

VIEWPOINT

The San Juan Star

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Worried about the weather? Plant a tree

Everybody talks about the weather, but nobody does anything about it.

Hartford Courant editorial, 1897

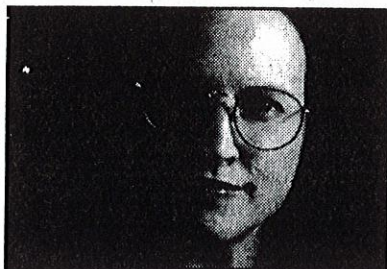
What's to be done about the weather? Not much. But when it comes to doing something about the climate, specifically the global climate change expected as a result of the Greenhouse Effect, there *are* things we can do.

One of the more pleasant things we can do is plant trees.

Trees thrive on carbon dioxide, the main culprit behind the expected warming of the Earth by several degrees Celsius over the next century. (More background on how carbon dioxide contributes to global warming can be found in my July 21 column.)

Carbon dioxide takes the blame for about 60 percent of the problem, with methane and chlorofluorocarbons — yes, the same CFCs that are destroying our ozone layer — accounting for most of the rest of the problem. But let's limit this discussion to carbon dioxide for today.

Plants "breathe" in carbon dioxide molecules and turn them into the starch that builds their tissues. About half the



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mass of plants, including trees, typically consists of carbon — carbon that started out as carbon dioxide.

That's a lot of carbon. In fact, the amount of carbon in the world's plant life is roughly comparable to the amount found in the atmosphere.

What's more, forests contain about 90 percent of the world's living biomass, as carbon-based life forms such as trees and animals are sometimes called by researchers like Bert Bolin, a Swedish professor who provided this estimate in the May 1977 issue of *Science*.

So you can see that forests have the capacity to play an important role in

regulating the carbon cycle that we've altered by spewing out fossil fuels into the atmosphere.

In fact, in the years since debate about the Greenhouse Effect began in earnest, scientists have added the destruction of world forests into the carbon equation.

Again, estimates vary — we are talking a lot of variables here, after all, like biomass of various forest types and rates of forest destruction — but the Intergovernmental Panel on Climate Change settles on a figure of about 1.6 billion tons a year, compared to the roughly 6 billion tons a year released through the burning of fossil fuels.

But even after calculating the additional carbon dioxide released by falling trees and burning forests, researchers still face a mystery over why the carbon dioxide levels aren't even *higher* than they are. (The accompanying graph on the following page illustrates the difference between expectations and reality.)

There are two places deemed to be the most likely "sinks" for this missing carbon dioxide — the remaining forests that escape destruction, and the oceans.

Proponents tend to make an argument based on one place or another, but the answer is probably both to varying degrees.

That the ocean would collect additional carbon dioxide during a warm spell flies in the face of conventional thinking in some ways; logic says that a warmer ocean actually should expel additional carbon dioxide, just as a warm Pepsi lets loose more of the carbon dioxide that makes it fizz.

But our oceans don't seem to be behaving like soda pop at the moment, and oceanographers and chemists have presented a case showing the deep blue sea may be sequestering some of the missing carbon.

Considering information in a March 1989 *Scientific American* article on the carbon cycle showing that the sea contains about 75 times the amount of carbon dioxide as found in our atmosphere, this theory might hold water.

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Weather

But I have to confess a tendency to look to the land for our missing carbon sink. Despite the ocean's greater area compared to land, it contains less than 1 percent of living matter, as reported in the IPCC assessment.

