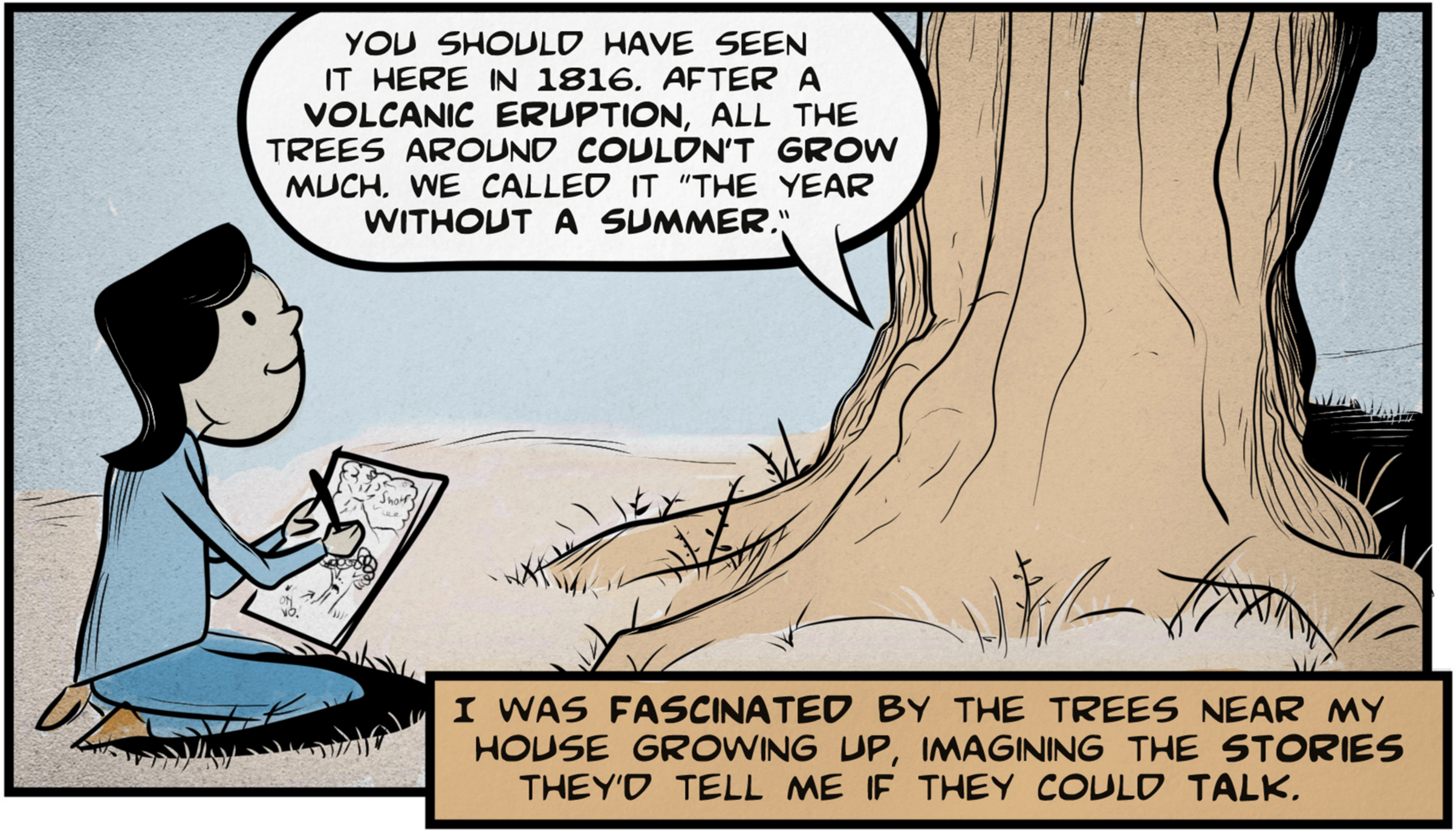
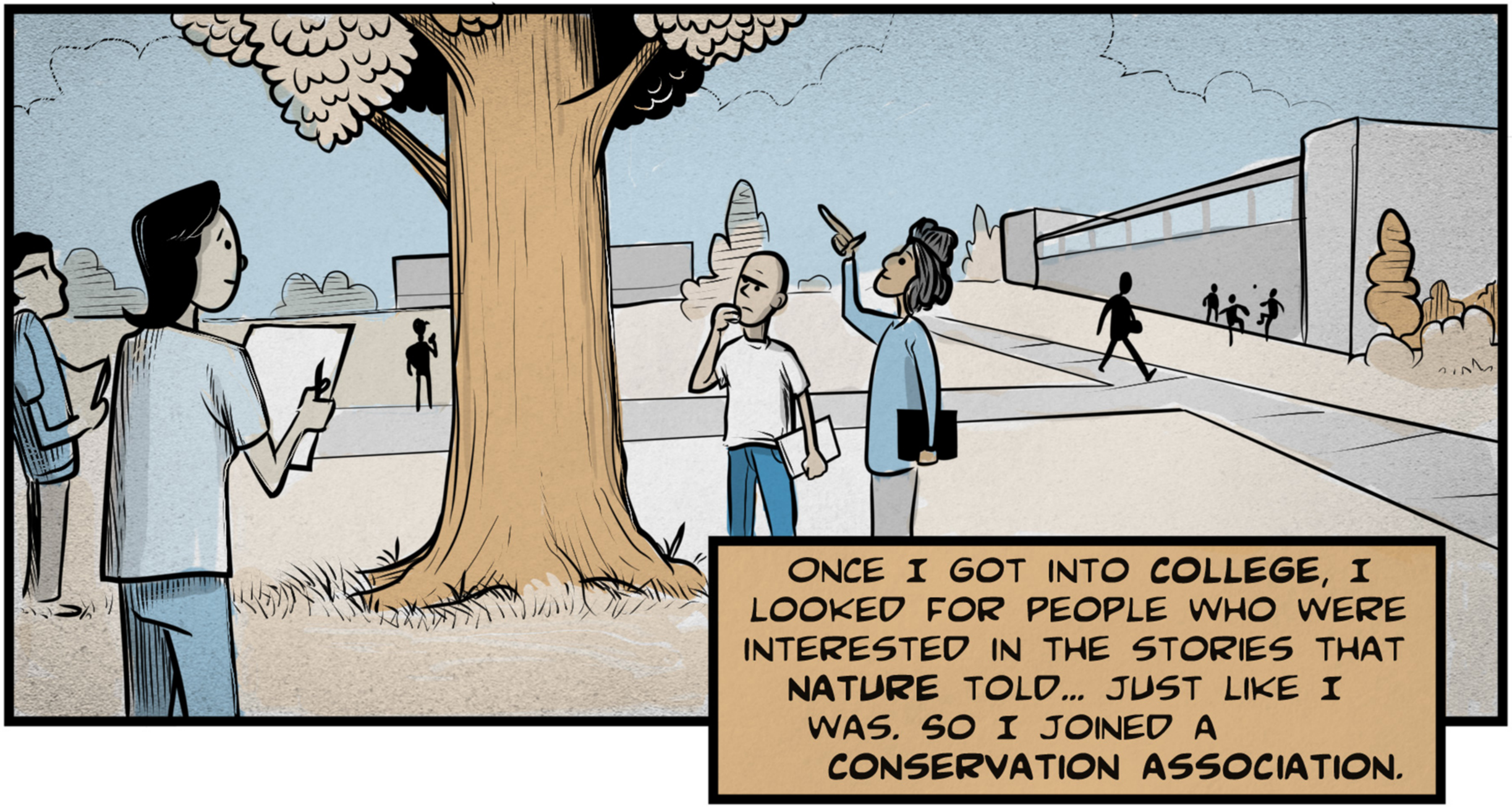
CARMEN

