called the 'forest edge,' and is prime habitat for raccoons, deer, blue jays, and crows. While some critters may do well along edges, many do not. For example, many edge-loving species prey upon small birds within the forest, stealing their eggs and eating their young.

Other critters are shy by nature, and prefer to stay within the forest. However, as patches of forest get smaller and smaller, there are fewer and fewer places for these animals to go. As these patches get further apart, remaining populations are isolated from one another, and the risks associated with migrating from one patch to another increase enormously. This isolation may also cause inbreeding, and will increase the

chances that remaining populations are wiped out by major disasters, such as fires and hurricanes.

In Nova Scotia, many forest species are vulnerable to 'edge effects' and fragmentation

of forests, including some well-known animals like moose and flying squirrels. At current harvesting rates, almost all forests outside protected areas will be degraded in this manner.

OLD FOREST – dependent species



Mammals: Northern Flying Squirrel, Marten, Fisher, Moose (at left)

Amphibians: Yellow-spotted and Red-backed Salamanders, Spring Peepers and Wood Frogs

Birds: Goshawks, Barred Owls (at right), Swainson's Thrush and Gray-cheeked Thrush;

Warblers: Northern Parula, Blackburnian, Bay-breasted, Black-throated Green, Black-throated Blue, and Black and white; Pileated and Black-backed Woodpeckers, Ovenbirds, White-breasted Nuthatch, Scarlet Tanager, Brown Creeper, Red-eyed and Solitary Vireo

Plants: Indian Pipe, Dalibarda, False Solomon's Seal, Common Speedwell, Rare epiphytic calicoid Lichens



Mechanization: does it really pay?

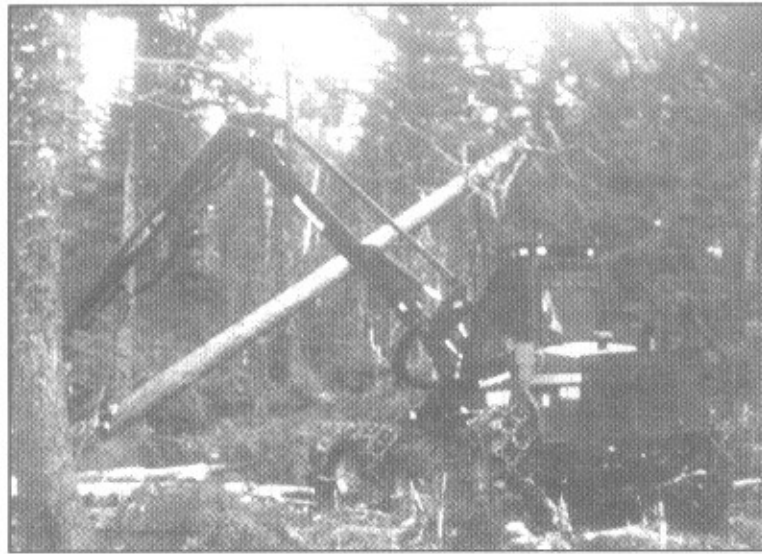
The forest industry has come a long way from the two-man cross-cut saw and oxen of the 1870s. Today, one feller buncher can do the job of nearly a dozen men, cutting more wood and bringing in more profits in a shorter period of time.

In Nova Scotia, the volume of timber cut per employee has doubled since the early 1980s. This may be desirable for a lumber company whose eye is on short-term profit margins. But from the viewpoint of a resource-dependent community, this is not an improvement, especially if it fails to translate into more jobs, depletes the resource on which those jobs depend, and undermines prospects for future generations.

Nowadays, anyone would think twice about becoming a logger. For most contractors it means being over a million and a half dollars in debt and working 80-100 hour weeks, stopping only for breakdowns. Pressure to pay for expensive machines means cutting night and day, and after all the bills are paid, one is lucky to earn a modest living.

As fewer people cut more trees, the remaining operators are incurring higher debt loads. In

addition to machinery costs, there are operating costs such as fuel, commuting costs and the ongoing maintenance and repair of machinery. In fuel expenses alone, it could cost about \$2,700/week to run a harvester and a forwarder for a typical 100-hour week. Maintenance of the tractor-trailer could cost at least \$10,000/year. Buying this equipment is not like buying



Single-grip harvester "processing a tree"

a house, because in no time at all, the resale value plummets – tractors, for example, are only worth about 10% of their original value after 10 years.

