

FROM "NICETY" TO "NECESSITY"¹

by Donald C. Willeke

I am pleased to see so many city, county and park system officials here today representing the communities of Florida and its sister Southeastern states which have distinguished themselves by their efforts in urban forestry. You officials know what trees can do for a community: for its economic health, and for the mental health of the people who live there. But each one of you has no doubt had to take the scorn and debasement meted out by your governmental colleagues who lump trees in with other elements of the environment which they call "beautification."

What an ugly, ungainly word for an otherwise pleasant subject! How much better it would be if people would say, "We should improve our community by 'foresting' it or 'gardening' it." And in truth and fact, trees are the major elements of any so-called "beautification project." Indeed, trees are the major natural element in our communities.

These days it is somewhat easier than it formerly was to discuss the subject of beautification in governmental circles, because at least a few governmental officials have started to recognize that there are some very direct benefits to a community's economic health. People like to locate in and spend money in communities which are attractive, and filling them with ornamental and flowering trees is one of the cheapest ways to make a community look graceful and inviting. But as sure as someone raises the need to engage in "beautification" or otherwise refers in more poetic language to the need to plant trees, someone else will point out in cold blooded budgetary language that the community cannot spend much money right now on "niceties" like trees, because it only has enough funds to engage in putting in the "necessities" like roads, parking lots, and similar utilitarian structures. Trees are for the poets and the dreamers, they imply. Those nice things have no real place among the necessary elements of a commercial society.

All too often in the past those of us who love and understand trees, and the need for them around

our dwellings and work places have allowed ourselves to be beaten down by this argument, and as a result very little money is available for tree planting, and even less is usually available for tree maintenance. It is a sad tale which is heard too many times.

And it is all because others think that trees are "niceties" and that they are not really "necessary." And you and I who should know better have too often let the engineers and planners get away with that approach. Many of the people I know in your position are resigned in their approach to this whole problem. Some seem to have almost gone to sleep in their positions, instead of being strong advocates for the planting and maintaining of trees on a large scale.

Well, I've got news for you. All this is going to change, and change drastically. Each and every one of you had better wake up to the fact that what in the past was (and, for many, even at the present still is) just a nice frill is about to become a cold blooded, drastic necessity: one about which many of you will spend much of your working life worrying, and one upon which all of us will very likely spend much public and private money.

The Gathering Storm

As I look out on this assembled group of quiet, distinguished, comfortable men and women who plan for and work in the parks and urban forestry programs of the Southeast, I am reminded of nothing so much as I am of the title of Volume One of Winston L.S. Churchill's great History of World War II, which he called *The Gathering Storm*. For as I look at you, I have the premonition that soon—far sooner than most of you think—your positions in our communities are going to change, and change drastically!

You know, when a Welshman really wishes to lay a curse on someone, he says to his intended victim, "May you live in interesting times!" and you all know the reason for the curse. Good and placid times are dull and boring. It is only when there is

1. An address delivered on 18 April 1989 to the Menninger Sunbelt Tree Conference, Cypress Gardens, Florida.

crisis and conflict and change and turmoil that times become "interesting." For reasons I am about to discuss in detail, I fear your times as community and governmental leaders and citizen activists are soon to become *very* interesting.

The perceptive members of my audience today have no doubt discerned the source of my fears and concerns: Many of you already know:

- That the 1980's have witnessed the six warmest years since weather records have been kept around the globe!
- Of these six hottest years, the most recent, 1988, was the hottest of all.
- Before the start of the Industrial Revolution, as far as scientists can accurately determine, using old air samples from polar ice and the like, the levels of atmospheric CO₂ remained fairly constant at 280 p.p.m.
- But combustion-driven industrialization using carbon-based fuels stored deep in the earth and global deforestation, have combined to raise the present level to about 345 p.p.m.
- The present rate of increase of CO₂ in the atmosphere is about 1.5 p.p.m. annually, or an increase of 1/2 of 1% per annum.
- There are about 5.1 billion tons emitted annually in the burning of fuel and related industrial and personal activities. Another 1.6 billion tons of CO₂ are emitted through the burning of tropical forests, for a total of about 6.7 billion tons of CO₂ annually. North America is responsible for about 25% of that 5.1 billion ton figure.

