



Brown's Ranch

"Regenerating Landscapes for a Sustainable Future"

TESTIMONY OF GABE BROWN
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"Climate Change and the U.S. Agriculture and Forestry Sectors"

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Thank you, Honorable Chairman Scott, and members of the committee, for allowing me the opportunity to testify before you today.

My name is Gabe Brown. I own and operate a 5,000 acre ranch near Bismarck, North Dakota with my wife, son and our family. We have farmed this land since 1991 and began by using conventional methods, but crop failures due to erratic weather, increased costs and rising debt led us to adopt a series of regenerative soil health practices. These practices have provided multiple benefits. Regenerative practices have made our farm profitable over the past 3 decades, and also increased our soil carbon over 6-fold since we first started taking on-farm measurements in 1993.

Today I make the case for wide-scale adoption of regenerative agriculture by sharing the essential opportunities afforded to me. Regenerative agriculture mitigates climate change while increasing resilience against current and future climatic uncertainty including flooding, fire and drought. It is essential to soil, plant, animal, human, community, and economic health. Regenerative agriculture does this by restoring our land and soil, the biology and the ecological cycles and processes which are foundational to human and planetary health and stability.

As a farmer and rancher, I have been affected by the extreme variability in weather. 2020 was the second driest year ever recorded where I live and ranch in Burleigh county, North Dakota. Just this month the local weather station recorded the most consecutive days of minus 25 degrees. From drought to flooding, from extreme cold to extreme heat, the change in our climate is affecting everyone and everything, especially farmers.

In 1997, I had the good fortune of hearing Don Campbell, a rancher from Alberta, Canada present at a conference and Don made this statement, "If you want to make small changes, change the way you do things; if you want to make major changes, change the way you SEE things."

This statement changed my life. I realized that the resiliency of my farm was up to me. The ability of my farm to cope with climate change was up to me.

As a farmer educator, I travel all over this country and have visited hundreds of properties. With my colleagues, I am currently involved with farmers and ranchers managing over 22 million acres in the US. The realities that these land managers are facing on the ground are alarming. One thing, however, remains constant, when a farmer or rancher changes how they see things, real regeneration starts happening

I want to be clear: farmers and ranchers are the heart of this country and so many of them are incredible stewards of our land. However, land use, particularly **the shift to our modern systems of agriculture in the United States and across the world has been** one of the biggest **drivers** of many issues we face today such as drought, flooding, soil loss and erosion, and the depletion of water resources, often attributed broadly to "climate change". Through mismanagement, our land and our soil is now heavily degraded and in many cases barely functioning, or worse, completely desertified.

Today, climate change is exacerbating the equally serious problem of degraded land. Scientists estimate that "75% of land is degraded". IPBES

It's not just a question of carbon or greenhouse gases. We've broken the hydrological cycle, carbon storage capacity, and nutrient cycle. Much of our land's soil is degraded to such a state and not functioning as it once did.

We have to come to grips with the reality that the current state of our soils is dire. We are losing 1.7 billion tons of soils annually (Cornell University). That is 4 tons of topsoil per acre per year on ag land (USDA).



Continuing on this trajectory should no longer be an option.

The Economic Toll of Modern Agriculture in the U.S.

- The average debt increase for farmers is 4.1% a year since 1990 (USDA).
- Percentage of net farm income from government support is increasing at an alarming rate; it's projected at almost 40% in 2020. (USDA)
- The cost of inputs, including fertilizers, herbicides, pesticides, etc. is rising for farmers due to the degradation of our soils
- Crop insurance payouts continue to rise, adding a burden to taxpayers.
 - The cost of crop insurance has been an average \$7 billion a year since 2013. (USDA-RMA)

However, US agriculture can and must be a major part of the solution. We can rebuild our soils through regenerative agriculture. Rebuilding our soils means rebuilding resilience, strength, and freedom for our nation.

Whether your primary concern is a farmer's bottom line, rural economic recovery, climate mitigation, sequestering carbon, reversing biodiversity collapse, cleaning our water and air, rehydrating our land so aquifers charge and springs flow again, providing land access for minorities and beginning farmers, or addressing the health crisis, regenerative agriculture provides the solution.

In 1991, my wife, Shelly, and I purchased a degraded ranch near Bismarck, ND. Soil tests showed that Soil Organic Matter levels (Soil Organic Matter is about 58% Carbon) were from 1.7% to 1.9%. Soil scientists tell me that historically, soil organic matter levels were between 7% to 8% in my region. This meant that approximately 75% of the soil carbon had been washed away or released into the atmosphere due to previous farming practices. This rate of soil carbon loss is all too common throughout the United States. Soils in North America have lost, on average, 20% to 75% of their carbon stock.