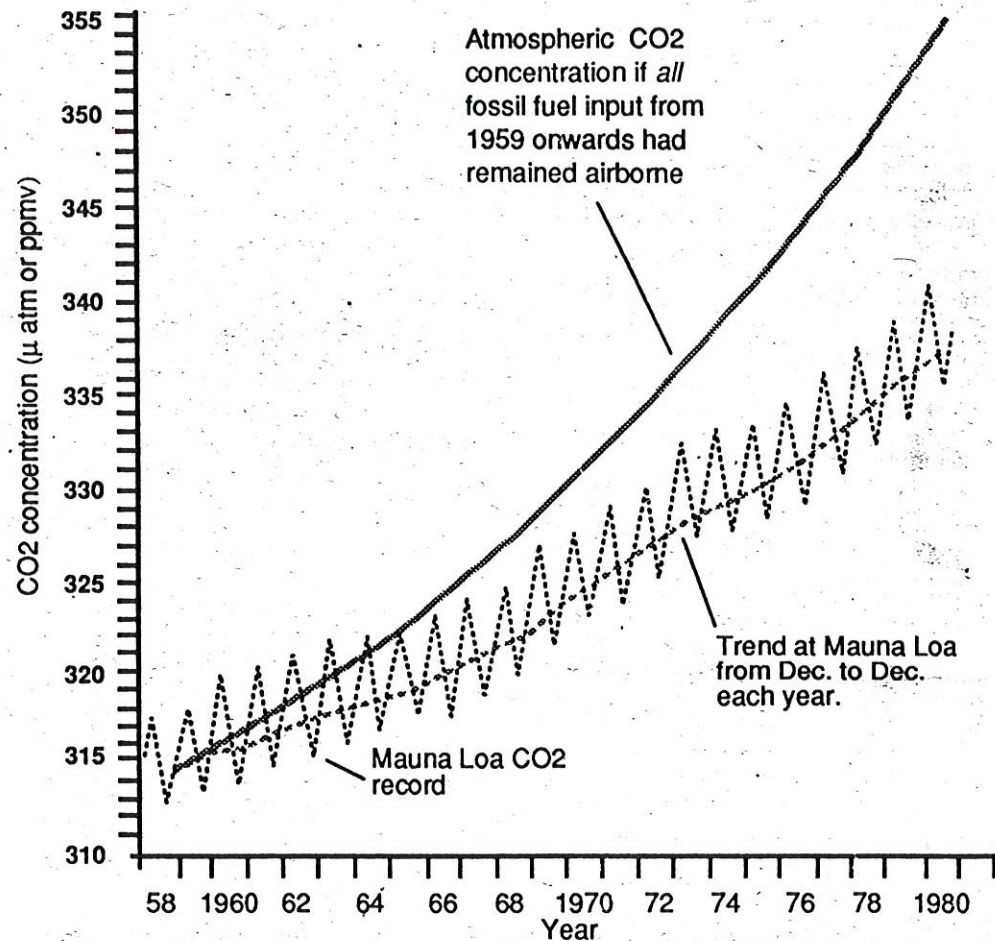
And there is a growing body of research that shows terrestrial plants appreciate the extra carbon dioxide as a type of fertilizer.

Perhaps taking a plant's perspective, scientists use the phrase "enriched carbon dioxide levels" to describe the many experiments conducted to test this effect on plant growth.

Generally they find that plants, including trees, tend to grow more quickly, need less water, and endure higher temperatures given higher carbon dioxide levels. (Some of this research is summed up in a July/August 1992 BioScience article called "Plant nutrition and growth regulation by CO₂ enrichment.")

This has a certain logic to it that can be seen on both the micro and a macro level.

It makes sense on the micro level because we know that plants sometimes accidentally take in O₂ molecules (oxygen) instead of CO₂ molecules (carbon dioxide) when trying to photosynthesize. This is a waste of time and energy for plants, and a



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higher proportion of CO₂ to O₂ in the air improves their odds of avoiding this costly mistake.

On the macro level of ecosystems, there is this from the textbook *Forest Ecology* (John Wiley and Sons, 1980): "The amount of carbon dioxide in the air surrounding tree crowns definitely limits photosynthesis." So again,

although growth of a forest system has proven more elusive to measure than that of an individual plant, the logic holds that higher carbon dioxide levels will improve growth at this level as well.

Policy makers know well the value of trees when trying to battle the Greenhouse Effect.

We find the IPCC repeating the suggestion of R.A. Houghton that by halting deforestation and planting an area equivalent to 1¼ the area of the Amazon Basin, we could expect the trees to sequester about 150 billion tons over the next 100 years. That's no small potatoes, given the annual fossil fuel emissions of about 6 billion tons a year.

As Norman Myers points out in a September 1991 joint article with Thomas Goreau in *Climate Change*, a few progressive power companies are even using tree planting as way of offsetting the carbon they're releasing through construction of new energy plants.

So there's the good news about trees. And there's more, because on top of their ability to absorb carbon dioxide, forests have other features that helps keep things cool.

For one, they are relatively dark so they absorb rather than reflect sunlight, thereby cutting down on the rays that gets reflected back into the atmosphere for another round of heating.

For another, trees really do cool the air around them through evapotranspiration, a fancy word that could be compared to our ability to sweat; they collect water from the soil and bring it up to their leaves, where it can be evaporated by the air. This requires the use of energy that might otherwise show up as heat.

So go ahead. Plant a tree. If nothing else, at least you'll have a cool, shady place to sit if the planet does start to heat up.

Lenart writes a weekly column on environmental issues.