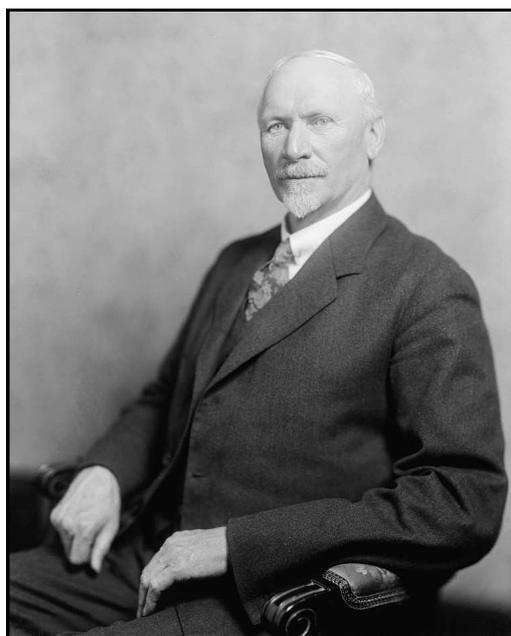

Holism: The Future of Range Science to meet Global Challenges

Allan Savory and Jozua Lambrechts
The Savory Institute
e-mail: allansavory@gmail.com

Introduction and Background

The perfect storm approaches - with global population rising, agriculture producing more eroding soil than food, and the world's vast grasslands turning to deserts – leaving in its wake man-made droughts, poverty and violence. I hope to inspire you to take the steps needed to avert this storm and, thus, to attain great achievements as professional researchers and managerial custodians of the vital grasslands and savannas of the world including this Mediterranean region in which you meet. The world's seasonal rainfall rangelands, I believe, hold the key to the survival of civilization as you will learn.

Never in history has humanity faced the extreme dangers we do today of man-made desertification and climate change. It is no exaggeration to state, for reasons I will shortly explain, that the entire future of civilization hangs on the slender thread of learning to manage livestock properly on the world's grasslands that are desertifying rapidly on your watch.



Jan Smuts - *Harris & Ewing Collection*
Wikimedia Commons

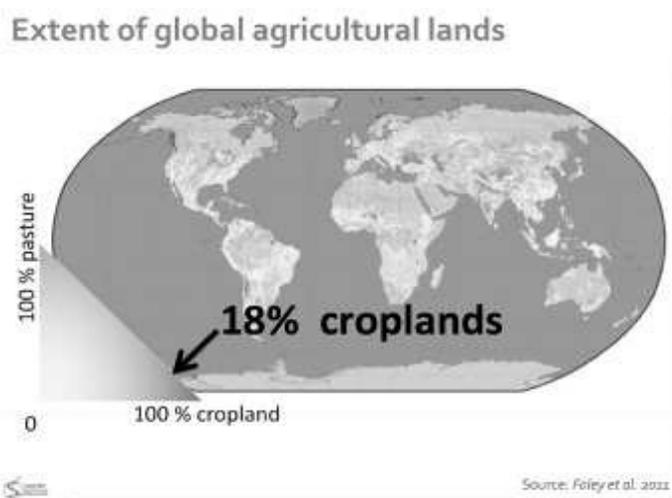
The theoretical foundation of my work over the past half century was provided by Jan Smuts which makes it appropriate that we meet today on his home ground where he was born on 24 May 1870 near Riebeeck-Wes.

As you know, Jan Smuts - lawyer, botanist and soldier - fought a hard and bitter campaign against the English as a Boer War General. But he went on with the rank of Field Marshal to command British forces and to serve as an advisor to two British cabinets during both world wars, due to English magnanimity and appreciation of his intellect.

It is no secret that the international range science profession and your institution have waged a bitter war against my work, and holistic planned grazing, for almost half a century. I do believe our war is ending, and that your magnanimity in inviting me to address you today is testimony to your integrity and caring for the future.

