

The Final Empire

CHAPTER 4

THE FOREST

The forests are the "lungs of the earth." They respire oxygen and inhale carbon dioxide; they also build soil, absorb moisture and translate sunlight into biomass more efficiently than any other ecosystem on earth.

In the view of Rudolf Steiner, the German mystic and creator of Biodynamic Gardening, the forest organism itself has organs. These include the soil, the plant stalks and the wind. The soil is the digestive organ of the forest.

The wind is the breath of the forest.

The tree bodies are the vascular system. From their roots deep in the ground trees bring up both water and minerals. Transpiration humidifies the air, moderates extremes of temperature, and creates complex microclimates that are rich habitats for many diverse life forms. The minerals come to rest in the tree's body, which will one day become topsoil.

One of the great benefits of forests is to moderate hard rains so that the water soaks into the soil and subsoil. Rain soaks into the forest floor and feeds the streams and aquifers. Because a native old growth forest recycles nutrients so efficiently, the water running from it is very pure, with little mineral content and few suspended solids.

In this way a forest supports the adjacent aquatic ecology. It is the quality of water that drains from the forest, which is important. In the Temperate Zone forests, whole fisheries have been destroyed when logging, especially clear-cut logging takes place. Without the trees, erosion soon begins to change the chemical and particulate composition of the water. Migrating salmon for example require small gravel in the streambed for their spawning. The gravel must be just the right size relative to their eggs so the eggs will be protected from predators. It must be porous enough so that the fry, when they hatch, can escape. When silt covers the gravel, the fish eggs die, fisheries are destroyed, the habitat of the aquatic plants is impaired and water supplies are degraded.

Forests have a great effect on rainfall. They actually create rain. Trees send a huge volume of moisture into the atmosphere. One medium sized, ordinary elm tree for example, will transpire 15,000 pounds of water on a clear, hot, dry, day. As a storm front moves through from the ocean, the moisture that has evaporated upward from the land helps to recharge rain clouds in a continuous cycle. The moisture from the earth surface is in micro-droplets that atmospheric moisture condenses around, then

falls back to earth. Vast amounts of water vapor rise to the clouds, then fall again as rain.

In both temperate and tropical rainforests there is also the phenomena of fog drip. As fog rolls through, water droplets are caught on the vegetation and drip down to moisturize the lower zones. The capture of water by this action adds significantly to the moisture levels of these forests.

Another significant effect of forests is the creation of electrically charged, negative ions. Negative ionization occurs heavily near waterfalls, on ocean beaches and in moist forests. A concentration of ionization creates an electrical field. The work of pumping water up out of the subsoil and transpiring it tends to moisturize the area and contributes to the negative ionization. Laboratory experiments show that plants will grow significantly larger in a negative ion-rich environment than in neutral or positively charged environments such as cities, clear-cuts or hot, windy deserts.

The forest is not simply a random group of trees. It is a vast complex of organisms which have lived together and differentiated their forms and relationships over millions of years. Their circulation of energies creates a giant metabolism. Native forest provides habitat for the largest number of species per acre of any ecosystem, except possibly a coral reef. Because of this, reforestation cannot repair damage. When industrialists replant forests they do not replant with the intention of returning a native forest ecosystem. Usually the land is replanted with some designer tree species that has economic importance and other species are left out. Tremendous amounts of money are now being spent to create genetically engineered trees for replanting cut over or damaged sites. In fir forests for example, after the clear cut, the industry spends millions of dollars, mostly on poisons, trying to defeat the healing succession of the forest in order to immediately replant fir trees. If the previous forest was a mix of cedar, alder and other trees with the fir, only the commercially valuable fir will be replanted. All of these replanting efforts are essentially "tree plantations" and were never meant to recreate a native forest. The true native forest with all of its complex web of life is gone and replaced by a tree farm, more like a corn field but with a longer life-span. Far from being a perpetual forest, as the ballyhoo of corporate public relations offices would like to picture it, these tree farms function in permanently damaged soils and reduced nutrient condition.

The human family has done very well as forest dwellers for several million years. Native people of the great forests of China, Europe, and the mixed forest of the eastern North American continent lived in one of the richest habitats possible. The few native agriculturists remaining in tropical rainforests can today easily grow more food per unit of energy input than the modern industrial system. Some continue to practice swidden agriculture, one of the most energy-efficient systems known. The ancient system rotates small clearings in the forest. The dozens of domesticated and semi-domesticated garden plants feather off into the mature forest so that there is no real break in the ecosystem. These complex gardens are products of the natives' deep knowledge of living things. The gardens flow with the tendency of natural life toward diversity and mutual benefit.