In addition to the financial burden of mechanization there are hidden costs to chronic indebtedness and extremely long work hours experienced by many logging contractors today. These conditions affect their quality of life, stress levels, and, ultimately, their health.

In other words, the economics of large-scale, industrial forestry creates its own pressures both on the resource and on those who try to make a living from it. But there is another way.

In Wisconsin, for instance, the Menominee Tribe's 89,000 hectare forest has been logged for 147 years and there is more wood there today than there was when the reservation was first established in 1854. Their motto? Cut what the forest provides and never modify a cut for the market. In other words, even when wood prices are high, ignore the temptation to cut more. Fifty per cent of the harvesting that takes place in the Menominee forest uses the selection method, where only single trees or small patches of trees are cut using chainsaws. Trees greater than 18 inches in diameter are the norm – a size many machines cannot handle.

JOBS PLUS... or minus?

Twenty-two thousand. That's the official number of jobs in the forest sector today in Nova Scotia.

But where did that number come from? In 2000, the Atlantic Provinces Economic Council (APEC) penned a report, funded by the Nova Scotia Forest Products Association, estimating that the forest sector provided 13,000 direct and 9,000 'spin-off' jobs in 1998 – for a grand total of 22,000 jobs.

However, their math was off, and 3,363 of those indirect jobs had been counted twice. The 9,000 figure for indirect jobs should be closer to 5,600. APEC has confirmed its error but the inflated figure of 22,000 continues to be mistakenly used by the forest industry, politicians and the media.

Assessing overall employment numbers for the forest sector is no easy task. Figures vary substantially depending on the source and on what is included in the category of 'forest sector'. Estimates of direct forest sector employment range from about 6,000 to 13,000.

Employment by itself, however, is not a good indicator of sustainability. Instead of asking how many people are employed in the forest sector, we should be asking, "How many jobs are generated per volume of wood harvested?"

From this vantage point, no matter which provincial employment figure we decide to use, the ratio of jobs per unit of wood harvested in Nova Scotia has declined by about 24%. Over the last two decades alone, volumes of wood harvested have doubled.

This has not translated into more jobs.

Why is this? One reason is growing mechanization in both harvesting and mills. Another reason is that Nova Scotia does not strive for high quality wood. In fact, the opposite is happening, and we have seen the near-complete loss of older forests in Nova Scotia, along with a decline in valuable, high quality timber. As a result, we have fewer and fewer opportunities to manufacture a diverse array of wood products.

Another reason there are fewer jobs per volume of wood harvested is because there are few companies in Nova Scotia adding any significant value to the wood they buy. 'Value-added' refers to the additional processing of wood, involving more human effort, tools, and machines. Each additional step employs more people, and creates a product of higher resale value. For example, a study in the U.S. found that turning logs to lumber creates, on average, three jobs for every million board feet harvested. Turning

that lumber into furniture parts creates another 20 jobs, and turning those components into actual furniture for sale creates another 80 jobs for the same million board feet.

Finewood Flooring and Lumber Ltd., a flooring business on Cape Breton Island, is a successful value-added business, employing 10 people for every 1000 cubic meters of wood purchased. Windhorse Farm, a small woodlot and sawmill operation in southwest Nova Scotia, employs eight people for every 1000 cubic meters of wood harvested. By contrast, the pulp and paper industry only employs 1.4 people for every 1,000 m³ of wood, and one of the province's largest, ultra-modern sawmills employs less than one person per 1,000 m³.

In fact, Nova Scotia's value-added forest sector is so poorly developed that we are far behind most other Canadian provinces. Ontario, for example, generates greater than three times more value-added per cubic metre of wood harvested than does Nova Scotia. In 1997/98, Ontario's value-added was \$273/m³, compared with \$123/m³ in New Brunswick, and only \$82/m³ in Nova Scotia.

Instead of turning our forests into high quality lumber or wood products, we're chopping them into cheaper lumber or grinding them into pulp and paper.

If the Nova Scotia government were to encourage selection harvesting and value-added wood industries, we would create far more jobs and wealth from forest-based industries.

How many jobs does 1,000 cubic metres of wood "create"?

Finewood Flooring	10.0
Windhorse Farm	8.0
Algonquin Park	4.1
Pulp & Paper	1.4
Large Sawmill Operation	1.0

Algonquin Park an investment that's paying off

In the early 1970s, the managers of Algonquin Park in Ontario began removing low quality, poorly formed trees, and leaving behind the high quality, good growing stock. They did this because for many years, Algonquin Park had been high-graded – with loggers 'taking the best and leaving the rest.' The managers knew that the sawmills would complain – after all, they were now receiving poorer wood. But they persisted with their long-term plan, knowing the first 20 years would be the toughest, with everyone scrambling to find markets for their low quality wood.