I also performed water infiltration tests. They showed that my soils could only infiltrate 1/2 inch of water per hour. This meant that any rain event in which I received more than that amount the water either ponded on the soil surface or ran off, in the case of any sloped land, carrying with it precious topsoil and nutrients. Top soil loss and artificial nutrient run off becomes problematic downstream with fish kills, water quality issues, and more.

On Farm Soil Comparison: Regenerative vs Conventional

In the picture you see before you, on the left-hand side of the screen are my soil's today (well aggregated and higher carbon levels). On the right-hand side of the screen are my neighbor's soils (compacted and mostly devoid of carbon). These samples were taken only feet apart. They are the same soil type. The only difference is management, or as I prefer to call it, stewardship.

Today, organic matter levels on my farm are from 5.7% to 7.9%. My neighbors are 1.7%

Today, my soils can infiltrate 30 inches of water per hour, while my neighbor is still lagging around ½ inch per hour.

- That is a 60-fold increase. In places around this country riddled with flooding, this could create massive reductions in damage and allow for us to retain precious water versus having it runoff carrying pollutants and sediment.
- As I am often quoted saying, "it is not about how much rain falls, it's how well you absorb and retain it"

Today, I do not use any synthetic fertilizer, pesticides, or fungicides. As a result of lower expenses and increased production my profits have increased tenfold.

So how does soil regeneration work?

The soil system evolved to be self regenerating and self healing, otherwise there would never have been soil to begin with. So, rebuilding soil is all about helping nature to do it using a system running on carbon energized by the sun - basically, maximizing photosynthesis - the ability for plants to use the energy from the sun to take carbon from the atmosphere and pump into the soil as liquid energy (glucose and water).



Building Functioning Soil

Nature also evolved to create functioning soil. Plants share their sugars with the microbes in the soil who not only make minerals and nutrients available to plants but also create glues that bind the soil particles

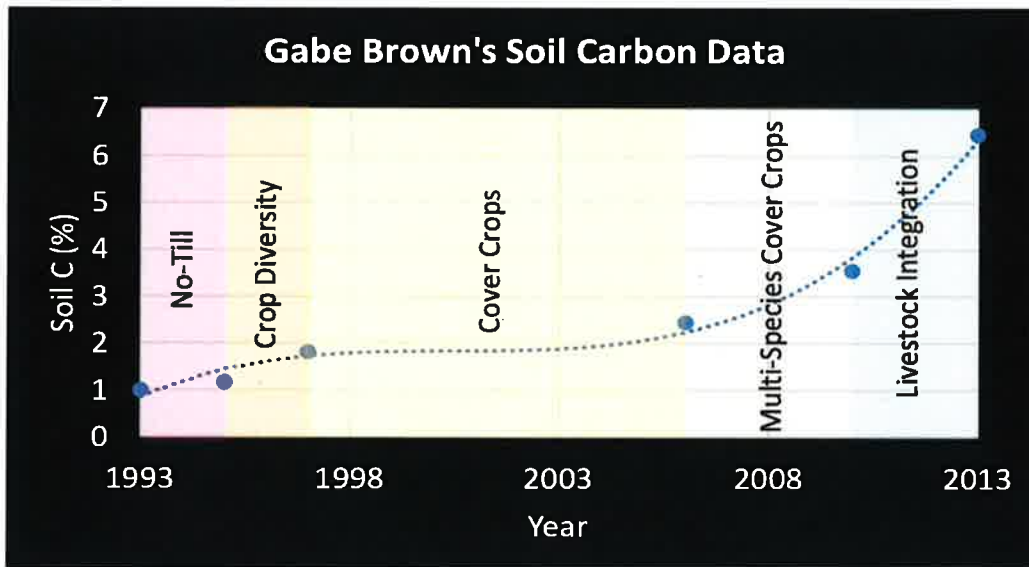
together forming aggregates. This is what causes the primary difference between soil and dirt where soils contain organic matter (i.e. carbon-based compounds) and dirt is only mineral - sand, silt and clay.



Healthy soil performs like a sponge.

