

# THE AGRICULTURAL SOLUTION TO THE GREENHOUSE EFFECT

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## AN OVERVIEW OF OBJECTIVES

There is a growing need to appreciate and understand the true depths of the term Sustainable Agriculture and its broader roll on our planet Earth. I believe we have to go back to basic and fundamental concepts to achieve this understanding. We have first to take a philosophical look at where we want this planet and its people to be in fifty or a hundred years from now. Only then can Sustainable Agriculture be given its definitive roll and its objectives in the future we desire.

I think we can divide our own objectives into two broad categories. One is the health and well-being of our people, our atmosphere, our soils, our animals, all our flora and fauna, our rivers and our oceans. The other is the emotional health of our people, their socio-political structures, their inalienable rights and their simple freedom from fear of starvation and destitution. Although these latter objectives aren't going to be discussed here, their existence must always be in the background influencing our decisions on how we handle our material world.

To comply with this broader criteria, I believe Sustainable Agriculture is:

1. A system in which the degradation of the soils of the country is reversed and we see a constant increase in the depth of soil structures and a constant increase in the mass of micro-biological activity within the soil.

2. It is a never ending cycle of growth, death, decay and re-growth where the extracted minerals are returned to the soils - not dumped in the rivers and oceans or huge waste pits. The soils mineral wealth must be part of a constant re-circulating chain of events.

3. It is an agricultural system where chemical plant stimulants ie. soluble fertilisers from fossil fuels, will have no significant contribution and where deadly herbicides, pesticides and fungicides are no longer needed. The role of man made chemicals must at best be a temporary measure administered as medicine paralleling the human use of medicine. Some chemicals, possibly could be a supplement with the test being that the final eco-system must be improved by their use, soil must be richer and with more life, water and air must be cleaner and food more nutritional. If not, they fail the test.

4. And finally, Sustainable Agriculture is a system where agriculture enhances the availability and purity of water systems, not destroys and pollutes them.

All this should be sufficient, but Sustainable Agriculture has one other massive task.

Agriculture is capable of stopping global warming.

OUR ATMOSPHERE - THE LIQUID AIR MODEL.

There is a lot of material published on how the "Greenhouse" will affect agriculture, but I have read nothing on the way in which agriculture can affect the "Greenhouse".

Soil bio-mass is the only thing big enough, massive enough to influence and to store atmospheric carbon that is capable of manipulation by man. This is a most profound concept.

When we talk about the Greenhouse Effect the numbers are so huge that they lose meaning. The whole problem moves out of the realm of comprehension and out of the realm of personal involvement. That must not be allowed to happen.

If the weight of the atmosphere of the earth is taken as five point three by ten to the fifteenth power tons and the weight of ozone in the upper atmosphere is taken as ten to the tenth power tons then increasing or decreasing these figures by ten fold or even one hundred fold leaves them still meaningless.

Does anybody know what I just said? - No!

So I have worked out a model which is comprehensible. It is to me and to most people I have talked with. I will round off the numbers and keep the decimal points in their right places. I will use the mainland of the United States and call its area two thousand million acres. Round off the population of the United States to two hundred million people which

allocates ten acres for every American.

Australia, for example approximates the same size and approximates a population of one tenth of the United States which is then one person per one hundred acres. Even Western Europe with slightly different areas and slightly different populations is not too dissimilar to the United States.

Now let's we look at the atmosphere, at two hundred and fifty thousand feet, say fifty miles up, there is still a tenuous atmosphere. Half the world's atmosphere is actually below fifteen thousand feet, that's three miles up. So to appreciate its vulnerability, let's liquify it. Let's look at it as if it is no longer a gas, but a layer of liquid, like water covering the planet. This brings it into perspective. It's all there. It's just compressed to liquid form, like steam back to water, so we can more easily understand what we are talking about. I call it the "Liquid Air Model".

Atmospheric pressure is about fourteen and a half pounds per square inch. Under a thirty foot head of water or thirty feet under water the pressure is fourteen and a half pounds per square inch, that's one "atmosphere". In other words the total mass, the total weight of all the gases in this whole planet adds up to no more than thirty feet of water. That's all the air we have.

