GROWING GREENER CITIES

A TREE-PLANTING HANDBOOK

GLOBAL RELEAF®

FOREWORD BY GRAHAM NASH

GROWING GREENER CITIES

A TREE-PLANTING HANDBOOK

GLOBAL RELEAF®

by
Gary Moll & Stanley Young

Illustrated by
Thomas C. Whittemore

LIVING PLANET PRESS
WASHINGTON, DC

Published in the United States by
Living Planet Press
2940 Newark Street, NW
Washington, DC 20008

Distributed by
The Sewall Company
145 Lincoln Road, Lincoln, MA 01773
1-800-258-0559

Interior design and page layout: Karen Bowers
Cover design: Annmarie Dalton

ISBN 1-879326-13-2

Printed on recycled paper

Manufactured in the United States of America

Library of Congress catalog card number 91-78089

10 9 8 7 6 5 4 3 2

FOREWORD

My musical career has given me the opportunity to travel the world and to experience firsthand the importance of the individual in implementing change. We all have a voice in our future, and a choice in the actions we take. Everything we do, from brushing our teeth to starting our cars, affects the environment for better or for worse. As the world population moves toward 6 billion people, our environmental impact is growing more potent each year. This impact is nowhere more evident than in our cities. When people congregate in ever greater numbers, the negative consequences are formidable. Living in Southern California, I have witnessed years of polluted air and water. We may not be able to clean up our cities overnight, but we can start to make a difference by making them greener places. Planting a tree may be the simplest, most immediate, and most effective way to make a personal commitment to the environment.

Growing Greener Cities will inform you about trees and the critical role they play in the natural cycles of the Earth. You will learn why we should plant more trees and take better care of the ones we have—and then find out how to do it step by step. This book is for people who want to add their voices to mine, to Global ReLeaf, and to the millions of individuals who are taking positive actions to help the environment.

Ecology is the study of balance. Proper balance creates harmony. If we can learn to "harmonize," we can create a voice more powerful than the sum of its parts and help to change the way we think about the environment. So plant a tree in your yard, join with a community group to plant and care for the trees in your neighborhood, let your local leaders know that you care about the trees along the streets and in the parks, and help them learn more about the ecological benefits trees provide. We not only have the responsibility but the power to make our planet a greener and healthier place.

—Graham Nash

ACKNOWLEDGMENTS

This book represents the ideals of the American Forestry Association (AFA) in every sense of the word. Staff members are involved in detailed conservation work every day, ranging from policy work on Capitol Hill to digging holes to plant trees with local tree groups. The staff of the American Forestry Association deserves a thank-you for their help, along with two AFA board members, Bob Skiera and Donald Willeke.

A few people at AFA deserve special recognition for the major roles they played in getting this book to press. Deborah Gangloff, vice president of program services, is our Global ReLeaf expert. She gave me guidance and support from the early development of the book to production. Dan Smith, director of communications, was an excellent reviewer, partner, and promoter; and Neil Sampson, our executive vice president, encouraged us to do the book and helped write about the tough issues, such as hydrocarbons. Lastly, thanks to my wife, Diane, who reminds me to keep life in perspective.

— G.M.

Thanks to Dinah Berland at Living Planet Press for her constant grace and expertise under pressure; to Stephen Tukel and Joshua Horwitz for letting me branch out; and as ever, to Janice for her understanding, and now Alyssa, who will enjoy tomorrow's shade of our flourishing urban forests.

— S.Y.

