

## LIVING IN TALL TREES

### *Joel with his bow*

His name is Joel Clement. No tree in the world is too tall for him to climb. His arrow with its sharp tip clipped off to protect the tree, will place a fishing line over a high branch so he can hang his rope there and climb to the tree's upper canopy.

### *Canopy*

Joel wants to venture where only a bird can reach. It is a biological frontier where the forest makes its first contact with the sky, where sunlight, wind, and precipitation trigger new life from crowns down to the tips of roots.

### *Joel climbing*

As a boy, Joel climbed trees for fun. Now he climbs with questions: What goes on in the canopy of these ancient trees? What is the secret of their longevity? What is lost when they are harvested? At 31 Joel Clement is one of the best tree climbers in the American Northwest, practicing a "tarzan science", a difficult and often risky quest to explore the forest canopy.

### *Canopy*

This environment, totally unknown to us walking on the ground, was for many years accessible only to scientists like Joel, who can climb tall trees. But in recent years, other scientists can enjoy a bird's eye view of the forest.

### *Crane.*

Using a huge canopy crane installed by the University of Washington, they set up their labs 250 feet above ground in the midst of old growth forest. These trees have never been cut, some of them are 500 years old. Dave Shaw is a chief researcher here.

### *Down the tree*

Here, scientists study how trees absorb the greenhouse gas carbon dioxide, how oxygen and water are released, and how moisture evaporates from the forest, helping to cool the planet.

### *Joel climbs, the tree. David in the gondola.*

Just as a doctor couldn't begin to understand human health by looking at only the lower third of patients' bodies, so scientists, who want to know what makes a forest thrive, must examine the whole tree. Joel Clement and David Shaw are two scientists working in a team combining human climbing skills with the crane's ability to reach over the canopy.

### *Joel climbing on the tree*

Joel and Dave create a health report for this tree, its vertical and a horizontal profile, noting lengths of branches and loss of foliage due to disease and other causes.

### *Taking measurements*

These numbers are the first stage of a process that will lead researchers to a better understanding of the forest canopy.

### *Images from the crane*

Along with Canada, Russia and Brazil, the United States is among the countries known as "the forest nations". But as a result of logging the United States has lost 97% of its old-growth-forest. The scientists who study the canopies of the remaining old trees are discovering just how tragic is this loss for the environment.

### *Joel driving in Costa Rica past logging trucks*

Half a world away, in Costa Rica, ecologists and the logging industry are locked in constant battle over the clear

cutting of old-growth-forest. It is also a place where the most important canopy research is being done.

### *Joel's jeep on road*

Joel is part of an international network of researchers from various disciplines who are contributing to a new science of the forest canopy.

### *Driving to Monteverde*

His former professor from the Evergreen State College created the Canopy Network, dedicated to research and education. She needs Joel's expertise in the experiments she conducts in Costa Rica's Monteverde Forest. For Joel, it is always a pleasure to see his mentor.

### *Getting out of car*

This is her, Nalini Nadkarni.

### *In the lab*

The world Nalini studies is called epiphytes, the plants growing on trees.

### *She pulls out a tray of dried epiphyte material*

For 15 years, Nalini has been collecting this organic material from the tops of ancient trees, and analyzing it to figure out what grows there, and how.

### *Beginning hiking. Tall trees*

Hiking into the Monteverde Forest Preserve, Joel and Nalini are entering a biological diversity equaled by few places in the world.

### *Hiking*

Nalini needs Joel's unique experience in collecting samples of epiphytes from great heights in the canopy.

### *Looking up at tree*

Nalini chose this tree to prove her hypothesis, that when an old-growth-tree is gone, a huge pantry of food supply feeding animals and other plants becomes irreplaceable.

### *Nalini explains sieve experiment*

Nalini wants to know what it takes to grow such a huge diversity of plant life at this height. Are the seeds carried by the wind or by animals or some combination.? She hangs sieves in the canopy to see what is falling onto these branches.

### *Joel cutting epiphyte sample. Nalini watches him*

Fifteen years ago Nalini started stripping some sections of plant material from branches. Every year she checks the re-growth on the branches that were stripped. Her question is this: if these ancient trees are cut down and replaced by a second-growth forest, how long will it take to replenish this biologically rich material?

### *In the lab: projecting slides.*

Nalini's research implies that when old growth trees are cut, a commercially planted forest has little chance of reproducing the biological richness that is lost.

### *Joel driving to the tram*

Alarmed by the dangers of deforestation, ecologists look for ways to share what they know with the public.

### *Joel and Don Perry enter tram*

For some time Joel's dream is to bring people physically above the trees, so they can see for themselves what biological treasure is stored there. There is a man in Costa Rica, who has made this dream a reality. Close to the Braulio Carillo National Park, an American, Don Perry, has built a "canopy tram", the first in its kind in the world.

Would he be interested in doing the same in Joel's Washington State?

*Joel Driving in Washington State*

Joel Clement is back in the United States. He is driving to a site in the Olympic National Forest in Washington State, which he thinks will be ideal for the proposed "canopy tram".

*Joel enters the forest and begins mapping the tram route*

Joel imagines a journey which will educate and inspire the public to appreciate this unique environment of old growth trees.

*Ferry to Vancouver Island.*

Joel is committed to public education, but occasionally he lends his science to political action. Across the bay from Washington State is the Canadian province of British Columbia. Its Vancouver Island was once completely covered by ancient forest. But no more.

*Entering Victoria harbor.*

Joel has been climbing trees in Canada many times as part of his research for the University of British Columbia.

*Meeting Allison and Chris*

But this time he comes at the invitation of an environmental action group. He is met at the dock by Allison Spriggs and Chris Genovali, of the Victoria chapter of the Western Canada Wilderness Committee.

*Joel and Allison board the plane. Take off*

They need Joel's climbing and scientific expertise in a campaign to educate the public about the necessity of preserving the remaining old trees. From the air, the

landscape of Vancouver Island with its vast areas of clear cuts, makes a compelling argument.

### *Aerials of clear cuts*

Seven years ago Allison and her colleagues fought a campaign to save the Upper Carmanah Valley, an oasis of rain forest designated for clear cutting.

### *Allison in the plane*

Their strategy was to set up research sites in the remote forest, and to invite scientists from around the world to study the forest, and report their findings to the media.

### *Clear cuts*

Proponents of clear cuts, afraid that forest studies will bring rare new species to light and force logging restrictions, have threatened some of the scientists.

### *Allison in the plane*

Research equipment and sites have been mysteriously damaged or destroyed.

### *Aerials of valley*

But the ecologists won, and the valley was saved. But now the Walbrun Valley, another part of the rain forest vital as a watershed for the nearby river, is in danger of clear cuts.

### *Exiting plane*

Allison invited Joel to be a pioneer scientist in a new campaign.

### *Looking at topographical maps on a table*

Selecting a site for a research station in the midst of an area designated for clear cutting, they are setting out for the Walbrun Valley.

### *Clear cuts on hillside*

As they drive towards the Walbrun Valley, evidence of logging is everywhere.

### *Arriving at the site. Hiking.*

In the Walbrun Valley, Joel Clement, a skillful climber turned scientist, educator and now activist, is in his element. These are his trees.

### *Setting up camp*

Tomorrow, he will climb 300 feet up these majestic peaks, to discover their biological treasures.

### *Huge Tree*

Other scientists will follow him, sharing a common belief that old trees hold some of the biggest secrets of life on our planet, and must remain with us forever.