It doesn't take much to dirty up thirty feet of water.

In comparison, seventy percent of our planet is covered by ocean. Average this water out over over the whole surface of the world and it comes out about eight thousand feet deep.

That's a mile and a half deep. There is thus twenty six thousand percent more water in the world than there is air. Care of the air is the urgent task.

The carbon dioxide levels in our atmosphere have ranged from two hundred and fifty parts per million in glacial times to three hundred and fifty parts per million today. Three hundred and fifty parts per million is 0.035 percent. The thickness of carbon dioxide in our "Liquid Air Model" is then 0.035 percent of thirty feet which works out at less than one eighth of an inch thick. That is one thirty second of an inch or thirty thousandths of an inch of pure carbon, because carbon dioxide is only 27 percent actual carbon.

When carbon dioxide levels in the air reach 0.2 percent it triggers lung spasms in humans. That's a total carbon dioxide content of less than three quarters of an inch in our Liquid Air Model. That's less than one quarter of an inch of straight carbon.

Metal plating such as chrome plating, zinc plating or cadmium plating have thicknesses measured in tenths of a thousandth of an inch. It doesn't take much to stop light. It doesn't take much to stop visible light or ultra violet light from getting through and high altitude ozone protects us from the ultra violet light.

Ozone in the upper atmosphere is measured in Dobson units, not parts per million. Three hundred Dobson units is a typical safe reading for upper level ozone to protect us from this dangerous U.V. radiation from the sun. This puts ozone

thickness as a liquid at one ten thousandth of an inch. One ten thousandth of an inch of ozone is all that prevents this planet from being constantly bathed in dangerous U.V. light.

The chlorine in chlorofluorocarbons, such as Freon has a one thousand to one destruction ratio with ozone. One bit of chlorine destroys one thousand bits of ozone.

One cup full of Freon wipes out the ozone on your own personal ten acres for twenty five years. One writer suggests that it's even worse at one hundred thousand to one destruction ratio. That cup of Freon would destroy the ozone layer for twenty five years for every family on the block.

#### CARBON DIOXIDE FROM FOSSILISED CARBON.

The coal reserves of the United States are around two and a half million million tons which is close enough to a one foot thick coal seam sitting under everybody's ten acre allocation, and coal is nearly all carbon. If only one quarter inch of that got into your ten acres of air it would trigger continuous lung spasms.

The United States burns about five hundred million tons of coal per year, about one quarter ton per acre or about two and a half tons per person per year. On our ten acre lots it amounts to two thousandth of an inch per year. At that rate coal burning alone would double the carbon dioxide levels in the atmosphere in fifteen years.

Fortunately each American not only has ten acres of land

each, he can also be allocated about thirty acres of ocean as the world is only thirty percent land covered. To double the carbon dioxide levels would therefore take about fifty years.

The amount of oil burnt per year is about double that of coal. Spread that over your ten acres and the total gets to around five thousandth of an inch, about the thickness of this piece of paper. Doubling the carbon dioxide levels then comes down to about twenty years. The oceans take up - suck up - a large percentage and so the general acknowledged figure for doubling the carbon dioxide levels of the atmosphere of our planet is about 50 years. That is what your government and mine has accepted is going to happen. Accepted it's going to happen, not decided it must never happen.

#### CARBON DIOXIDE LEVELS CONTROL ICE AGES

The Milancovitch Theory which ties ice ages and inter-glacial periods to slight planetary wobbles and small astronomical variations in the earth's orbits has now considerable acceptance in scientific circles. The sequence is first the wobble, then a decrease in carbon dioxide levels of about thirty percent, then glaciation. That's an ice age. The reverse is, wobble or astronomical change, increase in carbon dioxide, then melting the ice. The carbon dioxide appears therefore to actually control the ice levels. The planet then seems to flip from stable glacial to stable inter-glacial periods.

We have no known examples in the last one hundred and

sixty thousand years, at least, where atmospheric carbon dioxide has ever been at the levels we have now created.