THE CONSERVATION SCIENTIST

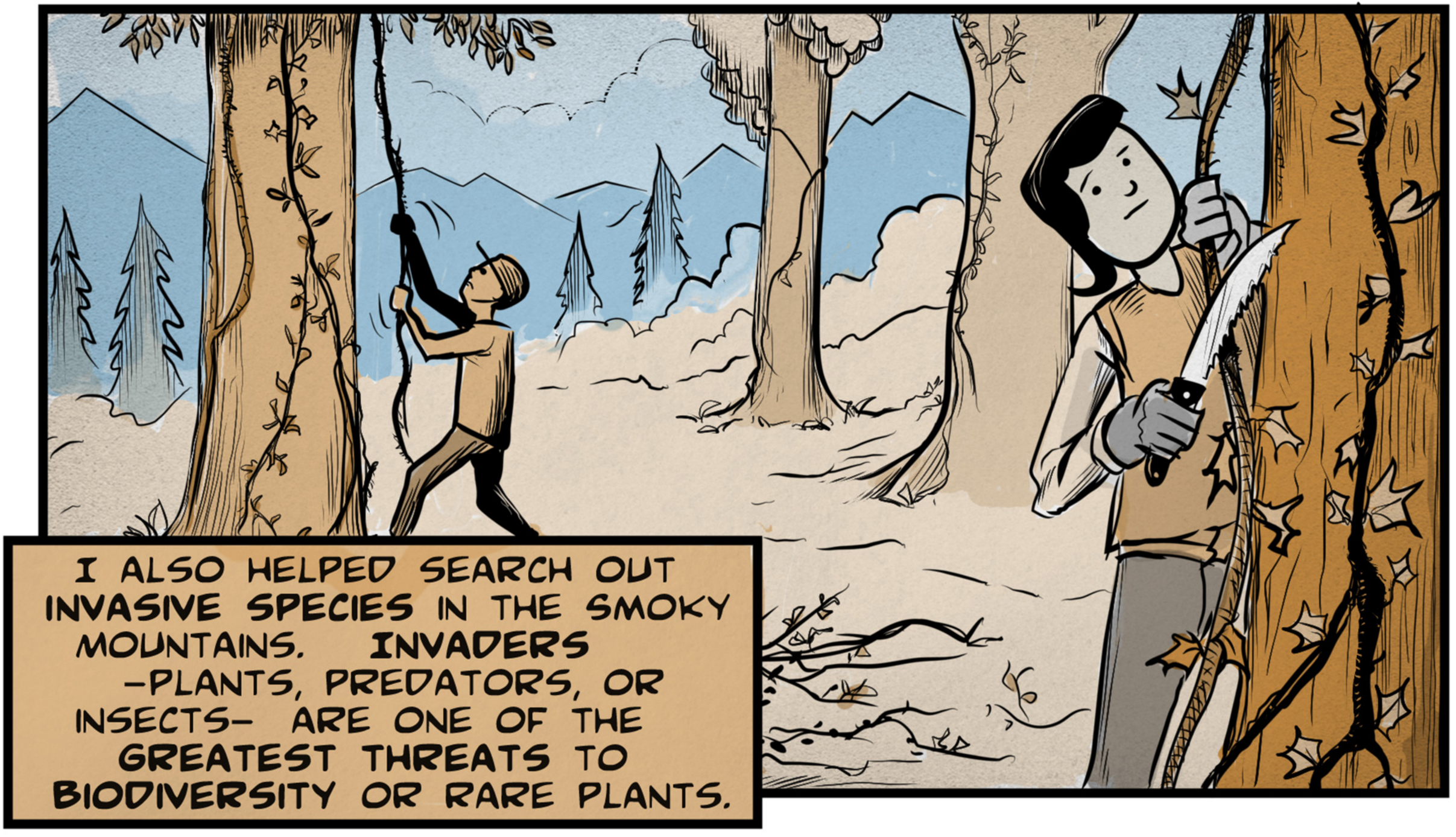
HEY, TREE, WHAT'S YOUR STORY?


YOU SHOULD HAVE SEEN IT HERE IN 1816. AFTER A VOLCANIC ERUPTION, ALL THE TREES AROUND COULDN'T GROW MUCH. WE CALLED IT "THE YEAR WITHOUT A SUMMER."
I WAS FASCINATED BY THE TREES NEAR MY HOUSE GROWING UP, IMAGINING THE STORIES THEY'D TELL ME IF THEY COULD TALK.

