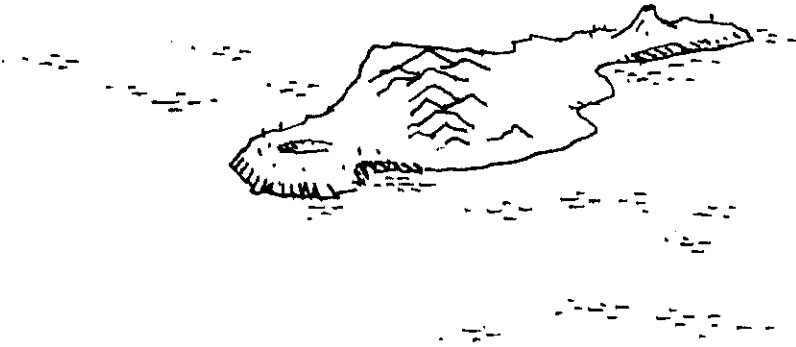


# ◇ CHAPTER 1 ◇

## FORESTS AND WATER

OUR STORY BEGINS IN A PLACE THAT'S BEEN CALLED THE MOST FAR-FLUNG INHABITED ISLAND IN THE WORLD: **EASTER ISLAND**, A 64-SQUARE-MILE SPECK IN THE PACIFIC OCEAN, 2300 MILES FROM ANYWHERE.



"HOW INAPPROPRIATE TO CALL THIS PLANET EARTH, WHEN CLEARLY IT IS OCEAN."

ARTHUR C. CLARKE

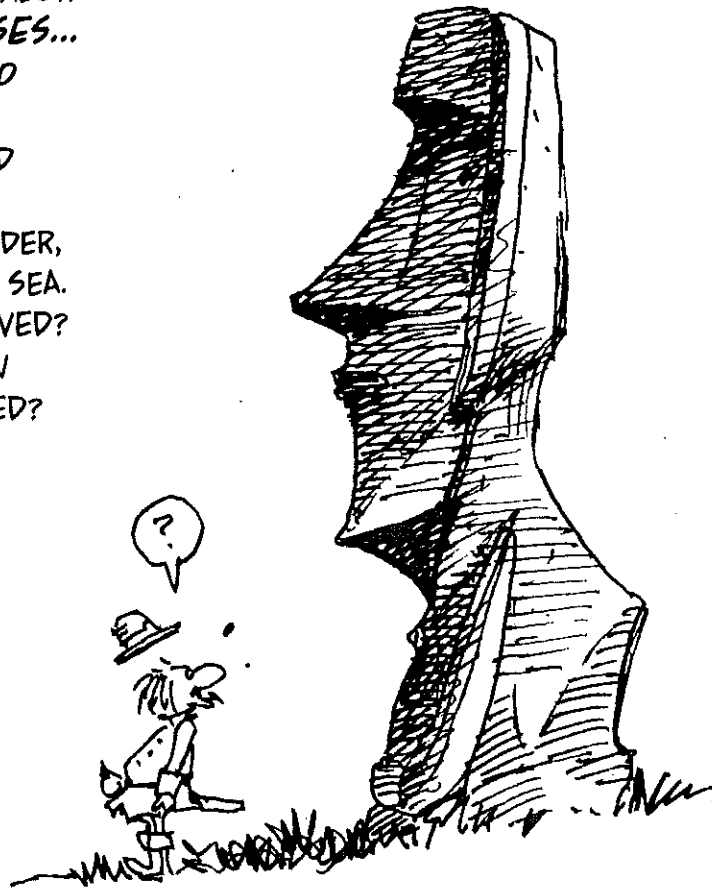
REMOTE, BUT NOT  
**DESERTED...** FROM TIME  
TO TIME VISITORS DROPPED  
BY... LIKE THE DUTCH  
ADMIRAL **ROGGEVEEN** IN  
1722. ARRIVING ON **EASTER  
SUNDAY**, HE NAMED THE  
ISLAND AFTER THE DATE OF  
ARRIVAL, AND LEFT THE  
FIRST WRITTEN ACCOUNT OF  
THE PLACE AND THE PEOPLE  
WHO LIVE THERE.



ACCORDING TO ROGGEVEEN AND OTHER 18TH-CENTURY REPORTS, SOME 3000 ISLANDERS EKED OUT A WRETCHED EXISTENCE BY FARMING BANANAS, SUGAR CANE, AND SWEET POTATOES FROM POOR, ROCKY SOIL. THE ONLY FRESH WATER CAME FROM MURKY LAKES INSIDE VOLCANIC CRATERS. THERE WAS SCARCELY A TREE ON THE ISLAND, AND THE PEOPLE WERE "SMALL, LEAN, TIMID, AND MISERABLE."