I could give you more statistics, but that is not really necessary. What *is* necessary is to tell you that many reputable scientists believe there is a direct correlation between the increase in global temperature and the build-up of CO₂ due to burning of fossil fuels and World deforestation. You would have had to be vacationing on the Planet Mars for the last year not to have heard the name that is commonly given to that correlation: it is the "Greenhouse Effect."

Their Finest Hour

I referred earlier to the title of Churchill's book, *The Gathering Storm*. Although CO₂ is transparent, odorless and colorless, the storm it will almost certainly provoke is gathering around us. I feel a kinship today with the spirit of Churchill.

All though the 1930's he lectured anyone who would listen (and many who would simply *not* listen) that the storms were gathering in Europe; that Nazi Germany was a far greater threat than anyone believed; that far from being harmless, the small percentage of Germans who were Nazis could and would wreck global havoc on a scale no one could imagine if they were not checked, and if their buildup was not halted.

Some of my colleagues and I—those of us who are concerned with our urban forests and our rural forests as the single most significant feature of our environment—have been lecturing all who would listen for some time that we are facing a major environmental crisis, far greater than a little pollution in ground water, and far greater than the buildup of minor mountains of trash in places where citizens do not want to look at them. But few have been listening to our message, and even fewer have harkened to the solutions we have advocated.

But Churchill pointed out in his History of World War II that, "The English-speaking peoples are far better at dealing with crises than they are at preventing them." Thus I fear (and my fears are supported by the views of many learned scientists):

- that we have already gone too far;
- that the disaster of global warming will soon be upon us, and may be upon us already;
- that the crisis of global warming can not be prevented, but may only be dealt with and, if we strive very hard, ameliorated somewhat.

The consequences of global warming may be dire indeed. Just as Churchill could in the 1930's anticipate the consequences of Nazism without being able accurately to predict the exact course, so too can we anticipate some probable effects of global warming without knowing exactly what will occur. Among the anticipated (but uncertain) possible effects on trees and plants are:

- that the range of more sensitive plant species will diminish or even evaporate entirely;
- that only tougher cultivars of some species may survive. We'll find out rapidly what trees have enough genetic diversity to produce some specimens with deeper roots and more drought and heat tolerance;
- that higher heat levels will mean more active

pathogens, for many fungi are known to increase rapidly at higher temperatures, and many insects (pine bark beetles for example) become virtual sex maniacs at 90°F and above, as you can easily observe all over my home state of Minnesota right now. No doubt you have had similar outbreaks of diseases here in Florida and the Southeast which your scientists and environmentalists could point out to you.

There are many other possible results of global warming, for these are just the effects on plants and trees. The larger effects on human society, though not known for sure, could include the following:

- great increases will occur in ocean levels, resulting in the flooding of a great many population centers, including much of Florida.
- indeed, a rise in ocean levels of 4.6 meters (a figure which is well within anticipated rates of increase given what is now known if the West Antarctic Ice Sheet breaks up under global melting) will inundate all of Florida south of Lake Okeechobee and much of the marginal land on both coasts, including Daytona Beach, St. Petersburg, and other large communities.
- deserts will develop where now rich agricultural land exists, in the USA and elsewhere around the globe;
- death of the World's most productive and fast growing forests will very likely occur;
- mass starvation on a scale never before imagined will be commonplace;
- food, timber and fiber will be much scarcer and much costlier;
- there will be even greater demands for energy to be used to deal with all these problems, thus exacerbating the problem with even more CO₂.