There is absolutely no way of knowing whether our unplanned manipulation of the atmosphere could trip us into a totally unforeseen climatic change in a matter of years. Not thousands of years, not hundreds of years but the years you could live to see. Is there enough weather hints to say we are starting to see it happening even now? There is no computer with enough capacity to handle the number of variables, and anyway we won't even know what a lot of these variables actually are.

Can we afford to take such a risk?

#### AGRICULTURE AND THE GREENHOUSE EFFECT

Now let's look at soil. Two factors, use of chemical fertilisers and "inversion tillage" has reduced the humus content in American soils catastrophically. Inversion tillage is the process of "turning the sod" which spread after the invention of the mouldboard plow and later the disc plow. The beauty of turning the sod lay in its ability to kill unwanted weeds by burying them, unfortunately out of the reach of soil building aerobic bacteria and their highly specific environment. The forked stick plow lost out awaiting the development of the chisel plow and the chisel plows further refinement to soil friendly sub-soilers capable of sub-soiling while still maintaining soil profiles. However the vast majority of U.S. soils are still cultivated by turning the sod.

Humus is produced by fungi, aerobic bacteria, earthworms, termites and their friends, all of whom have a diet of dead plant material. Soil is that busy environment and chemical fertilisers kill the inhabitants.

An acre of soil about eight inches deep weighs about one thousand tons. A good soil might have ten percent humus content or five percent actual carbon content. That is fifty tons of carbon per acre. That's about three eights of an inch of carbon spread over the ten acres. Remember the carbon in our air adds up to only one thirty second of an inch in our Liquid Air Model, or thirty thousandth of an inch.

It would take seventy five years or more of burning fossil fuels at current U.S. rates to produce as much atmospheric carbon on a per acre basis as has come from the rich prairie lands by fertility loss, since they have been farmed.

An average drop in the humus content of all American soils by two percent, over the last fifty years would release into the atmosphere, about as much carbon dioxide as has been released, by the burning of all the coal and oil and gas in the United States over the same period.

Soils lose organic matter when cleared and farmed using current farming practices. Humus levels drop to about half and then stabilise. This is over a thirty to sixty year period. The levelling out occurs when all the biologically active humus is gone leaving only the highly stable humus molecules left.

#### AGRICULTURE MUST CHANGE.

It is obvious that the greatest contribution to Sustainable Agriculture and a Sustainable Planet must be the cessation of the use of soil destroying chemicals, nitrogenous fertilisers and the elimination of cultivation practices that turn soil upside down to ever increasing depths. This must then be coupled with the rapid and deliberate increase in the organic content of the earth's soils.

There is an upper practical limit in the development of soil fertility and soils ability to combat atmospheric carbon dioxide buildup. When that limit is reached however, alternative energy sources to the burning of fossil fuels must be well established, up and running.

Fertility enhancing agriculture must become "conventional agriculture" in ten years and the use of fossil fuels as our prime energy source must be phased out completely by the year 2015. That's twenty five years. That time table is easy. The real financial cost is probably zero. Only the politics is difficult.

#### TREES AND OUR PLANET

A discussion on trees must be included in any overall view of Sustainable Agriculture. One of the most emotive issues of our time is the "destruction of rainforest" and the almost religious worship of trees. The only other issue with the same emotional impact is the use of nuclear energy. That people are so convinced of the evil in both issues is

marvelously convenient for the oil and coal industries!

Timbers competitors are steel, aluminium, cement, bricks and plastics. All are tremendous consumers of fossil fuels. People who are friends of the trees are therefore not necessarily friends of the environment after all.

There should be a massive re-education to make people realise the ecological desirability of timber as a construction material. Timber after all is nature's plastic, made from air, water, soil and sunlight.

#### SOLAR, HYDRO AND NUCLEAR.

Nuclear energy, the supreme threat to the oil-coal complex has been effectively made socially unacceptable despite safety performances and standards so high that in the real world these standards border on the ridiculous.

Utter and complete pollution free - safe energy - economical energy - energy so squeaky clean nobody could criticise it, in some parts of the world is there for the asking. One is solar energy, the other is hydro-electric energy.

