

21ST CENTURY CONSERVATION PRACTICES

HEARING
BEFORE THE
SUBCOMMITTEE ON
THE INTERIOR
OF THE
COMMITTEE ON OVERSIGHT
AND GOVERNMENT REFORM
HOUSE OF REPRESENTATIVES
ONE HUNDRED FOURTEENTH CONGRESS
SECOND SESSION

SEPTEMBER 13, 2016

Serial No. 114-75

Printed for the use of the Committee on Oversight and Government Reform



Available via the World Wide Web: <http://www.fdsys.gov>
<http://www.house.gov/reform>

U.S. GOVERNMENT PUBLISHING OFFICE
22-195 PDF

WASHINGTON : 2016

For sale by the Superintendent of Documents, U.S. Government Publishing Office
Internet: bookstore.gpo.gov Phone: toll free (866) 512-1800; DC area (202) 512-1800
Fax: (202) 512-2104 Mail: Stop IDCC, Washington, DC 20402-0001

COMMITTEE ON OVERSIGHT AND GOVERNMENT REFORM

JASON CHAFFETZ, Utah, *Chairman*

JOHN L. MICA, Florida	ELIJAH E. CUMMINGS, Maryland, <i>Ranking</i>
MICHAEL R. TURNER, Ohio	<i>Minority Member</i>
JOHN J. DUNCAN, JR., Tennessee	CAROLYN B. MALONEY, New York
JIM JORDAN, Ohio	ELEANOR HOLMES NORTON, District of
TIM WALBERG, Michigan	Columbia
JUSTIN AMASH, Michigan	WM. LACY CLAY, Missouri
PAUL A. GOSAR, Arizona	STEPHEN F. LYNCH, Massachusetts
SCOTT DESJARLAIS, Tennessee	JIM COOPER, Tennessee
TREY GOWDY, South Carolina	GERALD E. CONNOLLY, Virginia
BLAKE FARENTHOLD, Texas	MATT CARTWRIGHT, Pennsylvania
CYNTHIA M. LUMMIS, Wyoming	TAMMY DUCKWORTH, Illinois
THOMAS MASSIE, Kentucky	ROBIN L. KELLY, Illinois
MARK MEADOWS, North Carolina	BRENDA L. LAWRENCE, Michigan
RON DeSANTIS, Florida	TED LIEU, California
MICK MULVANEY, South Carolina	BONNIE WATSON COLEMAN, New Jersey
KEN BUCK, Colorado	STACEY E. PLASKETT, Virgin Islands
MARK WALKER, North Carolina	MARK DeSAULNIER, California
ROD BLUM, Iowa	BRENDAN F. BOYLE, Pennsylvania
JODY B. HICE, Georgia	PETER WELCH, Vermont
STEVE RUSSELL, Oklahoma	MICHELLE LUJAN GRISHAM, New Mexico
EARL L. "BUDDY" CARTER, Georgia	
GLENN GROTHMAN, Wisconsin	
WILL HURD, Texas	
GARY J. PALMER, Alabama	

JENNIFER HEMINGWAY, *Staff Director*

DAVID RAPALLO, *Minority Staff Director*

BILL MCGRATH, *Staff Director, Subcommittee on the Interior*

WILLIE MARX, *Clerk*

SUBCOMMITTEE ON THE INTERIOR

CYNTHIA M. LUMMIS Wyoming, Chairman

PAUL A. GOSAR, Arizona	BRENDA L. LAWRENCE, Michigan, Ranking
BLAKE FARENTHOLD, Texas	Member
KEN BUCK, Colorado, Vice Chair	MATT CARTWRIGHT, Pennsylvania
STEVE RUSSELL, Oklahoma	STACEY E. PLASKETT, Virgin Islands
GARY J. PALMER, Alabama	

CONTENTS

	Page
Hearing held on September 13, 2016	1
WITNESSES	
Ms. Judith D. Schwartz, Author	
Oral Statement	5
Written Statement	8
Mr. Byron Shelton	
Oral Statement	12
Written Statement	14

21ST CENTURY CONSERVATION PRACTICES

Tuesday, September 13, 2016

HOUSE OF REPRESENTATIVES,
SUBCOMMITTEE ON THE INTERIOR,
COMMITTEE ON OVERSIGHT AND GOVERNMENT REFORM,
Washington, D.C.

The subcommittee met, pursuant to call, at 2:50 p.m., in Room 2154, Rayburn House Office Building, Hon. Cynthia M. Lummis [chairman of the subcommittee] presiding.

Present: Representatives Lummis, Buck, Palmer and Lawrence. Mrs. LUMMIS. The Subcommittee on the Interior of the Committee on Oversight and Government Reform will come to order. This hearing is somewhat unique, in that it's totally about the future, the government reform component of OGR's responsibility.

In order to set the stage for this discussion, I want to explain why the subject is so important to me and why it should be important to Congress. Let's step back into Mr. Peabody's Way Back Machine and turn the dial to the 1970s. The 1970s were a time of major environmental and natural resource lawmaking. The EPA was created in 1970; the Clean Water Act was passed in 1972; the Endangered Species Act in 1973; and FLPMA, the Federal Land Policy Management Act, in 1976. Incidentally, I was in high school and college during those years and took classes in both range management and soil science in college. I also had some really bad hairdos, but we won't go there.

All right. Roughly 40 years have passed. Scientific knowledge has grown leaps and bounds. What was settled science back then is now very different. Global cooling science from the 1970s is now global warming science. We know only one thing for sure: science is never settled.

Range science is among the scientific disciplines that have evolved exponentially since I took a range management class in college over 40 years ago. We are going to hear about some of those practices today, those modern practices, which were neither contemplated nor accommodated in our 40-year natural resource management statutes. Rules and policies adopted recently in this decade are based on old laws and old science. Some of these rules implement practices that may accelerate desertification. There is a better way.

For the sake of our range health, let's explore modern soil science and grassland health. Modern holistic practices can inform natural resource laws, rules, and practices. 99.9 percent of the Bureau of Land Management land in the U.S. is in 11 western States. It is mostly grassland, a huge carbon sequestration resource.

We are grateful today for the testimony of witnesses who can attest to 21st century conservation practices that are restoring health to soils and grassland resources.

I also want to thank Ranking Member Lawrence for this departure from normal hearing processes to view the following excerpt from a Ted talk delivered by Allan Savory, a global leader in regenerative land and resource management. Now, Mr. Savory would have been here today to testify, but he is with Prince Philip in England talking about these very same issues, so he was unable to attend.

But would you please show us his Ted talk?

Mr. SAVORY. "Desertification is a fancy word for land that is turning to desert, and this happens only when we create too much bare ground. There is no other cause. And I intend to focus on most of the world's land that is turning to desert. But I have for you a very simple message that offers more hope than you can imagine. We have environments where humidity is guaranteed throughout the year. On those, it is almost impossible to create vast areas of bare ground no matter what you do. Nature covers it up so quickly. And we have environments where we have months of humidity followed by months of dryness, and that is where desertification is occurring.

Fortunately with space technology now, we can look at it from space, and when we do, you can see the proportions fairly well. Generally what you see in green is not desertifying, and what you see in brown is, and these are by far the greatest areas of the earth. About two-thirds, I would guess, of the world is desertifying. I took this picture in the Tihamah Desert while 25 millimeters, that is an inch of rain, was falling. Think of it in terms of drums of water each containing 200 liters.