Just as no one in 1936 could have foreseen the vast devastation of World War II, so we cannot foresee the worst which global warming could bring. But whatever the results of global warming, you can bet your last tax dollar that they will have an enormous impact on the economic development of each and every region in the country. The Southeastern United States certainly will be no exception. I am afraid that in the not-too-distant future most of you will be spending a great deal of your time worrying about the impact of this phenomenon on your communities, your region

and the State of Florida and the Southeastern United States.

In spite of my current pessimism, I note that it was in dealing with the crisis of Nazi Germany that the British, standing alone, achieved what Churchill called "Their Finest Hour." Not surprisingly, that phrase is the title he gave to the volume which follows *The Gathering Storm* in his great history series. You all remember him speaking of the Battle of Britain, which was not fought in the air alone, but also was fought in the factories, hangers and repair shops by the working men and women of England who gave the total support which made the Royal Air Force's victory possible. Churchill used a memorable phrase to describe that monumental effort, and indeed of the whole war effort where normally leisurely and diffident Englishmen, like the sleepy English Bulldogs they love so much, aroused themselves into a furious but highly organized and effective effort. He said of that time that, "If the British Empire and its Commonwealth shall last for a thousand years, men will still say 'This was their finest hour.' "

What We Know About the Greenhouse Effect

If, in fact, we face a "Gathering Storm", far greater even than that faced by Churchill, his British people, their Commonwealth and their American allies, then *our* question becomes: Can we mobilize in time, as the people of the Allied Powers did in the absolutely astounding effort made between 1940 and 1945? What can we do to insure that in facing the threat of global atmospheric pollution and greenhouse gas buildup, we create our finest hour, instead of letting humanity die piecemeal in underground bunkers, as Hitler died in Berlin?

Well we know three key things about CO₂: 1) humans are creating it, 2) some of it is absorbed into sea water, where microorganisms lock it up in the form of calcium carbonate, where it sinks to the bottom and remains there forever for all practical purposes, and 3) every tree growing on the globe is a device which locks up carbon, liberates oxygen, and in the process cools the globe by evaporating water into the air (the Boyle's law effect), which water vapor can and almost certainly does increase shading cloud cover.

Now as to the first two key facts I have just

discussed, you and I cannot do much. First, changing global levels of CO₂ creation is a vast effort, involving many key and complex social, political, legal and tax considerations. It involves huge industries in this country and around the World, employing hundreds of millions of people. It involves rich and powerful capitalists and huge labor unions. It involves major relationships between nations, both communist and capitalist nations and developing and industrialized nations. I predict that, with one exception, really meaningful efforts at reduction of CO₂ emissions will not come until the greenhouse effect is as much upon us as World War II was after Pearl Harbor.

Secondly, we only vaguely understand the oceanic calcium carbonate mechanism. However, scientists do know that the carbonate mechanism (which presently absorbs about 42% of the CO₂ released by burning fossil fuels) is limited and may not be expanded or intensified by any practical means known to or contemplated by scientists.

That brings us to the third thing which we know about CO₂, and that is that trees lock up the carbon and liberate the O₂. Any healthy, fast growing tree anywhere on the face of the earth is contributing to the reduction of total atmospheric CO₂.

I do not mean to insult the intelligence of this distinguished audience by saying such basic things which you certainly all know. Most of you know more about the science of these things than I do. But have you thought of all the implications of the knowledge you already have? Let's think about it for a little. Let us think of the implications of some of the things you already know.

The best *rural* trees for eliminating CO₂ from the atmosphere are young, healthy, fast growing trees. Climax forests (like the old growth forests of the West, what few are left of them) are in approximate CO₂ balance: new growth about equals CO₂ generated from decay of wood on the forest floor. But it is estimated that six acres of fast growing trees will offset the CO₂ generated by and for a family of four, including home heat, utilities, auto use, and a pro-rata portion of industrial CO₂ generation. Surprisingly, we do not know for sure, because all the United States Forest Service studies to date of forest growth have been of production of merchantable board

feet of timber, not total biomass (roots, trunks, branches and leaves), which is approximately proportional to total carbon uptake.