Solar energy systems are now only a little more expensive than oil. Your power costs would go up a little. Would that really matter? Hydro-electric power where sites are available is unbelievably cheap. Aluminium production uses a lot of electric power and its production has usually been considered feasible only if hydro-electric power was available. How could these power systems be somehow made socially unacceptable also.

To dam a couple of the Amazon tributaries, drowns thousands of square miles of rainforest, yet if they were already natural lakes it would be an ecological sin to drain them. The relative area of these lakes in that vast continent would be minuscule. We are being indoctrinated to believe that lakes are suddenly bad, and forest that grow in very high rainfall areas, are environmentally better.

Actually, mature trees pump out as much carbon dioxide at night as they pump out oxygen by day. They are "greenhouse" neutral. If this damming can be stopped it ensures Brazil's reliance on fossil fuels for energy. Tasmania, the only state in Australia well endowed with hydro-electric potential has had something like half the state tied up in "National Parks", guaranteeing the continuation of fossil fuel reliant energy sources.

Whole river drainage systems, with gigantic and clean environment perfect energy potential, have been locked away - frozen up by what a cynic might describe as the astute manipulation of the green pawns of the environmental movement.

P.R. people have even dreamed up a criticism for solar energy, "it uses up land space". Solar plants work best in cloudless desert waste land. I'm sure however, some wilderness society or organisation will be recruited to protest their construction and use.

Energy saving systems and more efficient use of energy has enormous potential. Halving the use of power, at no cost whatever is not even slightly difficult. Energy saving

however, has been subtly and falsely equated with a major change and reduction in lifestyle and therefore made vaguely "impractical".

All this while the entire atmosphere of this planet, all twenty million billion tons of it, our whole complex weather system, the unknown deep ocean currents and their complex heat transfer systems are being changed in totally unknown and unpredictable ways, without even a wimper.

#### WHAT'S TO BE DONE

In the U.S. there are two major obstacles on the path to Sustainable Agriculture and the needs of our planet. First is the petro-chemical industry and the second is the United States Department of Agriculture. Both of these obstacles seem utterly insurmountable, so monolithic, so unalterable, a part of life as we know it, but wasn't that exactly what we thought of the Berlin Wall such a short time ago. These two obstacles, it therefore would appear, can be beaten by a people or consumer led uprising. The silent majority needs to start grumbling. The silent majority need to start questioning.

It is unfortunate that good business for the petro-chemical, agro-chemical industry actually requires an unhealthy agriculture. As soils progressively get worse, they require progressively more fertilisers, as plants, in consequence, get progressively less healthy, they require progressively more pesticides and fungicides. As soils deteriorate non-nutritional weeds proliferate and require more

herbicides.

It would naturally be good business for the petro-chemical industry to have a considerable influence on the policy of the USDA. It would also be good business for them to be materially involved in the funding, and therefore have some influence, over agricultural colleges, universities and research institutes. If the petro-chemical industry has not influenced the USDA then it is an amazing coincidence that so many of USDA policies are so much in line with what would be the obvious wishes of the petro-chemical, agro-chemical industry.

The USDA and American agricultural policies have straight jacketed the American farmer with a web of bureaucratic entanglement. In a most manipulative way the American farmer is effectively fined - penalised - if he tries to improve his own soil. For example, by using crop rotation he could then lose his grain allocation. The semi-enforced concept of mono-cropping is unbelievably destructive to soils. It also constantly creates bigger and yet bigger markets for the pesticides, herbicides and chemical fertilisers of the agro-chemical industries. This is an insidious system. Sad as it may be, your taxation money, fed into agro-chemical subsidies, is destroying the soils of America.

### SIMPLE TAX CHANGES NEEDED.

To achieve what is necessary farmers have to change their ways. To make that happen it must be good business for them to do so. Good farmers are always good businessmen. There are rapidly spreading systems of certification for organically grown foods. This makes it very easy to have some fixed percentage of organically grown farm sales not considered as income for tax purposes. The percentage could easily be adjusted from time to time to control the rate of change.