Over 1,000 drums of water fell on every hectare of that land that day. The next day, the land looked like this. Where had that water gone? Some of it ran off as flooding, but most of the water that soaked into the soil simply evaporated out again, exactly as it does in your garden if you leave the soil uncovered.

Now, because the fate of water and carbon are tied to soil organic matter, when we damage soils, you give off carbon, carbon goes back to the atmosphere.

Now, you are told over and over repeatedly that desertification is only occurring in arid and semiarid areas of the world and that tall grasslands like this one, in high rainfall, are of no consequence, but if you do not look at grasslands, but look down into them, you find that most of the soil in that grassland that you have just seen is bare and covered with a crust of algae, leading to increased runoff and evaporation. That is the cancer of desertification that we do not recognize till its terminal form.

Now, we know that desertification is caused by livestock, mostly cattle, sheep, and goats overgrazing the plants, okay, leaving the soil bare and giving off methane. Almost everybody knows this, from Nobel laureates to golf caddies, always taught it, as I was.

Now, the environments like you see here, dusty environments in Africa, where I grew up, and I loved wildlife, and so I grew up hating livestock because of the damage they were doing, and then my university education as an ecologist reinforced my beliefs. Well,

I have news for you. We were once just as certain that the world was flat. We were wrong then, and we are wrong again. And I want to invite you now to come along on my journey of reeducation and discovery.

When I was a young man, a young biologist in Africa, I was involved in setting aside marvelous areas as future national parks. Now, no sooner—this was in the 1950s. And no sooner did we remove the hunting, drumbeating people to protect the animals, than the land began to deteriorate, as you see in this park that we formed. Now, no livestock were involved, but suspecting that we had too many elephants now, I did the research and I proved we had too many, and I recommended that we would have to reduce their numbers and bring them down to a level that the land could sustain. Now, that was a terrible decision for me to have to make, and it was political dynamite, frankly, so our government formed a team of experts to evaluate my research. They did. They agreed with me. And over the following years, we shot 40,000 elephants to try to stop the damage, and it got worse, not better. Loving elephants as I do, that was the saddest and greatest blunder of my life, and I will carry that to my grave. One good thing did come out of it. It made me absolutely determined to devote my life to finding solutions.

When I came to the United States, I got a shock to find national parks like this one desertifying as badly as anything in Africa, and there had been no livestock on this land for over 70 years. And I found that American scientists had no explanation for this except that it is arid and natural.

So I then began looking at all the research plots I could over the whole of the western United States where cattle had been removed to prove that it would stop desertification, but I found the opposite. As we see on this research station where this grassland that was green in 1961, by 2002 had changed to that situation. And the authors of the position paper on climate change from which I obtained these pictures attribute this change to unknown processes.

Clearly we have never understood what is causing desertification, which has destroyed many civilizations and now threatens us globally. We have never understood it. Take one square meter of soil and make it bare like this is down here, and I promise you, you will find it much colder at dawn and much hotter at midday than that same piece of ground if it is just covered with litter, plant litter. You have changed the microclimate. Now, by the time you are doing that and increasing greatly the percentage of bare ground on more than half the world's land, you are changing macroclimate, but we have just simply not understood why was it beginning to happen 10,000 years ago, why has it accelerated lately. We had no understanding of that.

What we had failed to understand was that these seasonal humidity environments of the world, the soil and the vegetation, developed with very large numbers of grazing animals and that these grazing animals developed with ferocious pack hunting predators. Now, the main defense against pack hunting predators is to get into herds, and the larger the herd, the safer the individuals. Now, large herds, dung and urinate all over their own food, and they have to keep moving, and it was that movement that prevented the

overgrazing of plants, while the periodic trampling ensured good cover of the soil, as we see where a herd has passed.

This picture is a typical seasonal grassland, it has just come through 4 months of rain and it is now going into 8 months of dry season, and watch the change as it goes into this long dry season. Now, all of that grass you see aboveground has to decay biologically before the next growing season, and if it doesn't, the grassland and the soil begin to die. Now, if it does not decay biologically, it shifts to oxidation, which is a very slow process, and this smothers and kills grasses, leading to a shift to woody vegetation and bare soil, releasing carbon.

To prevent that, we have traditionally used fire, but fire also leaves the soil bare, releasing carbon. And worse than that, burning one hectare of grassland gives off more and more damaging pollutants than 6,000 cars, and we are burning in Africa every single year more than 1 billion hectares of grasslands, and almost nobody is talking about it. We justify the burning as scientists, because it does remove the dead material and it allows the plants to grow."

Mrs. LUMMIS. Well, that is just a segment of the Ted talk. I recommend that you see it in its entirety; it is very impressive. And I happen to know, because I ranch in Wyoming. My family purchased the ranch next door. It had a Savory grazing system on it named after Allan Savory, the gentleman you just saw in the Ted talk. So it was 2,600 acres, it was divided into 16 grazing cells, and we would put very large numbers of cattle into each cell, and they would graze it down to the nubs, and then we would move them frequently from cell to cell using the same herding ideas that were expressed that occur naturally in the wild in Zimbabwe and elsewhere in Africa. By doing that, it did heal up some of the draws that were bare of all grasses and the grass did return, because you had the hoof action of the cattle depositing with their manure nutrients into the soil that were compacted into the soil by their split-hooved hooves before they were moved into the next pasture.

So I can attest to the fact that Allan Savory's theories have worked on the ground in places, including the land that I worked as a rancher, and so it is something that we should discuss in terms of looking forward about how we manage public lands and present—or excuse me—prevent damage to our natural resources inadvertently.

With that, I now recognize Mrs. Lawrence, ranking member of the Subcommittee on the Interior, for her opening statement.

Mrs. LAWRENCE. Thank you, Madam Chair. I do want to say, being a city girl born and raised, I have learned a lot from you.

The United States has over 770 million acres of grazing land. These lands are important to both our agriculture and the environment. Grasslands provide pasture for livestock, but also act as a natural erosion control habitat for a diverse and sometimes even endangered species, and reservoirs for carbon dioxide that would otherwise be released into the atmosphere.

While the environment is healthier, more resources exist for agricultural purposes. It goes without saying that if there is no forage, cattle simply cannot graze. Our ecological goals are intertwined with protecting the livelihood of farmers and ranchers.

As we will hear from our witnesses today, effective grazing practices actually offer the potential to help restore the quality of our grasslands. The movement of hooved animals turn the soil, allowing it to retain more water and nutrients. This boosts our soil quality and encourages future plant growth, and reduces the risks of destructive wildfires through the natural bush clearing.

But grazing practices are not one-size-fit-all; rather, different environments may require different management practices for maximum benefit. According to the Natural Resources Conservation Service, animals should be moved from one area to the other, as the expert has told us, in a way that truly gives natural cycles a chance to occur and the plants an opportunity to regrow before the sections of land are grazed again. This principle is important to what we will discuss today, meeting the needs of livestock and ranchers while optimizing benefits to the environment.

I look forward to hearing from our witnesses, and I yield back my time.

Mrs. LUMMIS. Thank you.

I will hold the record open for 5 legislative days for any member who would like to submit a written statement.