Healthy soils are able to hold 20x their weight in water due to the pore space between aggregates which also allows for faster infiltration rates. The substances building the aggregates, the glues from the microorganisms, and the organic matter within the aggregates are carbon based and often very stable (meaning it can remain as soil carbon for years). Thus, the CO₂ in our atmosphere can and must become the glue that rebuilds our soils so they can function again.

How Regenerative Soil Health Practices Build Soil Carbon Over Time



Carbon Bank/Markets: if we move this direction please take in mind these four areas of concern.

1. Integrate other outcome areas while building out carbon models so they aren't separate (i.e. hydration, biomass, evapotranspiration, biodiversity, etc)
2. Large scale ground truthed calibration with real-time satellite data so it is based on outcomes.
3. Make sure at least 50% of all monies from carbon (or other services) make it to the farmer.
4. Make sure all corresponding data like precipitation, humidity index, etc are included in the baseline so equal setting is created for every state and region.

Regenerating healthy soil is the solution.

- o The Benefits:
 - Massive carbon sequestration potential.

1. Adaptive "Regenerative" grazing cases have shown the top 12" of soil are adding 4.76 tons (short US) C/acre/year and 17.46 (short US) tons CO₂/acre/year.
- Increase water holding capacity and absorption.
 1. 1% increase of Soil Organic Matter means 18-25 thousand more gallons per acre held.
 - Biodiversity
 1. Life in the soil means more life on the land (birds, bees, game, etc return)
 2. 1 teaspoon of healthy soil holds more organisms than people on earth.
 - Resilience/risk mitigation
 1. My colleagues and I work with hundreds of farmers totalling 22 million acres of land. The average we are seeing is only ½ inch of water infiltrated per hour.
 2. My farm started at this same rate and now can absorb 30 inches rainfall per hour.
 - Healthy plants and Farmer Profits
 1. Healthy soils make healthy plants that are pest and disease-resistant and require less input costs because the life in the soil makes the nutrients available to the plant.
 - a. In partnership with General Mills, Understanding Ag tested 45 farms that averaged 9,000 pounds of nitrogen in the top foot of the soil profile.
 - b. In most cases, soils are not deficient in nutrients, they are deficient in biology.**
 - c. Biologically active soils can help farmers reduce input costs. 7k acre farms, like Rick Clark's in Indiana, are saving \$860k a year on input costs.

Why are farmers moving toward regenerative? - *They want out of this endless cycle of debt and dependence. They want freedom. They want to see their sons and daughters interested in carrying on the legacy of their family farm. At the very least they want to provide for their families and keep them safe. The shift is huge, once they start working with nature instead of against her, their lives completely change. We work with every type of farmer, large, small, organic, conventional, wealthy, and in debt. We work with every race, religion, and creed. We work with White, Black, Latino, Asian, and Native American farmers. Regenerative agriculture came about because farmers were hurting, this is an incredibly interconnected movement from the soil up.*

The demand to successfully transition to regenerative agriculture is here and it is growing. And it means each of you can work to make sure that option is available to all farmers. At the very least encourage, and if needed, facilitate early adoption.

To move to regenerative on a massive scale with any type of farming and ranching we have to prioritize these six principles.

○ **Context**

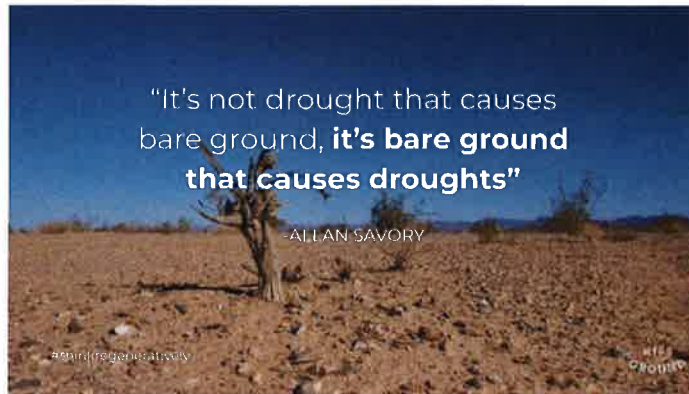
- Nature always acts in context. It does not try to grow plants or raise animals out of context of where they should not be growing or living.
- Programs like crop insurance are currently not based on positive outcomes and don't work in context, often leading to continued nationwide degradation of our soils.
 - We need to monitor for real outcomes as to benefit farmers building resilience into their operations.
 - Crop insurance needs to integrate environmental contexts so we aren't creating unnecessary harm.
- Our financing and loan system for farmers is often out of context keeping farmers on an arbitrary hamster wheel of trying to pay back principal balances. It could

be changed to an investment model that helps farm and ranch operations move to regenerative.



