

Reversing the Climate Emergency

The role of regenerative farming systems in reversing Climate Change



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Regeneration International**

**Santiago, Chile
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REGENERATION INTERNATIONAL

COOL THE PLANET. FEED THE WORLD.

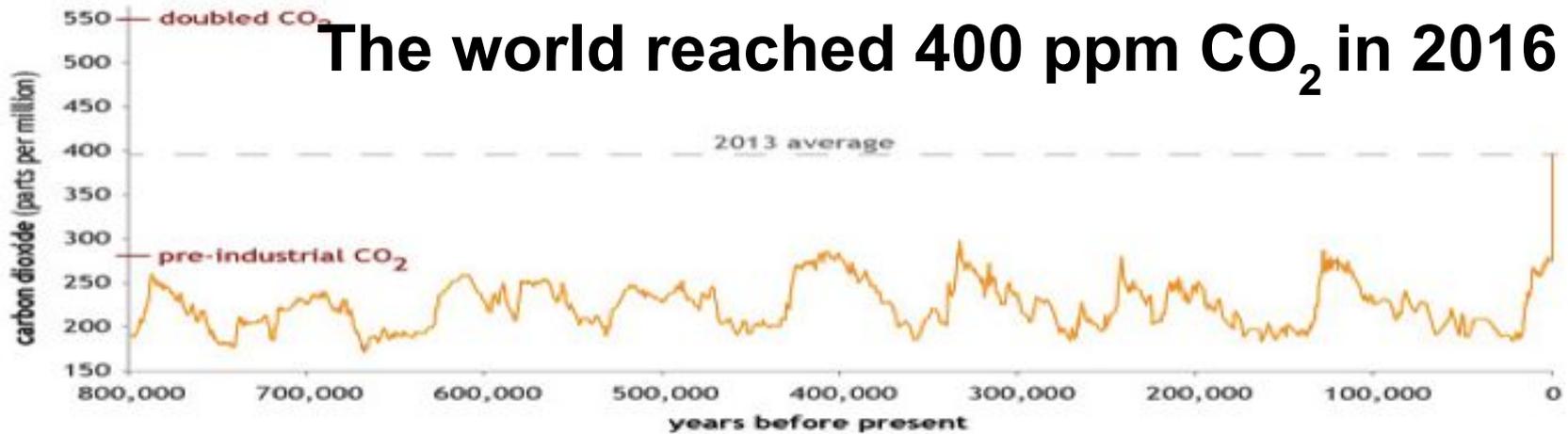
Regeneration International was conceived at the New York Climate Change meeting in 2014

OUR VISION

A healthy global ecosystem in which practitioners of regenerative agriculture and land-use, in concert with consumers, educators, business leaders and policymakers, cool the planet, feed the world and restore public health, prosperity and peace on a global scale.



The world reached 400 ppm CO₂ in 2016



- The last time the world had 400 ppm, based on evidence from 3.0–3.5 Million years ago - **5 to 16 C warmer (28.8 F)** (Rohling et al. Nature)
- Sea levels were 20 to 30 meters higher (65 to 100 ft)
- CO₂ levels are increasing by 2 to 3.3 ppm per year - **reached a record of 415.3ppm May 2019**
- Getting worse despite the Paris agreement
- Paris target of Net Zero Emissions by 2050 will mean close to 500 ppm

Climate Change

Scientists Warn: Nine Climate Tipping Points Now 'Active' – Could Threaten the Existence of Human Civilization

TOPICS: Atmospheric Science Climate Change Oceanography Popular

University Of Exeter

By UNIVERSITY OF EXETER NOVEMBER 30, 2019



Nine active tipping points:

1. Arctic sea ice
2. Greenland ice sheet
3. Boreal forests
4. Permafrost
5. Atlantic Meridional Overturning Circulation
6. Amazon rainforest
7. Warm-water corals
8. West Antarctic Ice Sheet
9. Parts of East Antarctica

Net Zero Emissions is not enough We need negative emissions NOW!