We will now recognize our panel of witnesses. I am pleased to welcome Ms. Judith Schwartz, author of "Cows Save the Planet and Other Improbable Ways of Restoring Soil to Heal the Earth"; and Mr. Byron Shelton, senior program director of the Savory Institute. Welcome to you both.

Pursuant to committee rules, witnesses will be sworn in before they testify, so please rise and raise your right hand.

Do you solemnly swear or affirm that the testimony you are about to give will be the truth, the whole truth, and nothing but the truth?

Thank you. The witnesses answered in the affirmative.

Please be seated.

In order to allow time for discussion, we ask you to limit your oral testimony to 5 minutes, but because we have some time to talk very casually and prospectively about these issues, we will have plenty of time for questions. Your entire written statement will be made part of the record.

So, Ms. Schwartz, we will begin with you. You are recognized for 5 minutes. Welcome.

WITNESS STATEMENTS

STATEMENT OF JUDITH D. SCHWARTZ

Ms. SCHWARTZ. Thank you. Is this on? Am I good?

Mrs. LUMMIS. It sounds like it's not on. Yeah. Is there a button—see the button?

Ms. SCHWARTZ. "Talk"?

Mrs. LUMMIS. There you go.

Ms. SCHWARTZ. Thank you to Congresswoman Lummis, Ranking Member Lawrence, and members of the Interior Subcommittee for this opportunity. I am before you today as an author of two books that explore animal-land dynamics, particularly the potential for holistic livestock management to regenerate landscapes.

“Cows Save the Planet” looks at soil as a hub for our environmental, economic, and social challenges, and for solutions. “Water in Plain Sight” explores how water intersects with climate, biodiversity, food security, and peace and conflict, and how understanding how water works, how it moves across the landscape helps us address such concerns.

Understand, that I never expected to be on this beat; rather, as a journalist driven to explore solutions, I was drawn to the elegant complexity of flourishing ecosystems and the promise of drawing on nature’s models to restore balance and vitality to our lands, including through holistic managed grazing.

Basically, whenever there are animals on the land, those animals are having an impact, which can be positive or negative depending on how they are managed. The paradigm for conservation has changed, in that land is not static, but requires biological activity. In nature, plants are to a large extent managed by herbivores and those plant-eating animals are managed by predators. The alteration of the landscape in the absence of natural predators have left a management void. With what we now understand about range-land systems, this void can be filled in a way that at once bolsters ecological function and economic opportunity.

In my reporting, I’ve encountered numerous examples of land transformed by restorative grazing. At Zimbabwe at the Africa Center for Holistic Management, the Dimbangombe River flows a kilometer farther than it has in living memory and now runs throughout the year. Despite drought in southern Africa, this land remains productive and supports abundant wildlife, including elephant and lions.

In the Chihuahuan Desert, which spans several states in part of Mexico, I visited an area where holistic ranchers are working with bird conservation organizations to create a corridor for endangered migratory grassland birds. These ranches are islands of grass for the birds, whose numbers have steeply declined due to desertification throughout the region.

In Australia, a rancher I interviewed uses cattle to control excess vegetation, and thus minimize the extent of wildfires.

In each instance, management entails inquiring how nature maintained healthy conditions, and finding ways to mimic or ally with those processes.

Agriculture, including ranching, need not be an extractive industry. It can be regenerative too, as well as consistent with conservation goals. This was noted at COP 21, the global climate conference in Paris last December, with the advent of the 4 per 1,000 Initiative introduced by the French Agricultural Ministry. This initiative, signed by 30 plus nations and several dozens NGOs, calls attention to agricultural means of bolstering carbon levels in the soil. Even at a modest annual rate, increasing soil carbon stocks has important implications for drawing down CO₂, bolstering fertility and biodiversity, and enhancing land’s ability to retain water, which means added resilience amid the threat of drought, floods, and wildfires.

Every 1 percent increase in soil organic matter, which is mostly carbon, represents an added 20,000 gallons of water per acre that can be held on the land. The loss of this capacity is a story that

has been written across much of the U.S., leading to many of our challenges that we face today.

My recommendation is that we do not leave land bare and languishing and hope that it will somehow improve; rather, we should explore strategies that work with natural processes, including holistic planned grazing, restoring the predatory-prey relationship, and reviving populations of keystone species, such as beaver.

One way to ascertain progress is through monitoring basic factors, such as water infiltration and soil carbon levels.

Thank you.

[Prepared statement of Ms. Schwartz follows:]

**Testimony of Judith D. Schwartz
Author/Journalist from Vermont
Committee on Oversight and Government Reform
Subcommittee on the Interior, Hearing on
“21st Century Conservation Practices”
September 13, 2016**

Thank you to Chairman Lummis, Ranking Member Lawrence, and members of the Interior Subcommittee for this opportunity.

I am before you today as an author of two books that explore animal/land dynamics, particularly the potential for holistic livestock management to regenerate landscapes. *Cows Save the Planet and Other Improbable Ways of Restoring Soil to Heal the Earth* (Chelsea Green Publishing, 2013) looks at soil as a hub for our environmental, economic and social challenges—and for solutions. *Water In Plain Sight: Hope for a Thirsty World* (St. Martin’s Press, 2016) explores how water intersects with climate, biodiversity, food security and peace and conflict. And how understanding how water works—how it moves across the landscape—helps us address such concerns. Understand that I never expected to be on this “beat”: Rather, as a journalist driven to explore solutions I was drawn to the elegant complexity of flourishing ecosystems and the promise of drawing on nature’s models to restore balance and vitality to our lands, including through holistic managed grazing.

Basically, whenever there are animals on the land those animals are having an impact, which can be positive or negative, depending on how they are managed. The paradigm for “conservation” has changed, in that land is not static but requires biological activity. In nature, plants are to a large extent managed by herbivores, and those plant-eating animals are managed by predators. The alteration of the landscape and the absence of natural predators have left a management void. With what we now understand about rangeland systems, this void can be filled in a way that at once bolsters ecological function and economic opportunity.

In my reporting I’ve encountered numerous examples of land transformed by restorative grazing. In Zimbabwe, at the Africa Centre for Holistic Management, the Dimbangombe River flows a kilometer farther than it has in living memory and now runs throughout the year. Despite a continuing drought in Southern Africa, this land remains productive and supports abundant wildlife, including elephants and lions. In the Chihuahuan Desert, which spans several states and part of Mexico, I visited an area where holistic ranchers are working with bird conservation organizations to create a corridor for endangered migratory grassland birds. These ranches are “islands of grass” for the birds, whose numbers have steeply declined due to desertification throughout the region. In Australia, a rancher I interviewed uses cattle to control excess vegetation and thus minimize the extent of wildfires. In each instance, management entails inquiring how nature maintained healthy conditions and finding ways to mimic or ally with those processes.

Agriculture, including ranching, need not be an “extractive” industry; it can be regenerative, too. As well as consistent with conservation goals. This was noted at COP21, the global climate conference in Paris last December, with the advent of

the 4 per 1000 Initiative, introduced by the French Agricultural Ministry. This initiative, signed by 30-plus nations and several dozen NGOs, calls attention to agricultural means of bolstering carbon levels in the soil. Even at a modest annual rate, increasing soil carbon stocks has important implications for drawing down atmospheric CO₂, bolstering fertility and biodiversity, and enhancing land's ability to retain water—which means added resilience amid the threat of drought, floods and wildfires. Every one percent increase in soil organic matter (which is mainly carbon) represents an additional 20,000 gallons of water per acre that can be held on the land. The loss of this capacity is a story that has been written across much of the U.S., leading to many of the challenges we face today.