BUT AMIDST THE SQUALOR  
WERE SOME **SURPRISES...**  
ESPECIALLY SOME 800  
**MASSIVE STONE**  
**STATUES** SCATTERED  
ACROSS THE ISLAND,  
SHOULDER TO SHOULDER,  
THEIR BACKS TO THE SEA.  
HOW WERE THEY CARVED?  
HOW QUARRIED? HOW  
MOVED? HOW ERECTED?  
AND BY WHOM?



WHEN THE EUROPEANS ASKED WHERE THE STATUES HAD COME FROM, THE  
ISLANDERS GAVE THIS REPLY:



FAILING TO RECOGNIZE SARCASM WHEN THEY HEARD IT, THE EUROPEANS EMBARKED ON A SERIES OF WILD SPECULATIONS THAT HAVE CONTINUED TO THE PRESENT DAY: **SPACEMEN** SET UP THE STATUES WITH **ANTI-GRAVITY DEVICES...** A HIGHLY CIVILIZED **LOST CONTINENT** HAD SUNKEN INTO THE SEA, LEAVING ONLY EASTER ISLAND BEHIND... THEY WERE FLUNG INTO PLACE IN ONE PIECE BY **VOLCANIC ERUPTIONS, ETC. ETC. ETC.**



SINCE THE ISLANDERS HAD EITHER FORGOTTEN WHAT HAPPENED OR DIDN'T FEEL LIKE SHARING, IT WAS LEFT TO WESTERN SCIENTISTS AND HISTORIANS TO PIECE TOGETHER THE STORY WITH **CALIPERS, SHOVELS, MICROSCOPES, AND ETHNOGRAPHIC SURVEYS.**



AND HERE IS WHAT THEY FOUND OUT...

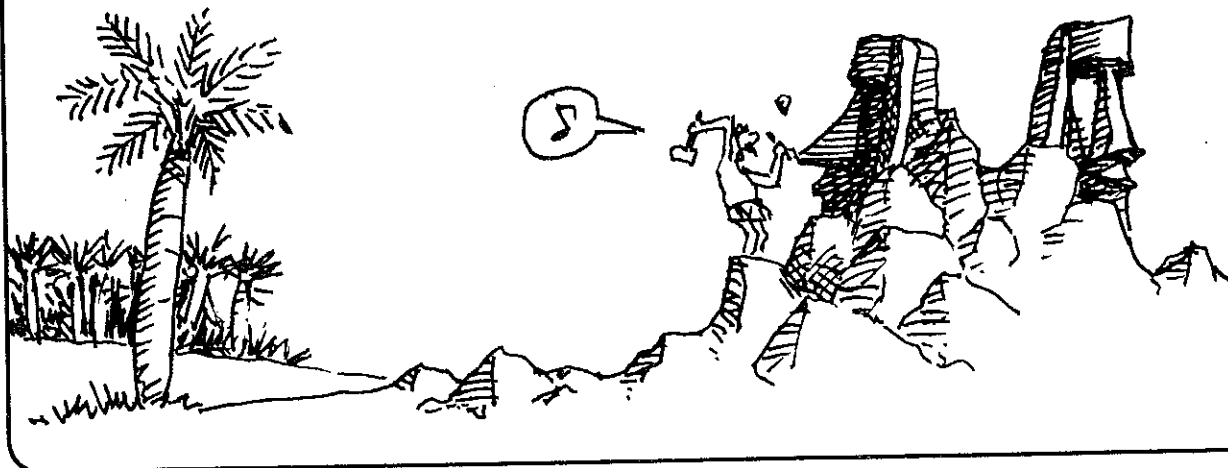
AROUND THE YEAR 400, EASTER ISLAND WAS COLONIZED BY **POLYNESIANS**. VARIOUS FEATURES OF THE ISLANDERS' SKULLS, THEIR BLOOD TYPES, SOCIAL SYSTEM, LANGUAGE, AND CROPS ARE ALL POLYNESIAN.



POLLEN SAMPLES TAKEN FROM LAKE BEDS SHOW THAT THE ISLAND WAS THEN THICKLY COVERED WITH VEGETATION. HACKING OUT CLEARINGS FROM THE JUNGLE, THE POLYNESIANS BUILT AND PLANTED, AND SOON THEY ENJOYED A TYPICAL POLYNESIAN DIET OF YAM, TARO, BREADFRUIT, BANANA, SUGAR, COCONUT, CHICKEN, AND POLYNESIAN RAT (SMALL AND TASTY!).