According to WMO Secretary-General Michel Jarraud
“Carbon dioxide remains in the atmosphere for ***hundreds of years***
and in the ocean for even longer. Past, present and future emissions
will have a cumulative impact on both global warming and ocean
acidification.”

The extra heat becomes a huge amount of extra energy fueling our
planet’s weather systems. **The equivalent of millions of
atomic bombs of energy**

It means violent and extreme weather events such as storms,
droughts, fires, floods and crop failures become more intense and
more frequent.

This is happening now!

**Net Zero Emissions is not enough
We need negative emissions NOW!**



Global sea levels rises will cause the atoll island countries, large parts of Bangladesh, Netherlands, Denmark, coastal USA,

New York, New Orleans, Miami, London, Hamburg, Copenhagen, Stockholm, Tokyo, Yokohama, Manila, Bangkok, Calcutta, Jakarta, Shanghai, Singapore, Lagos, Sydney, Melbourne and other low lying areas go under water

Causing a huge refugee crisis for hundreds of millions of people

**Net Zero Emissions is not enough
We need negative emissions NOW!**



Soils are the greatest carbon sink after the oceans

Over 2700 Gt of carbon is stored in soils worldwide

Biomass 575 Gt most of which is wood. Source (Lal 2008)

Atmosphere 900 Gt

1 Gt (gigaton) = 1 billion tons

It would be most logical to remove the CO₂ from the atmosphere and put it into the soil – where it is needed

Now!



Ending fossil fuels and adopting renewal energy must be non-negotiable

However this will not stop catastrophic climate change

Need to draw down around 25 Gt of CO₂ per year from the atmosphere just to stabilize CO₂ levels at around 415 ppm

Further scaling up to reduce CO₂ levels

4 POUR 1000

Les sols pour la sécurité alimentaire et le climat
4 per 1000 - Soils for food security and climate



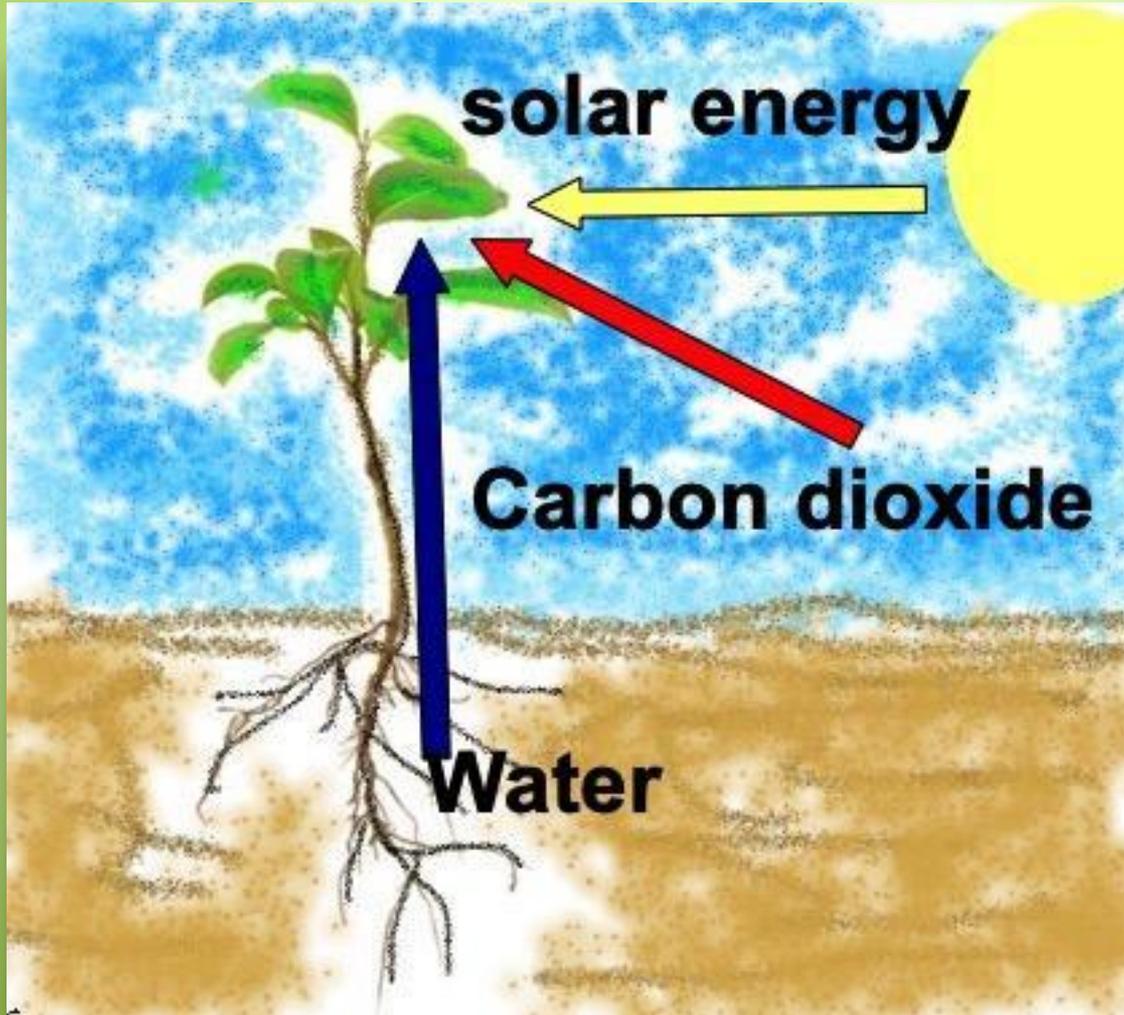
Launched in Paris in Dec 1, 2015 this initiative aims to change farming from being a major CO₂ emitter to becoming a major mitigator of CO₂ by storing it in soil as soil organic matter