My recommendation is that we do not leave land bare and hope that it will somehow improve. Rather, we should explore strategies that work with natural processes, including holistic planned grazing, restoring the predator-prey relationship, and reviving populations of keystone species such as beaver. One way to ascertain progress is through monitoring basic factors such as water infiltration and soil carbon levels.

Additional information:

--Article on Wildfires (Judith D. Schwartz)

<http://www.commondreams.org/views/2016/08/16/wildfires-are-getting-worse-time-rehydrate-our-landscapes>

--Soil as Carbon Storehouse (Judith D. Schwartz)

http://e360.yale.edu/feature/soil_as_carbon_storehouse_new_weapon_in_climate_fight/2744/

--Cows and Conservation in Zimbabwe (Judith D. Schwartz)

<https://thefern.org/2016/04/conservation-age-climate-change-saving-cows-grasslands-rural-zimbabwe/>

--Restorative Grazing and Biodiversity in the Chihuahuan Desert Grasslands: Video by Bird Conservancy of the Rockies

<https://www.youtube.com/watch?v=XsmoJsRWK0Q>

--The Soil Carbon Coalition has been a leader in promoting monitoring of soil carbon levels. This is an interactive map of the United States that measures changes in soil carbon.

<http://soilcarboncoalition.org/changemap.htm>

--The Healthy Soils Initiative has just received funding in the State of California. This is a possible model for measurement and incentives.

<http://calclimateag.org/healthy-soils-initiative-funded/>

--Congressional hearing, June 25, 2014, by the Subcommittee on Public Lands and Environmental Regulation on the topic of "Increasing Soil Carbon on Public Lands". The material in the testimonies are relevant to today's discussion.
<http://naturalresources.house.gov/calendar/eventsingle.aspx?EventID=384738>
(Testimony starts at 30:00.)

Individual testimonies:

http://naturalresources.house.gov/uploadedfiles/testimony_martinpler6.25.pdf
http://naturalresources.house.gov/uploadedfiles/testimony_richpler6.25.pdf
http://naturalresources.house.gov/uploadedfiles/testimony_teaguepler6.25.pdf
<http://naturalresources.house.gov/uploadedfiles/wicktestimony-6-25-14.pdf>

--This document explains the 4 per 1000 Initiative that is referenced above:
<http://4p1000.org/understand>

Biographical Summary

Judith D. Schwartz is a journalist whose recent work looks at ecological restoration as a way to address environmental, economic, and social challenges. She writes on this theme for numerous publications and speaks in venues around the world. She has written for a variety of newspapers and magazines including *Scientific American*, *Discover*, *Time*, *The New York Times*, *The New York Times Book Review*, *Pacific Standard* and *The Christian Science Monitor*. Her 2013 book *Cows Save the Planet* was awarded a Nautilus Book Award Silver Prize for Sustainability and is among Booklist's Top 10 Books On Sustainability. A new book, *Water In Plain Sight: Hope for a Thirsty World* has just been published by St. Martin's Press. A graduate of the Columbia Journalism School and Brown University, she lives in Vermont.

Judith's professional website is: <http://judithdschwartz.com/>

Mrs. LUMMIS. Thank you, Ms. Schwartz.
And Mr. Shelton, you are recognized for 5 minutes.

STATEMENT OF BYRON SHELTON

Mr. SHELTON. Honorable House Members, thank you for the opportunity to share conservation practices related to grazing. I am Byron Shelton, senior program director for Savory Institute.

Allan Savory, the scientist, ecologist, and farmer, has worked years to understand and train others in managing land regeneratively. This effort has resulted in holistic management. Managing holistically considers the whole picture, including economic, environmental, and social considerations simultaneously, both short and long-term.

Savory Institute was formed to promote large-scale restoration of the world's grasslands. Grasslands comprise one-third of the world's land surface, 70 percent of which are degraded. Savory Institute has 30 training centers worldwide, including demonstration sites and accredited professionals. Currently, over 40 million acres worldwide are being managed holistically.

With that background, I would like to get right to the crux of the matter. If I could have—I have two photos. The first photo at this point could be put up. To allow for reasonable debate and decisions on grazing, a clear understanding of the role of the grazing animal is needed. A land manager may say, I wish it would rain, causing more plant growth. Just as important is the need for water for plants to decay. Nutrients have to cycle back to regenerate soil. Decay occurs through microorganisms and insects, which need water to live.

With regular humidity and rainfall, as in this photo of the midAtlantic region, plants will grow, then biologically decay onto and into the ground, replenishing the soil, as water exists for the microorganisms and insects to live. You could go to the second photo, please.

Now comes the point that is not generally recognized. With irregular humidity and rainfall, as in many of our western lands, plants remain standing for years, as water is limited for microorganisms that would cause biological decay. These plants turn gray, oxidize into the air, mine the soil by not returning to it, and die, creating bare ground, poor water and nutrient cycles, and biodiversity loss. This variation in regularity of humidity and seasonal rainfall is referred to as brittleness. Nonbrittle environments have regular humidity and moisture, where brittle-leaning environments have irregular humidity and moisture.

What does this have to do with grazing? A bison, elk, deer, antelope, or cow, sheep, or goat can't digest plants any more than you or I, but these ruminants, as they are called, have a multi-chambered stomach full of moisture and microorganisms. These microbes digest the plants the animals chew. The ruminant, wild or domestic, is a mobile digestive vat moving about the land, breaking down plant material and returning it as dung or urine to replenish the soil.

When this animal is removed from brittle environments, this system is broken. This system is also broken by removing the predator

that kept the herding animals bunched and moving, allowing for grazed forages to recover by regrowing roots and leaves between grazings. Herding and fencing replaces the predator. The hooves aerate the soil that has been sealed by rainfall, to allow for water to enter, making the rainfall more effective, and trampling the old plant material.

With bison or cattle, two tools are being managed: grazing and animal impact. Holistic management uses holistic plant grazing to manage these tools properly for regeneration of the natural resources.

Regardless of whether one eats meat, wildlife and their predators or domestic livestock being managed to mimic nature are required in these brittle areas for a healthy ecosystem, biodiversity, and drinking water.

Savory Institute's work addresses food production, water quality and quantity, soil health, carbon sequestration, wildlife and plant conservation, and climate change.

Land managers are increasing their profits while building biological capital, producing food and water on regenerating soils. Livestock, wildlife, plants, and human needs can be met simultaneously.

Holistic management is appealing to conservative and liberal values. Managing holistically is economically viable, while restoring the environment and meeting the needs of the people involved.

Thank you.

[Prepared statement of Mr. Shelton follows:]



September 13, 2016, 2:00PM

Written Testimony – by Byron Shelton, Savory Institute
 Congressional Hearing “21st Century Conservation Practices”
 Committee on Oversight and Government Reform, Subcommittee on the Interior
 Room 2154, Rayburn House Office Building, Washington DC

Honorable House members. Thank you for taking the time to hear some of the “21st Century Conservation Practices” of land management applicable for both federal and private lands and specifically related to grazing.