THEIR LIFE WAS RICH... THEIR BABIES THRIVED... THEY POPULATED THE ISLAND WITH LITTLE EFFORT... AND IN THEIR COPIOUS SPARE TIME, THEY CARVED **STONE MONUMENTS, ESPECIALLY STATUES**.

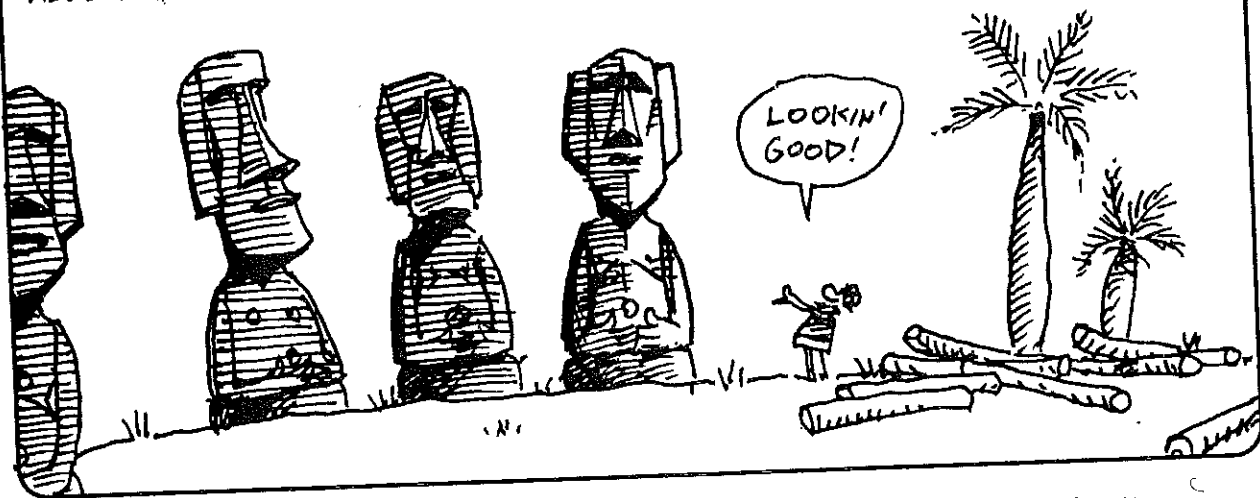


THE STATUES WERE MOVED AND SET UP WITH LOGS AND ROPE. RECENT EXPERIMENTS\* HAVE PROVED THAT WHEN A STATUE IS STRAPPED UPRIGHT ONTO LOGS CARVED INTO SLED RUNNERS, AND RAISED ONTO A TRACK OF WOODEN ROLLERS, A COUPLE OF DOZEN PEOPLE COULD PULL IT EASILY!

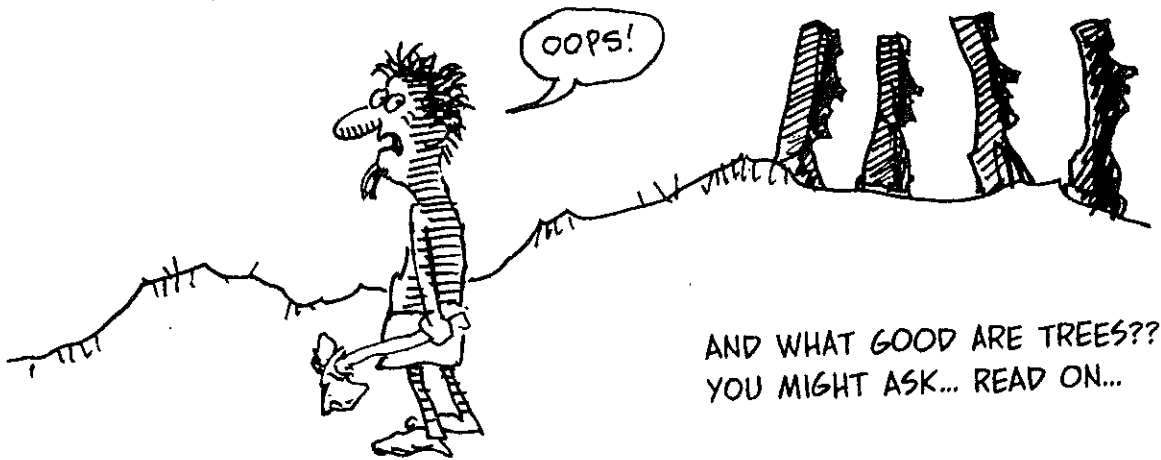


\*BY AMERICAN GEOLOGIST CHARLES LOVE.

SO THEY CUT DOWN A LOT OF TREES, NOT JUST FOR ROLLING STATUES, BUT ALSO FOR FIREWOOD AND BUILDING MATERIAL...