The UNFCCC recognizes this initiative by French Government as part of the Lima – Paris accord

32 Countries, several regions, FAO, IFAD, GEF, CGIAR and hundreds of NGOS have signed on.

Changing farming from a major problem to a major solution

Maximize Solar Energy

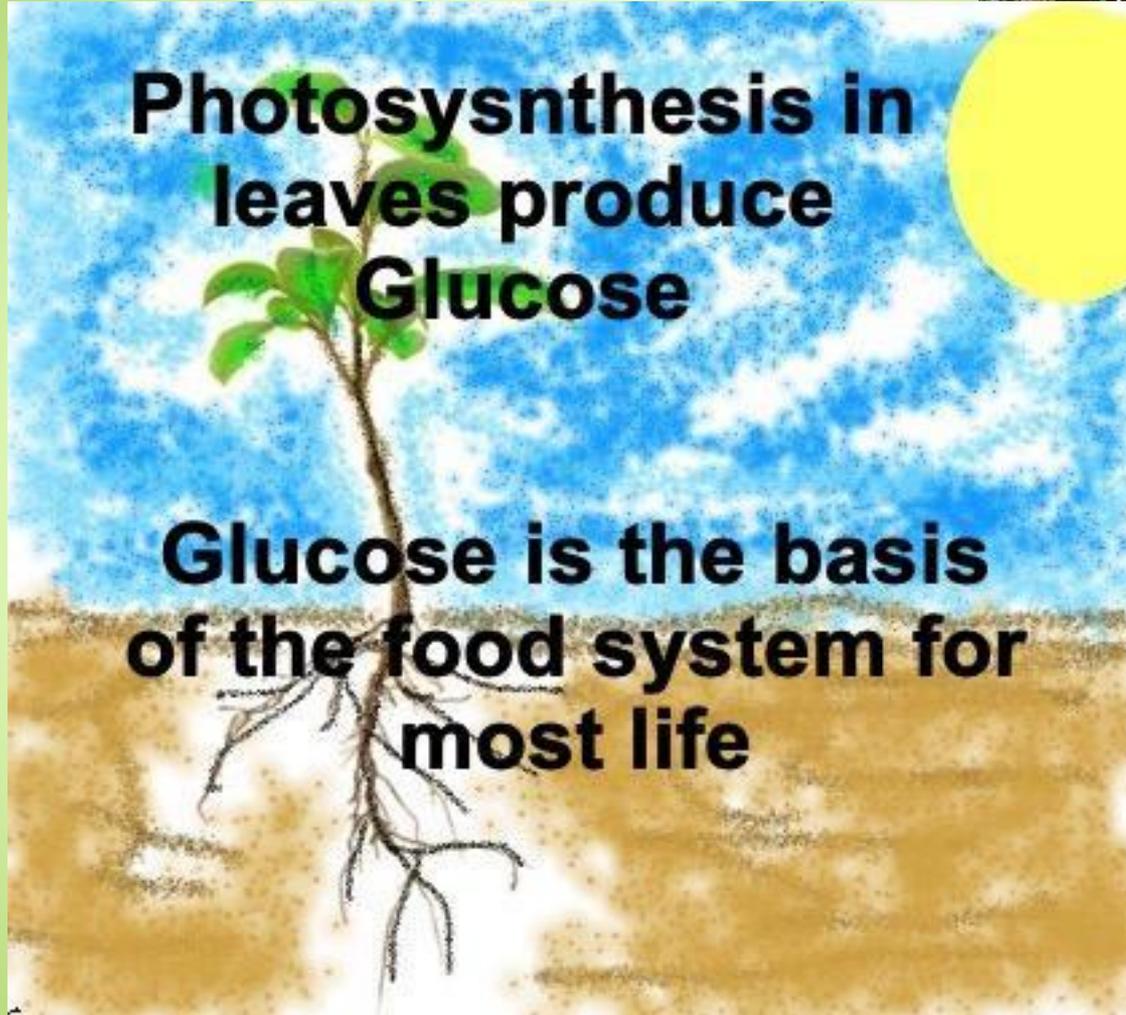


Maximize Solar Energy



**Photosynthesis in
leaves produce
Glucose**

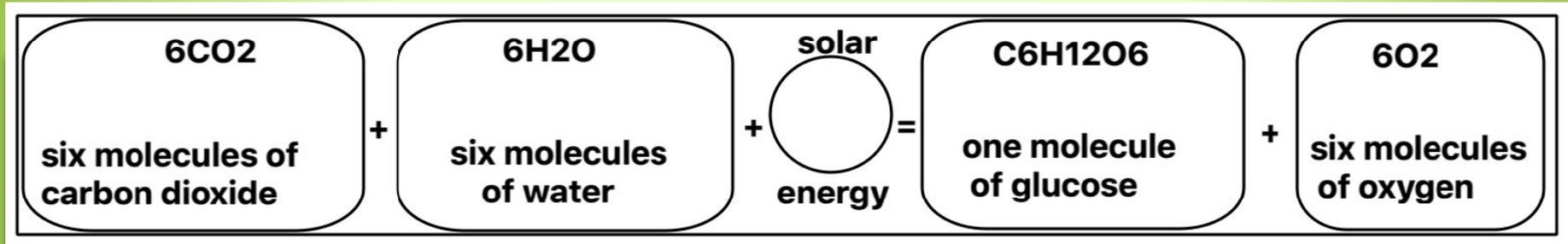
**Glucose is the basis
of the food system for
most life**