Later, as a part of our analysis of solutions we will present a contemporary version of this sophisticated food system.

How the Forests Went Down

It is estimated that more than one third of the earth was forested prior to the culture of empire. This is roughly 30 billion hectares (nearly 94 billion acres).¹ The most recent estimates show that only about a tenth of the forests remain, some 4 billion hectares (about 9.9 billion acres).² It is important to note here that these figures refer to any assemblage of trees, not just the climax ecosystems. The amount of uninjured old growth forest remaining has never been calculated; indeed, this minuscule, high-value remainder is so much in demand by the timber industries of the world that any calculation would be immediately outdated because the trees are disappearing so fast.

When forests are cut, the rainfall, which the trees had moderated, rushes over the bare surface of the Earth, carrying off the loose soil. The silt-laden runoff swells and overflows the riverbanks, flooding the lowlands, scouring out and widening the riverbeds. When the living system of roots, which held the soil on the hillsides, is gone, landslides become increasingly frequent. When the dry season returns, no reserves of moisture remain in the ravaged soil. A worsening cycle of flooding and drought begins. Without the moderating effect of the transpiration of the trees, and without the forests' tendency to attract rainfall, drought increases.

Throughout the world this process of depletion is occurring. If it were not for all of the other crises on the planet, the disappearance of the world's forests alone would be considered a planetary emergency, so important are the services of forests to the planetary ecosystem.

All of the major forest ecosystems of the planet are under severe attack. The forests of all continents are suffering severely.

Throughout the foothills of the Himalayan Mountains forest destruction is proceeding rapidly. Goat herders work their way up the slopes felling trees, selling the firewood, burning it for their own use and feeding the twigs and leaves to the animals. People who then try to farm the steep slopes often follow these goat people. The demand for firewood in the denuded lowlands and the attempts to farm even the steep, high mountainsides is stripping the land. Floods, erosion and drought are the result.

Nepal is headed toward desert status. Firewood shortages in Nepal force the people to use dung and crop residues for fuel to heat their habitations and cook their food. Authorities calculate that depriving the soil of this dung and residue reduces the annual grain yield of the country by 15 per cent.³

Through the ages of empire, forests have receded before the goats of the herders and the people with the plow. Because forest soils are rich, civilized people always seek to clear them and plow the fertile soil. This destruction is rivaled by that of the charcoal burners who have gone out like locusts and stripped the forests for the metal smelters, for limekilning, for the ceramics industry, and to provide fuel for cooking and heating of houses. The ancient empires were deforested early. For example, the plateau east of the Turkish Mountains, where the present city of Ankara is located, was once a forested region. Its fate was similar to that of the Armenian highlands. Authorities believe that the original forest covered 70% of the land area of the plateau; forest

cover is now reduced to 13%. The remainder of the plateau has now irreversibly regressed to steppe conditions.⁴

Author Thor Heyerdhal has made many journeys in reed rafts since his book *Kon Tiki* was published. In a recent journey he sailed a reed raft along the southern coast of Arabia. He and his crew hauled ashore in a desolate area of Oman. In a short expedition inland they discovered a huge open pit copper mine from the Sumerian era five thousand years in the past. It is difficult; now, to imagine that this desert once harbored forests which could support smelting on such a scale. But the evidence is there.

Even the Sinai which is located to the Southeast and the Negev, East of the present state of Israel, bear evidence of past, perhaps abundant forests. The 1960 investigations of Sir William Flinders Petrie into mining operations in the Wadi Nash area of the western Sinai desert, believed to date from the third millennium, BC, yielded unmistakable clues:

"(Petrie) found a bed of wood ashes 100 feet long, 50 feet wide and 18 inches deep, and also a slag dump from copper smelting, 6-8 feet deep, 500 feet long and 300 feet wide. It seems that the adjacent area, now desert, must have borne combustibles during the period when the mines were operating. Similarly, in the Negev, copper smelting kilns of a highly developed kind dating from 1000 BC have been found in the now quite desert-like Wadhi Araba."⁵

The forests of the Mediterranean region all figured centrally in the strategies of the empires through the ages. Besides being burned at the smelters, forests were the raw material for the shipbuilding industry. As nearby forests disappeared, a major thrust of imperial strategies was to conquer the forests of other areas to be used to build more ships for war and for trade. Whole empires rose and fell based on the availability of forests.