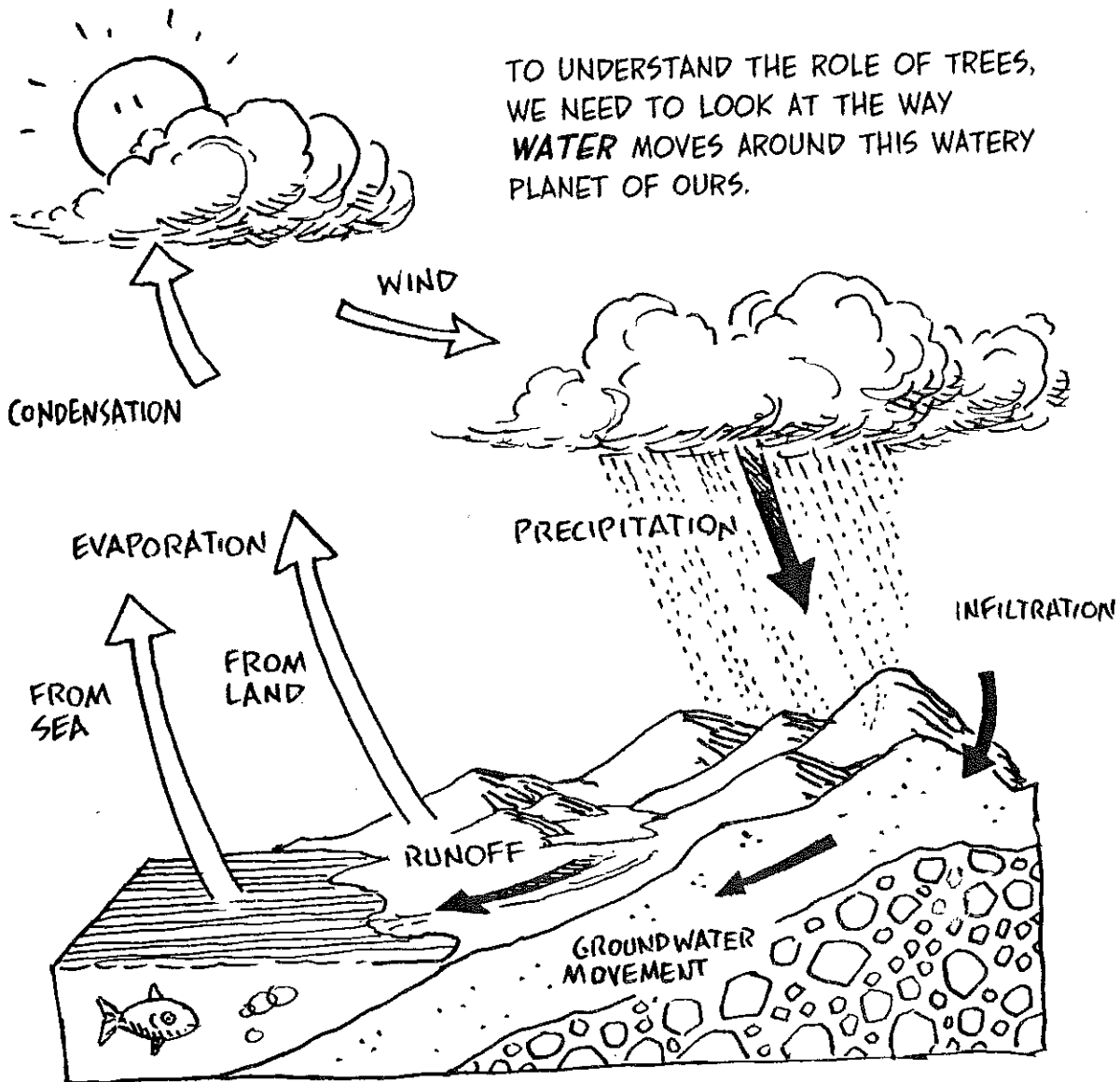


AND BY THE YEAR 1400, THERE WAS SCARCELY A TREE LEFT STANDING ON EASTER ISLAND...



AND WHAT GOOD ARE TREES?? YOU MIGHT ASK... READ ON...