Maximize Solar Energy

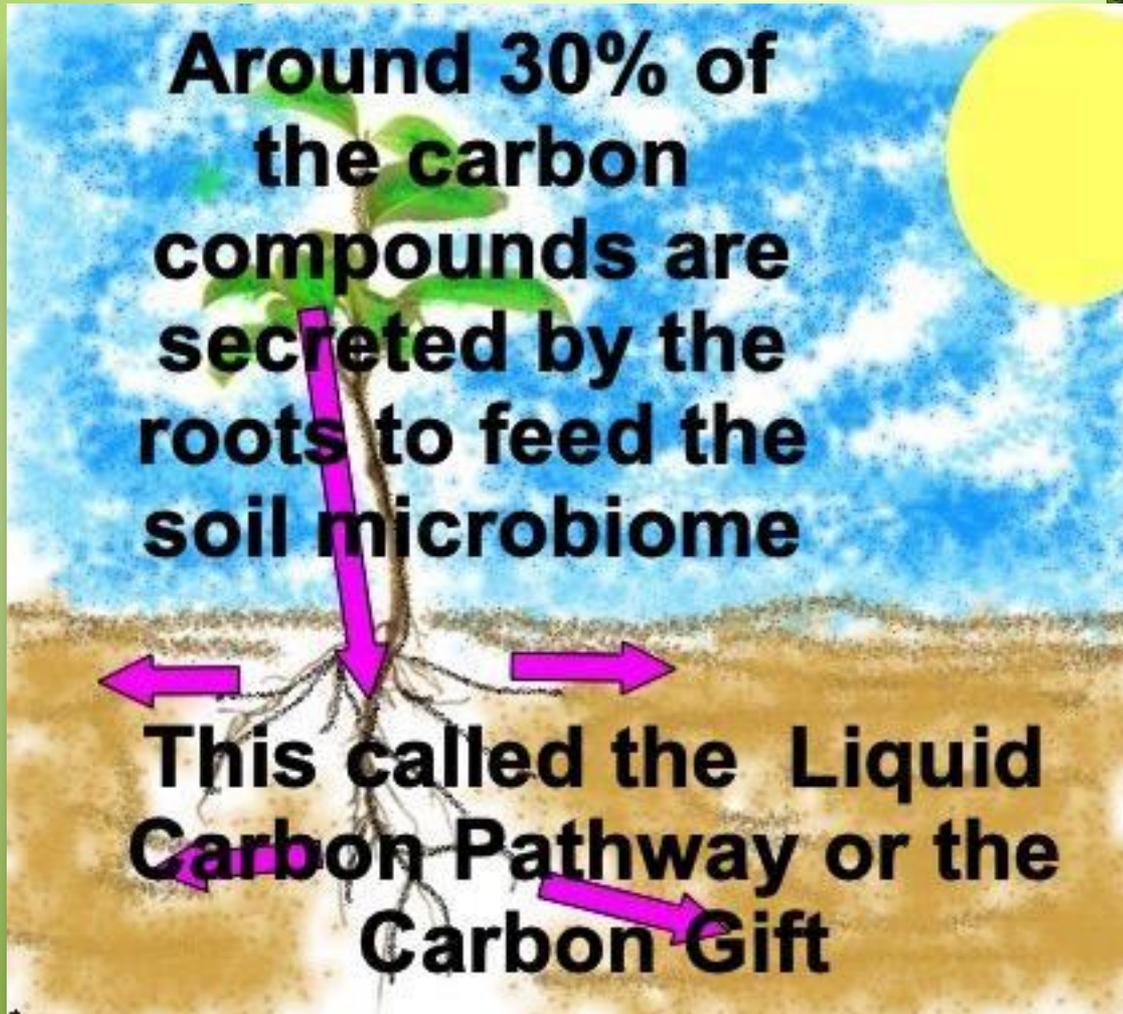


Use Photosynthesis to Grow Soil Carbon



- Between 95 and 98% of a plant's biomass come from water and carbon dioxide using the energy from photosynthesis to make glucose

Maximize Solar Energy



MANAGING GROUND COVERS



Rootmass activity stimulates nutrient availability in soil by:

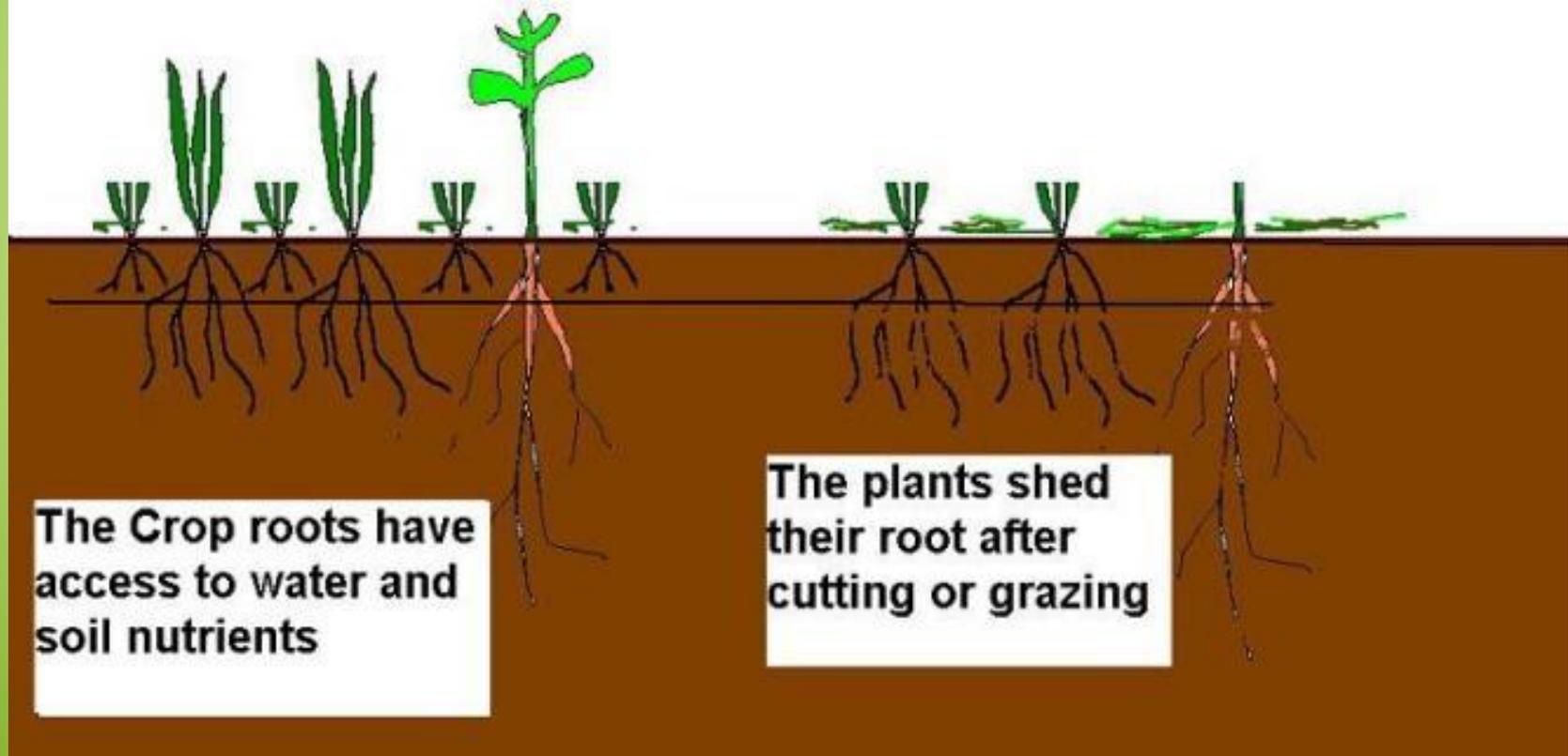
- **Root exudates that feed microbe communities**
- **Root enzymes and acids extract minerals from rocks**
- **Builds soil structure and deepens soils**
- **Generates soil carbon and nutrients for the crop through correct management**



MANAGING GROUND COVERS



Crop has access to Sunlight



MANAGING GROUND COVERS



Building Topsoil

Soil organic matter increased from 1% to av. 6% in 11 years

- pH 4.5 to 6.5

The Total Exchange Capacity from 6.66 to 24.78.