CONTENTS

Foreword

by Graham Nash v

PART I: WELCOME TO THE URBAN FOREST

A Forest Grows in the City 2
Making the City Livable. 4
Global Warming 8
Janitors of the Air 11
The Oasis Effect 15
Slowing the Wind and Rain. 18
Fighting a Numbers Game 20
Getting to Know the Urban Forest 23
Of Trees, Settlers, and Cities 27
Seeing the Forest and Its Trees 30

PART II: PLANTING YOUR TREE

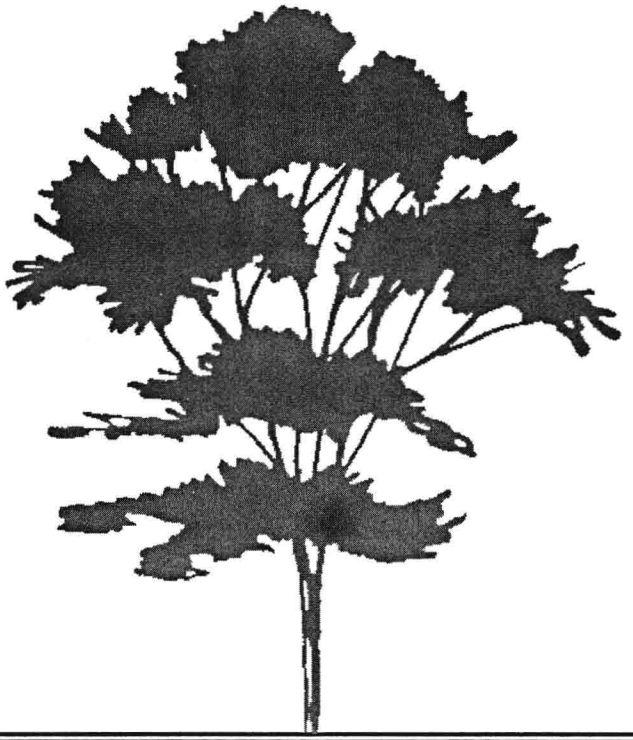
The Right Tree in the Right Place. 32
Step One: Exploring the Urban Forest. 34
Step Two: Planning Your Landscape. 44
Step Three: Shopping for Your Tree 49
Step Four: Preparation and Planting 51
Of Streets, Pits, and Pots 56
Step Five: Caring for Your Tree 60
Step Six: Enjoying the Fruits of Your Labor 70
The Anatomy of a Tree 70

PART III: GLOBAL RELEAF, THE COMMUNITY, AND THE WORLD

Keeping the Global Picture in Mind 80
Making a Difference at Home and Abroad 81
The Community Connection 88
Eight Steps to Organizing a Community 94
Educating the Children. 104
Global ReLeaf Comes Full Circle. 107

NATURAL RESOURCES 108

Glossary. 122



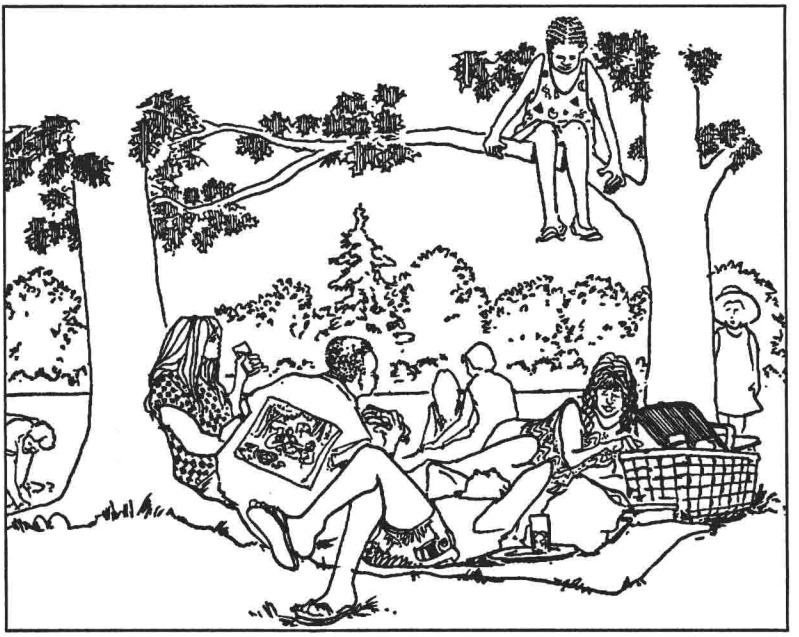
PART I:

WELCOME TO THE URBAN FOREST

A FOREST GROWS IN THE CITY

Look around. You may not realize it, but you are living in the midst of a forest. Every tree you see is linked to all the other trees and plants throughout the city. This delicate network is a living system that contributes to the well-being of our environment, cleansing and cooling the air, shading our streets and beautifying the world we inhabit. We call this living, growing system "the urban forest," a wondrous web of life and a crucial element in the health and livability of our cities. As we head into the twenty-first century, the role that trees play in our cities will become increasingly important.