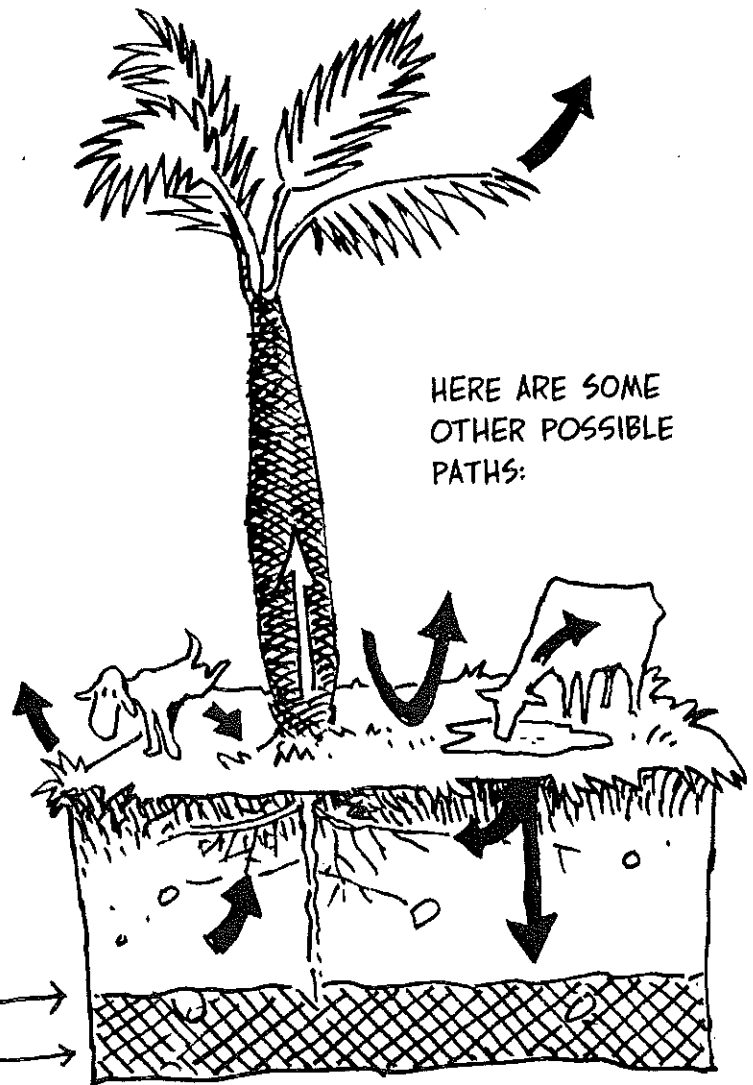
# THE WATER CYCLE



TO UNDERSTAND THE ROLE OF TREES,  
WE NEED TO LOOK AT THE WAY  
WATER MOVES AROUND THIS WATERY  
PLANET OF OURS.

CLOUDS HOLD MOISTURE, WHICH FALLS AS RAIN (OR SNOW, BUT NOT IN POLYNESIA!). IT FALLS WITHIN A **WATERSHED**, AN AREA THAT COLLECTS SMALL STREAMS INTO A MAJOR RIVER, AND ULTIMATELY RUNS TO THE SEA. WATER EVAPORATES FROM LAND AND SEA INTO THE AIR, WHERE IT CONDENSES INTO CLOUDS, AND THE CYCLE IS COMPLETED. WATER IN THE ATMOSPHERE IS FULLY REPLACED EVERY 12 DAYS.

WHEN PRECIPITATION FALLS IN A FOREST, THE WATER HAS MANY OPTIONS: SOME BARELY PENETRATES THE GROUND BEFORE IT IS TAKEN UP BY ROOTS AND PASSED BACK TO THE AIR BY TRANSPIRATION (PLANT BREATHING). SOME GOES DEEPER, ALL THE WAY TO THE GROUNDWATER.

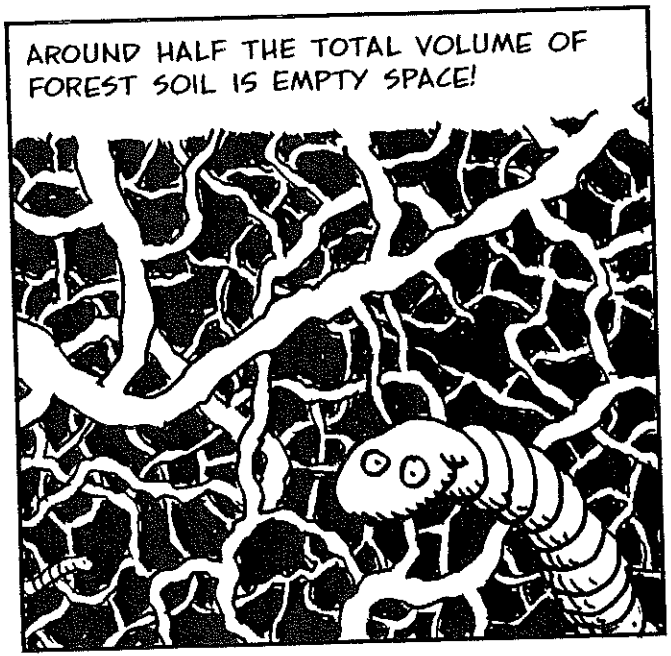


HERE ARE SOME OTHER POSSIBLE PATHS:

(WHAT'S GROUNDWATER? DIG A DEEP ENOUGH HOLE IN THE GROUND, AND YOU'LL HIT WATER. THAT'S GROUNDWATER. THE TOP OF THE GROUNDWATER IS THE WATER TABLE.)