- Available N from 46 kg/ha to 123 kg/ha.
- Calcium 534 ppm to 3696 ppm,
- Magnesium from 101 ppm to 391 ppm,
- Potassium from 45 ppm to 230 ppm,
- Phosphorous from 123 ppm to 1561 ppm.



Pasture Cropping - No Kill No Till

Sowing annuals into perennial pastures



Oats Sown into Pasture
Only a little bit of phosphate
was added due to deficient soils

Gives the same yield as intensive plowing
and fertilizers, at a fraction of the cost
Animals can go back on pasture after harvest-
giving two crops and double income

Pictures: Colin Seis



Dr Christine Jones has conducted research at Colin Sies's property in Australia

An average increase of 8 tons/ha of



SOIL CARBON

- 0 - 10cm
150%
- 10 - 20cm
243%
- 20 - 30cm
317%
- 30 - 40cm
413%
- 40 - 50cm
157%

Soil Comparison between Winona and nearby property. Picture: Dr Christine Jones

Pasture Cropping - No Kill No Till



Soil Kee, Australia

- Sowing annual cover and cash crops in perennial pastures
- 11.2 metric tons of CO₂/ha/yr Verified by the Australian Government Soil Carbon Initiative
- Extrapolated globally across agricultural lands would sequester 55 Gt of CO₂/yr



Soil Carbon Sequestration

BEAM (Biologically Enhanced Agricultural Management)

A highly aerated composting process developed by Dr David Johnson of New Mexico State University, that produces compost with a high diversity of soil microorganisms.

37.7 metric tons of CO₂ per hectare per year (published paper)

Extrapolated globally across agricultural lands BEAM would

sequester 184 Gt of CO₂/yr



Picture: Regeneration International

Singing Frog Farm



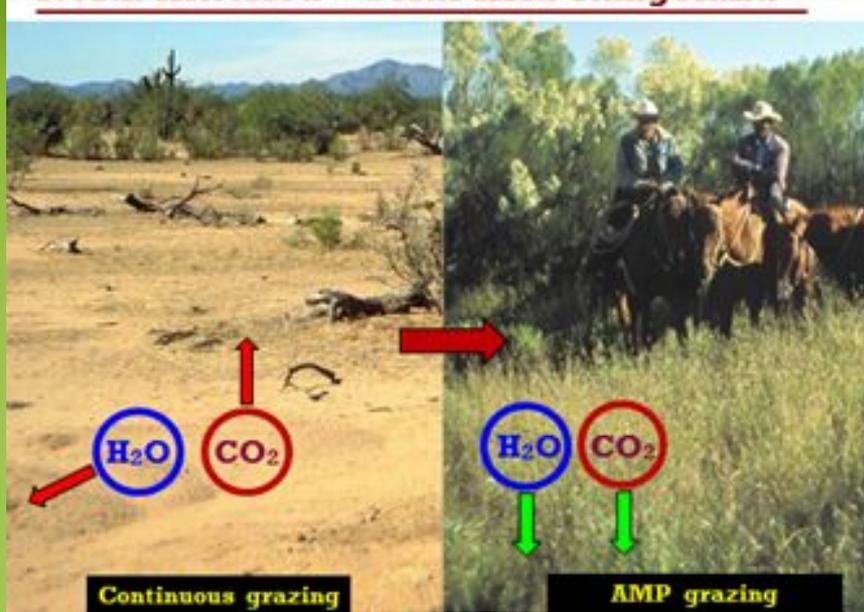
The Kaisers have managed to increase their soil organic matter from 2.4% to an optimal 7-8% in just six years, an average increase of about 3/4 of a percentage point per year - Chico State University USA

Intensive No Kill No Till highly biodiverse agroecological organic vegetables on 2 acres