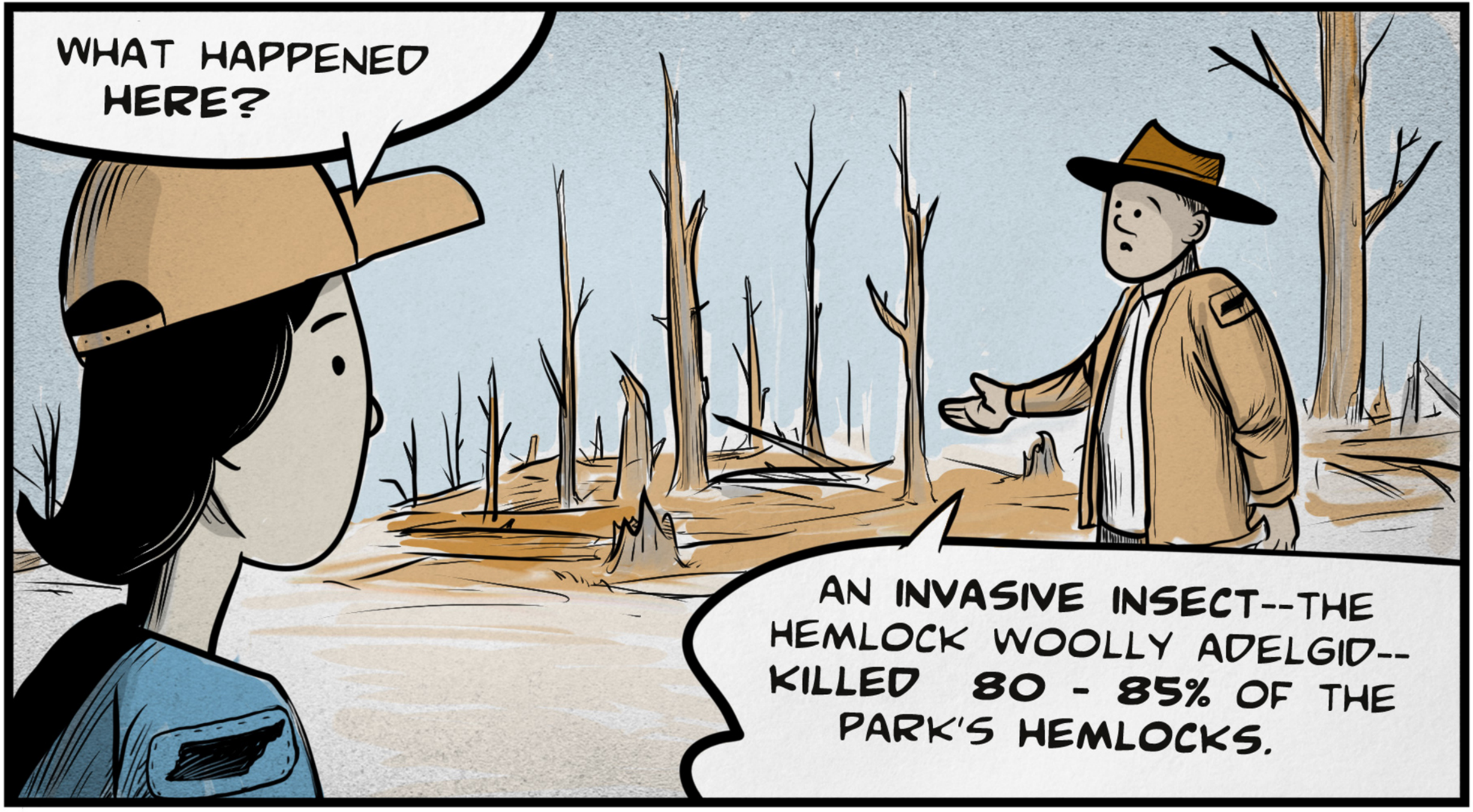
I GOT MORE CURIOUS AS I GOT OLDER. AND MY STORIES EVOLVED.


ONCE I GOT INTO COLLEGE, I LOOKED FOR PEOPLE WHO WERE INTERESTED IN THE STORIES THAT NATURE TOLD... JUST LIKE I WAS. SO I JOINED A CONSERVATION ASSOCIATION.

