Forest Myths

by Chris Lohr

If a tree falls in a forest, and no one hears it, does it make a sound?

Apparently it does to the stunted, sunlight-starved balsam fir beneath. Because now there is a hole of light in the canopy, and the tree surges in growth.

Death and rebirth; these are inseparable partners in a forest, and they are balanced by the environment.

This relationship is incredibly important to Canadians; our entire economy benefit from logging and the sale of forest products, but now our interventions threaten the forest's continued existence. As the scientists try to educate the politicians, the public is gorging itself with information predicting the bleak future of our environment.

The "green" era and the associated scientific advances create a difficult juxtaposition of new concepts and problems. Perhaps the easiest way that people can decipher the wealth of technical, scientific jargon is to find a common thread or theme that can guide future incoming information. When educating ourselves about our forests, however, one single rule often leads to inappropriate generalizations.

Forest myths

There are two pervasive misconceptions about the forest. The first is the "Old-Age Myth". The idea here is that a normal forest is actually an ancient (almost immortal) entity consisting of one-, two-, or three-hundred year old trees. This state is seen as the ultimate realization of genetic potential. The second misconception is the "Diversity Myth". This idea stems from the awe we feel when we see a forest consisting of thirty different deciduous and coniferous species, and three levels of tree height inside the canopy. An even-aged forest with only a few species, then, is regarded as deprived and unhealthy.

What does a "normal" forest look like?

A forest can be young and old at the same time. We can categorize one forest into components called stands: these are groups of trees in one location sharing some common characteristics such as age, height, species-mix, etc. The stands that are "old" in a forest actually make up only one moment through a very much larger succession through time. A stand of one-hundred year old trees cannot have existed as such since the glaciers retreated during the last ice age. It must have been a group of seedlings at one time. There is a constant cycle going on - the seed establishes itself, sprouts, and, providing that it can compete for sunlight and nutrients against the other plants develops to maturity. It becomes senescent and more vulnerable to disease, insects or windthrow, and eventually dies. This life cycle could be ninety years for a Balsam Fir, or four hundred for a Douglas Fir. Once there is a clearing, there is room for the regeneration of a new tree, and ultimately a new stand.

It is true that a certain "climax community" of plants may develop over time. In the absence of disturbance (natural or human), there can be a terminal, stable condition where one community will continue to exist. As the forested ecosystem matures, there is an increase in biomass, but a decrease in net productivity. There are generally more species of organisms in mature ecosystems than in immature ones, since the late successional forest is more complex. The organisms occupying this forest have much narrower (more specific) ecological requirements or niches. This is a stable, but dynamic equilibrium in which one tree dying is replaced by another. This is a self-perpetuating community. Canada usually has harsher sites, however, so that these climax communities rarely exist per se. Either the vegetation changes are so exceedingly slow that a "climax" may never be attained, or there are always natural disturbances that prevent it being attained. Fires, insect devastation, severe storms and even volcanic activity may naturally clear enormous areas of the forest. In the past, the forests have never NOT experienced these disturbances. The only species "fit" to survive these devastations were those which had successfully developed genetic adaptations to them. The strategies that evolved over time vary for each species so that each may take advantage of a specific condition better than the other.

When a wooded area is cleared and left alone, plants will slowly reclaim the area. There are pioneer species such as raspberry, foxglove, pin-cherry, and white birch that occur only at the early stages of the succession. These species are intolerant; that is, they require an open canopy of light and do not fare well against competition from other plants. They tend to have high reproductive rates and very effective means of seed dispersal. These characteristics evolved as strategies for propagating as quickly as possible when the conditions permit. As time passes, more tolerant species like Balsam Fir, pine, spruce, and maple will become established. The initial fugitive species eventually disappear as the canopy closes in. You will never see a white birch in the understory of an older stand. If it does not make up the sunniest, upper-most level, it simply will not grow.

The Balsam Fir is an excellent example of a species adapted to natural disturbances. It is extremely tolerant; it can literally wait for decades in the dimly-lit understory until an opening "releases" it to full growth. The species depends largely on the spruce budworm for this release. Since the budworm favours older trees, the selective destruction of old trees allows the younger trees to replace the old. This can produce a vast sector of the forest comprised solely of even-aged, even-heighted trees and be perfectly normal.