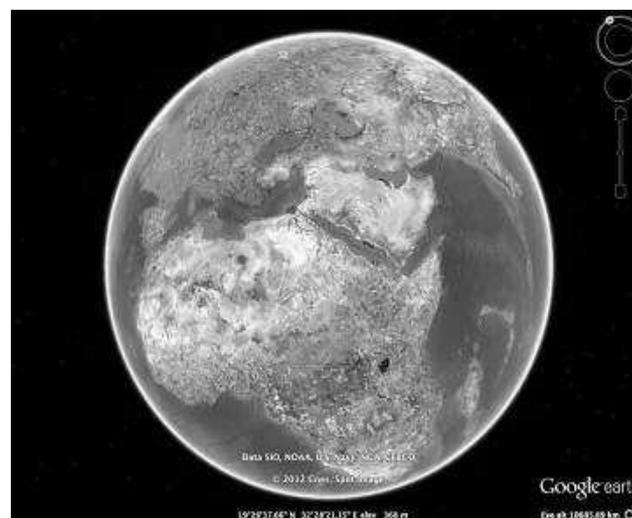
My interest in the grasslands and savannas resulted from my passion to save Africa's wonderful big game animals. It did not take long to realize that the destruction of habitat was the greatest danger to wildlife. From there, it was but a small step to understanding that this habitat destruction, threatening wildlife, did not differ from the habitat destruction that had destroyed many civilizations, and today presents a global threat greater than all the wars ever fought.

Agriculture, its Importance and Impact



Global proportions of croplands and non-cropland agriculture - *Foley et al 2011**

Agriculture is not crop production alone, as commonly believed. It is the production of food and fibre from all of the world's land surface and waters. Of the world's land less than 20% is under cropland production with the remaining 80% under non-cropland agriculture, predominantly livestock and wildlife on the vast grasslands, savannas and man-made deserts of the world. In many African countries the amount of land under crop production is less than 10% with some as low as 1%. In the entire region stretching from North Africa through the Middle East to Pakistan and on up into China, one of the most troubled in the world, many countries have only 1% to 5% cropland with the rest being grasslands essentially under livestock and wildlife and little else.



Vast region across North Africa to China desertifying seriously - *Google Earth*

** Reprinted by permission from Macmillan Publishers Ltd: Nature) Foley et al 2011, Solutions for a cultivated planet), copyright 2011*

Agriculture made civilization possible. Without agriculture we could not have cities and towns, a government, an army, a university, businesses or your profession. But agriculture, today produces more eroding soil than food even in the U.S. And agriculture, mainly pastoralists, caused the major man-made deserts like the Sahara and Tihama. Desertification being exacerbated by annually burning more than a billion hectares of grassland a year in Africa alone. All leading to ever increasing droughts, floods, poverty, social breakdown, emigration, violence, cultural genocide and suffering. Further, these symptoms of faulty agriculture have nothing to do with climate change, though they are now seen as effects of climate change.

Agriculture, when we weigh up the soil carbon emission from the destruction of soil, expanding desertification and biomass burning, as well as the destruction of tropical forests and millions of cattle being fed grain, is contributing as much as, or maybe more than, fossil fuels to climate change. What is more serious is that climate change is likely to continue even in a post-fossil-fuel world unless we address desertification and agricultural destruction of soil causing it to no longer hold both the carbon and water it formerly did.

I do not believe any informed scientist would dispute what I have laid out over the last five minutes. Yet, we repeatedly hear that agriculture will need to adapt to climate change while mainstream institutional scientists forge ahead promoting more of the very cropping and range management practices causing climate change.

Why is your profession so important? It is because the world (ordinary people, people working the land, political leaders developing policies etc.) looks to you for expert opinion on the greatest areas of the world's land surface - essentially two thirds of Earth's land area - and restoring that land mass is crucial to averting climate change, restoring fresh surface and ground water resources, feeding humanity and mitigating poverty, violence and war.

I can think of no single profession more vital to the future of global civilization than range science!

In the 1950's, when the seriousness of the desertification of the world's grasslands and savannas first dawned on me and I began seeking practical solutions, I was an institutional scientist working for a government. Realizing that political and other pressures made scientific integrity well nigh impossible for me, I became an independent scientist, supporting my work in any way I could.

I was fortunate to be able to stand on the shoulders of people like Jan Smuts and the French pasture scientist Andrée Voisin in particular. I regretted not studying range science at university. This failing of mine, however, proved fortuitous. Just as the finest candle makers could never have conceived of nor developed electric lights, so too breakthroughs in ecology, range science and management were bound to come from people on the fringe.

Holism

Einstein said he believed two constructs would prove important to the future of humanity - his own of relativity and Jan Smuts' construct of holism.

Holism is a concept that has been hijacked to mean many things to many people with little understanding. We have had one major global paradigm shift in history, from the Earth being the centre of our universe to the sun being at the centre. We are currently in the early stages of the second global and probably greater shift in our world view. The shift from a mechanistic to a holistic world view.

It was Smuts who first warned us as scientists that we would never understand nature (the main aim of science) till we understood that nature only functioned in wholes and patterns. Because of our mechanistic worldview, the simplicity of this concept is difficult to grasp.