WATER TABLE →  
GROUNDWATER →

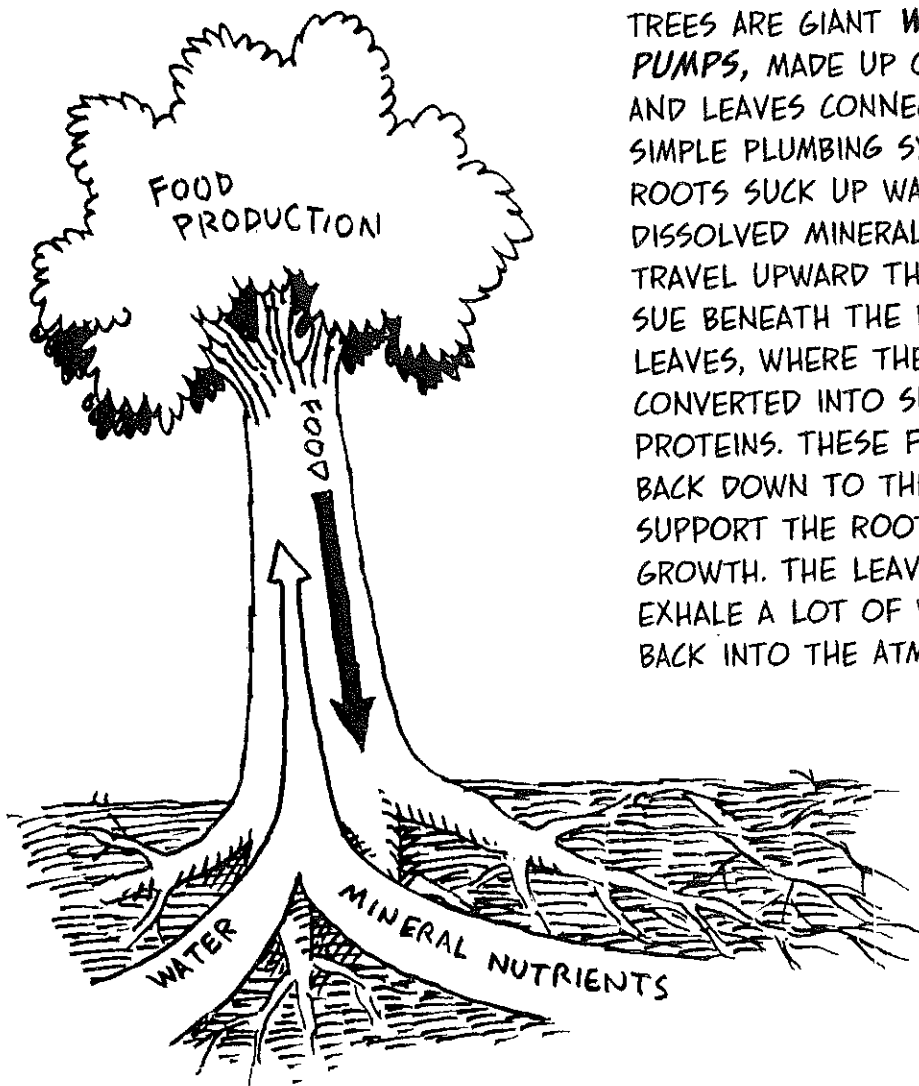
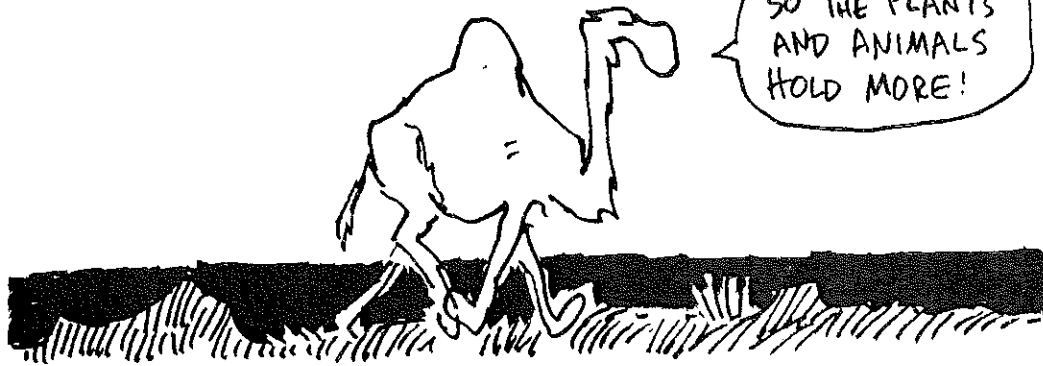
FOREST SOIL HOLDS A LOT OF WATER BECAUSE IT'S SO **POROUS**: A MIXTURE OF CLAY, SAND, AND DECAYING ORGANIC MATTER, THE SOIL IS HONEYCOMBED BY CHANNELS MADE BY ROOTS, BURROWING ANIMALS, AND FUNGI. THE TOP LAYERS TEEM WITH BACTERIA, WHICH BREAK DOWN ORGANIC COMPOUNDS INTO CHEMICAL NUTRIENTS THAT DISSOLVE IN WATER, DRIP DOWN, AND ARE TAKEN UP BY ROOT SYSTEMS.