The good news is that their investment is already paying off. One sawmill owner, who receives logs from areas first treated 20 years ago, reports that mills are now sawing more high quality wood from managed hardwood stands. Quality sawlogs are now 50% of total hardwoods cut, up from the traditional 35-40% range. In contrast to the decline in wood quality in Nova Scotia, the Algonquin Park forest is literally "worth more" than it was 25 years ago, and is producing ever higher grades of lumber.

Doing what's best for the bush

Most of Nova Scotia forests are naturally uneven-aged, with trees ranging from saplings to 300-year-old giants. Four centuries of exploitation, however, have left our forests younger, more even-aged, and dominated by lower value tree species. As in Algonquin Park (see sidebar on page 3), we have to start doing 'what is best for the bush'. This means practising ecological forestry.

Ecological forestry in Nova Scotia will require far more careful tree cutting. Currently, only one per cent of our forests are managed carefully, using a cutting method called 'selection harvesting'. Selection harvesting involves cutting individual trees or groups of trees in any given entry into the forest, and may result in the removal of 30% of the volume of wood in a stand. By comparison, clearcuts generally remove 100% of the wood. Logging works on a rotation basis, culling some trees while leaving the healthiest, best-formed ones behind. When the stand is harvested again in 15-20 years, the quality and volume of wood has improved.

Some of the basics of ecological forestry

- The landowner and forester plan for the long-term
- Low quality, slow-growing trees are removed
- Healthy, well-formed trees are retained
- Long-lived, valuable tree species are favoured and encouraged
- Harvest volumes do not exceed annual growth rates
- Forest soils are protected from root damage, rutting, and soil erosion

- During logging operations, great care is taken not to damage the trees left standing in the forest
- A protective canopy of trees is maintained
- Old-growth trees, live and dead, are left alone
- Significant wildlife habitat is protected.

Windhorse Farm – doing it right

Windhorse Farm, located near New Germany in southwest Nova Scotia, is a rare example of a woodlot that has been managed sustainably since 1840. Despite 160 years of logging, this hemlock-dominated forest has retained much of its original character and boasts trees as great as 450 years old. In fact, it is one of the best examples in the province of the original Acadian forest. Trees over 80 years old dominate 90% of the 55 hectares of forest stands at Windhorse Farm.

The volume, quality and value of wood at Windhorse Farm not only remains undiminished, but has been enhanced, because logging has been conducted according to ecological principles. Trees are cut if they are slow-growing relative to nearby trees of the same species. Small groups of slow-growing, valuable trees are sometimes cut to open a gap in the canopy and to allow light to penetrate to the forest floor. The tallest trees are never cut in order to ensure high canopy height.

The woodlot currently has 2 million board feet of good-sized trees. In total, over 8 million board feet have been cut since 1840 – more than would have been obtained from the woodlot had it been clearcut every 50 years.

What YOU can do

"A change of heart or of values without a change of practice is only another pointless luxury of a passively consumptive way of life." – Wendell Berry

Five things you can do for our forests:

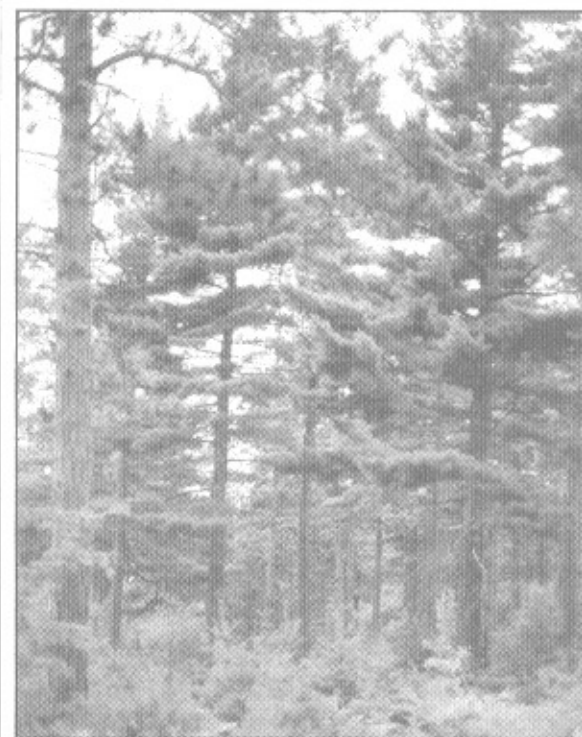
1. Contact Premier John Hamm, your local MLA, and Ernie Fage, Minister of Natural Resources. Let them know you don't like the way our forests are being managed. Remember, one letter is said to be as effective as 100 phone calls.
2. Support local conservation and woodlot owner organizations through financial or in-kind support. Volunteers can help with writing, fundraising, graphic design, researching, book-keeping, etc.
3. Reduce your consumption of lumber, paper, and all other wood products.
4. When purchasing wood or wood products, ask where the wood comes from, and if it is Forest Stewardship Council certified.
5. If you use firewood, find out where