My name is Byron Shelton. I am the Senior Program Director for Savory Institute based in Colorado. The Savory Institute is named for Allan Savory, a scientist, ecologist, farmer, and rancher from Zimbabwe and the United States who has worked tirelessly over the last 60 years to understand and train others on how to manage land and resources regeneratively. This includes increasing biodiversity of plant and animal life, increasing water holding capacity of the soil, increasing soil building capacity, increasing soil carbon sequestration and nutrient cycling, and increasing capture of solar energy flow.

This effort by Allan has resulted in a management process that has come to be called Holistic Management. Managing holistically, as successful management has to do, considers the whole or big picture including economic, environmental, and social ramifications simultaneously. Otherwise we end up taking actions that have many unintended consequences. The actions might be environmentally sound but not economically sound or visa versa and may not meet the needs of the people involved.

Savory Institute was formed to promote the large-scale restoration of the world’s grasslands, which include the croplands of the world, as most crops are grown on soil created by productive grasslands. Grasslands are extremely important, as they comprise 1/3 of the world’s land surface, 70% of which are in degraded form. That means grasslands are losing plant and animal biodiversity, soil structure, soil carbon, and water holding capacity leading to more severe droughts and flooding and soil loss.

Savory Institute has approximately 30 regional entrepreneurial for-profit and non-profit hubs or training centers around the world. These hubs include demonstration sites and trained Savory Institute Accredited Professionals to leverage spreading the knowledge of how to improve our resources through management. They focus on getting results on the land. Currently over 40 million acres around the world are being managed holistically. We are actively working to increase the number of training centers to 100 by 2025. With functioning ecosystem processes water, food, and security are tremendously increased for people around the world.



Holistic Planned Grazing is one of our important planning procedures. This procedure is used to manage livestock for land health and improvement vs. land degradation. We also use other planning procedures including Holistic Financial Planning, Holistic Land or Infrastructure Planning, and Holistic Ecological Monitoring to ensure land managers are being successful in improving the resources while remaining viable as a business.

With that background, I will encourage you to review the written material and resources provided that give further information on Savory Institute and what we are working to accomplish. In our limited time I want to get right to the crux of the matter.

To allow for reasonable debate and decisions on actions on grazing a clear understanding of the role of the grazing animal is needed.

Many times you'll hear a farmer or rancher say, "I wish it would rain, we need more water". This is true to allow for more plant growth. Just as important however, is the need for water for decay of the plant material to replenish the soil. Nutrients have to cycle from the land and back to the land for a healthy regenerating soil. Decay occurs by microorganisms and small insects eating and decomposing the old plant material. These microorganisms and small insects cannot live without water.

In an environment with regular humidity and rainfall, regardless of the amount of rainfall, as here in the mid-Atlantic region, plants that grow will decay back onto and into the ground, as the habitat including water for the microorganisms and insects exists. These microorganisms and insects eat the plants and cause them to decay biologically back into the ground thereby replenishing the soil.

Now comes the point that is not generally recognized or understood. In an environment with irregular humidity and rainfall regardless of the amount of rainfall, as on many of our western federal rangelands and private lands, plants that grow will remain standing for many years as there is limited water in the air or on the ground to allow for micro-organisms to live that would eat the plants and cause the plants to decay biologically back into the ground. These plants actually turn gray and oxidize or rust into the air, mining the soil by not returning to it, eventually dying, and creating more bare ground. This causes poorly functioning water and nutrient cycles, biodiversity loss and therefore desertification.

This variation in regularity of humidity and seasonal rainfall we refer to as brittleness on a continuum from non-brittle, having regular humidity and moisture, to brittle, having irregular humidity and moisture.

Now what does this have to do with grazing? The areas of the world that tend to have no or low humidity and seasonal rainfall dry out throughout the year and from year to year causing the microorganisms that would cause plants to decay to go dormant or die. Plant decay stops.

 **Savory**

However, these areas had herds of large wildlife with their predators. A bison, elk, deer, antelope, cow, goat, or sheep can't digest plants any more than you or I. That's why these ruminants, as they are called, have a multi-chambered stomach with the first compartment being full of moisture and microorganisms year round. These microbes digest the plants the animals eat with the animal assisting by re-chewing the forage to help break it down. In other words, the ruminant whether wild or domesticated is a mobile, digestive vat moving about the land that breaks down plant material and returns it to the soil as dung or urine to replenish the soil. When this animal is removed from these brittle environments the natural system is broken.

Another way the natural system is broken is by removing the predator that kept the herding animals bunched and moving. This movement allowed grazed forages to recover by being able to re-grow their roots and leaves between grazings to grow and remain healthy. Herding or fencing replaces the predator. Additionally, the hooves aerate or break the soil surface as a gardener does their garden that has been sealed by rainfall to allow for water to enter versus run off thereby making the rainfall more effective. These hooves also trample the old plant material onto and into the ground.

When bison or cattle are on the land the manager is managing two tools involving living organisms – grazing and animal impact. When managed improperly these animals can be very destructive to the land. When managed properly these tools are extremely powerful for improving the effectiveness of the water cycle and nutrient cycle by capturing more sunlight, covering bare ground, and therefore increasing biodiversity and reversing desertification.

The Holistic Planned Grazing planning procedure developed by Allan Savory and used in Holistic Management allows the land manager to manage these tools of grazing and animal impact properly for regeneration of the natural resources both in brittle and non-brittle environments. Holistic Management addresses this need for timing of plant, animal, and soil relationships through Holistic Planned Grazing within the Holistic Context of the people involved.

As I would tell customers at farmers markets asking about my beef for sale, "regardless of whether one eats meat or not, wildlife and their predator or domesticated livestock being managed to mimic wildlife and their predator is required in these brittle areas for a healthy ecosystem, biodiversity, and water for us all to drink and improves the nonbrittle areas".

Other tools beside those related to living organisms we have available are technology in many forms, fire, and rest (no disturbance by grazing, animal impact, fire, or technology). These tools, however, need to be used knowing where on the brittleness scale the land involved lies as the probable results on the land of using a



tool are different depending on the degree of brittleness, the regularity of rainfall and humidity.

Management of livestock that is aware of the points I've discussed is seeing success. Management where livestock are not being used to mimic nature is seeing continuing degradation of land, loss of water and carbon holding capacity in the soil, more bare ground, and reduced biodiversity.

Savory Institute's work addresses food, water quality and quantity, soil health, soil carbon sequestration, wildlife and plant conservation, and climate change. We are seeing land managers increase their profits while building their biological capital by producing food and water on regenerating soils. Livestock, wildlife, plants, and human needs can be met simultaneously. Holistic Management is appealing to both conservative and liberal values. It's economically viable, can generate income and, at the same time, restore landscapes for wildlife species and the enjoyment of people.

Please refer to the written material, our website www.savory.global, and Allan Savory's TED talk for further information. I thank you for your time today. I'll try to answer any questions you may have when we get to that part of the hearing.

Thank you for allowing this panel to present proven conservation practices that are being used in the 21st century.

Resources:

What are Holistic Management and the Savory Institute?
<http://savory.global/>

Public Land Issues
<http://www.rangemagazine.com/features/summer-15/range-su15-sr-cows-save-world.pdf>

Allan Savory speaking specifically about Western Rangeland issues
<https://www.youtube.com/watch?v=bj0aIK970jA>

**Byron L. Shelton
Biographical Sketch
9-11-16**

Byron is the Senior Program Director for the Savory Institute. The Savory Institute promotes large-scale restoration of the world's grasslands through holistic management. His role involves providing training and coordination of the worldwide network of Savory Institute Professional Educators and Field Professionals and providing consulting in holistic management on farms and ranches. Byron is a Savory Institute Professional Educator/Field Professional. He has worked in the United States, Canada, Europe, Asia, and Africa.