AROUND HALF THE TOTAL VOLUME OF FOREST SOIL IS EMPTY SPACE!



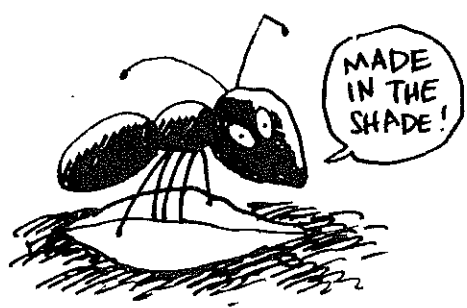
BY CONTRAST, OPEN LAND HAS LESS BIOLOGICAL ACTIVITY AND SO HOLDS LESS WATER.



TREES ARE GIANT **WATER PUMPS**, MADE UP OF ROOTS AND LEAVES CONNECTED BY A SIMPLE PLUMBING SYSTEM. THE ROOTS SUCK UP WATER AND DISSOLVED MINERALS, WHICH TRAVEL UPWARD THROUGH TISSUE BENEATH THE BARK TO THE LEAVES, WHERE THEY ARE CONVERTED INTO SUGAR AND PROTEINS. THESE FOODS TRAVEL BACK DOWN TO THE ROOTS TO SUPPORT THE ROOTS' FURTHER GROWTH. THE LEAVES ALSO EXHALE A LOT OF WATER VAPOR BACK INTO THE ATMOSPHERE.

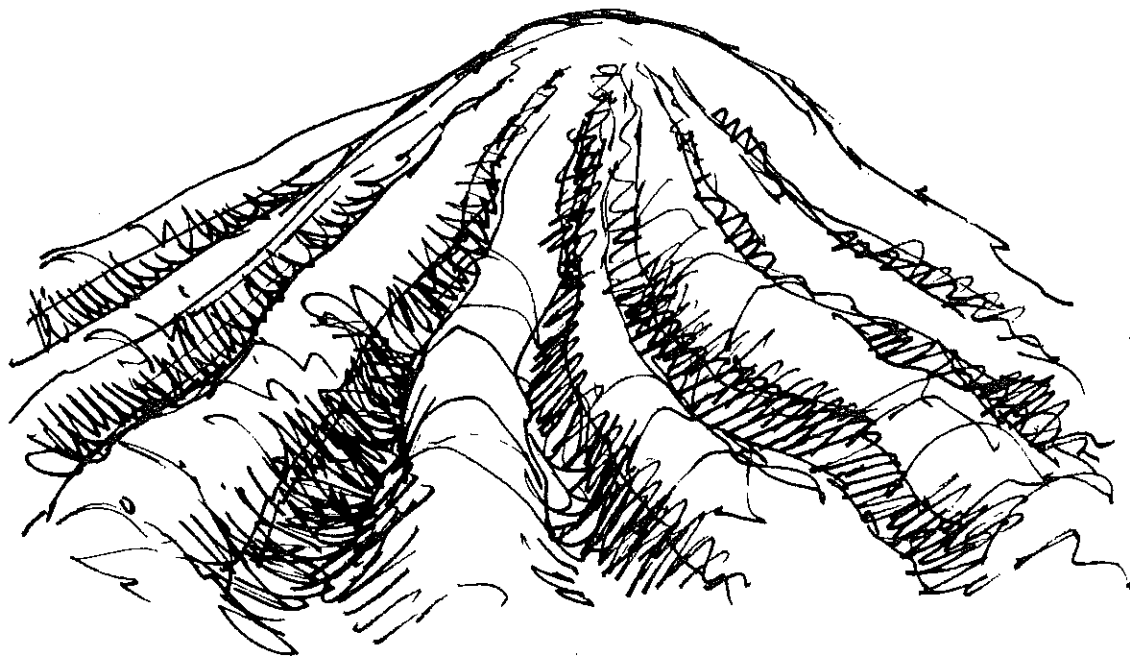
UNDERGROUND, HUNDREDS OF MILES OF TREE ROOTS ANCHOR THE TREE TO THE GROUND AND HOLD THE SOIL IN PLACE. MARVELOUS THING, A TREE!