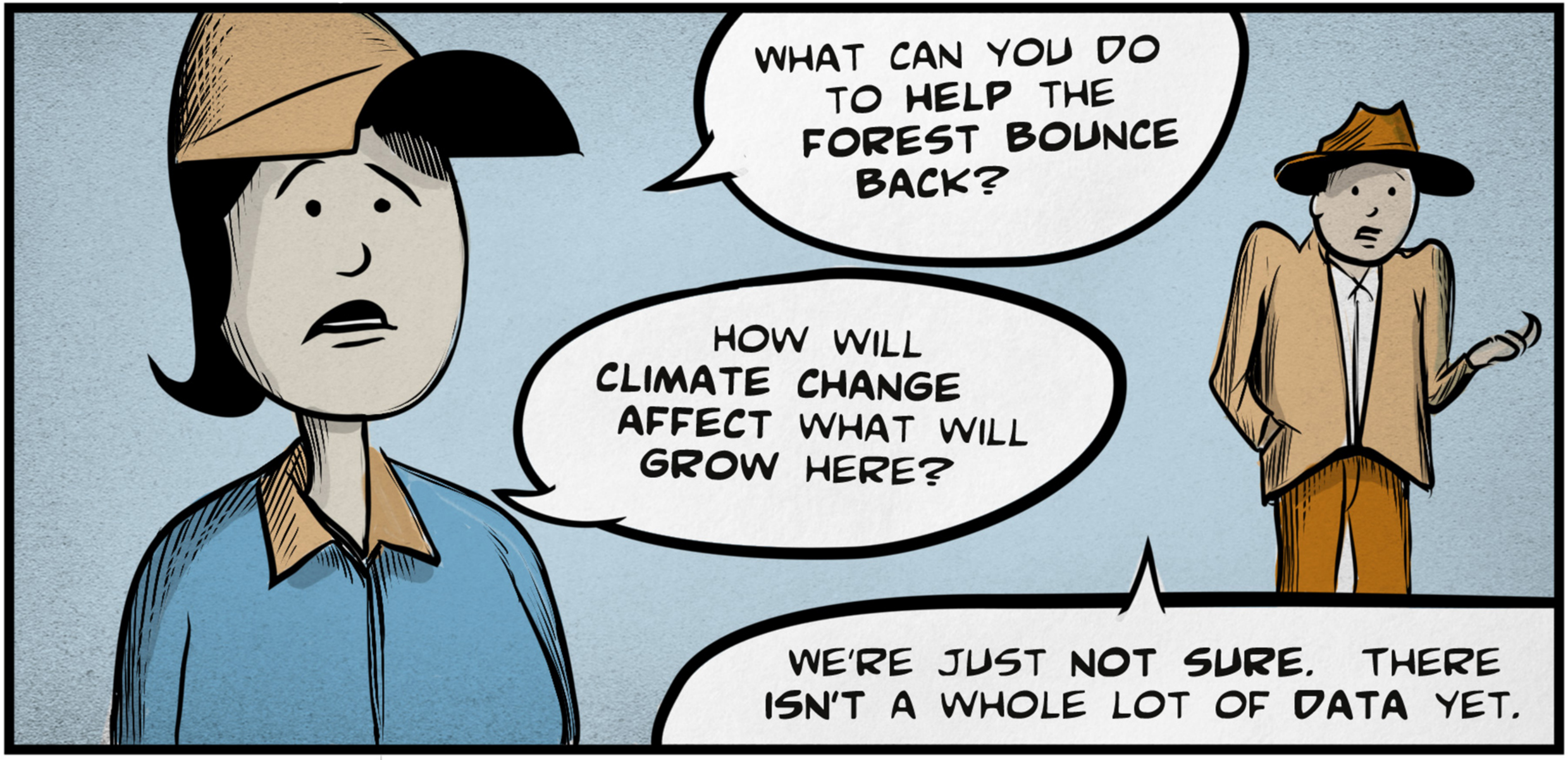

IT HELPED ME FIND SOME COOL SUMMER JOBS, LIKE GETTING PAID TO IDENTIFY PLANTS IN NATIONAL PARKS. I LEARNED THAT UNDERSTANDING WHAT YOU HAVE —TRACKING THE NUMBER, SIZE, AND AGE OF TREES IN A FOREST, FOR EXAMPLE— IS THE FIRST STEP IN CONSERVATION.


I ALSO HELPED SEARCH OUT INVASIVE SPECIES IN THE SMOKY MOUNTAINS. INVADERS -PLANTS, PREDATORS, OR INSECTS- ARE ONE OF THE GREATEST THREATS TO BIODIVERSITY OR RARE PLANTS.


EVERYTHING I WAS LEARNING MADE TREES' STORIES MORE FASCINATING. BUT THEY WERE ALSO GETTING MORE COMPLICATED.
But, one day...
Oh, no! My leaves are drooping.
DROOP
my roots reach... but... NO Water!
Invaders!

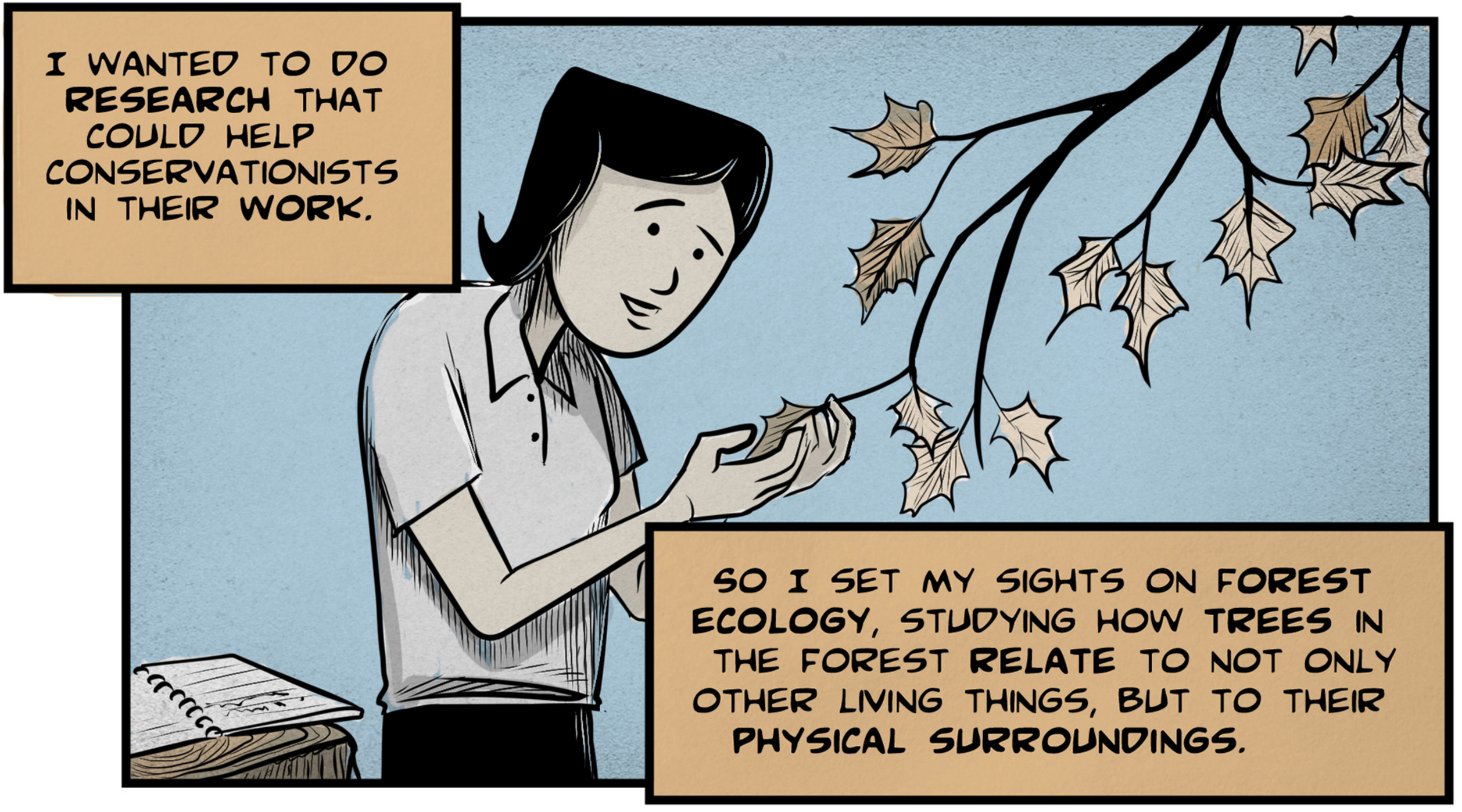

WHAT HAPPENED HERE?
AN INVASIVE INSECT--THE HEMLOCK WOOLLY ADELGID--KILLED 80 - 85% OF THE PARK'S HEMLOCKS.