The growing of organic food is of course, very difficult without first developing deep, rich, high humus soils. Sustainable Agriculture would then take off. This is so simple to do.

While America can easily afford these minimum tax concessions, America certainly cannot afford to avoid the issue. There is such a beautiful, multiple pay off, richer soils, cleaner water, healthy food and an atmosphere and weather system our grandparents simply took for granted.

### TAX HARMFUL CHEMICALS.

To outlaw the use of various chemical fertilisers is possibly too restrictive and too authoritarian. Chemical fertilisers, pesticides and herbicides when permitted at all should simply be a non tax deductible item.

Tax incentives could also be given based directly on the rise in a farm's soil humus levels.

Turn over tax - value added tax - sales tax should be

added to any suspect chemicals.

The price of food may go up a little but food itself on the farm is very cheap and there is always more money invested in its packaging and transportation than the food costs are actually less with soil enhancing techniques.

Taxation manipulation and assistance along the above lines should almost go to an overkill situation, because agriculture and only agriculture can give us our breathing spell. Only agriculture can give us the time we need to wean us off what is claimed to be "cheap" energy. There would be no drop in our standard of living. It no longer depends on this "cheap" energy.

#### LEASED LAND - SO WHO CARES?

Another major problem that encourages the destruction of soil is the widespread U.S. practice of farming leased land. Why should you develop the soil on somebody else's land? The real owner of the land is almost certainly holding it with the expectations of capital gains. If the income for leasing the land covers the interest, profits are automatic. Land values are maintained at an artificial high level and out of reach of the farmer. The lease or rent payments on farm land should be a non-deductible item in the hands of the farmer. This really doesn't hurt the farmer. He will do what is prudent. It would, however, take the speculation out of rural land and makes the farmer himself the most able person to ultimately own farm land. His borrowings to purchase this farm land of course

are tax deductible. What good then would farm land be to anybody else?

DON'T LIMIT PRODUCTION ACREAGE.

The limitation of acreage to stop runaway crop production is ideal for the petro-chemical industry. It encourages the forced stimulation and thus destruction of soil to produce maximum yields. It also requires an army of bureaucrats to police it. This should be immediately switched to a limitation on tonnage at the subsidised price, not acreage, with the excess going onto the open market.

Of course subsidised agriculture must eventually be phased out and if necessary protective tariffs should be imposed on the importation of subsidised agricultural products. It seems strange that the American taxpayers are expected to subsidise Russian housewives. If American farmers only have to compete with other farmers and not governments, then I'm sure they will survive.

The whole American free market environment has been totally distorted by the crop insurance system. The USDA should have no say or monetary influence whatever in the crops a farmer wishes to sow, possible only provided it is on his own land.

The poisoning of underground water systems should not be legal. Bio-degradable pesticides and herbicides sound attractive, but require an active soil life by definition. But, Catch 22, the soil life has been destroyed by the soluble

fertilisers and soil turning tillage so there is no "bio" to do the degrading.

#### DE-REGULATE CULTIVATION

Regulations now exist that severely limit the farmer's right to cultivate his own land in the way he thinks most appropriate. Yet no farmer, if he was permitted the choice would systematically destroy his own land, the way successive American governments and governmental departments have destroyed the Soils of America.

Land in the U.S. is often arbitrarily defined as too steep to cultivate. In the Australian Keyline System of agriculture, techniques have been developed for such situations. It does not cause erosion and in fact prevents it, while at the same time developing rich soils. Sub-soiling has been done on land so steep it has to be cultivated straight up and down the slope to stop the tractors rolling over. Slopes have been that steep. Cultivation exactly at right angles to contours to develop soil, prevents erosion. This practice has had great benefit and actually prevents the concentration of water and subsequent erosion.

These arbitrary regulations should be completely abolished or at the very least made inapplicable when the farmer is aware of the correct techniques and owns the land.

## SOIL CREATION.

Techniques for rapidly increasing soil organic matter content and humus levels are spelt out clearly in the Australian Keyline System and are now well established. Keyline is a comprehensive system of agriculture and urban development. The concepts originated on the Yeomans' family farms "Nevallan" and "Yobarnie" at North Richmond, New South Wales, Australia, in the late 1940's through to the early 1960's. P.A. Yeomans wrote three books on the Keyline during that period.

