Climate Change and Regenerative Agriculture
A Mission for the 21st century

Worldwide desertification and global climate change is our greatest challenge.
If we do not acknowledge and resolve the issue of excess atmospheric carbon dioxide soon, we will face insurmountable problems this century.
So what does all that mean?
It means we better get it together pronto.
We probably have 10 years before systems start to really unravel.
Young people don't wait for your parents or elected officials or the status quo to do anything.
If that were going to happen, it would have already happened.
Become involved.

It's unfortunate that most people don't care but it is critical that those that do care have a full understanding of what is really going on.
We have over 50 years of concerns about climate change issues, global conferences, and international resolutions basically failing to acknowledge the full extent of the problem.
It is generally accepted that fossil fuel emissions must be reduced and eventually eliminated.
Less understood is the loss of soil organic carbon and it's equal contribution to the problem.
Millions of years of stored carbon is being returned to the atmosphere due to deteriorating soil fertility, deforestation, and desertification.
If we could stop all fossil fuel emissions tomorrow, our present crisis remains.
We have to reduce already existing excess atmospheric carbon dioxide.

Allowing for naturally and producing agriculturally more green leaves on the surface of the Earth is essential.
Through photosynthesis carbon dioxide in the atmosphere is drawn down and converted into liquid carbon in the green leaves of plants.
This energy feeds the plant and the surplus is exuded from the roots.
Microorganisms process this into fertile soil and stable carbon is stored.
As soil organic carbon increases, the risk of desertification decreases.
A fertile soil environment has greater absorption and retention of water

The only difference between Earth and the rest of the planets is earth.
If it were not for photosynthesis drawing down toxic levels of gases from the atmosphere life as we know it would not exist.
Over millions of years carbon dioxide has been processed, stored, and soil created.
Our ideal world is due to this thin layer of earth and our distance from the Sun.
This perfect carbon dioxide, nitrogen, and oxygen level stabilized relative to our time on Earth at 280 ppm carbon dioxide.
We are currently at 410ppm and climbing fast.
We need to draw this level down to at least 350ppm.
That is 350 parts carbon dioxide to a million parts atmosphere.
The only way to take sufficient amounts of this excess out of the atmosphere is through photosynthesis and storage into the ground. Oceans have done their part and are now saturated. The bulk of this drawdown will have to go into the soil.

Building soil fertility and promoting the greatest amount of green ground cover is our mission. But we can't achieve this in a desert.
And we can't even begin if people don't understand the situation we are in.
It's not that something might happen later and we can figure it out then.

Our problem is already existing carbon dioxide levels.
There is no question or need for further information.
We have a situation now and the longer we wait reduces the
possibilities for resolution.

So what's the big deal. Life is carbon based.
420 million years ago our atmosphere was at a toxic level of 8,000 ppm.
Through bio sequestration this level balanced out at 280 ppm,
until about 70 years ago. This represents the beginning of industrial agriculture, intensive chemical inputs, increasing fossil fuel emissions and deforestation.
Half of the excess carbon dioxide is returned to the atmosphere from burning fossil fuels.
The other half is returned to the atmosphere from loss of soil organic carbon
by unsustainable agricultural practices.

In 1958 atmospheric carbon dioxide began to be recorded on a graph where the vertical line is the amount of atmospheric CO2 and the horizontal line is time.
The increasingly upward, 45' angle is not straight but rather jagged with
seasonal upward and downward movements.
This represents the difference in the amount of photosynthesis taking place
between winter and summer.
We can reduce the upward direction through all of the things you are aware of:
reducing fossil fuel emissions, alternative energy, reducing chemicals,
population control, recycling, etc.
Of equal importance we can increase the downward direction by drawing down
carbon dioxide and storage in the ground through regenerative agricultural practices.

Photosynthesis is the process whereby green leaves utilize the energy from the Sun
to convert carbon dioxide gas and water into glucose and oxygen.
Each molecule of glucose formed in the leaves sequesters 6 molecules of CO2.
"Liquid Carbon"is created and through a microbial partnership is added to the soil.

For every molecule of carbon there are two options.
Oxidize and return to the atmosphere or it can be sequestered into the soil or oceans.
The objective is to put the most organic matter for the longest amount of time into the ground
This is achieved by increasing soil fertility and the time that green plants can grow. Fertile soil increases aeration, water absorption and retention, microbial life, access to vital nutrients, and increases carbon storage.