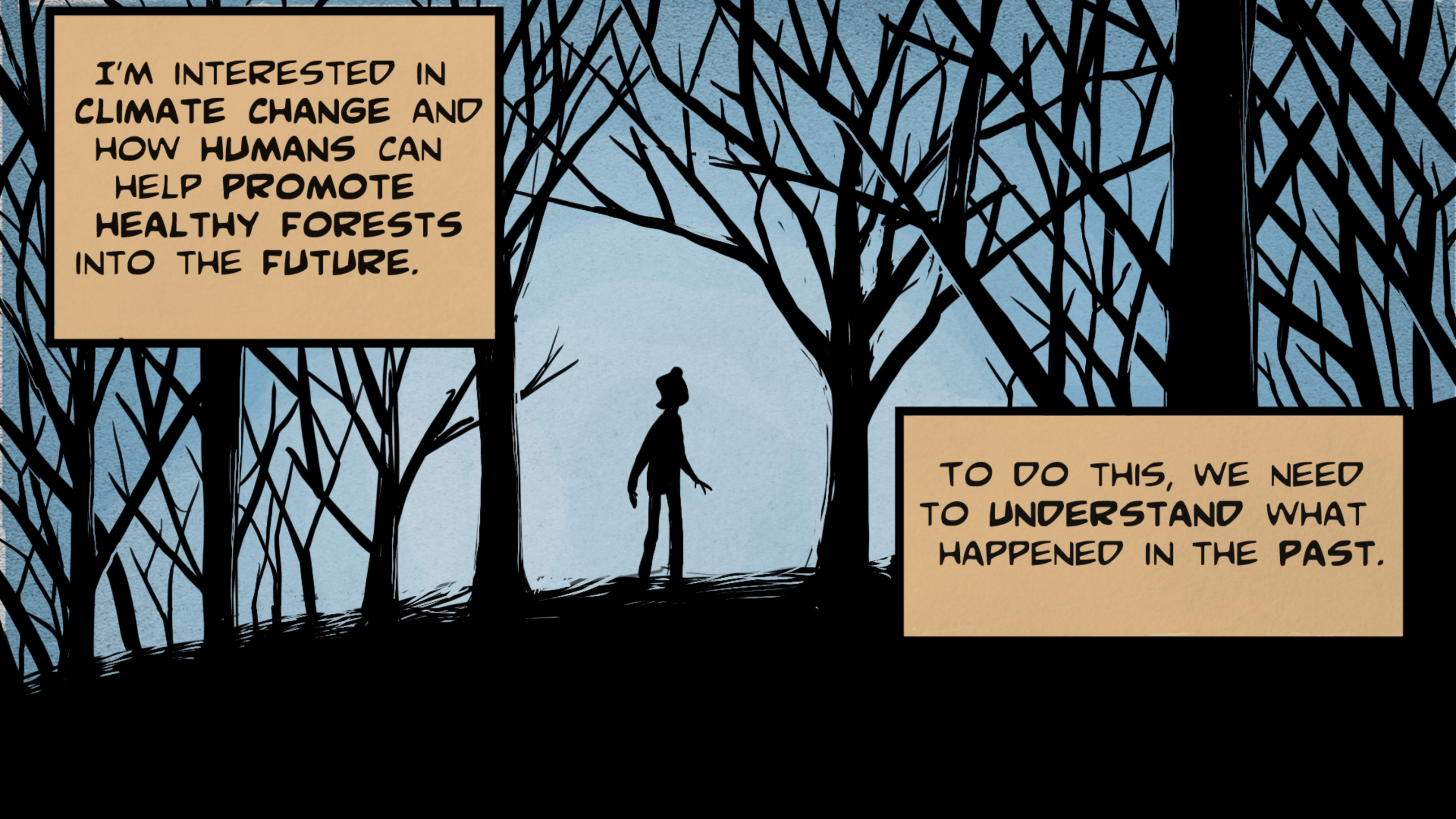
THERE WERE SO MANY UNANSWERED QUESTIONS...



IT WAS A DEFINING MOMENT.

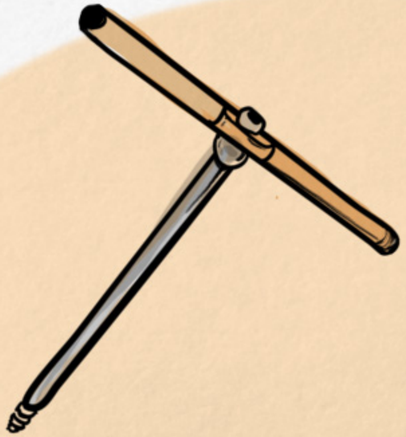
TO GET THE ANSWERS THAT WOULD HELP FILL OUT THE STORIES, I DECIDED TO GO BACK TO SCHOOL.

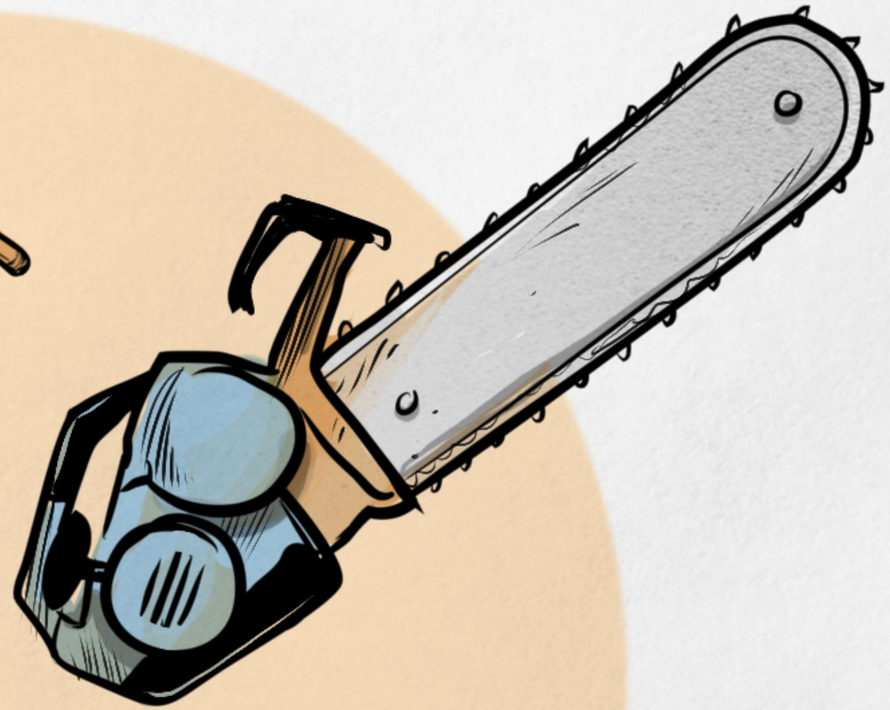

I WANTED TO DO RESEARCH THAT COULD HELP CONSERVATIONISTS IN THEIR WORK.
SO I SET MY SIGHTS ON FOREST ECOLOGY, STUDYING HOW TREES IN THE FOREST RELATE TO NOT ONLY OTHER LIVING THINGS, BUT TO THEIR PHYSICAL SURROUNDINGS.