Keyline and Keyline Principles are taught at most colleges and universities throughout Australia and have been for many years.

Keyline has modified agricultural thinking and agricultural practices in Australia to a quite incredible extent. For example, the use of sod turning, fertility destroying, mouldboard plows is almost unheard of there now. The use of conventional nitrogen fixing legumes as part and parcel of grain production is almost standard practice.

It is now considered that about one third of Australian grain farmers do all their cultivation with tined implements, either sub-soilers operated as both sub-soilers and chisel plows or straight conventional chisel plows. These farmers produce probably two thirds of Australian grain. Indicating that the bigger growers are the ones tending to be more fertility conscious and aware of its financial viability. Other food producers are moving in the same direction.

Soil fertility levels in consequence are generally on the rise. The use of herbicides for weed control is probably the major non "organic" practice left in broad-acre grain farming in Australia at this time. All this with absolutely no federal or state financial backing or subsidies. In fact often in direct opposition to their chemical orientated advice.

Just ordinary farmers being allowed to do what they think best.

For the Greenhouse problem the most relevant factors in Keyline however are the techniques for rapid development of soil with its massive entrapment of atmospheric carbon dioxide into the soil. Prolific biological activity and huge increases in humus levels is where the carbon dioxide ends up.

The late Brigadier Sir Cedric Stanton-Hicks who before his death was Professor of Human Physiology and Pharmacology at the University of South Australia in Adelaide and was Director of Army Catering for all Allied Land Forces, South West Pacific areas in World War Two in his book "The Nutritional Requirements of Living Things" says and I quote.....

"After three years, he (P.A. Yeomans) was able to demonstrate that black soil had formed to a depth of twelve inches where scarcely any soil had previously existed on this rock-strewn countryside. Shale and sandstone debris had disintegrated into soil. Thousands of farmers from all over Australia have visited this first experimental estate and many distinguished visitors from overseas have witnessed the results of this transformation of a barren tract of land into a park

like region carrying fine livestock all year round". He goes on to say "The chief factors in this transformation are air and water. The restoration of topsoil is perhaps the most promising discovery made by Yeomans".

The late Lady Eve Balfour, undoubtedly the most respected woman in organic agriculture ever, said of the Keyline System, "I was a great admirer of P.A. Yeomans in Australia, and of his Keyline work - a lovely 'whole' concept. I think that he contributed as much to organic agriculture as anybody else this century".

Soil is simple to create when you realise what soil actually is. Soil is not an inert thing. Soil is a living environment and rich soil is a very busy living environment. It is a continuous process fueled with dead plant material which becomes humus to feed new plants. This while process can be accelerated using simple Keyline techniques.

Dead plant material is litter, straw, any crop remains, and especially dead leguminous root systems. Ideally added to this is animal droppings. Preferable from animals already there.

The earth has to be loosened for some very good reasons and without "turning the sod". One is to allow the entry of rain. Water is obviously essential. Another is that the beneficial inhabitants, the bacteria, the earthworms, are all air breathers. So air is allowed in. The plant material must be on or near the surface. Also our soil inhabitants require living space to move around, which would also be supplied.

Timing of the loosening of the soil should ideally just precede hot, moist conditions.

The resultant activity, a proliferation of life, and its secretions attack the basic rock particles to produce the mineral wealth to sustain itself.

#### IT CAN BE DONE

That a nation's soil, once lost, is lost forever is utter nonsense. It is only true when the life that continuously creates soil must battle a never ending chemical warfare with the agricultural establishments.

The ultimate solution to the stabilisation of our weather is to stop burning underground carbon to supply energy and to start absorbing carbon into our soils to produce fertility. It must not be allowed to take more than 25 years to finish the first task and of course there will be giant opposition.

In 10 years the second task can easily be done by farmers if given some simple practical and financial incentives.

All this planet needs is enough people who believe it must be done to support those people, who, each in their own way can make it all happen.