The term *urban forest* may be new to you. Perhaps you find the word "forest" to be something of an exaggeration, especially when you consider the mostly treeless state of your inner city. But the use of "forest" is no exaggeration, for it refers to the city as a whole and helps us to see it that way—trees, buildings, people,



everything. While Manhattan, or Tucson, or downtown Los Angeles may not resemble the sylvan spots you remember from camping trips, each one is, in fact, as much a living system as the densest reaches of a verdant national park.

A Thread of Life

Were you to hover over your own city, you would see that about one-third of the urban area is covered by a canopy of trees. Another third of the typical American city is covered by grass and other vegetation; the rest is streets and structures. Beneath the canopy—the trees' upper area—is a dense, living network of leaves and twigs with a collective surface area that is four times as large as the total surface area of the city's buildings, roads, and sidewalks. The city, far from being a barren and unnatural intrusion into the world, is in fact mostly a "living landscape," a true ecosystem. And it operates in much the same way as a rural forest: pumping water from the ground, exchanging gases, modifying airflow, and cleansing the atmosphere.

The Need for Trees

The urban forest is important to the well-being of our cities for a multitude of reasons. Perhaps the most overlooked is the simplest and the most powerful: we like trees. We enjoy being in their company; we value their shade and their beauty. A city landscape without trees is likely to feel barren, lifeless, and inhospitable. Trees carry with them the most basic elements of life; they fulfill needs that are ancient and deep.

"I saw a glade," writes author Jean Liedloff of a childhood experience she had one summer in Maine. "It had a lush fir tree at the far side and a knoll in the center covered in bright, almost luminous green moss. I felt the anxiety that colored my life fall away. Everything was in its place—the tree, the earth underneath, the rock, the moss. I felt I had discovered the missing center of things . . ."

There is indeed a magic to trees. Rooted in the earth, their branches stretching toward the heavens, they are a living link between the realms of our life. They shade and shelter. They give

us a feeling of security and make us feel at home. And no wonder—according to Darwin, the green canopy above us was once our original "living room" before we descended from the branches to walk upright on the ground. Trees were our first habitat, and in their presence we feel protected and at home.

There is also something grand about trees. Their age and stature lend our surroundings a quiet nobility. The presence of these lofty beings enhances our lives and provides visual relief from the square walls of our dwellings and the containment of our workplaces.

MAKING THE CITY LIVABLE

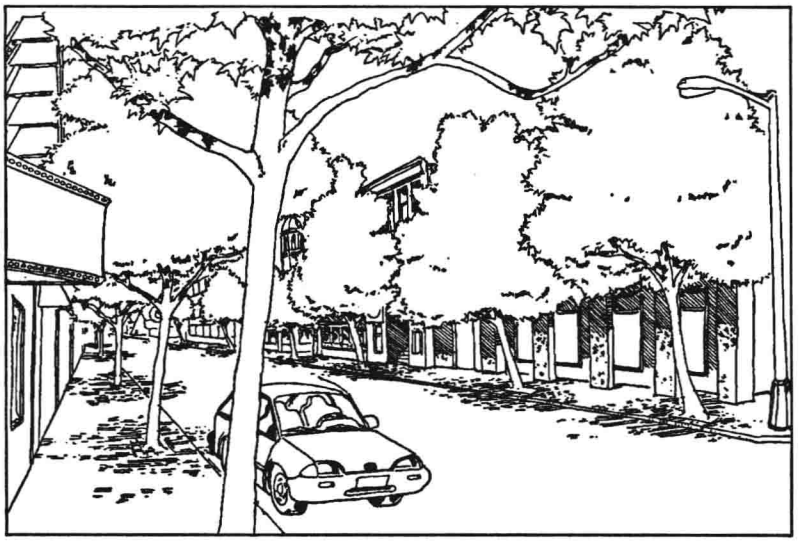
It is no coincidence that the cities rated "most livable" always have an abundance of trees. Most of these cities recognize the crucial role that trees play in terms of enhancing the urban environment and have turned their commitment into law. Local ordinances assure urban forests a secure future and give them an important place in each city's infrastructure and funding.