Whole atoms forming whole molecules, whole cells, organs, organisms, populations, communities and so on to a whole universe.

Some try to explain holism using the cliché that the whole is greater than the sum of the interconnecting parts. Whilst a step in the right direction, this fails to capture the idea because parts and interconnections are mechanistic concepts having no counterpart in nature. Nowhere is our lack of comprehension of the holistic nature of our ecosystem better illustrated than in the case of the three great issues of today – biodiversity loss, desertification and climate change.

Each is being addressed separately by different institutions and even within such institutions – universities, environmental organizations, governments and international agencies, and in separate international conferences. Yet they are one and the same inseparable issue.

Desertification simply does not occur without biodiversity loss. Desertification is only a symptom of biodiversity loss – i.e. the loss of plant mass and biological cover of the soil, leading to the available rainfall becoming less effective. And desertification and soil destruction generally leads first to a change in micro-climate and ultimately macro-climate - a process greatly accelerated since the exploitation of fossil fuels.

Without addressing soil destruction and desertification, climate change is impossible to prevent or address.

That management needs to be holistic and can never be reductionist was initially strongly resisted but is increasingly being accepted. I also believe we all accept management should be based upon good science.

Good Management - the need to manage holistically

Let us first look at what management that is holistic means, and then look at current range science. Many today confuse holistic management with integrated management in which many disciplines come together in management situations. Desirable and useful as combining different disciplines is, it does not in any way constitute holistic management.

Allow me to explain. Management, especially in agriculture, involves making and acting on decisions that are always dealing with social, economic and environmental complexity. Complexity is the essence of soft systems (human organizations) and natural systems (nature) as defined in Systems Science. Such arrangements have emergent properties, including unpredictable emergent properties.

They are self-organizing and thus able to function with components missing, and when problems occur they are extremely difficult to solve.

Humans (including farmers and range scientists) make decisions to achieve objectives. No conscious decision is made that does not involve an objective – grow maize, eradicate alien plants, control soil erosion, buy a car or run livestock. No range management action is taken without an objective and no development project, or government policy, is formed without an objective. What is most important is that all objectives need a context. Without context objectives become loose cannons on the deck liable to lead to unintended consequences.

A simple example makes the point. I say I intend to light a fire (my objective) and ask your opinion if I should do it or not. You have no idea what to say as my objective lacks a context. If the context is to cook our food - great, if the context is to burn down our home - not so great. So it is with every objective of every person, institution or government. Objectives - without adequate or appropriate context are loose cannons.

The context for almost all objectives given our mechanistic world view, if we think deeply, narrow down to one of three things - “need”, “desire” or “addressing a problem”. To heal an eroding gully, wage a war on “alien” plants, settle wandering pastoralists, clear invading brush, reduce livestock, or feed starving mothers and children in the Horn of Africa all fall into one of the three common contexts - need, desire or addressing a problem.

With development projects, and with policies of governments or international agencies, we find – if we analyze a broad array of them - the context is almost without exception the need to address a problem.

Now, because of the holistic nature of the ecosystem, societies, cultures and agriculture as well as economies they all function in complex wholes and patterns. In this unavoidable daily reality of great complexity, the three contexts I’ve presented - need, desire or addressing problems - simply do not provide a real world or adequate context to make sound management decisions or to develop sound projects and policies. The context is generally too simplistic for the real world complexity. Thus, not surprisingly, most of our objectives when achieved are followed by unintended consequences – some good some not too good. And in the case of development projects and government, or international policies, few objectives are ever achieved while almost all result in unintended consequences.

This we witness culminating in the global problems of chaos in financial and economic systems, mounting violence, increasing desertification and climate change.

You do not need to look far in any direction to see how our focus on solving problems without a holistic context leads to ever escalating problems in range science. A hundred years of rotational and other grazing systems, livestock reductions, technological interventions to prevent soil erosion, poison alien plants, clear encroaching brush and control gullies -- only to see desertification expand -- increasing the severity and frequency of both drought and flood, poverty, violence, migration, cultural genocide of ranchers and pastoralists. All this contributing to climate change unintentionally.

We see such unintended consequences from objectives without an adequate holistic context in other fields than range science - examples include feeding grain to livestock, producing ethanol from corn or now biofuels leading to land grabs and social turmoil and of course the war on drugs leading to crime worse than in the heyday of the prohibition of alcohol. So common is the phenomenon of unintended consequences, first noted by economists, that some use the term “law of unintended consequences” and books have been published on the subject.