Byron is the founder and managing member of a company providing facilitation and training in whole farm planning using holistic management decision-making, financial planning, ecosystem processes management, planned grazing, ecological monitoring, land planning, policy analysis and development processes, and low stress animal handling in agricultural, natural resource, business, family, and community settings. He has worked with large and small beef and dairy operations as well as with a wide range of other livestock and crop enterprises across the US and in Europe.

Byron is the founder and managing member of a company producing and marketing primarily 100% grass-fed and grass-finished, land-improving, beyond-organic beef. He has managed organic and non-organic ranches and farms in Colorado, New Mexico, and Virginia. Grass-based enterprises managed include cattle, veal, bison, sheep, hog, broiler, layer, and turkey. Other enterprises managed include orchard, market garden, draft show horse, hay, guest ranch, and adventure youth/family camp enterprises.

Byron has served as a founding Board Member of the Central Colorado Food Shed Alliance, Faculty Innovator Coordinator in Instructional Technology for Colorado Mountain College, Adjunct Instructor of Agriculture/Natural Resource Economics at Colorado Mountain College, Career/job Skills Instructor for the Colorado Correctional Alternative Program, President and Board Member of the Colorado Branch of Holistic Management, Independent Construction Contractor, Camp/Guest Ranch Director, and as a High School Vocational Agriculture Instructor and FFA and Young Farmer Advisor in Colorado.

Committee on Oversight and Government Reform
Witness Disclosure Requirement – “Truth in Testimony”
Required by House Rule XI, Clause 2(g)(5)

Name: *Byron Shelton*

1. Please list any federal grants or contracts (including subgrants or subcontracts) you have received since October 1, 2012. Include the source and amount of each grant or contract.

None

2. Please list any entity you are testifying on behalf of and briefly describe your relationship with these entities.

Savory Institute - Senior Program Director

3. Please list any federal grants or contracts (including subgrants or subcontracts) received since October 1, 2012, by the entity(ies) you listed above. Include the source and amount of each grant or contract.

None that I am aware of

I certify that the above information is true and correct.
Signature:

Date:

Byron Shelton

9-11-16

Mrs. LUMMIS. I thank the witnesses. And now we will have a period of questioning. I will recognize myself for 5 minutes.

Thank you again both for being here. What is inspiring and, I believe, hopeful about your testimony is, Mr. Shelton, what you noted near the end of your testimony, is this is something that conservatives and liberals can find some agreement on and move forward in a way that improves our land resources. So let me begin my questioning with you.

Mr. Shelton, you're from Colorado. Can you explain to me what the Savory Institute does to help it either demonstrate effective land management or assist with improving rangeland quality in the western United States?

Mr. SHELTON. Yes, I can. We work to demonstrate ourselves as the headquarters kind of part of the organization, we collaborate on special projects with strategic partners, Heifer International, the Nature Conservancy, we work to have a—we have a worldwide network of regional training centers, or hubs, both in the brittle and nonbrittle environments, we have a hub in Michigan with Michigan State University, we collaborate with them to provide training for on-the-ground practitioners and managers of land.

We see our role at the institute based in Colorado is also to remove barriers and improve conditions, and we see that primarily through informing policy, coordinating for relevant research is important, establishing market incentives, and working to increase public awareness.

And I would say to your first comment, as I work with different managers on the land and people involved, wherever I go, it totally does involve people across the political spectrum, because we're looking for what is it you want, what do you want the land to be like, therefore, do we understand what the actions we might do will give us, and how do we go about monitoring the ecosystem to make sure it works, and so it's not a—it takes the emotion out of it and really works toward getting the answers people desire on the land.

Mrs. LUMMIS. Ms. Schwartz, in your research and study of these subjects, do you find that Federal policies are always consistent with a good result on the ground, or do you think there are ways that we could apply some of these new scientific discoveries on old grazing practices that could be useful in managing Federal lands in the future?

Ms. SCHWARTZ. Absolutely. I haven't studied in particular Federal lands, but we know that much of the land that is under the auspices of the government at this point is desertifying, is deteriorating and degrading, whichever term you choose, and a lot of that does have to do with a lack of understanding of how these ecological processes work.

And one point that I made that I can highlight here is that our appreciation of what conservation means, that paradigm has shifted, because we understand the complexity involved in a functioning ecosystem. And one example, I'd like to talk about that example of the Chihuahuan Desert, because one would not expect conservation professionals and ranchers to be on the same page. However, what they found, that—even though the conservation organizations were focused on the birds, what they found was what was good for the animals was also good for the birds, and that the synergies, the bi-

ological synergies of the animals' action on the land when they were managed appropriately, that creates the conditions for the birds to thrive.

So there were these areas where there were—as one wildlife biologist said, were very birdy, you know, that these birds were really doing very well there, and then areas where you could see a little bit of mesquite, and otherwise it was just, you know, dust blowing around, and birds would have nowhere to alight, nowhere to find safety or food. So the point being that all those needs could be met together.

Mrs. LUMMIS. My time has expired. I will now recognize the gentlelady, who is ranking member of this committee, Mrs. Lawrence, for 5 minutes.

Mrs. LAWRENCE. Thank you so much.

Cattle are frequently considered significant contributors to climate change because they are responsible for 18 percent of the U.S. methane emissions, a gas that has 23 times the warming effect of carbon dioxide.

Ms. Schwartz, you study soil health, and note that the positive impacts of healthy soils can extend way beyond its ability to encourage plant growth. In fact, healthy, nutrient-rich soil, created in part by fish and cattle managing processes, can work to directly counter climate change. Can you briefly walk us through how the movement of cattle sequesters carbon in the soil?

Ms. SCHWARTZ. Okay. First I do feel the need to specifically address the methane question—

Ms. LAWRENCE. Okay.

Ms. SCHWARTZ. —because, again, that has so much to do with how the animals are managed. So if you have cattle in very close proximity and feedlots, and their waste is going into lagoons, that is a prime scenario for the production of methane. However, what's often not understood—so blaming the cattle for that, you know, that's our management decisions, but also in a natural system, in the soil, in healthy, diverse living soil, there are organisms that consume methane, they are called methanotrophs, these are bacteria.

So if you have healthy grassland, then you've got a cycle within the larger carbon cycle in which there is no methane problem, because the methane is emitted, the methane is consumed by these organisms, and so it's all in balance. So that is not a problem, and I think it's important to have that. Did I get that?

Mr. SHELTON. Yes. I agree.

Ms. SCHWARTZ. Did I nail that? Okay.

Wow, climate. I hope it's okay if I—I'm going to kind of—I want to just expand a little bit on climate change, because I think it's really also important to have that in context too.

So when we talk about climate change, particularly in policy and journalism circles, we are often—the phrase tends to be understood as shorthand for too much CO₂ in the atmosphere largely from the burning of fossil fuels. So that's important, but I feel that that definition, that understanding of climate change limits us, so the way—my working definition of climate change is manifestations of distorted carbon, water, and energy cycles. And when we look at

it that way, then we can start to roll up our sleeves and say, how might we bring those cycles back into balance.