FALLING LEAVES MAKE UP A GOOD PART OF THE DEAD ORGANIC MATTER ON THE GROUND. SHADE REDUCES EVAPORATION FROM THIS MATERIAL, AND SO, IN A SENSE, THE TREE **MANUFACTURES THE SOIL** IN WHICH IT GROWS.



THIS TAKES TIME, OF COURSE. FIRST, SMALL PLANTS PRODUCE A LITTLE TOPSOIL, WHERE BIGGER PLANTS CAN GROW. EVENTUALLY, ENOUGH NUTRIENT-RICH EARTH BUILDS UP TO SUPPORT A FOREST, WITH ALL ITS TEEMING SPECIES.

WHAT HAPPENED ON EASTER ISLAND? WHEN A TREE IS CUT DOWN AND ITS ROOTS DIE, THE TOPSOIL LOSES ITS ANCHOR. 4 TO 5 FEET OF EARTH MAY EVENTUALLY BE WASHED AWAY, AND THERE IS NO QUICK WAY TO REPLACE IT.



WITHOUT FORESTS TO ABSORB RAIN AND REPLENISH GROUNDWATER, THE ISLAND'S STREAMS AND SPRINGS DRIED UP... THE AIR BECAME LESS HUMID, AND RAINFALL DIMINISHED. AS FERTILE TOPSOIL ERODED, CROP YIELDS FELL... THERE WAS NO WOOD FOR HOUSES... NO FIBERS FOR FISHING NETS OR SAILCLOTH, NO LOGS FOR CANOES...

AND WORST OF ALL: WITHOUT CANOES, NO ESCAPE!



RIVALRY FOR RESOURCES LED TO PERMANENT WARFARE. UNFORTUNATELY, CLAN PRESTIGE WAS DISPLAYED BY *ERECTING STATUES*, SO THE LAST TREES WERE PROBABLY CUT DOWN IN A FRENZIED EFFORT TO SHOW OFF...

SO THERE!!



THE POPULATION PEAKED AT AROUND 7000 PEOPLE IN 1550 AND COLLAPSED SO QUICKLY THAT SOME 400 STATUES WERE LEFT UNFINISHED IN THE QUARRIES.

WHAT ARE THEY DOING NOW?

REDUCING THE POPULATION FURTHER...



BUT THE RIVAL CLANS FOUGHT ON... THEY PULLED EACH OTHERS' STATUES DOWN... AND BY 1860, EVERY STATUE ON THE ISLAND HAD BEEN TOPPLED.

WHEW!



THE POINT OF THIS STORY IS NOT THAT THE PEOPLE OF EASTER ISLAND WERE SOMEHOW STRANGE, SILLY, OR DIFFERENT FROM ANYONE ELSE. QUITE THE CONTRARY: LIKE THE REST OF US, THEY WERE **CREATURES OF HABIT**, AND THEIR WAY OF LIFE—FARMING, FORESTRY, BUILDING, AND DISPLAY—WAS HARD TO CHANGE.

UNTIL IT WAS TOO LATE, THAT IS...



EASTER ISLAND IS VERY SMALL. FROM ITS SUMMIT YOU CAN SEE THE WHOLE THING. THE PERSON WHO CUT DOWN THE LAST TREE MUST HAVE KNOWN THERE WERE NO MORE—AND STILL HE CUT IT DOWN.



OUR PLANET, WHILE MUCH LARGER, IS STILL FINITE. LIKE THE ISLANDERS, WE TOO CAN SEE IT ALL, AND LIKE THE ISLANDERS WE HAVE NO MEANS OF ESCAPE. IS IT STILL POSSIBLE THAT WE CAN TAKE STOCK OF OUR RESOURCES AND CHANGE OUR HABITS IN TIME TO AVOID THE FATE OF EASTER ISLAND?

YES... IN JUST A MINUTE... OR MAYBE AFTER WORK... TOMORROW IS GOOD... THERE'S A NATURE DOCUMENTARY I WANT TO CATCH ON THE TUBE TONIGHT...