Defining an appropriate holistic context in any managed situation is not difficult. It involves people describing the lives they want to lead based on their deepest cultural, spiritual and material values – followed by forms of production to ensure such lives and a description of their life-supporting environment in such condition that it would sustain such lives for thousands of years.

Given a holistic context, as we do when using the holistic framework in management situations, we find objectives can be assessed more sensibly, achieved more easily and do not as easily lead to unintended consequences. This we have observed over the many years that it took for me and the thousands of people working with me to develop the holistic framework. And we have observed this encouraging success from households to farms, ranches, pastoral communities and in the analysis of a great many projects and policies.

During the Carter Administration the U.S. Department of Agriculture engaged me to put some 2,000 scientists through training in the analysis of policies and projects using the holistic framework. These officials, and university faculty members, evaluated many of their own projects and policies dealing with symptoms of the serious desertification of the United States - increasing droughts, floods, noxious weed invasions, brush encroachment, soil erosion, disappearing wildlife, failing rural towns and more. They found no project or policy that would not worsen situation due to unintended consequences.

This was simply because all of their objectives lacked a holistic context. Those American scientists covered almost all the same sort of policies being advocated in most nations including your own by your profession. Similar work I did with officials in Lesotho and India led to similar conclusions.

Now let me move on to my second point earlier, namely that management needs to be not only holistic, but based on good science.

Good Science - the brittleness scale

I believe using currently available knowledge, good science and defining a holistic context for policy and project objectives, we can reverse agricultural degradation of the environment in about a third of the world's land where atmospheric humidity is well distributed throughout the year.

However, that is not enough in the greater two thirds of the world of a seasonal rainfall nature. This is because current management practices and policies dealing with these vast areas are not founded on good science but rather on deep beliefs that have assumed scientific validity.

Let us look at the tools available in range science to manipulate our environment at large, including reversing desertification to address climate change. Humans have had two tools for about a million years – technology and fire – to impact our environment. Technology includes everything from sticks and stones to axe or spear to hunt, spade to plant, herbicides, genetic engineering, tractors, ploughs etc.

About 15,000 or so years ago, with the advent of domestication of plants and animals, we developed the idea of using rest, or non-disturbance, as a tool. Early examples were shifting agriculture and pastoralists moving livestock. Today we see this in concepts like national parks where we leave it to nature, and we see it in removing or reducing livestock as practiced by your government or that of the US, Israel or China.

Over all of human existence the only other tool we developed was using small organisms to make cheese, wine, medications, compost, compost teas etc.

Train in any profession in any university in the world and you are unknowingly trained to use human creativity, money and labour through technology, fire or non-disturbance/rest to deal with our environment at large.

While these tools have worked very well in environments where humidity was spread throughout the year, unfortunately there is no tool here that could prevent, or reverse, desertification in two thirds of the world where humidity was not spread throughout the year – the savannas, grasslands, Mediterranean and arid areas of the world. Thus, It is not surprising that Elisabet Soutouris describes us – when seen from space - as a “desert making species”.

The reason desertification was inevitable and defied all range science attempts to understand or reverse it, and also why discovering it's cause evaded us for thousands of years, is simple and logical to explain in hindsight. It is because the bulk of the world's land is of seasonal rainfall nature and no technology even imaginable, fire or resting the land can maintain the effectiveness of the available rainfall the way that vast grazing herds and pack hunting predators once did. Today in practical terms only much vilified livestock properly managed to mimic these natural patterns can do what is required on the scale and with the frequency required. Let's investigate this further.

The vast grassland, savannah regions experience seasonal rainfall and thus dry or dormant periods in every year – high or low rainfall. They do not enjoy the more even distribution of humidity of even low rainfall areas in much of Europe or some, mainly coastal, areas of the U.S.

In such seasonal environments perennial grass plants, and their dead litter, provide most of the soil cover and more so as rainfall gets lower and insufficient for a full canopy of tree cover. Such grass plants co-evolved with their living soils, with vast herding herbivore populations and pack hunting predators. Most perennial grasses have growing points close to ground level out of harm's way because they co-existed with billions of grazing herbivores. From a holistic perspective one can say they used to function in wholes or patterns of soil, soil life, plants, herbivores, predators and more in functional communities constantly sequestering vast amounts of carbon and water in the soil and playing a role in cycling the necessary ambient atmospheric carbon to all life forms. Soil was the greatest fresh water storage place – greater than all lakes, rivers and dams.