But we do know for a fact that in dealing with CO₂, urban trees are far more efficient than are rural trees. Scientists at the Lawrence Berkeley Laboratory in Berkeley, California estimate that urban trees are up to 15 times as valuable as identical rural trees in limiting CO₂ buildup:

- one time for the CO₂ they lock up in biomass; and
- fourteen times because of the fossil fuel they save by reducing needs for air conditioning in summer and heating in winter.

With regard to cooling, the Boyle's Law effect is perhaps the key, more so than shade, since ambient heat is actually removed by the act of evaporating water: one calorie of heat is removed from the ambient air for each gram of water which is converted from liquid into vapor. Such cooling results in air conditioning cost reductions estimated to be from 10% to 50%. This is especially important because our urban areas have become "heat islands." As city planners and developers have put in more and more buildings, roads, driveways, and parking lots, and have reduced the amount of greenery, the average temperatures of the centers of large urban areas increases into double-digit differences from the average temperatures of surrounding rural areas. Even in the winter, trees play an important role, for large trees (including large deciduous trees) eddy the straight line winds which cause so much of the winter chilling. Surprisingly, residents of cities in my home state of Minnesota may feel the loss of their elms and oaks more in winter than in summer, although they may not know that the chill they are feeling is due to the absence of the winter-modifying effect of those large trees which we have lost and are losing to Dutch elm disease and oak wilt.

This whole thing is not just my fear, and the fear of a bunch of people who love trees. Hardly a day goes by without a major article in the international and national press which does not detail the particulars of the problem to a far greater degree than I have time for here. I refer you to extensive articles in recent issues of *The Economist* (the issue dated 11-17 March 1989) and *Scientific*

American (the April, 1989 issue). We clearly have a major problem on our hands, far greater than any one of us could have dreamed even five or six years ago.

From Where Will Our Salvation Come?

What is our hope of salvation from this crisis? As I said before this is a human problem. Humans created it. It is also largely a city problem. Our congregation in large urban masses has caused the great increase in energy use for transportation. It is logical, then, that we look to our cities as the places to start ameliorating the crisis.

From what I told you earlier about the relative CO₂ effectiveness of urban trees as opposed to rural trees, it ought to become clear that all levels of government have to start paying much more attention to our urban forests. We have to elevate what had been a *nicety* to the new, exalted status of a *necessity*. In this effort, you people who make and carry out urban policies respecting trees must be the principal saviors of society.

I do not have the time here to set out in detail the practical things which we can easily do to use trees to reduce the CO₂ problem. However, I can give you a hint, a "short list" of things we must start on right now. That list could include these items:

1. We have got to really start planting trees in our communities on a large scale. Our goals should be to fill every available street tree place in every city and town by 1995. That would cost a tiny fraction of municipal budgets, but would have a monumental effect on energy conservation, urban beauty, and commercial attractiveness. But, at the present time, tree planting plans and tree planting appropriations are the first to be cut when governmental money is tight—and money is *always* tight, if you listen to the bureaucrats, but they always find money for their pet projects. The taxes and the budgets go up and up and up, but there is hardly ever any money to plant trees, and then, there is next to none to maintain the trees in most communities. We are failing to do the most simple, most inexpensive thing we could do to help our communities and our world. This is a crime, and furthermore, it is clearly *stupid*.

2. We should make tree planting mandatory around every new house built in any community in

the Southeastern United States, and not just any old tree in any location. Tree planting plans should be approved by competent urban foresters and by others who are trained in tree ecology (and not just in landscape design). We have people competent in electricity and plumbing approve building plans which include those elements. We require code reviews of insulation and other internal energy conservation systems in new buildings. Why not have people competent in the use of trees to conserve energy approve mandatory planting plans?