The wars of the empires also caused much deforestation because of deliberate burning of whole forests in order to debilitate the enemy. Many of the instruments of war required forests. Wood was used for chariots, battering rams, fortifications, scaffolding and other instruments of the siege against walled cities. Forests were used in the siege of Lachish, in 588 BC by the Babylonian, Nebuchadnezzar. "After 2500 years, layers of ash several metres thick still remain, higher than the remains of the fortress walls. The hills for miles around were cleared of trees. The wood was piled outside the walls and fired. Day and night sheets of flame beat against the walls until eventually the white-hot stones burst and the walls caved in."⁶

Archeology corroborates Biblical reports that much of what is presently Lebanon had closed-canopy forests and Israel was once forested or at least had considerable natural tree cover. The cedar forests of Lebanon were logged early by the Egyptian empires to be used for building materials and ships, and by all the following empires until they were gone. Today, the only remaining remnant groves of the Cedars of Lebanon are located in some of the monastery yards, which exist in the former forested zone. A few years ago, when a small amount of forest still stood outside of the monasteries, a UN Food and Agriculture report recorded a scene that is ages old but still continues in remnant forests throughout the world:

In the Lebanon Mountains...the scene had to be witnessed to be believed for there one can see the most incredible scenes of wanton destruction of the last remnants of these beautiful trees. Not only are the last trees being sought out and hacked down for timber and fuel, but one sees mature trees being lopped and actually felled in order to provide goat fodder. So heavy is goat grazing...that the flocks have already consumed nearly all forms of vegetation within their reach. The shepherds, unperturbed, have therefore resorted to felling the last remnants of high forest in order to satisfy the empty bellies of their ravenous flocks. It is an astonishing sight to see a fine cedar or silver fir tree felled for this purpose and then to see hundreds of hungry goats literally pounce upon it the moment it falls to earth and devour every vestige of foliage from the branches. It does not take many minutes for such a flock to strip a tree of its foliage. The felled tree has then served the shepherd's purpose and is left to rot where it fell; he then turns his attention to the next tree and so on. (FAO, 1961)"⁷

The practice of destroying forests as a war strategy continues today. Defoliation of the tropical forests of Vietnam by United States' chemical warfare stands out as an egregious example. U.S. "humanitarian" aid to the Nicaraguan Contras was used to purchase chainsaws so that they could destroy and incidentally make some money from the sales of irreplaceable tropical forest along Nicaragua's southern border. Contra attacks have also targeted ecological restoration efforts. In Guatemala, the Drug Enforcement Administration of the United States government has sponsored the spraying of many thousands of acres of tropical rainforest. Because of the secretive nature of the project it is not known what poison is being sprayed, but it is known that many unnatural fires occurred in the Guatemalan forests and this indicates that the forest has been debilitated.

Deforestation Follows the March of Empire

The Moors burned the bulk of what was left of the North African forests in the early Middle Ages on their way to Spain. The forests of Spain and Italy dwindled steadily and then their final destruction was accomplished by the Moors who brought sheep. The deforestation of Spain and Italy became severe at that time.

The great forests of Europe and the British Isles began to go down for Celtic bronze smelters. Destruction stepped up with the Romans, who cleared the land for agriculture and shipbuilding. European forest destruction continues to the present day.

As colonists invaded North America, they simply burned huge tracts of forest in order to open it up to European-style agriculture. In 1756 John Adams spoke for the perception of the empire. Referring to the area of the continent now covered by cities, industrial wastelands, toxic waste dumps, poisoned air, poisoned waters and forests dying from acid rain, he observed:

The whole continent was one continued dismal wilderness, the haunt of wolves and bears and more savage men. Now the forests are removed, the land covered with fields of corn, orchards bending with fruit and the magnificent habitations of rational and civilized people."

In Canada the southern agricultural regions have lost two-thirds of their forests. In the United States, deforestation has had a longer history. "In the United States 900 million

acres were originally wooded with more than 1,100 species of trees, a hundred of which had great economic value. Only 647 [species] remain and only 44 million acres have preserved their original forest."⁸

Farther south on the American continent, Mexico, which was originally 50 per cent forested⁹ has lost one-fourth of its forest lands each century since the conquest.¹⁰ Much of the forest of Mexico went to fire the smelters to melt the ores of Mexico's mines. In some areas whole forests have disappeared for this purpose. Today, there are no forests in Mexico that are in their original condition.

The Poison Air, The Poison Rain

Not only are chainsaws, road building and land clearing threatening forests, now, the airborne poisons that float up from civilized areas are killing the forests of the earth. Notice first began to be taken when lakes began to die. After the biological death of hundreds of lakes in Scandinavia and North America, scientists concluded that it was something in the air that was causing it. Then it was realized that forests were also dying. There is controversy as to which combination of chemicals is doing the most harm, but there is no doubt that the airborne poisons floating off industrial areas is the cause. These contaminants are changing the chemistry of whole regions.