Grass plants grow profusely during the growing season, but every year as the atmosphere dries off most of the plant above ground dies. This plant mass dying every year during a compressed period of the year, needs to decay biologically and rapidly for growth to continue uninterrupted in the following season. However in the absence of adequate herbivores digesting lignin in a symbiotic relationship with micro-organisms, the old material that stands upright breaks down gradually through oxidation and weathering. This gradual chemical/physical breakdown leads to smothering of growth points and the death of many grass plants.

What follows varies with amount of rainfall but generally leads to healthy grasslands shifting to some form of woody or tap-rooted plants and bare soil covered with algae. As plant spacing opens up and bare soil increases, the available rainfall becomes less effective leading to desertification. This process happens more rapidly where rainfall is lowest.

Good Science - the predator-prey relationship

In such environments the functioning whole in the past included those masses (billions) of large herding herbivores and their pack hunting predators, ensuring bunching for protection, and constantly moving – breaking soil capping, trampling down plat material, grazing, dunging and urinating and planting of seeds - to maintain overall soil cover and grassland health.

As humans over much of the world – over a very long period of time - killed off most large herbivores, using their ability to organize through language, driving animals over cliffs, into wetlands, surrounding with fire or using stone driving walls into killing grounds and more, they soon learned that the grasslands shifted from rapid biological decay to gradual oxidation and weathering and it was but small step to using fire to maintain grasslands.



Grassland oxidizing and shifting to woody vegetation following 15 years of resting from grazing. Atlanta Research Station, Zimbabwe - *Photo: Allan Savory*

In this 1980's picture we see slowly oxidizing grass, dark grey to black in colour, after fifteen years of no livestock leading to nature filling the vacuum with woody plants in high but seasonal rainfall in Zimbabwe on the Atlanta Research Station.

Unfortunately, fire is merely rapid oxidation that while it removes the dead mass of plant life stifling grass growth thus keeping adult plants alive, it also leads to exposed soil between plants, massive atmospheric pollution and to less effectiveness of the available rainfall, or desertification over time.

The other tool acceptable to your profession and mainstream science is some aspect of technology but no technology imaginable is likely to ever replace biological breakdown and decay over so much of the world every single year, nor is it needed when animals can do all we need.

So, to avoid or reverse desertification mainstream scientists are left with only the tool of resting land. This is done, to varying degrees, under the name of "conserving" land or "leaving it to nature". Fortunately, there are many research plots, long rested from livestock, as well as national parks and wilderness areas in seasonal rainfall environments that we can study.



Chaco Canyon New Mexico, managed by US National Parks Service following 70 years of resting from all grazing and vast sums spent on soil conservation measures - *Photo: Allan Savory*

If we do study these sites, we note extreme desertification as we see in this picture of land managed by the US National Parks Service. This land has been rested for over 70 years while having vast amounts of money spent on many technological interventions to prevent soil erosion. Desertification as we see is as bad as anything in Africa or China. That rest, or inadequate disturbance, led to desertification escaped us because of our beliefs. I also fell into this trap for years and am today embarrassed by papers I published in which I, like other scientists, interpreted the data to fit our beliefs. In the Tuli Circle on the Botswana border thousands of cattle died as the land degraded in the 1960's and we thought it would recover. But then some 50,000 head of game died and it became even worse, and I published a paper noting that the land had degraded to a point of no return. How wrong I was to learn when later we were able to restore perennial grassland in such areas using nothing but greatly increased numbers of cattle and holistic planned grazing.

I also did the research and wrote the first reports saying we would have to cull elephants causing damage in newly formed preserves due to excessive numbers. A team of scientists formed to evaluate my work agreed with me. We subsequently shot some 40,000 elephants in Zimbabwe only to see the situation worsen. We were all wrong.

Long ago range scientists, presumably observing the damaging effects of resting such environments, realized the beneficial effects of millions of animal hooves. In fact, as you know, because of this realization, but also a belief that livestock caused desertification, American universities developed giant machines, such as the Dickson Imprinter, to mimic the essential periodic high disturbance of large herbivores.

Many of those range scientists also developed countless ways to reseed dying grasslands and the machinery for a plethora of soil conservation measures. Today one has only to drive around the desertifying United States to see millions of hectares of failed check dams, contour ridges, reseeded ranges and failed poisoning and mechanical removal of so-called noxious plants. Despite all these techniques the desertifying grasslands continue their march toward woody plants and bare soil, drought, flood, poverty and cultural genocide of ranching communities.