Milwaukee, as one example, has a separate forestry division within its department of public works. It also maintains a wide-ranging street-tree program, and involves thousands of people in an Arbor Day program with the visible participation of the mayor and city aldermen. Minneapolis cherishes its tree-lined streets, and the city spent millions of dollars in a successful program to save 86,000 of its elms while that species was being ravaged elsewhere by disease. Other cities, such as Charlotte, North Carolina; Evanston, Illinois; and Austin, Texas, all have continuing commitments to their urban forests, a clear indication of their vibrant sense of pride and identity.

Urban Forests: Stretched to the Breaking Point

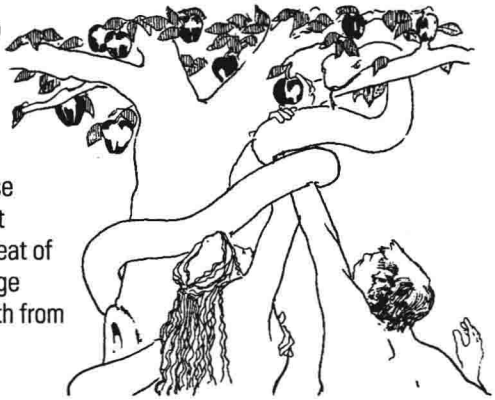
Today, sadly, many other cities are cutting back on their tree programs, even though the need to support the planting and care of our urban forests nationally has never been more pressing or more important.

In many cities, the thin thread of life that is the urban forest is stretched to the breaking point. Yes, there is a forest about us, but it is not a forest simply because we find two trees on the same street;



Trees, Myths, and Paradise

"The groves were God's first temples," wrote William Cullen Bryant, the American poet. Trees have always inspired us and captured our imagination. The Bible relates the tale of the Garden of Eden, with its Tree of Knowledge and Tree of Life. Hindu mythology tells of the great primal forest and its central tree, the mighty Jambu, which bore fruit as large as an elephant and from whose seeds flowed the purest gold. In Asia, the Buddha achieved enlightenment under the Bo tree, whose leaves are still considered a symbol of spirituality. Samoans believed that a coconut tree grew near the entrance to Pulotu, the World of Spirits. Should a wandering spirit strike the tree, it would have to return to the body for another lifetime of earthly existence. In Norse mythology, Ygdrasill, an evergreen ash tree, held the universe together, its roots in the underworld and its branches extended into the heavenly realms of the sky. The Greeks and Romans felt that the human race was the fruit of trees. "These woods," wrote the poet Virgil, "were first the seat of sylvan power and savage men who took their birth from the trunks of trees and stubborn oaks."



Often a particular type of tree was thought to have magical powers. Ancient Danes believed that the good mother of elves—the Elder Queen—lived in the roots of the elder tree. Before removing a branch or cutting down an elder, it was necessary to ask permission of the Elder Queen herself to prevent misfortune. In Russia, the elder tree was used to keep evil spirits out of houses. And in England, the elder was often found growing beside country cottages to keep evil at bay. (An elder twig in the pocket was also said to cure rheumatism.)