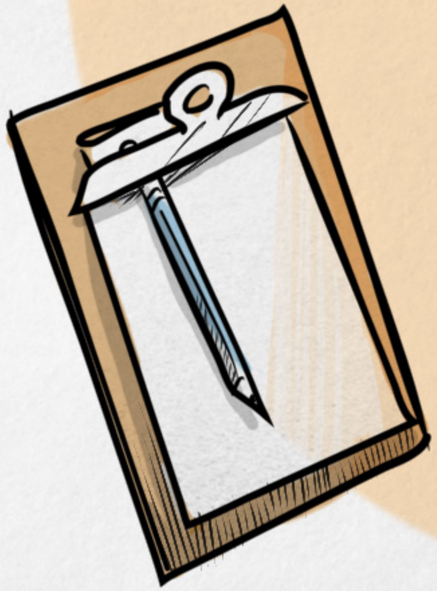

I'M INTERESTED IN CLIMATE CHANGE AND HOW HUMANS CAN HELP PROMOTE HEALTHY FORESTS INTO THE FUTURE.
TO DO THIS, WE NEED TO UNDERSTAND WHAT HAPPENED IN THE PAST.

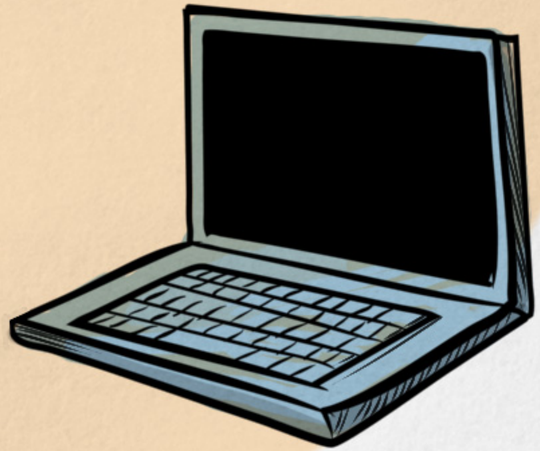
IT TURNS OUT THAT TREES TELL THEIR OWN STORIES THE BEST.

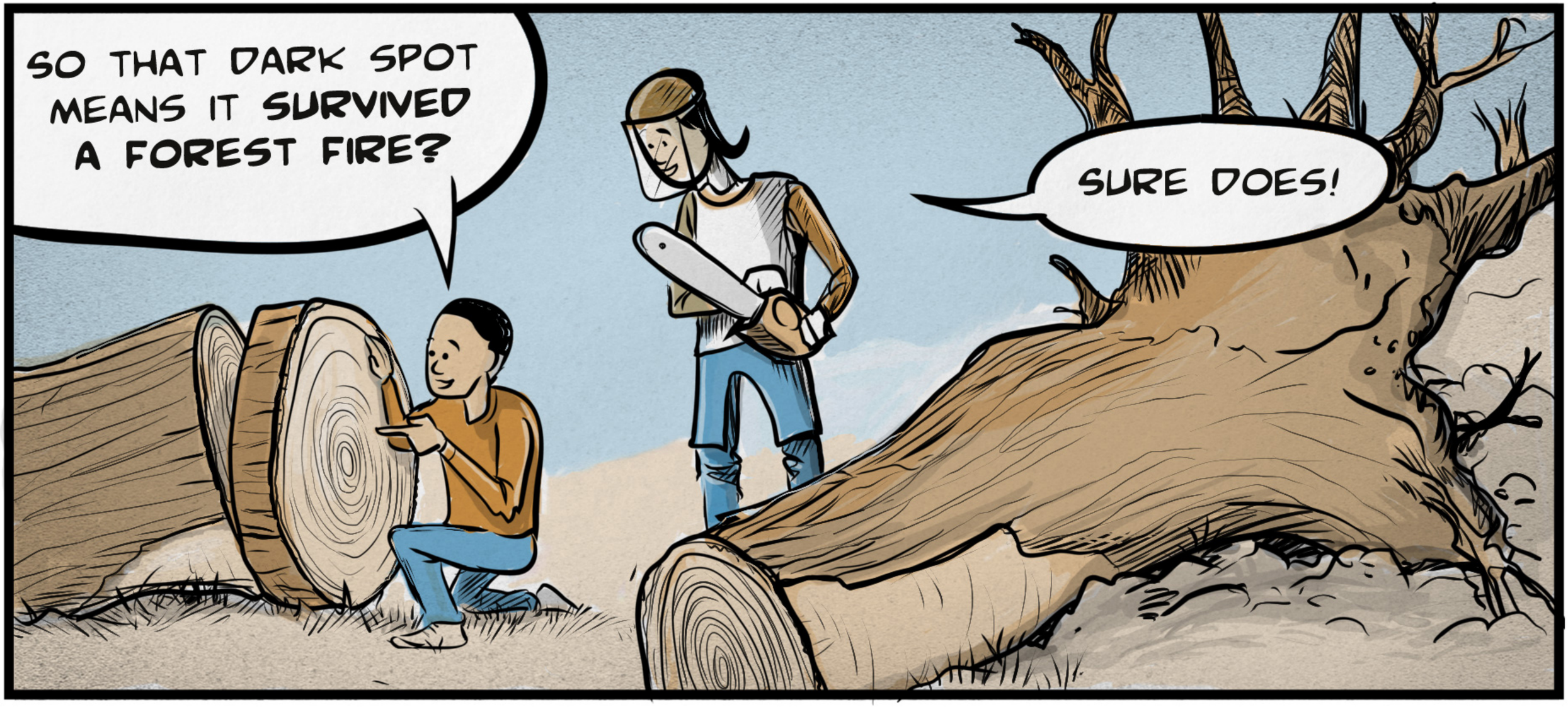
I JUST NEEDED THE TOOLS TO BE ABLE TO UNLOCK THOSE STORIES.











BY STUDYING THE **RINGS** FROM TREES THAT HAVE ALREADY FALLEN, WE CAN SEE HOW FORESTS HAVE **RESPONDED TO CHANGES** AND STRESSES LIKE **FIRE**, **DROUGHT**, AND **CLEARING LAND** FOR AGRICULTURE.


COMPARING TREE RING INFORMATION WITH CLIMATE DATA AND HISTORICAL RECORDS HELPS US TELL A MORE COMPLETE STORY.
WHY IS THIS RING SO SMALL COMPARED TO THE YEARS BEFORE?
OOOO, THIS WAS DURING THE DUST BOWL IN THE 1930S!
I JUST TOUCHED THE DUST BOWL!