Travel hundreds of miles through the desertifying United States and you will see a handful of cattle on over-rested ranges. At the same time, hundreds of thousands of cattle are crowded into feedlots being fed grain. And, this model of cattle management is being spread around the world.

Any relatively intelligent person knows that this model creates many unintended consequences from excessive pollution, resistance to antibiotics, meat of low nutritional value, public reaction against eating meat and millions of humans undernourished as grain goes to feed animals that cannot digest it well. The unintended consequence of the objective of grain feeding cattle still not understood is the consequent increased desertification of the US rangelands due to too few livestock overgrazing plants while over-resting the land.

Good Science - time versus animal numbers

When I first realized we had no option but to use livestock in high numbers instead of machines and planting grasses, shrubs and trees to reverse desertification, I still faced the problem of overgrazing. As you know, overgrazing is blamed for causing desertification. The range science position, as you also know, is supported by thousands of peer reviewed studies of grazed and overgrazed rangelands in countless rotational and other grazing systems. This research presented two difficulties when viewed holistically. First, rangeland cannot be grazed or overgrazed. Only plants can be grazed or overgrazed, and so much more than grazing of plants is happening on rangelands supporting animals.

Secondly, although the idea that overgrazing is connected to numbers of animals is the foundation of range science, I have never been able to find a single peer-reviewed paper that in any way connects these two things - overgrazing of plants and number of animals. Throughout these studies, the assumption has been consistently made that any overgrazing of plants occurring meant too many animals were on the land. Belief assumed scientific validity - despite lack of evidence.



André Voisin*

* Reprinted with permission from Mme. Marthe Rosine Voisin

Fortunately, the French pasture researcher Andrée Voisin provided the needed breakthrough when he established that plants became overgrazed only when exposed to grazing for too long, or re-exposed after insufficient recovery time between grazings. And, this information was published in five major languages sixty years ago now. Changing animal numbers only changed the number of plants overgrazed or over rested. On relooking at all the research available from earlier plant physiologists, as some of the first range scientists seemed to be, I found Voisin's position constantly supported and never refuted. Finally, I could see that managing the time the plants were exposed to the animals was the way to greatly increase livestock numbers without overgrazing plants. And, if that could be done, we might also achieve the amount of trampling and grazing required, and that I had observed on healthier land still supporting large herds of wildlife with pack hunting predators.

**Using the science to improve
management - the need for holistic
planned grazing**

Realizing that livestock could be used to mimic nature's herds of old I still did not know how we might do this. Herding seemed out of the question with some 15,000 years of highly knowledgeable pastoralists constantly moving

modern rotational and others grazing systems – had accelerated desertification even in higher rainfall seasonal environments. Early Afrikaaner farmers had noted this but were ridiculed. This includes John Acocks, the botanist who first stated, in the 1960's, that South Africa was “overgrazed” but “understocked”.

The essence of the problem was finding a way to address the complexity of dealing with the needs of livestock, wildlife, plants, soils, soil organisms and erratic weather simultaneously while still making a profit. Grazing systems were designed to simplify this complexity, and pastoralist herders had never accounted for it adequately.

I first tried Voisin's rational grazing. Voisin, having understood the failings of rotational grazing, had developed rational grazing – meaning thought out or planned and never simply rotated. While rational grazing had proven so successful in the relative simplicity of European more humid climates and pastures, I quickly ran into trouble dealing with the greater complexity of seasonal rainfall rangelands, where we were also integrating wildlife and croplands - and dealing with very erratic rainfall while also beginning to incorporate social and economic factors.

Ecologists, wildlife and range scientists had never addressed such complexity in management. So, rather than reinvent the wheel, I simply took the hundreds of years of European experience as taught at Sandhurst, the British Royal Military Academy, and the planning process they had found best suited to immediate battlefield conditions. Military planners having established a process of building the best possible plan at any moment through simple sequential steps building on one another, I had only to develop a chart to plot the emerging plan that could cater for the dimensions of time, area, numbers and behaviour for which military planning did not cater. Planning on a chart also provided other advantages such as the ability to plan grazings backwards at critical times, to plan animal moves through a minefield of other considerations concerning wildlife, weather, fire, cropping and other land uses. It also provided me with the ability to plan constantly for droughts on the basis of time not areas of land, thus keeping production of both animals and land higher than conventional planning for drought reserve grazing. All of these necessary things no imaginable rotational or other grazing system could address.

