Response to Request for Information on the "Science" and "Methodology" Underpinning Holistic Management and Holistic Planned Grazing

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Theory

It is desirable to know the underlying theory behind Holistic Management to understand both the science applied and the methodology. Jan Christian Smuts who wrote "Holism and Evolution" in 1926 provided the theoretical base. Smuts, more than anyone subsequently, provided sound reasoning to accept "holism" as the operating principle in nature. The concept that nature functioned in wholes and patterns of great *complexity*, unlike the mechanistic world view in which nature is viewed as a *complicated* machine with interconnecting parts.

Using this theoretical base, we recognized that land alone is not manageable because it is so tied to the culture, beliefs, and values of the people occupying it. Ultimately the practical management of whole situations, in which land is involved, could only be done by viewing people, their land, and their economy as one *indivisible whole*. Land alone is no more manageable than is either hydrogen or oxygen alone manageable in water. The people's economy is indivisible from land because the only wealth that can truly sustain any community or nation is ultimately derived from the photosynthetic process (plants growing on regenerating soil). Managing holistically involves addressing the one simple underlying cause for widespread failure to address the complexity in agriculture. That cause being simply the genetically embedded way humans make management decisions. Superimposed on our genetically embedded way, unknowingly used by even the most sophisticated scientific teams, we use a modified holistic framework that does enable us to address social, environmental, and economic complexity simultaneously.

In management, actions are taken to achieve various objectives. All objectives require a context because without one (or with too simplistic a context) unanticipated consequences arise. Currently the context for almost all actions (and policies) in agriculture and other fields is "need," "desire," "profit," or "addressing a problem." When faced with the inevitable complexity the objectives almost always result in unplanned consequences because the context is too simplistic. Accordingly, when managing holistically a Holistic Context, is defined and used in each unique situation. This is a new concept, not previously found in any branch of science, philosophy, or religion, that ties people's lives and cultures, through forms of production, to their life-supporting environment. The Holistic Context provides the context for all objectives, goals, or actions toward any vision or mission. In addition, a set of ten filters are used to ensure objectives, goals, and actions are within the relevant Holistic Context and thus simultaneously socially, environmentally, and economically sound both short and long term in people's own enlightened self interest. This helps greatly in avoiding unintended consequences to our actions that are so universal that economists long ago used the term "Law of Unintended Consequences."

Managing holistically involves all the sciences and other sources of knowledge. If an action is new in any environment we also automatically assume that it is wrong because of nature's extreme complexity

currently beyond understanding. On this assumption we monitor the point of earliest warning so that management is proactive and no longer adaptive as it has been for centuries.

Because each and every managed situation involving land (people, land, money) is totally unique, and also unique every year, managing holistically does not permit replication. Because of this fact we can only validate the "science" used and monitor or document "results achieved." This point is critical to understanding the great difficulty people have insisting on experimental protocols suited to research in comprehending holistically planned grazing (commonly called Holistic Planned Grazing) because no two plans are ever the same even on the same property two years running. What such researchers also fail to understand is that if somehow the Holistic Planned Grazing was replicable, as are all grazing systems and rotations, it still would only provide the results and not the "science." Every study of Holistic Planned Grazing that has been done has provided documented results that are rejected as anecdotal by range scientists because there was no replication.

The Science Supporting the Major "Proof of Concept" Learning Site in Zimbabwe that Won the 2010 Buckminster Fuller Challenge

People managing holistically obviously use basic scientific knowledge from many fields/disciplines. However, that which matters most in this case, where the reversal of desertification is being demonstrated using greatly increased livestock numbers, is the science vital to the management of the world's largest land areas – the deserts caused by human actions and the desertifying grasslands and savannas. Humans are a tool-using animal. We cannot drink water today without technology unless going to a river and scooping it to our mouths. Over the millennia, unlike other tool using animals, we expanded our tools beyond simple sticks and stones (earliest technology) to include fire thus enabling us to move to the copper, bronze and iron ages and to all modern technology. The only other tool ever devised to manage our environment on a vast scale was to rest the land. Thus our genetically embedded way of making decisions with millions of tools today still has our tools with which we manage our environment and agriculture, fall under three headings – technology, fire, and resting the environment.