The acidity is changing the pH (acid/alkaline) balance of the soils. Plants are specifically adapted to this balance. Different species can tolerate different levels of acidity. The plants that grow in any ecosystem grow there because they are adapted to exactly that soil. As acid rain changes this balance over time, not only forests but also whole ecosystems will die out.

There are many areas in Russia, Scandinavia, Europe and North America near industrial zones where forests are already dead. Even areas where there are green and apparently healthy forests there is also damage. Close study has shown that the rate of growth of trees slows down when they are impacted by the poisoned air. Investigation has shown also that regeneration rates slow down or stop. That is, there are fewer or no infant trees growing up from the forest floor.

In Central Europe, the Worldwatch Institute says that: "Trees covering more than 5 million hectares-an area nearly half the size of East Germany- now show signs of injury linked to air pollutants." In North America, forest death is beginning in some areas of the northeastern U.S., southern Canada and with trees in and around Mexico City. In southern California, the Southeast and Appalachia, studies have shown impact. It is safe to say that anywhere industrial poisons reach, ecological damage occurs.

Acid rain not only effects the natural ecology, but people and agricultural crops as well. The Worldwatch Institute states that: "In the United States, [ground level] ozone is lowering the productivity of corn, wheat, soybeans, and peanuts, with losses valued at \$1.9-4.5 billion each year."¹¹ Poison industrial air causes human allergies, contributes to emphysema, heart disease and other medical conditions.

The Vanishing Tropical Rainforest

Tropical rainforests are the womb of life on this planet. Some of the older tropical forest areas have been standing for 70 to 160 million years. Norman Myers points out that, "Following the glaciations of the Ice Ages, when much of the temperate zones became barren, tropical forests supplied a reservoir of life forms by which the sterilized areas recovered much of their biological health."¹² As we slide into the depths of the crisis of the Final Empire, much disruption will be due to the destruction of tropical rainforest. One of the immediate results is the greenhouse effect. The destruction of tropical forests contributes a large portion to the carbon dioxide buildup because tropical forests are the major reservoirs of carbon on the planet. As tropical forests are burned and decomposed, the carbon dioxide goes into the atmosphere along with that from burning fossil fuel. These are two important factors producing the greenhouse effect.

Forests in general and tropical forests in particular are stabilizers of climate for the planet. The green mat absorbs heat and generates rain. These factors have led to the climatic patterns that we now have. When these factors are gone, we can expect wild fluctuations in all meteorological systems. **Civilization equals aridity.** As we reach the depths of the crisis we can expect heat and aridity, interspersed with torrential rain. There will be unusual winds, tornadoes and cyclones as weather systems at different elevations of the atmosphere mix.

The destruction of the bulk of the tropical forests has happened in the last half of the Twentieth Century. It is a phenomenon of excess human population, extortion by the transnational corporate elite and clearance for temporary cattle grazing by colonial elites. In 1950, 15 per cent of the earth's surface remained covered by tropical forest. By 1975 this was down to 12 per cent and, given the general exponential increase of civilization, it will be gone by 2000.¹³ The rate of destruction is so large and increasing so fast that in the eighteen years between 1966 and 1984 the area of tropical forest in Ivory Coast was down 56 per cent; in Gambia, 35 per cent; in Costa Rica, 45 per cent; in El Salvador, 37 per cent; in Nicaragua, 33 per cent; in Ecuador, 17.5 per cent; in Thailand, 40 per cent; in the Philippines, 28 per cent; and in Australia, 23 per cent.¹⁴

The earth's islands have been devastated by the expansion of the European Empire. Islands, because of their isolation usually develop delicate and unique life systems. They are easy to approach and ship "resources" from. Because islands are usually small and easily controlled, colonial elites have been able to remove their raw materials quickly. Haiti was once a tropically forested island. Now, less than 2 per cent of its original forest remains. After the Native American population was worked to death, the colonial elite used African slaves to work the soils of the bottomlands with plantation agriculture. After the elite was dispatched by a slave revolt, population began to climb and even the mountainsides were stripped. The denudation of the remaining forest has reduced the rainfall by nearly half in the last ten years. The country now imports 70 per cent of its food.¹⁵