Mrs. LAWRENCE. For the record, I agree with you on that definition.

Ms. SCHWARTZ. Okay. Okay. Thank you. So by bringing in the cattle, the animal impact into that—okay. So we've got lots of things happening.

Mrs. LAWRENCE. Yes.

Ms. SCHWARTZ. So the animal activity is bringing carbon into the soil through the waste, through the burying—the bringing into the ground of the organic matter, the plant matter, and having it be worked up upon by the microorganisms, and by keeping the range lands healthy, this bolsters the production of deep-rooted plants, which draw carbon down, one—

Mrs. LAWRENCE. Ms. Schwartz, I just want to—I want to get—

Ms. SCHWARTZ. Please.

Mrs. LAWRENCE. —a question in to—

Can you explain how the desertification of grasslands causes these massive wildfires and how effective cattle grazing has the potential to reduce their occurrence? Mr. Shelton, do you have any comments on that?

Mr. SHELTON. If there's a lot left there to burn that could be put into the air, why wasn't it eaten or put back onto the ground, maybe partly each way, to build the soil. It came from the soil, so it needs to go back.

In those areas with that regular humidity, like I was saying earlier, it will do that naturally. In the areas where that is seasonal, then the large herding animal played that role. So there they are putting it back on the ground, but then that generates more to grow. Well, that's great. We've got more food production, more wildlife production, it's a continuing cycle, and we need to look at it that way as improving production to feed humans and wildlife as opposed to just seeing the effect of the problem and trying to get rid of a low level succession of a lot of weeds that would burn.

Mrs. LAWRENCE. Thank you. I yield back my time.

Mrs. LUMMIS. The chair recognizes the gentleman from Colorado, Vice Chairman. Mr. Buck, you are recognized for 5 minutes.

Mr. BUCK. Thank you.

This question really goes to both of you, and feel free to take it in whatever order you'd like, but you talked about how these grazing practices could improve the land. Have the Federal agencies been open to your suggestions on this issue?

Mr. SHELTON. Yes is the short answer. The long—

Mr. BUCK. Give me the long one too.

Mr. SHELTON. The longer answer is when the new ideas came out when Allan started working back in the 1970s and 1980s, there was more resistance than today. And who knows why the reason, it just—it was challenging some with current thought, but even since that day, but certainly now, there is more acceptability. It is very much dependent upon individuals within each agency, whether it's the BLM, the Forest Service, or the NRCS, but we have very good support.

I have leased land, I have ranched with tremendous support from State agencies or the Natural Resources Conversation Service as

the planned grazing we do meets and exceeds their prescribed grazing, and they work with us and are willing to let us do that.

Sometimes, though, regulations, as was indicated at the beginning of opening statement, are—they force a one-size-fits-all method. Every situation is different. Every piece of land down the road, be it farm, ranch or communal area has different people involved, different needs, and different economics. They need to use the principles of how land is managed and what the results will be to create what they desire, and that would be, in my eyes, the best practice as opposed to coming up with specific strategic actions that are best practices, because they can't always be.

Mr. BUCK. Ms. Schwartz, have you had any experience working with the Federal Government on these issues?

Ms. SCHWARTZ. I haven't.

Mr. BUCK. Okay. Let me ask you something. The chair mentioned something that's interesting to me. I guess it's the role of the fence in terms of grassland management or range management. With the vast ranches that we have in Colorado and Wyoming and the west in the high arid desert, how do we create the incentive for our four-legged critters to move from one area to the other to accomplish the goal that I think you're both talking about?

Mr. SHELTON. We have to be the predator, and that's done through herding or fencing or a combination.

Mr. BUCK. Now, you're talking to a prosecutor, so make sure you use the word "predator" carefully, because I used to prosecute a lot of those folks.

Mr. SHELTON. Well, then let's definitely clarify that.

Mr. BUCK. Okay.

Mr. SHELTON. The predator of the livestock that makes them want to stay together and moving. If you're a grass plant and you get bitten off, you're made to do that, but then as you start to regrow, you've got to let the sunlight be able to light and regrow roots and leaves so then you're ready to go again, and that's when you put carbon in the soil.

If we don't have a predator moving the herd along, again, we do that today easier because we don't have enough wildlife, so through livestock to create habitat for more wildlife. Through livestock with it's man-managed fencing and/or herding combination, we're allowing that land to not be overtrampled or overgrazed; it's grazed, it's left until it regrows, and then that's—it functions well that way, because it's supposed to. It's a management issue, it's not a numbers of livestock or a livestock issue, and it's a lack of predator problem.

Now, how do we put that back when we live there now and there's people making a living. Well, that's when we need to understand how it works so we can come up with creative answers that meet each situation. But the short answer, the fence keeps them moving so that they don't stay in the one area like—well, there you go.

Mr. BUCK. Thank you.

Thank you, Chair. I yield back.

Mrs. LUMMIS. Among the things that we've dealt with is if you had livestock herders who really could stay with livestock while they were on large expanses, public lands, it would allow them to

keep the animals bunched and then allow them to continue to move them on in a way that would mimic the four-legged predators that kept that cycle going, for example, in Africa.

One of the things we do is through our own Department of Labor rules, we have a one-size-fits-all regulation that prevents it from being economically viable to hire herders to be out with livestock on the open range or in forests, and so we can even look at our own Department of Labor regulations as a way to exempt cattle herding, sheep herding from one-size-fits-all, more urban-focused Department of Labor regulations. That's just one example.

The chair now recognizes the gentleman from Alabama, Mr. Palmer, for 5 minutes.

Mr. PALMER. Thank you, Madam Chairman.

Ms. Schwartz when we hear that a system of grazing management is not prescriptive, because all land is different, what exactly does that mean?

Ms. SCHWARTZ. It means that what works in one place doesn't necessarily work in another.

I think I need your help with this.

Mr. SHELTON. Sure. No problem.

Mr. PALMER. Actually, I think that's a good answer.

Ms. SCHWARTZ. Oh. Okay. Okay.

Mr. PALMER. And the logical conclusion from that is is that some of our Federal agencies need to understand that.

Ms. SCHWARTZ. Yeah. That—that makes sense.

Mr. PALMER. That one size does not fit all.

Ms. SCHWARTZ. Right. And I think that's something that Mr. Shelton was alluding to. And when I mentioned at the end here in my suggestions that monitoring is often a very effective way of knowing that you're right, you're doing the right thing, as opposed to checking off the boxes, did I do this, did I follow this, because then you're looking at how it's actually working. And there are some really simple ways of monitoring water infiltration, how much water you're absorbing, and also the soil carbon accumulation.

And just another thing to mention along those lines is that the tools that we have now for assessing land changes with the satellite, mapping, and—interactive mapping and citizen science initiatives, it's really pretty extraordinary and potentially very powerful.

Mr. PALMER. Either one of you can comment or answer on this, and I'm not an expert in this, I grew up on a farm in northwest Alabama, and very humid climate, so we didn't have some of the issues that they have out west, but just looking at it from a historical perspective and watching the video earlier, I can't help but think about pre-expansion out west, the huge herds of buffalo, the antelope, things like that.

Are we talking about—basically talking about the same things when we're talking about grazing and having herds that occupy the land that help maintain these grasslands? Because looking at the map that he showed, it's obvious that what was grasslands 150 years, 200 years ago, maybe longer than that, we're losing those. Does that make sense?