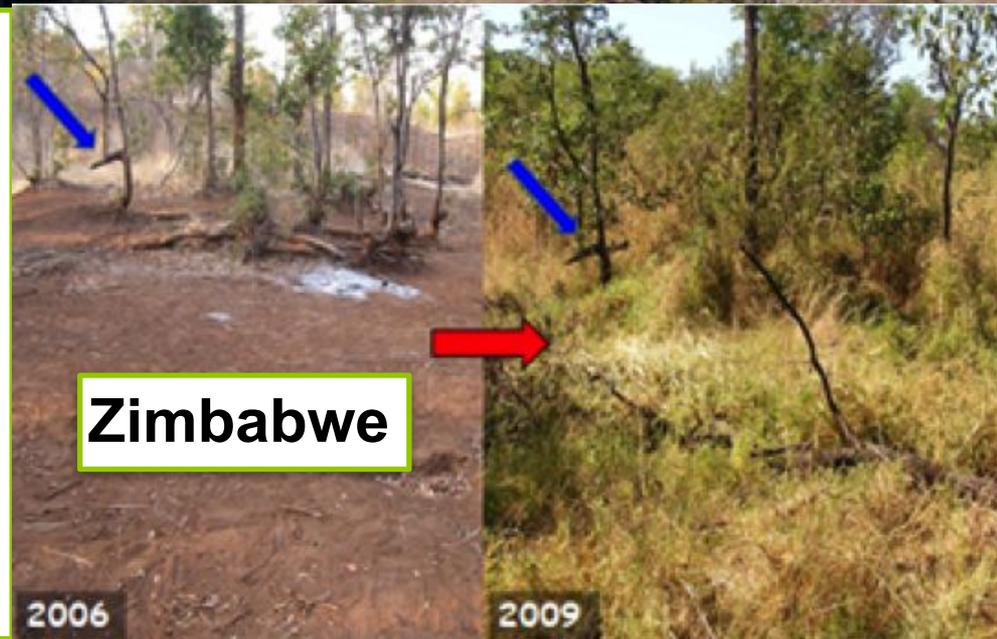
**Extrapolated globally across arable and permanent crop lands
it would sequester 179 Gt of CO₂/yr**

Regenerative/Holistic Grazing



- Regenerates degraded rangelands - 68% of Ag lands
- Increases biodiversity
- Improves water infiltration
- Increases stock carrying capacity
- Sequesters CO₂
- Biodegrades methane

Pictures:
Richard Teague



Regenerative/Holistic Grazing



'Here we show that these farms accumulated C at $8.0 \text{ Mg ha}^{-1} \text{ yr}^{-1}$.' (Machmuller et al. 2015)

$8.0 \text{ Mg ha}^{-1} \text{ yr}^{-1} = 8,000 \text{ kgs of Carbon being stored in the soil per hectare per year.}$

Soil Organic Carbon x 3.67 = CO_2 , means that these grazing systems have

Sequestered 29,360 kgs (29.36 metric tons) of CO_2 / ha/yr

(Sequestered 29,360 pounds of CO_2 / acre/yr)

Rangelands: $3,356,940,000 \text{ ha} \times 29.36 = 98.5 \text{ gt } \text{CO}_2/\text{yr}$

If these regenerative grazing practices were implemented on the world's grazing lands they would sequester 98.5 gt CO_2/yr

Why is policy change urgently needed?



Just transitioning a small proportion of agricultural production to best practice regenerative systems will sequester enough CO₂ to reverse climate change and restore the global climate.

- 10% of Agricultural lands under Beam could sequester 18.5 Gt of CO₂ per year.
- 10% of small holder farms across arable and permanent crop lands using Singing Frog Farm's No Kill No Till systems could sequester 18 Gt of CO₂ per year
- 10% of grasslands under regenerative grazing could sequester 10 Gt of CO₂ per year

This would result in 46.5 Gt of CO₂ per year being sequestered into the soil which is more than the amount of sequestration needed to drawdown the 25.61 Gt of CO₂ that is currently being emitted

Why is policy change urgently needed?



We only need to transition a small proportion of agricultural production to best practice regenerative systems to sequester enough CO₂ to reverse climate change and restore the global climate.

We can have negative emissions and bring the world back to the pre industrial revolution levels in a few decades

They are shovel ready solutions!!!!!!!!!!!!!!!!!!!!

Thank You