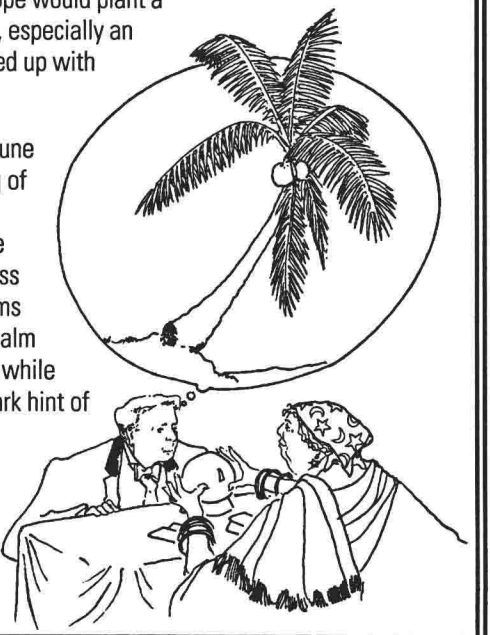
Other trees served equally well as guardians against the forces of darkness. "Witches have no power where there is rowan-tree wood," goes one English madrigal concerning the red-berried rowan, or European mountain ash. Many a person would place a rowan branch under his or her bed to keep witches away; a small cross made from the rowan's branches placed in the churn protected butter and cheese from the evil influence of errant sorceresses.

French Canadians believed that Jack Pine, a spirit with evil and capricious powers, dwelt in the stump and roots of the pine tree. Rather than cut it out to remove it, they would pile brush around it and burn it.

Many Native Americans believed tall trees were the homes of spirits who cried out when the trees were cut down. Members of the Hidatsa tribe in the upper Missouri Valley felt that the cottonwood tree had an intelligence of its own and would come to the aid of individuals if beckoned. Tribal elders held that the irresponsible cutting of sacred cottonwoods in the last century led directly to the Hidatsas' later misfortunes.

Germans and Slavs often planted a tree in front of a newlywed couple's house. Many families in Europe would plant a tree upon the birth of a baby, especially an heir, whose fate was then tied up with that of the tree's.

Trees were used to help fortune tellers to divine the meaning of dreams. In medieval Europe, dreaming of a green oak tree indicated a long life; a cypress was the harbinger of problems in business. Dreaming of a palm tree was the best of omens, while the vision of a pine was a dark hint of looming problems.



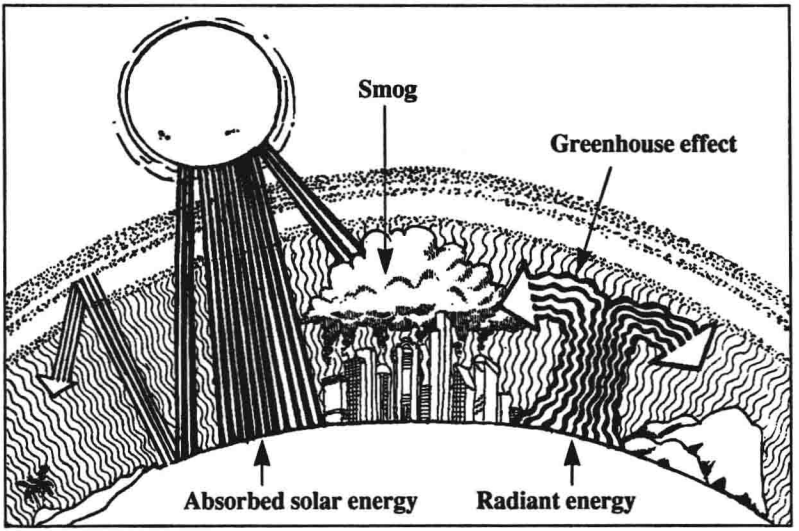
the healthy urban forest, like a rural forest, needs diversity, large numbers of trees, and proper conditions for continued growth.

In the past, a society counted its wealth in terms of its cultural heritage and the health of its trade and economy. Today, we must add a determinant of national pride: biological diversity, a living heritage. How do we deal with our natural patrimony, with species that have been here for eons, old-growth forests that are irreplaceable? The urban forest is a more recent but vital part of our biological inheritance—a gift and resource to be cherished and nurtured.