"In a functioning system there will be 10 parts biomass below ground to 1 part biomass above ground. In the last 70 years we have reversed this equation."
Chemical fertilizers have increased surface mass while reducing soil biota.
Nutrient levels in the foods we consume are substantially reduced.
Expansive root systems that were able to supply more water, fertilization, and nutrients have been destroyed by tillage, chemical fertilizers, herbicides, pesticides, fungicides, and burning.
Massive amounts of organic matter or carbon is now returning to the atmosphere as carbon dioxide gas. Millions of years of carbon being drawn down via bio sequestration is now oxidizing at a very fast rate.

Much of the agricultural soils worldwide have been reduced from 20% organic matter content to less than 2%. Every percentage increase through improvements in soil fertility is significant.
Industrial agriculture can emit 10 tons of carbon per hectare per year into the atmosphere.
Regenerative agriculture can store 10 tons of carbon per hectare per year into the ground.

So what's the problem with this surplus carbon?

Here are the basics:
There are 342 watts of heat energy per square meter entering Earth and 339 watts going out. 3 watts per square meter is the problem. This is global warming.
Heat trapping gases, dust particles, and uncovered surface area creates this surplus retention of heat.This is the green house effect.
Desertification, alteration of ocean currents, extreme weather events, rising sea level, and disturbance of the heat dynamics of the planet. This is climate change.
CO2 isn't going to kill us. The problem is water or rather the lack of and hydrological extremes. Water controls 95% of the heat dynamics of the planet.

So what can we do?
Reduce fossil fuel emissions
Increase soil fertility so we can increase carbon storage
Increase microbial life and nutrient acquisition
Extend surface plant coverage and photosynthesis
Extend length of growing time
Increase forest coverage wherever possible
Increase water absorption and retention
Increase the "sponge"
We need to absorb the greatest amount of moisture to dampen inevitable increases in global heat build up.
Water has to be actively cycling through the system to avoid desertification.

How can we best implement these actions?
Establish a tax on carbon being exported into the atmosphere at the source.
Establish a credit on carbon being imported into the ground at the source.
The fossil fuel industry and manufacturers will transition into renewable energy.
Farmers and ranchers will transition into carbon farming.
The status quo and vested interests will attempt to complicate this very simple solution. When it is all said and done, this is our only option.

Here is the good news:
For every molecule of glucose formed through photosynthesis in green leaves 6 molecules of carbon dioxide are being drawn out of the atmosphere.
Through the process of photosynthesis "liquid carbon"is being created and this feeds the plant.
The plant exudes the surplus through the roots to feed the microbes.
The microbes supply the plant with fertilization, water, and nutrients.
Through this symbiotic process "liquid carbon"and microbial activity produce fertile soil and carbon is stored.

One cubic meter of healthy soil can have 25,000 kilometers of fungal roots.
A "soil food web" is formed whereby there is interaction between plants and trees. This is the biological internet.

Every gram of carbon can hold 8 grams of water.
With water retention longevity of growing green leaves increases.
More carbon can be processed and stored in a growing season.

"Each molecule of carbon builds a matrix or fan with negative charge points.
Nutrient cations with positive charges connect like Velcro."
The question is not if the 33 essential elements are available.
It's if they are accessible. A "microbial bridge" is essential.
Improving soil fertility increases organic matter and microbial activity

So it is actually quite simple.
We can continue to export carbon into the atmosphere
or we can import carbon into the soil
We can avoid desertification of the planet if
we can develop soils that absorb and retain moisture.
We can continue to deplete aquifers or recharge them.
We can consume nutrient deficient foods and be sick
or we can stimulate microbial life and increase nutrient acquisition.
"Microorganisms are the biological infrastructure of the Earth."

Reductions in fossil fuel emissions is a gradual process.
Supporting regenerative agricultural practices is something you can do today.
Consumers determine what is produced.
Agricultural producers have an opportunity to help solve rather than add to problems but significant production changes will have to be made.

"One of the most unnatural practices of conventional farming is it's creation of vast landscapes in which only one type of plant is grown.
Such monocultures never occur in nature.
A lush mixture of plants above ground means that there is a correspondingly lush community of microorganisms underground.
Different plants offer different root exudates and attract an array of different microorganisms, making the soil overall more resilient.
Nature is always trying to restore balance to landscapes we degrade.
When we create bare ground, nature sends a battalion of weeds to colonize and cover the soil.
When we establish a monoculture, nature sends in pathogens to weaken and even kill the crop allowing other species to fill the void."

We have a really good guide to help us, Nature.
Along the way, we might find that these insurmountable problems have already been solved many times over through millions of years of trial and error.
It is essential to reconnect with these natural processes while we still have the opportunity to store carbon.

P.S. Christine Jones, Walter Jehn, and Ademir Caligari, whom I have quoted, have helped me to explain some of these natural processes in a simplified form.