Jackpine is another example of a disturbance-adapted tree species. It depends entirely on forest fires for its propagation. The cones open up and release their seeds only by the intense heat of a fire. Again, the result can be a very uniform-looking forest, caused by the sudden onset of this species after a fire. This is also normal.

In fact, if the stands in a forest did not change over time, then certain types of wildlife could not find their niche. A very specific combination of food, cover, and water that the plants provide shape the animal's habitat. Through photosynthesis, plants are the only organisms that produce their own food. Therefore the plant forms the base of the trophic structure from which all other levels of organisms in the food chain stem. The plants provide cover for the herbivore's escape from predators, and provide food. They can only be eaten, however, if the plants' chemical composition "agrees" with the herbivore. Therefore the plant species composition can determine which herbivores can co-exist, and which cannot.

The presence of predators is dependent on the component herbivores, so that, for example, if a forest were devoid of young regenerating stands, the frequency of owls and hawks would decrease. These raptors prey on small mammals whose habitat niche is characterized by the grasses and shrubs. Similarly, the woodpeckers require old or dead trees for finding insects and making their nest, and deer require a leafy, young stand for browsing.

The plant-animal interaction is not unidirectional, though. Just like an insect outbreak can drastically alter the successional sere, foraging animals can suppress succession by eating and consequently reducing the stock of seeds.

These examples show that the forest is dynamic; the multitude of interactions, whether it be from other organisms, climate, or time, all create a continuous, world-wide succession. Even huge fires and clear-cuts cannot prevent new forests for long. In fact, it would probably be impossible to stop them from coming back.

But isn't a normal forest exceedingly complex?

Whether a forest consists of three, twenty, or fifty species all depends on the rainfall, temperature , soil, topography, and the species mix existing before the disturbance or decline.

The more Southern forests are richer and more diverse because the more moderate climate does not limit the less rigorous species from growing. There are long, warm summers, and sufficient precipitation to allow a large mix of conifers and deciduous trees. The Northern Boreal forests, however, have longer winters and receives much of its precipitation as snow. Only the most specifically suited can survive under these conditions, so the forests consist mostly of spruce and fir.

In Canada alone there is enough variability in climate and terrain to account for about eleven distinguishable forest regions. British Columbia shares six of them: the Columbia, Subalpine, Montane, Coast, Boreal, and Grassland regions. There are also three types of Boreal Forest which, according more or less to latitude, form a continuous belt across all of Northern Canada. There exist also the Great-Lakes - St. Lawrence Forest Region, and Maritime's Acadian Forest Region.

The fact is, every province itself has a unique combination of geological bedrock, soil nutrient availability, water availability, etc., so that there is no use speaking of what a "normal" forest should look like. The Northern areas of Ontario, for example, can be so harsh that only three species can exist. In the Southern part of the same province, by contrast, there can exist a completely different Forest Region with twenty species.

Even these broad Forest Regions can be further sub-divided. The climate, and therefore the forest species of New Brunswick is strongly related to the bedrock geology. We can categorize six Forest Zones in New Brunswick. The granites and ferromagnesiums comprise most of the uplands. The granites are weathering slowly and producing shallow, stony soils, and the ferromagnesiums are weathering well to produce a fine, rich soil— The forests here, for example, comprise the Sugar Maple - Yellow Birch-Fir Zone. Conversely, near the Bay of Fundy Coast, the same bedrock exists, but a climate of late spring, cold summer and frequent fogs creates the Spruce -Fir Coast Zone instead. The Spruce-Taiga Zone consists of short dense spruce and fir, limited by the cold, boggy conditions. The three other Forest Zones are: Fir-Pine-Birch Zone, the Sugar Maple-Hemlock-Pine Zone, and the Sugar Maple-Ash Zone.

Obviously, even in New Brunswick, the comparison of forest at one location to another elsewhere should only be made with the careful scrutiny of these differences.

Admittedly, there are changes in the forest that are, unfortunately, abnormal. The fact that humans are responsible for much more rash and enduring intrusions on the forest, creates a cynically-tinted window on any presently existing forest. The insights we gain about the forests are often untestable or not immediately observable, however, because of the huge time frame in the lifespan of a tree. Many of our past errors are only coming to produce an effect now, while the deed has already been done.

There is a need for correct information. There is a need for educating ourselves while the errors have not accumulated to irreparable levels.