Holistic planned grazing as it has become known was immediately successful in restoring grassland health under increased livestock numbers and has continued to be successful wherever used since the 1960s. Today holistic planned grazing is being practiced on well over 20 million hectares on four continents and it is being taught by the Africa Centre for

Holistic Management to semi-literate pastoralists and agro-pastoralists from Zimbabwe, Namibia to Kenya, Somalia and Ethiopia.

Let me use but one example of how planned grazing restored degraded grassland.



Entire ranch was devoid of grass when some appeared on recently graded airstrip in 1978. *Photo: Allan Savory*

Here is a picture of my plane on a recently graded airstrip in the Karoo area near Beaufort West in the 1970's. As we know from the historical record, and work of John Acocks, this was once grassland teeming with millions of antelope of many types but with low and erratic rainfall. By the 70's this ranch was only able to support a few sheep living on desert bushes and we actually measured 6 km from one annual grass plant to the next.

Some annual and a few perennial grasses appeared after the grader making the airstrip had broken the hard capped soil surface, so we took the picture. On this ranch we then doubled the livestock numbers using holistic planned grazing to begin reversing the desertification and we based all timing on the needs of grass plants not desert bushes.



Grassland at same site in 2012.
Photo David Jack.

Now in 2012 the ranch looks as we see in this picture, with the old airstrip in the background. Once more grassland is returning because of increased livestock properly managed.

I should mention that in the 1960s apart from the international Charter Trial in which we established that a doubling of livestock numbers could be safely conducted with planned grazing, we also ran an "Advanced Project" on Liebig Ranch in the southern lowveld before expanding planned grazing too widely.

For this project designed to push the stocking rate to what was considered extreme, the worst land possible was selected. Land on which there was not a single perennial grass plant to be seen in over 100 mile drive. On this land we increased the stocking rate by 300% in the first year. And over the following 8 years with planning of the grazing done twice a year it became productive perennial grassland once more, producing five times as much meat per acre as the surrounding 220,000 acre control area.

No range management measures, feeding or seeding were required and the total cost of water and fencing was \$1.80 per acre.

This project was then subjected to three years of rotational grazing when the managers stopped using the holistic planned grazing process using one to two day grazing periods at the same stocking rate. By the fourth year so many plants were seriously overgrazed that it had to be destocked entirely.

A great lesson was learned in that even experienced managers in that case could not substitute planned grazing as a process with a rotational grazing system.

I believe, after nearly fifty years of consistent success with holistic planned grazing in many countries and through all manner of seasons, that we can assume it safe to replace grazing systems with a planning process to deal with complexity.



Liebigs Advanced Project, Zimbabwe, designed to push holistic planned grazing to see if failure could be caused under extreme pressure, before widespread adoption. Land representing the worst that could be identified in the country was selected, with not a single perennial grass found within many miles. Cattle were then increased 300% using holistic planned grazing, resulting in the formation of healthy perennial grassland *Photo: Allan Savory*

And here I need to make an appeal to you to try to understand the difference between a planning process that can never be replicated and prescriptive grazing systems that can be replicated for research. Over the years I have observed vast sums of money and man hours of effort researching and publishing papers comparing grazing systems that could never work. There is nothing wrong with management systems when used in all situations where things are predictable. Examples are inventory management, vehicle maintenance, accounting systems and the like in any business. However no business would endeavour to run on the basis of a management system to deal with it's day to day complexity and unpredictability. Likewise no grazing system can ever account for the complexity involved in managing soils, plants, livestock wildlife, erratic weather, cultural and social issues, economy, fires and more.

In all my years of planning grazing, over four continents and many countries from small mixed farms to giant ranches and pastoral rangelands, I have never seen two plans the same. Some plans involve many herds, others one, some have most animals moving through paddocks, or herded using virtual paddocks. Some plans have some animals on continuous grazing to allow other animals to move faster. Some have herds entering a paddock as another herd vacates it and some have herds allocated certain areas of land and so on. Sometimes the animals are grazing plants severely but most times not doing so.

We even developed one plan with a single cow herd of 500 and single sire bulling using one bull to 90 cows. The only name that fits what is done is holistic planned grazing. And this is what ranchers and pastoralists world wide are gradually being taught to do when the objective or goal of running livestock of any sort is within a holistic context.

The results I am personally most excited about are those where we are running 400% more livestock on planned grazing fully integrated with a substantial wildlife population and we see in these before and after pictures at the Africa Centre for Holistic Management in Zimbabwe.