Ms. SCHWARTZ. Yeah. Well, I guess one of the insights that Allan Savory had, and he—and he said he wasn't alone in having this in-

sight, but he articulated it very well, is that grasslands and grazing animals co-evolved, so that the land needs the animals in the same way that the animals need the land. And then he also made the observation that land can be undergrazed as well as overgrazed.

So the lack of all those animals, when we think about the millions and millions of bison across our Great Plains and how that was managing that ecosystem.

Mr. PALMER. And then that ecosystem, it was holistic in the sense that the bison herds helped preserve the grasslands, but also were a source of food and clothing and shelter for native tribes, so it all worked together. And obviously we're not going back there, so it leads to the conclusion that in terms of a holistic approach to land management, introducing cattle and other animals, and that industry becomes very significant for restoring the land.

And this is part of what bothers me about some of the environmental claims and the issues that they bring up in the context of climate change and wanting to get rid of the cattle industry and things like that. What are we going to do? Are we going to go back to millions of buffalo and—you know?

I think the bottom line here is that we're doing more harm than good. Would you agree with that?

Ms. SCHWARTZ. We're doing more harm than good in what context?

Mr. PALMER. In the context of the damage that's being done to the land, how—

Ms. SCHWARTZ. As it's—

Mr. PALMER. —and how the land is turning into desert, because we've stepped into an area that nature kept it healthy. Obviously things have changed, we're not seeing millions of buffalo running across the plains anymore, so we've replaced that with agriculture and—and farming of cattle. And if we eliminate the cattle industry, then the land is going to suffer as a result.

Mr. SHELTON. The land is suffering as a result, yes. The grasslands created by the relationship between the animals and the land, this is where our biggest topsoils are, this is where land can sequester more carbon than even some of the forestland. This is what we've torn up to put in our croplands because the soil is so good. This is what we're now needing to figure out how to maintain before they run out.

You know, 22 civilizations or so came and went. They didn't have the technology we have now, but they still mismanaged their soil and water base. This really isn't even about just grazing in an animal, whether you're choosing a dairy or an elk that you want to have there, or a beef cattle; this is about keeping the soil covered so that plants grow, so it regulates the earth's temperature and even probably most importantly, gives us water.

The watersheds here in the Chesapeake Valley, they are no different than the ones in the west. They're masked a little bit, it's a little harder to see the soil erosion and the water we're losing. So it is trying to—what we're trying to do is make the point that along with many forms of technology, fire when it's needed sometimes, rest, in other words, no disturbance of any kind, we need to

have in our toolbox also properly managed livestock and their predator to make land function.

Mr. PALMER. One last point, and I realize I've gone over my time, Madam Chairman, but you brought up proper burning techniques, and I think in the video it was mentioned that burning one hectare of grasslands released more dangerous gases into the atmosphere than 6,000 automobiles.

And I think about what's going on in California and the wildfires out there, and, again, going back to Federal policy for land management, you can't cut in firebreaks like you used to, you don't have the road access, and we are seeing hotter fires burning more acres, and that's also a major concern of mine and how that—the damage that that does.

I do think the importance of this discussion we're having today in the context of Federal land management, we really need to emphasize this, that we've made some policies that I think are doing more harm than good.

I yield back.

Mrs. LUMMIS. I thank the gentleman.

And now I want to ask each of you to spend 5 minutes with concluding about questions that you wish you would have been asked but weren't, statements that you want on the record for policymakers, but among those, I would like you to address whether you believe that Federal policymakers could experiment with some of the techniques that you see as improving grassland health in a way that could be replicated on the larger Federal landscape. In other words, are there demonstration projects that you can point to that have been done thus far that we might be able to use as examples for pilot projects on Federal lands? And in doing so, I want to thank you both so much for being here.

The gentleman from Colorado, Mr. Shelton, is recognized first.

Mr. SHELTON. Thank you. There are case studies where this has been demonstrated on the land already that are available. Yes, it could be done and replicated on Federal lands also. Probably—and I do believe that. The key, though, is because of the simple concept of regularity of humidity that I brought up earlier and that Allan mentioned in his Ted talk, if you used the tool of—any tool, say, fire, in a brittle-leaning area versus a nonbrittle or one with regular humidity, you will get a different result. This concept of that regularity takes everything we could do to the land and eliminates the possibility that we could have a one answer for every area, because it doesn't work.

We work to see and learn what will the probable results be if we use this tool in an area based on its degree of that regular humidity. It sounds simple, but that just is so important to understand.

What we also do, though, is whatever piece of land we're working with, you've got to get the right decisionmakers at the table, you've got to draw on the experts when you need input, but you've got to have the decisionmakers know what is it they want, what is the quality of life values they want for that property, and also what do they want that land to look like in the future, what will that future resource base be, what will the landscape look like?

Then we choose actions that will bring about the desired results, and so each test that you would refer to would have to be driven

by that holistic context, we call it, just that combined context of the people involved.

Then actions are chosen or not. And as Judy mentioned, we do the early warning, monitoring of the ecosystem processes to ensure that the land is moving in the direction it needs to go, the economy is moving in the direction, the economics related to that project, and the needs of the people are being met.

So in that sense, the point I'm in short trying to make, there's no list of prescribed actions or best management practices. All those types of things, which are good, need to be, though, tested, filtered toward are they keeping us within the context that we're trying to work with in creating what we're trying to create?

Mrs. LUMMIS. Thank you, Mr. Shelton.

Ms. Schwartz, you are recognized to respond as well with my gratitude for your being here.

Mr. SCHWARTZ. Well, thank you very much. I concur in that it is very possible to bring this understanding and apply this knowledge set of practices, decisionmaking framework, however one characterizes it, to Federal lands. And I guess what I would say is, perhaps the most important aspect of this discussion is to know that it's possible—to know that it's possible to restore landscapes at large scale because I don't think that that is generally understood.

And I also believe that through my reporting, observations and talking to people, that what interferes with our being able to improve our landscapes, to help them be more resilient to fire and floods and droughts, and have them be more vibrant and productive, in many ways, comes down to—what interferes with it is imagination. To know that it could get better.

I think that it's very powerful when Allan Savory put up that image of the National Parkland that was all sand. Because I know that I might—had I not been studying and researching and all of this—go there and say, isn't that stark beauty? Because one assumes that it has always been that way and can never be any different. So we have lost, as we go through generations where many of our lands are losing function, we think that it's always been that way and we don't understand how lush and productive and vibrant our landscapes can be.

Mrs. LUMMIS. Well, I cannot express enough my gratitude that you both traveled all this way and prepared testimony and have presented your thoughts to this committee and for the record.

This is the beginning of a dialogue. We are now 15, 16 years into this 21st century and have a long way to go to absorb and understand the scientific growth that you understand and how to use it for the betterment of the land and water resources that you have discussed today.

So you've enlightened the discussion. I hope this is the first of many opportunities for Congress to begin to use the information that you have provided today to produce on-the-ground results that will allow us to hand our children and our children's children a better landscape and better understanding of how to manage it.

So I wanted to thank you both for the work you do in this area and for taking the time to appear before this committee today to enlighten this discussion.

If there is no further business, without objection, the subcommittee stands adjourned.

[Whereupon, at 3:51 p.m., the subcommittee was adjourned.]