GLOBAL WARMING

The importance of the urban forest extends well beyond the metropolitan or even national boundaries. The condition of our urban forests now has global environmental implications. Eight of the hottest years of the century occurred during the 1980s and early 1990s. Is this a harbinger of a large-scale upward shift in global temperatures, or only a statistical blip that doesn't signify any major change? Not all the evidence is in, but there are clear indications that something is seriously amiss. "Global climate and chemical cycles have undergone dramatic and closely linked changes," say the authors of the September 1989 issue of *Scientific American.* Extensive smog and air pollution, acid rain, and depletion of the ozone layer are the direct results of industrial and other emissions, and they are all linked to the possibility of major global climate changes in the coming century.

The Earth has gone through cycles of temperature changes before. At the end of the Pleistocene epoch, 10,000 years ago, the Earth's temperature rose by 10 degrees Fahrenheit over a 1,000-year period. In contrast, scientists now estimate that the current predicted rise in temperature—between 5 and 9 degrees Fahrenheit by the middle of the next century—is more rapid and potentially disastrous. This much warming would cause some of the Earth's ice caps to melt, resulting in higher ocean levels and widespread flooding of low-lying areas such as Bangladesh and Florida. Worldwide weather patterns would



The greenhouse effect is produced when the increase of carbon dioxide and certain other gases in the air traps the sun's energy near the surface of the Earth, causing an increase in the temperature of the atmosphere.

change, resulting in droughts in the American Midwest, and increased monsoon conditions in India. An expert at the Smithsonian Institution estimates that 15 percent of all species alive today could become extinct as the changing weather patterns remove or alter their habitats.

Fighting the Greenhouse Effect

Global warming is the potential result of a phenomenon known as the *greenhouse effect*. The Earth's atmosphere functions much like the glass of a greenhouse. Much of the sunlight that reaches our planet is reflected back to space by the upper reaches of the atmosphere, but a small amount, in the form of short-wave energy, is able to slice its way through the 7-mile-high barrier of atmospheric gases. After hitting the Earth's surface, it is reflected back as long-wave radiation. This energy then becomes radiant (or heat) energy, some of which is reflected back into the atmosphere where it remains trapped, a process that has kept the temperature of the Earth stable for hundreds of millions of years.

Since the Industrial Revolution, the amounts and types of these greenhouse gases, mostly methane and especially carbon dioxide, have increased. The burning of fossil fuels and the wholesale cutting of forest areas have driven the amount of carbon dioxide in the air from 280 parts per million (ppm) in the year 1800 to its present-day 350 ppm—a 7 percent increase per century. This rise in carbon dioxide and the infusion of other chemicals, such as chlorofluorocarbons (CFCs) produced by industries, have conspired to make the Earth's atmosphere more efficient at trapping the sun's reflected heat. And, like an increasingly efficient greenhouse, the Earth's atmosphere is driving up the surface temperatures of the planet.

Ecology and Carbon

Ecology is the science that explains the interaction of living things with the Earth's natural chemistry at a scale we can see, touch, and observe. The "web of life" is an analogy often used to explain this interdependence of one living thing on another. The importance of carbon in this process cannot be overstated; it is the single most important element on Earth. Essentially, every living thing is built on a carbon frame with various combinations of hydrogen, oxygen, nitrogen, and traces of other elements attached to it.

Trees are an integral part of the ecological web of life and play an ever-present role in the life cycles of the Earth. Because they are the largest vascular plants on Earth, they work like a master conductor in orchestrating the growth and development of an ecosystem.

Large tree canopies capture huge amounts of sunlight which fuel photosynthesis and plant growth. In addition, trees soak up carbon from the air and soil, and store it in their trunks, branches, and roots. Trees are always products of the environment and a living measure of the quality of life. In the arrangement of living things, their grandeur might be compared to the great cathedrals, such as Notre Dame, built by European masons. Given the right conditions, trees produce giant pillars and an arching canopy of leaves. This abundance of leaves and branches has an effect on