Liebigs Advanced Project four years after abandoning holistic planned grazing in favour of high intensity rotational grazing system *Photo: Allan Savory*

Condemnation of livestock

In summary let me return to the vilification of livestock. Nothing is endangering humanity and currently causing more suffering and violence more than this condemnation of the only thing that can practically and realistically address desertification and it's role in climate change if properly managed. Your profession is strangely silent on the matter. Let me deal with the main reasons one hears and answer each argument made.

Livestock overgrazing causes land degradation or desertification. Yes, livestock are certainly causing land degradation or desertification, but entirely due to the way we have always run them. Run as we have done for centuries without holistic context and simplified grazing systems, livestock have led to both carbon and water moving from soils to atmosphere. But run in a holistic context mimicking nature and by planning their grazing, livestock result in both carbon and water being sequestered in grassland soils. There is no option but to use properly managed livestock if we want to address desertification, heal the land and make rainfall effective.

Livestock emit methane. Yes they do, as does any animal or micro-organism capable of digesting or decaying lignin that humans cannot digest. New research is suggesting healthy grassland soils include methantrophic bacteria that oxidize methane. The resultant carbon dioxide having no more carbon than the original cattle feed contained. Assume me wrong. Assume livestock emit ten times the methane they do. We still have no option but to use properly managed livestock to address desertification and carbon retention in the largest areas of the world's land without unintended consequences.

Livestock consume too much water. This is true when cattle are run in factory-like settings being force fed grain that they did not evolve to eat, and when we factor in all the water consumed in growing the feed and lost on monoculture grain fields with over 95% bare soil pumping water out of the soil night and day through capillary action and evaporation. Cattle properly managed on the land increase the effectiveness of the available rainfall resulting in greater soil water retention far in excess of any water cattle could ever consume.

Summary

Finally, as the perfect storm approaches we have not only to reverse desertification on the world's rangelands but also to sequester the excessive or legacy load of atmospheric carbon.

While planting trees results in carbon moving from atmosphere to plants almost all such carbon is subsequently released over the life of the trees to maintain the vital ambient carbon cycle vital to all life. And helpful as tree planting is, it cannot address desertification where rainfall is too low for full soil cover under trees with their litter. So we are left with the world's grasslands and livestock properly managed as the key to survival of civilization as we know it. The main place where we can address drought, flood, poverty and violence while sequestering the world's legacy carbon load without any fear of unintended consequence – is the realm of your chosen profession.

No technological solution can ever, as I have explained, reverse desertification and any such solution to sequestering carbon, when dealing with nature's complexity on this magnitude, is an objective without holistic context and thus carries a high chance of unintended consequences.

I hope that I have given you much food for thought. I have made many strong statements that no scientist in his or her right mind would do unless basing everything stated on the best science available. The years of academic attack and ridicule, without highlighting any flaws in either the science or the planning methodology have been hard to endure but have also had the unintended consequence of sharpening the rigour of thought and practice.

We are in what I call the greatest, and if lost, the last war humans will fight. The war to learn to live in harmony with ourselves and our environment. And you in the range science profession have a major role to play. It is a role and responsibility you will fail to carry out if you continue business as usual studying and developing grazing systems that do not address social, economic or environmental complexity.

I believe that some of your leaders are very aware of this and that is why they so magnanimously invited me to address your gathering today for which I thank them. I believe a whole new world of opportunity is opening up for you; An opportunity to live truly meaningful lives leading vast change serving the needs of our nations and the world. Opportunity to do exciting new research of which so much is needed in support of management; opportunity to break discipline boundaries in management in the spirit of holism.

Earlier I mentioned biodiversity loss, desertification and climate change being one issue, and not three barely associated issues. What profession could pull all together better than yours? Promoting such change against institutional inertia and paradigm paralysis to save mankind will require keen minds, moral courage and leadership from you. I envy the opportunity before you to rise to the occasion and I wish you success.



Allan Savory
The Savory Institute

“Management needs to be Holistic and can never be Reductionist”





Left ground largely bare for over 30 years regardless of seasons and right following heavy impact with cattle and holistic planned grazing. Pictures taken October two seasons apart. Dimbangombe Ranch, Zimbabwe - *Photos Allan Savory*



Left bare and eroding for more than thirty years. Right following very heavy animal impact and holistic planned grazing four seasons later. Dimbangombe Ranch, Zimbabwe *Photos Allan Savory.*



a) Top left, grassland close to river. b) top right, typical river view in Hwange communal lands, Zimbabwe. c) lower left, grassland close to river and d) lower right, river flow on Dimbangombe Ranch, Zimbabwe. Pictures taken same day at end of rains when land at it's best throughout the year. *Photos Allan Savory*