WE ALSO USE INCREMENT BORES, OR HOLLOW HAND DRILLS, TO GET PENCIL-SIZED SAMPLES FROM LIVING TREES WITHOUT HARMING THEM.

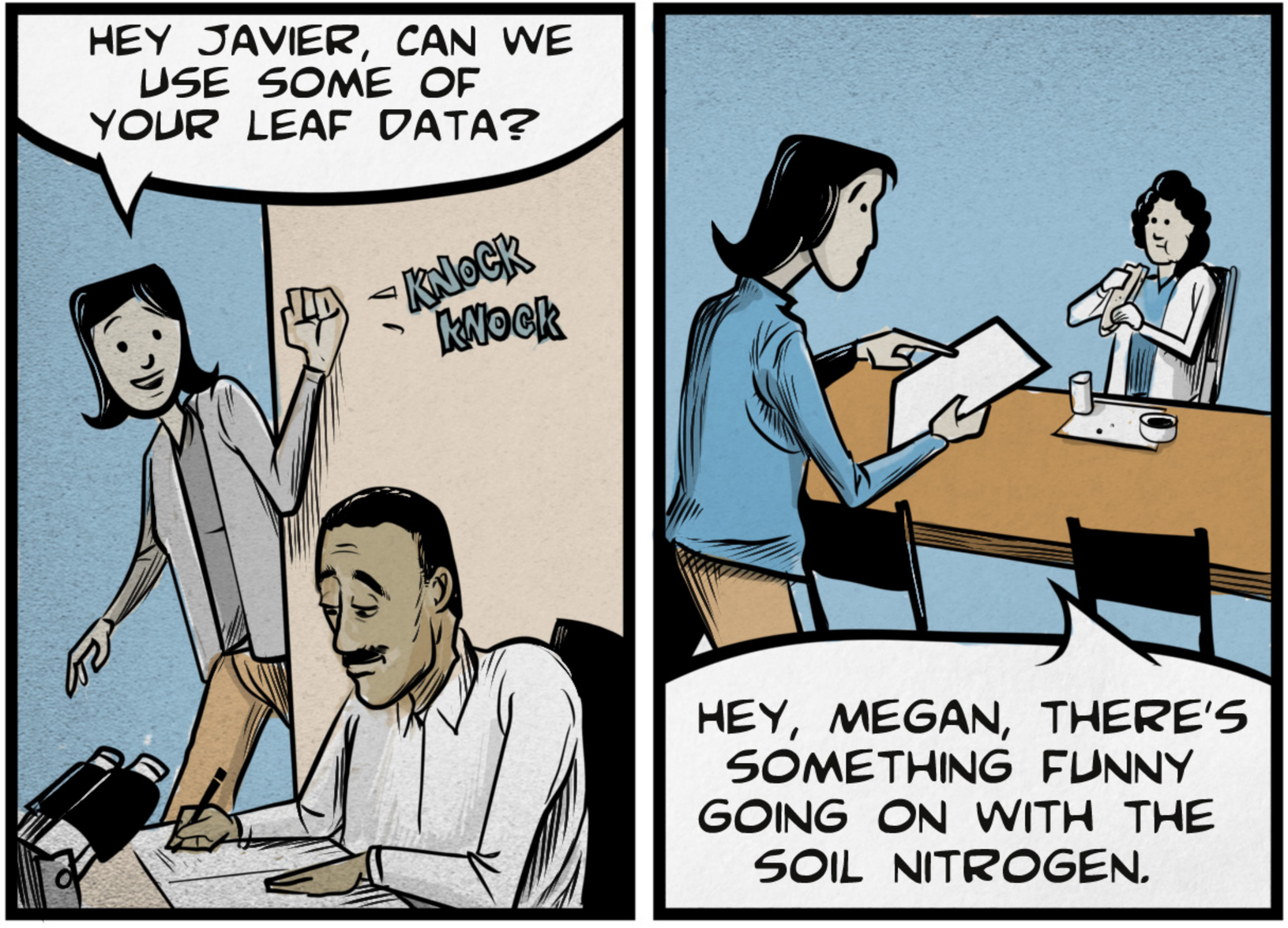
WE CAN EXAMINE THESE THROUGH A MICROSCOPE.

TO TELL TREES' STORIES WITHIN A **SINGLE YEAR**, WE RELY ON **CITIZEN SCIENCE**. OUR **VOLUNTEERS** GO OUT WEEKLY, NOTING THINGS LIKE **WHEN** A TREE'S LEAVES APPEAR OR WHEN IT'S **BLOOMING**.

BUT TO TELL TREES' STORIES INTO THE **FUTURE**, WE NEED **DIFFERENT KINDS OF TOOLS.**

SINCE WE DON'T HAVE A **TIME MACHINE**, WE USE **MATH**, **STATISTICS**, AND **COMPUTERS** TO BRING DIFFERENT STORIES TOGETHER AND TELL NEW ONES.