Orchards in the desert. Example of bad context.

- **Least Disturbance**
 - We have to get serious about reducing and eliminating tillage.
 - We have to reduce chemicals. Nature does not use copious amounts of chemicals.
 - The chemicals, herbicides, fungicides, insecticides, even the fertilizer we are putting on our crops are damaging our soils.
- **Living Root**
 - Living roots in the soil as long as possible throughout the year. Nature always wants a living plant to take carbon out of the atmosphere, through photosynthesis convert it to carbon compounds that it can pump into the soil to feed microbes. That is what makes rebuilding soil possible.
 - We need a massive mobilization of multispecies cover crops and mentorship from experienced individuals to ensure their success. We need 75% of our cropland covered in the offseasons as soon as possible.
 - We need viable options like roller crimpers for termination of diverse cover crops.
 - CRP can be beneficial but it is highly underutilized for actual regeneration. It needs diverse mixes of species not monocultures of shallow-rooted grasses that have poor nutrient quality. It needs to include regenerative grazing.
- **Soil Armor**
 - Walk through the forest, there is a carpet of leaves. Walk through a healthy prairie and every inch is covered in plants, deep-rooted grasses, and forbs. Nature always wants to cover the soil to protect it from wind erosion, water erosion, and evaporation to keep building soil aggregates.
 - We have to think holistically. We have to prioritize every square foot of soil and how well the soil is performing versus leaving thousands of acres bare and exposed while investing in small infrastructure projects and thinking we've accomplished our goal. (without armor, every bare inch of soil becomes vulnerable to water droplets that act like bombs to soil aggregates exploding them and leaving dispersed soil easily compacted and able to wash away).



○ **Increase biodiversity**

- Where in nature do you have a monoculture? The answer is only where human intervention has dictated it. Nature thrives on diversity, yet what do we do? We plant monocultures, corn, soybeans, wheat, cotton, rice, and the list goes on.
- As policymakers, you can help change this! Every working farm, ranch, or land in CRP can significantly increase the biodiversity of plants, animals, insects, and soil biology.
- This pint jar of soybean seed that I am holding has been treated with neonicotinoids and has the capability of killing 72,350,000 honeybees from the amount of chemical alone.

○ **Animal Integration**

- Ecosystems do not function properly without animals. Many of our richest, healthiest soils evolved with, and were formed in partnership with, grazing ruminants. Proper use of grazing ruminants are one of the keys to taking massive amounts of carbon out of the atmosphere, especially in more brittle environments that were originally grassland systems maintained by large herds and the indigenous people of this land.
- We must work together to bring back animals into our farming systems. We have to understand the profound opportunities and the differences of Adaptive "regenerative" grazed land versus "rotational" grazing or "continuous" grazing.
 - Compare soil carbon data - **total soil carbon tons per acre.**

Horizon	Adaptive (Regenerative)	Rotational	Continuous
6"	4.67	1.64	1.36
12"	4.00	1.88	1.37
18"	2.95	1.03	0.40
24"	2.04	1.02	0.54
30"	1.71	0.38	0.40
36"	1.42	0.41	0.34

TSC

And, we can do this faster than we ever thought possible! As my associate Dr. Allen Williams says, "outcomes that used to take us 15-20 years we are now seeing occurring in 3-4 years.". What he is saying is that the advances in how quickly farmers can regenerate landscapes, all while reducing input costs, continues to improve.

This is the Chihuahuan desert in Texas. Many think that with only 6-8 inches of annual rainfall it was always a desert



But take a close look at this picture. See the dark-colored soil near the surface? That is carbon. This was recently a vast grassland.



- This is erosion and is happening more and more across the whole country. Look closely to see the barbed wire going across this gully. This erosion occurred in just the past 60 years.
- I want to ask you all to take this back to your own states and districts. Think about places you grew up in or how your grandparents described the landscape, I want you to become present to the rates of land degradation that are happening all around us now. Climate change is exacerbating it but the management of the land is of the utmost importance.
 - Look for dried up streams or riverbeds. Look for bare land that once was vast prairie
 - It's all connected. We are drying ourselves up and leaving our land vulnerable.

You drive through this desert and then you open a gate to enter Alejandro Corrallo's ranch.