Because no technology even imaginable can maintain rapid biological decay of annually dying grass parts in seasonal rainfall environments, as is required, and because both fire and resting the dead above ground plant parts constitute oxidation and exacerbate desertification, a new tool had to be introduced. Centuries of failure to address desertification necessitated introducing new tools without which desertification cannot be reversed. These new tools being advocated to manipulate our environment at large (over billions of hectares) when managing holistically are – grazing and the physical impact of large herbivores (mainly livestock) which we call animal impact. Because livestock are blamed for causing desertification is the widespread current societal belief, it has assumed scientific validity in not only range science but also throughout environmental organizations, governments, and international agencies. The fact that practically, livestock (cattle, sheep, goats, camels, horses, etc.) are the only tools that can reverse the desertification process is counter-intuitive and thus could only result in the normal rejection by authorities that has accompanied all major advances in science throughout history. Let us look at the science supporting these two new tools – grazing and animal impact. They are separated into two tools because they can in practice be used differently.

Grazing

The myth, or deep human belief of thousands of years, that has permeated range science and all organizations and institutions, is that overgrazing is due to too many animals. In thousands of PhD dissertations range scientists assumed this to be scientific fact. So much so, that no one either defined overgrazing (other than too many animals) or produced any evidence linking overgrazing to animal numbers. Fortunately, considerable plant physiology research on defoliation of grasses and the subsequent effects on root sacrifice (to provide the energy for regrowth) enabled a French pasture researcher to establish that overgrazing was a function of how long a plant was exposed to grazing and how long it was before it was re-grazed. In other words, overgrazing was a function of time and not of animal numbers. Whether there is one cow or a thousand does not alter the fact of overgrazing but merely changes the number of plants overgrazed if the animals remain too long in the same place or return to it too soon following grazing.

This researcher, Andre Voisin, was widely published in four major European languages sixty years ago. Voisin's work was quickly picked up by myself and by scientists in Cuba, Brazil, and New Zealand but ignored in Africa, Australia, and the United States which was so influential in range science world-wide. To keep Voisin's work alive I championed republication of his book, Grass Productivity (Covelo: Island Press, 1988).

So Holistic Management and it's Holistic Planned Grazing is based on minimizing overgrazing through maintaining a high graze/trample/recovery ratio on the land at all times. Thus we are using the established scientific knowledge provided by this French pasture specialist rather than the myth that predominates in international range science, governments, international agencies, media and environmental organizations to this day. How this is done is covered in methodology later.[1]

Animal Impact

The second 'tool' used extensively in Holistic Planned Grazing is the application of high physical impact – trampling, dunging and urinating – on the land in short periods interspersed with much longer periods for plant and soil life recovery. Ecological thinking has advanced considerably in recent years recognizing that seasonal rainfall grasslands require periodic disturbance for overall health. Numerous papers have been published on "disturbance" regimes and their desirability. Acceptance over the last forty years has been such that prominent land grant universities in Texas and Arizona designed machines to simulate the physical effects of once prevalent vast herbivore herds – such as the millions

[1] All grazing systems and rotations that range scientists accept and publish papers about are accepted because they could be replicated, although the "science" behind them is lacking, being based on the belief (not science) that overgrazing is a function of animal numbers. Even rotational grazing first introduced in Europe in the 16th Century was found wanting when dealing with the complexity of pasture swards without adding the social and economic complexity it was not addressing. This (complexity of pastures) Voisin addressed thoroughly based on his considerable research and observation. For this reason, he developed "Rational" (not rotational) grazing with a simple planning process controlled by focusing on recovery periods and not grazing periods as in rotational grazing.

of bison, pronghorn, deer, elk, etc. that roamed North America. These machines such as the Dixon Imprinter were put into operation over thousands of acres of the western U.S to break soil crusts and cause indentations and irregularities while laying down plant material as soil- covering litter, vital to soil health. Such machines were highly effective, warranting the expenditure of millions of dollars at the time, but unfortunately the treatment could not be repeated year after year as needed without prohibitive cost and their use was abandoned.