I NEED TO PULL IN MY **COLLEAGUES** FOR THIS, BECAUSE **NOBODY KNOWS IT ALL.**



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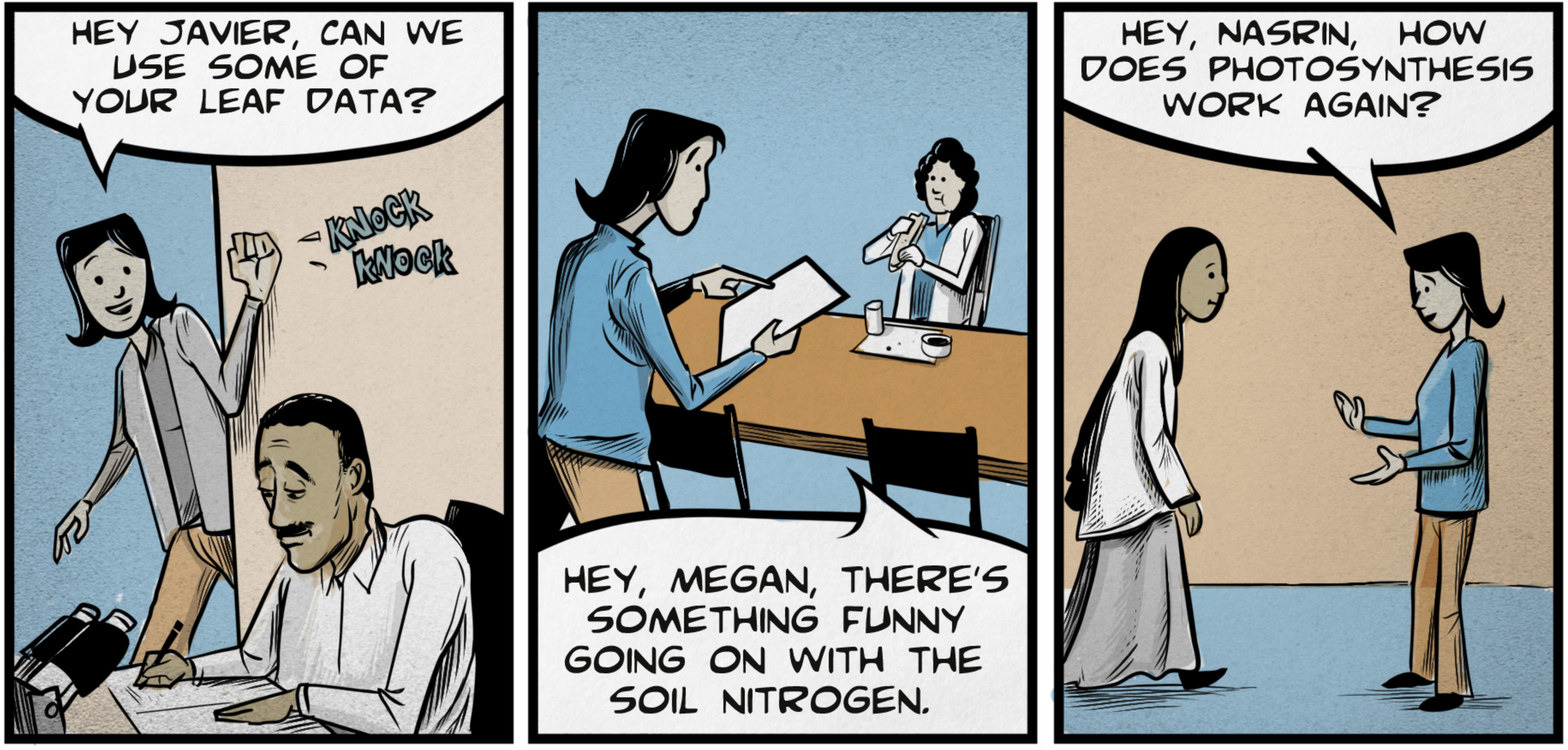

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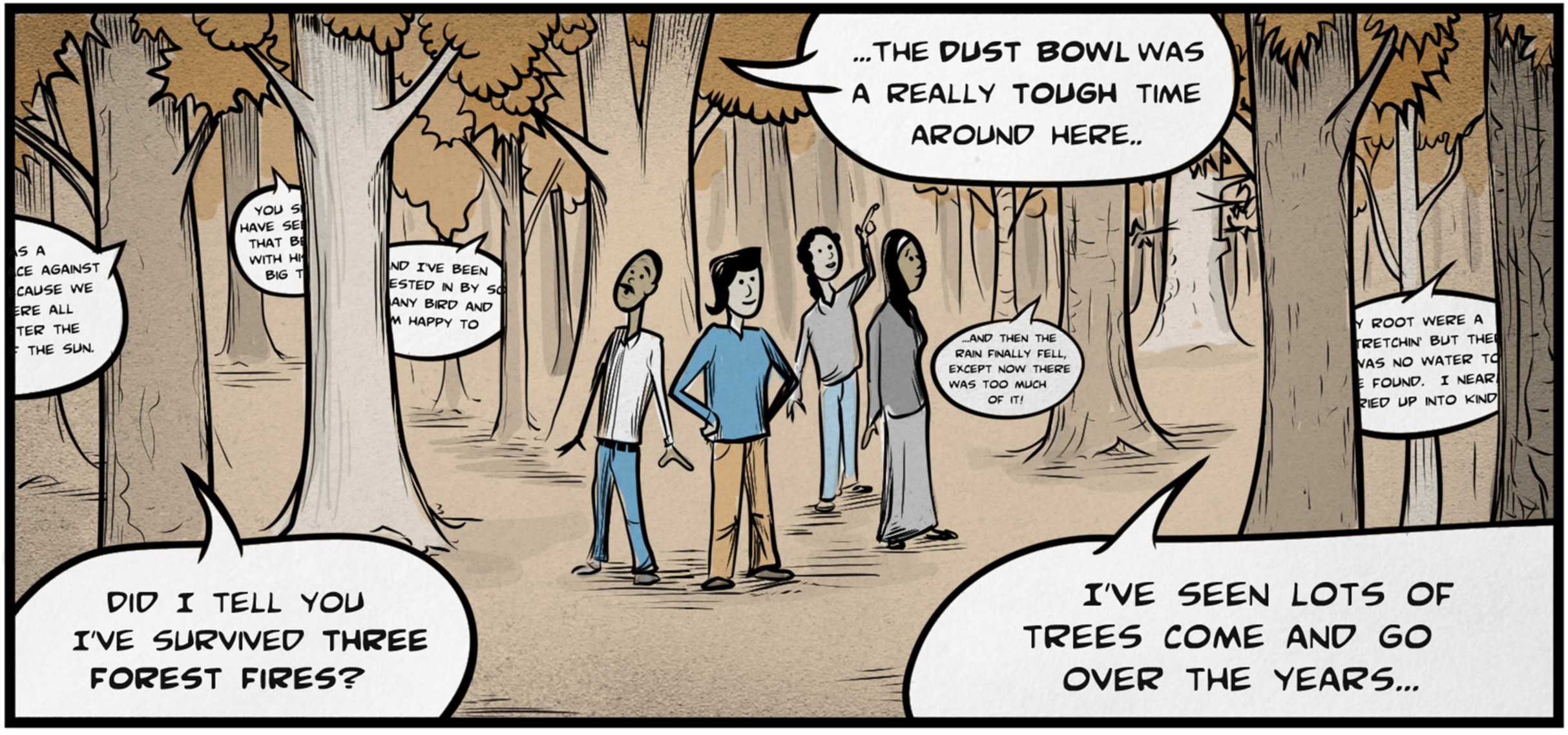
I LOVE MY JOB. I MEAN, TO UNLOCK TREES' STORIES I HAVE TO GET DIRTY AND USE POWER TOOLS.
VVRRROOOMM

BUT OUR COMPUTER MODELS ARE EVEN MORE POWERFUL TOOLS...



...HELPING US TELL THE STORIES OF HUNDREDS OF THOUSANDS OF TREES ALL AT ONCE.