

## FOREST WISDOM: A SUMMARY

A forest is a single organism connected by infinite biological pathways that allow trees to communicate and interact in an intelligent way.

Cooperation and Connection: Forests are complex adaptive systems that cooperate and care for trees and other life forms by creating favorable conditions, resisting stress and fostering long life. Trees provide carbon from photosynthesis to soil fungi, which in turn provide essential nutrients to the tree. Between 20 and 80 percent of a tree's carbon is shared with soil fungi that can't make their own. Fungi in turn mine essential minerals from the soil necessary for the tree's photosynthesis. Sharing for the greater good gives cooperating networks evolutionary advantages over competing individuals.

Tree Senses: Trees have highly developed sensory apparatus to locate food and identify threats. Trees "see" and react differently to wavelengths of light invisible to humans as well as to shadow. To protect themselves, trees "smell" chemical signals released by neighboring trees being chewed on by leaf eating insects, prompting them to make their leaves inedible. They "taste" the insect saliva then send out chemical signals that attract predators to feed on that particular insect. Trees have even been shown to "hear" by producing defensive chemicals in response to a recording of a leaf eating caterpillar.

Mother Trees: Trees "talk" through vast underground fungal networks of hubs and links, sharing nutrients and water, resisting insects and disease and nourishing their progeny until they reach the light. The most linked hubs in this network, known as "mother trees", recognize their young, sending them the building blocks of life and reducing root competition. When injured or dying a mother tree releases its store of nutrients and defensive chemicals into the fungal network which doles it out to the newest and healthiest trees, even those of a different species. For example, the food and resources of a dying Douglas fir may go to a vigorously growing ponderosa pine better adapted to the warming climate. It's unknown whether this forward thinking originates with the tree or fungi act as below ground brokers.

Giving Trees: In winter evergreen fir and pines share food resources with deciduous trees like aspen; the nutrient flow is reversed in summer when the aspen leaf out. Cooperation between species results in more total photosynthesis, and greater resilience to disturbance.

Mindless Mastery: Intelligence is a property of life; in trees it is decentralized and underground. Thousands of root tips gather and assess data from the environment and respond in coordinated ways that benefit the entire forest. Forests achieve a “mindless mastery” through cooperation without the need of a centralized nervous system allowing them to respond in optimal ways to environmental challenges.

Nature’s Phoenix: Forests arise renewed like the mythological phoenix from the ashes of fire. Aspen, oaks and many other trees and shrubs quickly re-sprout from roots in even the most severely burned areas. Wildflowers and grasses cover the soil and buzzing bees, butterflies and beetles fill the air. Pocket gophers and salamanders emerge from their burrows. Deer and elk feast on fresh green shoots. Woodpeckers arrive to nest in charred trees and feed on wood-boring beetles that have flown for many miles, homing in on the fire’s heat or smoke. Fires of all kinds and intensities renew forests by recycling nutrients and creating habitat.

Cutting the Future: In its formative years the Forest Service encouraged land owners along the eastern seaboard to cut down all American chestnuts to recover their economic value before they were killed by an exotic blight. As a result the few genetically resistant trees that may have allowed the species to survive and adapt were lost. More recently, White Bark Pines in the northern Rockies that have survived bark beetles are being cut and replaced with non-resistant trees. Both are examples of forestry practices working against evolutionary processes.

Sacred Groves: Trees that have been growing for centuries in unmanaged forests have long been considered sacred. European cathedrals resemble the sacred groves of ancient trees with their soaring tree-like columns, ceilings converging high overhead penetrated by shafts of light. The essence of the sacred is found in the great age and highly evolved relationships of ancient forests.

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