Machines using fossil fuels, and lacking digestive systems, simply could not mimic the large herbivores of old that formerly provided repeated disturbance and annual cycling of dead plant material biologically and rapidly.[2]

Fifty years ago from my observation of large wildlife herds I realized that animal hooves, mouths, and digestive systems could do this same task more effectively, and with the annual repetition required, and at no cost while not consuming fossil fuels. This required no science but simply common sense as any gardener would understand because large herbivores do three things that are not arguable. They:

1. Break soil crusts. Trackers have observed this for thousands of years. The effect is more pronounced when animals are concentrated in large herds as they do when under threat of predation from pack hunters. The broken crust allows soil to absorb water and to breathe, enabling more plants to germinate and establish.

2. Compact the soil under their hooves. Anyone who has had a horse stand on their boot understands this. Compaction is required for good seed to soil contact to increase germination. This is why gardeners tamp down the soil around seedlings or seeds or some farmers put a heavy roller over certain crops after planting.

3. Return standing grass plant material (dead or alive) to the soil surface earlier than the plant material would have returned to the soil had the animals not been there. One has only to watch a cow or buffalo trample or dung to know this. The conversion of plant material to litter or dung is essential to maintain biological decay – something the machines designed to imitate animals could not do.

These three influences of grazing animals are as clear as the fact that water flows downhill – no amount of research will ever disprove such influences and the management skill becomes the use of such influences in every unique situation. When using animals to perform these tasks there is always a time dimension that planning of grazing needs to consider. For example, trampling for too long powders

[2] Because the machines to mimic nature were promoted and designed by range scientists holding a mechanical paradigm in a society also believing in technology to solve agricultural problems, their use was not first subjected to any replicated studies which they could have been subjected to. Governments invested in them because "experts" in prestigious universities advocated their use. It is simply a strange anomaly of the human mind that while machines to mimic herding animals of the past were not questioned nor was the science questioned, while the suggestion to use actual animals to mimic animals has raised a storm of protest for half a century with researchers claiming it is not scientific.

soil, increasing erosion by wind and water. Trampling for too long, especially when soils are wet, also causes compaction in deeper layers that is adverse to plant growth, thus requiring longer recovery times between such tramplings. And dung and urine, like most things in excess, become pollutants as feedlot animal producers soon learn.

So with Holistic Planned Grazing, whether using fencing or herding, animals are mainly used in high concentration ***over brief time periods*** to break soil surfaces, compact soil to ensure seed germination, and cycle annually dying plant material biologically and rapidly. They do this by crowding the management herd onto any ground 'requiring gardening' to increase plant establishment. Herding is proving more effective than using fencing and herders are trained to look for any areas of bare soil and make sure the surface is broken up and litter and dung are laid down with a short period of soil compaction. In addition, they are trained to keep an eye out for any areas of existing grass where the seasonally dying above ground parts are starting to shift from rapid biological decay to gradual chemical/physical breakdown (oxidation and weathering). Where such areas exist that would result in the grass community shifting to bare soil and brush encroachment, the herders again concentrate the animals while out grazing as a herd, laying down litter and clearing old grass away from growth points in the coming season so sunlight can reach them. The moribund oxidizing material prematurely kills the plants – the main reason people burned.

In the Zimbabwean site because many major predators are present and we run livestock in a predator-friendly manner, the livestock are held every night in portable lion-proof corrals (known as *kraals* in southern Africa). The kraals are portable to prevent excess dung and urine becoming pollutants. We do not kill the lions, leopards, hyenas, wild dogs or cheetah that are present because they are crucial to keeping wildlife moving and thus the land healthy. We have learned that these overnight kraals provide extremely high animal impact and we use this generally for no more than seven nights to heal any seriously eroding gullies or extremely compacted and crusted bare soil. We have also learned that using the overnight kraals for soil preparation in crop fields before planting greatly increases yields.[3]

Now that we have the understanding that grazing and animal impact as tools to manipulate our environment over vast areas of seasonal rainfall environment grasslands and savannas and unique at this point to Holistic Management, let me now look at the only other thing we can document which is results.