The Planetary Greenhouse

Among the swift planetary changes about to occur within the next several decades is the warming of the earth caused by the "Greenhouse effect." The warming of the atmosphere is caused in part by the increase in carbon dioxide created by human

activities. The burning of fossil fuels and deforestation are the primary producers of the carbon dioxide abundance. The other sources of warming are methane, the chlorofluorocarbons, oxides of nitrogen and low elevation ozone. The effect of these substances in the high atmosphere is to reflect heat back to the surface of the earth rather than allow it to refract back out into space. Beginning with the industrial revolution, the level of carbon dioxide in the atmosphere began to rise. In the past one hundred years the level of carbon dioxide has risen twenty five per cent and the level of atmospheric methane has doubled.¹⁶

There is little scientific dispute that a planetary warming will occur because of the Greenhouse phenomenon, although there is considerable dispute concerning the intricacies of all of its effects.

This change that the planet is about to undergo will be extremely swift on a geological time scale. It will shred ecosystems. We know that some plant and animal species are more resilient when impacted with temperature and climactic changes than others are. The most susceptible will be the first to go and as the web of the ecosystem begins to develop "blank spaces," the natural flows of biological energy will be disrupted.

The effects of empire are to shift planetary energy flows out of cycle. The Greenhouse effect is one of the major influences in this disruption. As the cycles of life are deformed on earth we can expect to see wild fluctuations in temperature, moisture, winds, ocean currents and other macro-flows of planetary energies.

One aspect of our prescription for balanced living is to create large inventories of seed. We do not know what the climates will bring specifically, but the wider range of seed that we have and the wider the diversity of our food growing system, will add to our survival.

The Failing Ozone Layer

An important role of the high atmospheric ozone layer is to filter out ultra-violet light. Holes in the ozone layer have been opening each year and growing larger. The breakdown of the chemical makeup of the ozone layer is caused by chlorofluorocarbons, particularly, cfc-11, and cfc-12. These are produced by refrigerants, aerosol propellants, solvents and blowing agents for plastic foam production¹⁷ The immediate effect of more ultra-violet light on humans will be increased incidence of skin cancer. The effects on the ecology are less understood. Different species of plants and animals will react in different ways to the increase in ultra- violet light. As these impacts deepen the ecological system will be damaged in ways similar to the changes being created by the Greenhouse effect. The species most susceptible to the changes will be the first to go and as they go the ecosystems will progressively deteriorate. The changes from the thinning ozone layer and the Greenhouse effect will be so swift that ecosystems will not have time to adjust to the changes such as they did when the ice age retreated over many hundreds of years.

NOTES

1 *International Green Front Report*. 1988. Michael Pilarski. Friends of the Trees pub. P.O. Box 1064, Tonasket, WA 98855. p.11.

2 *World Resources 1987: An Assessment of the Resource Base that Supports the Global Economy*. International Institute for Environment and Development and the World Resources Institute. Basic Books. New York. 1987. pp. 58,59. (This study gives a figure of 4.1 billion hectares of forest remaining).

State of the World 1988. Lester Brown, et. al., Worldwatch Institute. W.W. Norton. New York. 1988. p.83. (This study gives a figure of 4.2 billion hectares of forest remaining).

3 Brown. op. cit. p.88.

4 *Man and the Mediterranean Forest: A history of resource depletion*. J. V. Thirgood. Academic Press. 1961. p. 52.

5 *ibid.*, p. 57.

6 *ibid.*, p. 58-59.

7 *ibid.*, p.73.

8 *Before Nature Dies*. Jean Dorst. Houghton Mifflin Co. Boston. 1970. p.136.

9 *Losing Ground: Environmental Stress And World Food Prospects*. Erik P. Eckholm. W.W. Norton & Co. New York. 1976. p.35.

10 *The Hungry Planet: The Modern World at the Edge of Famine*. Georg Borgstrom. Collier Books. New York. Second Edition. p. 309.

11 *State of the World 1985*. Lester R. Brown, et. al. W.W. Norton & Co. 1985. p.121.

12 *The Primary Source: Tropical Forests And Our Future*. Norman Myers. W.W. Norton & Co. 1984. p. 12.

13 *Gaia: An Atlas of Planet Management*. Norman Myers, General Editor. Anchor Books. Garden City, New York. 1984. p. 42.

14 *World Resources 1987*. op. cit. pp. 268-269.

15 *The Oregonian*. (newspaper) Portland, Oregon. 7/21/88. p. B-3.

16 *Scientific American*. September, 1989. Vol. 261, #3. "The Changing Climate," by Stephen H. Schneider. P. 73.

17 *Scientific American*. op. cit. "The Changing Atmosphere," Thomas E. Graedel & Paul J. Crutzen. p. 63.