3. We have got to stop killing high-value large old trees when building in wooded areas. We are as guilty as the Brazilians in that respect. We let builders come in, develop a wooded area (most of which developments now bear names of trees which used to grow there) and then leave with armloads of money. But within two years most of the large trees that were used to sell unsuspecting consumers on the new homes have died, because the builders graded dirt around their roots and smothered the roots due to lack of oxygen. These trees, often centuries old, could be doing all the things I have described right now. We do not have to wait for them to grow up. But these high value trees are condemned to death by the actions of the builders. In this the cities and towns are not just uncaring onlookers. They are parties to the crime, because ignorant city planners require grade changes even in wooded areas, without having the faintest idea that grade changes injure or kill trees, most of whose roots are in the top six inches of soil.

4. We have got to stop the highway engineers, who have unwittingly promoted vast CO₂ generation by building wider, faster roads. The first thing they want to do on any project is to remove the trees. Then after widening the roads, they prohibit planting along the roadway on the theory that somebody might hit the tree and they might have some liability. The answer to that problem is not to eliminate trees; instead it is to eliminate any governmental liability to anyone who hits a roadside tree, unless it can be conclusively proven in court that the tree leaped out into the roadway and planted itself in front of the car (which is usually driven by someone with a closer attachment to vines than to trees). We have to insist that there

be extensive plantings along our highways and streets, and that these plantings be a part of the transportation improvements budgets right from the start.

5. Finally, and most important of all, I believe that if the World's salvation is to come in great part from planting trees, rural and especially urban, then each of you must spread the word. You must speak the message of salvation, but you must not just be high priests in the temple, talking to each other:

You must be missionaries:

You have the knowledge: the saving knowledge!

And you have an obligation to spread it, and not just be politicians or planners or administrators. You must use the means at your disposal to solicit the support of everyone in your communities. All of us must be tree planters and tenders if we are to be saved from a greenhouse disaster, and like the other form of salvation we hear a lot about on Sundays we will all be better people for having not only had faith, but for also having engaged in the good works without which faith is dead.

You must spread that knowledge now, for trees do not grow overnight. As each of you knows very well, the best time to plant a tree is 40 years ago. Of course, the second best time is right now! The planners in our midst had better realize that they can create roads and parking lots in a period of months or just a few years. But mature, beneficial trees take decades. The urban forests we enjoy today were in large part the heritage of men and women who are now long retired, or who have already passed from our midst.

Conclusion

From what I have said today, it should be clear

that I believe that trees, and the people who plan for them in our communities, are undergoing a monumental change of status. They are changing from being "nice" to becoming "necessary." And as trees change in status, your status in those communities is very likely to change greatly as well if (but only if) you are capable of providing the leadership this great battle for survival will require.

What if I am wrong? What if this greenhouse thing is really nothing much, and trees are not all that important? After all, we have had some pretty cold weather this winter up north in Minnesota and elsewhere. What if the huge buildup of CO₂ and other greenhouse gases in the atmosphere means nothing. What if somehow the extra heat produces more clouds which shade the Earth prevent it from heating up beyond a certain point? What if this is a false scare?

Well, if we are wrong, we have *still* done the right thing if we plant our towns and our cities and our nation and our World. We will leave to our heirs a far better, far more beautiful and far happier World. We will be answering with a resounding affirmative the question posed by Churchill when he asked "What be the use of living if it be not to leave the World a better place for our having lived in it?"

And if we are *not wrong* then we will be the saviors of our cities, our state and our World. And the community trees and urban forests we admire and enjoy will have moved from being a *nicety* to being a very great *necessity*.

Chairman

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Addendum

The location of the authors for the article in the May, 1989 issue of the Journal of Arboriculture beginning on page 120 entitled *Physiological responses of deciduous trees root collar drenched with flurprimidol* was inadvertently omitted. Please add on page 124:

*ARS-USDA
Foreign Disease-Weed Science Research
Frederick, Maryland 21701*