[3] The results of the dramatic reversal of desertification on such sites from this treatment are available to anyone interested and are on the site savory.global or can be seen in the TED 2013 talk http://on.ted.com/Savory

Results

The first documented result was from an international trial established in then Rhodesia (now Zimbabwe). "Results of the Botanical Analyses in the Charter Trial," by J.N. Clatworthy for the Rhodesian Branch of the South African Society of Animal Production in 1976 and published in the *Zimbabwe Agricultural Journal* in 1984. After 8 years of testing planned grazing against a government grazing system it showed we could run twice as many animals and make more profit, without any deterioration of the plant community using planned grazing.

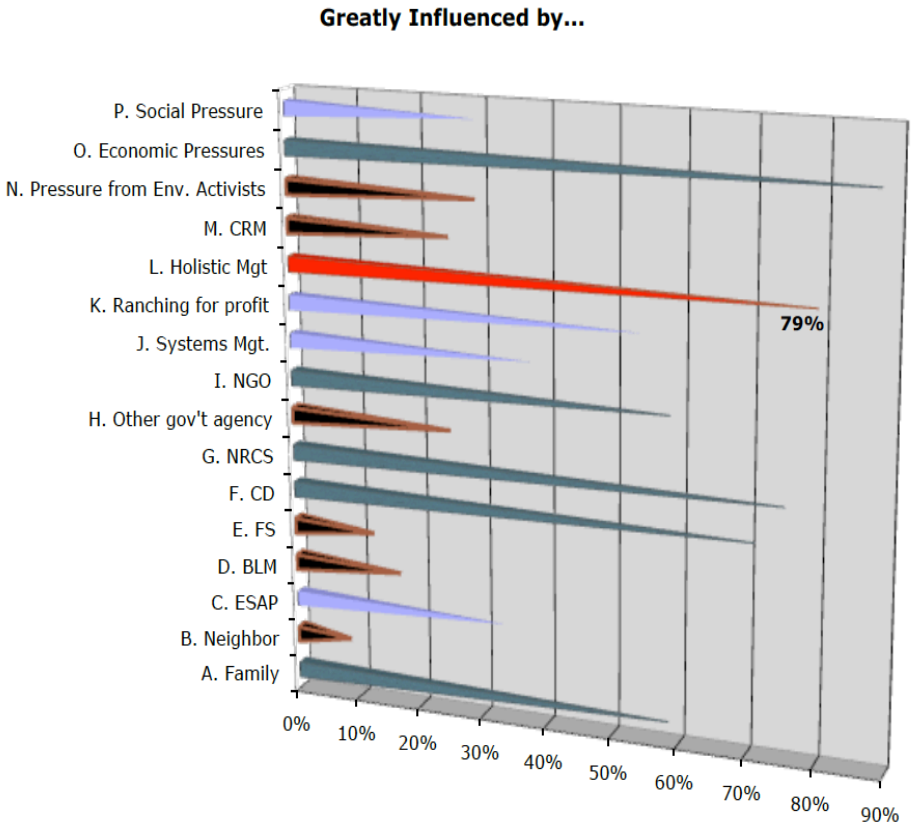
The next study comparing Holistic Planned Grazing against total rest and against a government grazing system was not conducted until recently and it looked at soil moisture retention as well as vegetation. This, NASA funded, study by Keith Weber at Idaho State University and published by Journal of Arid Environments is to be found on the Savory Institute web site. It documents statistically significant increase in soil moisture retention under Holistic Planned Grazing compared with both total rest of land and with a standard government grazing system.

An earlier investigation of overall results (social, environmental and economic) was published by Dr. Deb Stinner and colleagues who investigated early adopters of Holistic Management across the US from California to Florida. "Biodiversity as an Organizing Principle in Agroecosystem Management: Case Studies of Holistic Resource Management Practitioners in the USA" (*Agriculture, Ecosystems and Environment,* vol. 62, 199-213, 1997), by Deborah H. Stinner, Benjamin R. Stinner, Edward Martsolf. This paper describes an attempt to move beyond experimental protocols in research in order to document what happens when whole situations are managed holistically. In essence this study documented significant increases in production, biodiversity, and an average of 300% more profitability.