it comes from. Is it coming from a clearcut, or from a well-managed forest?

Demand the following from our politicians:

- a) Harvest volumes should be reduced to half their current level. Promote a gradual shift from volume-based production to value-based production by
 - (1) managing forests for higher quality, premium-priced wood; and
 - (2) favouring and promoting value-added manufacturing.
- b) Clearcutting should be reduced immediately, and gradually replaced with 'uneven-aged' methods that select trees based on age and quality, while always maintaining a variety of ages and tree species. Industrial forestry workers – from technicians to foresters and logging operators –
- c) The silviculture credit system under the new Forest Sustainability Regulations should be adjusted immediately to reward uneven-aged management, selection harvest and forest restoration methods, and to penalize clearcutting.
- d) Tax incentives must favour value-added wood product manufacturing over primary processing in the pulp and paper and sawmill industries. We should strive for Ontario's level of value-added manufacturing.
- e) All logging on Crown lands should be Forest Stewardship Council certified, and there must be active public participation in their management.
- f) Complete an expanded and adequate network of protected areas in Nova Scotia.

should be retrained in these 'selection harvest' methods.



Denny's Park, Pictou Landing First Nation

Pictou Landing: A forest with a future

In 1992, the forests of the Pictou Landing First Nation were similar to most forests in Nova Scotia – subjected to more than 300 years of land clearing, cultivation, burning, clearcutting, and highgrading (taking the best and leaving the rest). By the 1990s, the Pictou Landing forests had been badly degraded and were dominated by short-lived, low value tree species, such as alders, white spruce, balsam fir, white and gray birch, red maple and poplar. More than 70 per cent of the trees were between 40-80 years old. The large-sized, long-lived trees of the Acadian forest, such as white pine, red oak and sugar maple, had all but disappeared.

Across Nova Scotia, foresters usually log for speed and quantity, typically cutting and replanting with short-lived, fast-growing coniferous trees. These trees are cut again in short order. By contrast, Pictou Landing practises "restoration forestry." This method fosters trees of many ages, creating an opportunity for the development of a natural, uneven-aged forest. It also provides a stable place for diverse populations of mammals, birds, reptiles, amphibians and micro-organisms. Restoration forestry requires knowledge and patience. The work of returning a forest to its "natural" state could take as long as 300-500 years – depending on the condition of the forest.

One way to allow restoration to occur is simply to leave a forest alone. In time the forest will heal itself. However, restoration can also be sped up a little if done carefully. Benefits can be realized along the way. That's what is happening at Pictou Landing.

In March, 2000, Pictou Landing was internationally recognized as the first Forest Stewardship Council (FSC) certified forest operation in Nova Scotia, and one of only ten FSC certified forest operations in Canada. The FSC supports environmentally appropriate, socially beneficial, and economically viable management of the world's forests. With this certification, all wood from Pictou Landing can now be labelled with a 'green' stamp that indicates it came from a certified well-managed forest.

Forest Accounts

For more information refer to source materials:
The Genuine Progress Index Forest Accounts
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Available at www.gpiatlantic.org

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Additional Resources

- Genuine Progress Index Forest Accounts reports: www.gpiatlantic.org
Clearcut Nova Scotia website: www.clearcutnovascotia.com
Ecology Action Centre's protected areas campaign: www.publiclands.ca
MacPhail Woods Restoration Forestry Project: www3.pei.sympatico.ca/garyschneider
Eastern Shore Forest Watch Association: www.forestwatch.ca
Nova Scotia Nature Trust: www.nsnt.ca
Maine Low Impact Forestry Project: www.lowimpactforestry.com
Federation of Nova Scotia Naturalists: www.chebucto.ns.ca/Environment/FNSN/
CPAWS: www.chebucto.ns.ca/environment/cpaws/