The difference is simply stewardship. Alejandro has used livestock as a tool to regenerate his soils and increase biomass. Where 12 years ago he needed 300 acres to feed one cow per year, he now only needs 30 acres per cow. *Note: Regenerative grazing in less brittle environments like Alabama see ranches going from 11 acres needed per cow/year to 2 in under three years.*



By practicing Regenerative Agriculture we can use nature's proven, time-tested principles to take massive amounts of carbon out of the atmosphere and build it back into the soil.

4 short case studies.

I want to very quickly share 4 case studies to show that this is not an anomaly for my ranch in North Dakota or Alejandro's in Texas. Yes, this can happen with farmers in your district.

Rick Clark (5th generation Farmer Indiana - Regenerative Organic)

- 7k acres growing alfalfa, yellow field peas, cattle, soy, corn, and wheat
- By moving to no-till and cover crop and planting into crimped cover crop "planting green", he eventually removed all chemical inputs (no synthetic fertilizer, pesticides or fungicides "farming naked")
- Savings on inputs approximately \$860k annually (based regional averages).
- His water infiltration rate has improved to 5" rainfall per hour.
- 4 bushel a year increase (for past four years) for corn. 1.5 increase for soy.

Adam Grady (11th Generation North Carolina)

- 1,600 acres cattle, pasture pigs, sheep, corn beans, pasture turkey, corn, and soy.
- Moved from tillage to no-till and cover w/livestock integration
 - "In our second year, we saved over \$200k by reducing input costs such as seed, pesticides, herbicides, fungicides, and fertilizer as well as reducing labor, and fuel costs. We had also reduced Glyphosate consumption by 80% and were glyphosate free by year three." - Adam Grady Dark Branch Farms
- Was able to seed two week after hurricane Florence waters receded while neighbors were still flooded.
- Was able to pay off his farm debt after only three years of farming regeneratively.

Adam Chappel (Arkansas)

- the 8k acre cotton farm was spending \$100 an acre on herbicides, "there was no way for us to be profitable".
- Switched to no-till and cover cropping now they are making 100-250 an acre profit.
- "I don't care what you call it, I call it profitable farming" - Adam Chappel

Dr. John Boyd (4th Generation Farmer Virginia)

- 1,300 acres growing corn, soy, wheat, beef cattle, goats, pigs, vegetables, and hemp.
- Transitioning to regenerative practices has lead to
 - Much native biodiversity being restored.
 - Major water and input savings.
- Working with tribal communities reintroducing hedgerows of elderberries into lands and pastures.
- As founder of the National Black Farmers Association, John works to help black farmers access NRCS soil health programs and get education in regenerative management.

This hearing is about climate change. But those of us who farm and ranch, it is so much more.

By practicing Regenerative Agriculture we can use nature's proven, time-tested principles to not just take massive amounts of carbon out of the atmosphere but we can use it to build back our soils, for farms, families and futures.

- We can restore the water cycle and replenish underground clean water sources making droughts less frequent.
- We can infiltrate water more quickly and hold more water thus alleviating flooding.
- We can hold nutrients on the landscape, thus preventing nitrates and phosphates from entering our watersheds.
- We can make farming and ranching profitable again by reducing inputs and stacking enterprises.
- We can revitalize our rural communities by diversifying farm production.
- We can produce food that is higher in nutrient density thus significantly lowering healthcare costs
- We can *Regenerate America*

Mr. Chairman, you and your committee members have the opportunity to foster this change. You can develop, adjust, or expand policy that will allow agriculture to be part of the solution. More resources are needed, but just increasing funding isn't adequate. It all starts with education and a "change in how we see things." We must educate farmers and ranchers as to these regenerative principles. But it's not just the farmers, this is systemic, the crop advisors, the field agents, and all society, need more education on the ecological approach and how and why regeneration of the land can and must happen.

From farmers, to soil scientists, to leading environmentalists, to government officials, you hear a resounding phrase, "I didn't know". Well, I didn't know either. This is an opportunity for all of us to learn.

While many of these concepts are rooted in indigenous knowledge, many of them are being relearned and shaped by our current context and are emerging with science. We are living in a time like no other, we need science, technology, indigenous wisdom, and holistic thinking working together to move us toward regeneration.

Building back healthy soil is the most cost-effective regional, state, and national investment. From risk mitigation to farmer prosperity, to human health, to carbon sequestration, it's a win, win, win, win, and this committee, Mr Chairman, can help lead the way.

Thank you for your time and I look forward to your questions.