From an informal survey conducted independently by Tony Malmberg in 2009 he reported as follows:

> "I conducted a survey of 114 recipients of the U.S. National Cattlemen's Environmental Stewardship Program. These winners were selected for economic and ecological success on their land management over the past 18 years. We had a response of 22.4% overall and the three areas comprising the South, the Rocky Mountain West, and the West, responded with 31.5%. Note that Holistic Management was the second greatest influence for change (79%) of these top managers over the past 18 years, with economics being the greatest influence (88%)."

The Savory Institute is continually gathering further data on results where management is holistic, working in conjunction today with several universities and other organizations, and this is made freely available.



Criticisms of Holistic Management

Despite years of practice, it is difficult to find scholarly criticisms of managing holistically. There are several reasons for this unfortunate situation. Perhaps the main reason is that there are substantial differences in the skills and training required for management and for research. Managers of land almost never achieve publication in peer reviewed journals concerning range management in particular, because such journals are controlled by the International Range Management Society which is dominated by researchers lacking both skills and training in management. Such researchers have over many years refused to accept documented management results as anything but anecdotal, because they cannot replicate management of any financial, social, and land management situation on small plots of land for statistical analysis. Management needs to be holistic and can never be reductionist.

Range Scientist Researcher Criticism

If an internet search is conducted one will find many references to papers by range scientists discrediting Holistic Management. The only independent assessment of all available critics and their citations was done by Chris Gill. Gill, involved in management and with a liberal arts education, studied every citation he could locate and who in turn those authors cited. As he reports not a single paper discrediting Holistic Management actually studied, or even attempted to study, Holistic Planned Grazing. All papers cited

referred to derivations of the work in which the holistic planned grazing process was converted to a grazing rotation system to fit research criteria and the Holistic Decision-Making Framework was never used in any of those studies. Report available at the Savory Institute's website savory.global. Many are the derivations or plagiarisms of Holistic Planned Grazing – to name a few: Short Duration Grazing System, Cell Grazing, Management Intensive Grazing, and so on of which the latest is Mob Grazing.

From a paper by Jan Douwe Van Der Ploeg, Piet Verschuren, Frank Verhoeven, and Jose' Pepels, Journal of Environmental Policy & Planning Vol. 8, No. 3, September 2006, 199–218, I quote from the summary

> "This article discusses a controversy that arose out of a grassland experiment in the Netherlands. Using the same data, one group of farmers and scientists concluded that a newly developed trajectory towards sustainability in dairy farming was highly effective, whilst a second group of scientists linked to the Research Institute for Animal Husbandry (PR) concluded the opposite".

In the future there will hopefully be considerably more empirical documentation of results, and people will increasingly understand that documented results without replication are not anecdotal.

Methodology

When managing holistically, as mentioned earlier, significant management objectives are achieved within a Holistic Context using the Holistic Decision-Making Framework and its filters to ensure actions are socially, environmentally, and economically sound and in Holistic Context.

This is described in the textbook Holistic Management: A New Framework for Decision Making, Second Edition (Island Press, 1999), Island Press written by myself and my wife, Jody Butterfield. Also now in a Spanish edition. Incidentally there are many references in the book to the work of other scientists that were used to develop the new decision-making framework.

While the textbook mentioned covers the basics of Holistic Management, there is also a publication – "Holistic Management Handbook: Healthy Land, Healthy Profits" Second Edition 2006, Island Press, by Jody Butterfield. This book describes in great detail how Holistic Planned Grazing is done complete with illustrated charts and diagrams. In summary - to deal with the daily complexity, that managers cannot avoid or bypass through any prescribed grazing rotation or grazing system as people have tried for centuries, I simply took an immediate battlefield military planning procedure from Sandhurst Military College in the U.K. and adapted it to the complexity of managing livestock, wildlife, erratic seasons, and more. So, the actual planning process has some 300 years of field-tested experience behind it. Not surprisingly it works very well and people can be trained to do it quickly and to do it even under great stress in times of fires, droughts, and other catastrophes that regularly occur over large areas of land. We have now simplified the process even more for semi-literate pastoralists who have implemented it with great success.