

Comments on Allan Savory's Proposed Application of "Holistic Management" to Grasslands, Including Desert Grasslands, For the Purpose of Increasing Sequestration of Atmospheric Carbon

(Based upon a memo of 2 April 2013 to the Sierra Club authored by Mike Hudak in collaboration with the Club's Grazing Team members and issued on behalf of the Grazing Team.)

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Summary

Recent widespread interest in Holistic Management (HM), primarily stemming from Allan Savory's presentation at the February 2013 Long Beach, CA, TED conference, makes it important that Club members and staff be consistent in their response to calls for application of HM. Savory has received considerable attention for his claim that application of HM to husbandry of ungulate livestock (typically cattle) in the world's grasslands could sequester sufficient atmospheric carbon to reduce atmospheric carbon concentrations to pre-industrial levels. I urge the Sierra Club to reject HM as a tactic to reverse climate change for the following reasons:

- 1) independent scientific research (in contrast to anecdotes from promoters and users of HM) since the early 1980s has not shown HM to perform better than other grazing management methods,
- 2) applications of HM have produced mixed results, but in arid regions worldwide have often led to further environmental degradation,¹
- 3) Savory's characterization of a "desertified" grassland is contradicted by well-established scientific understanding of desert ecology, particularly as regards biological soil crusts, and
- 4) claims of HM's widespread ability to increase sequestration of atmospheric carbon have not been independently studied and are indirectly contraindicated by recent, peer-reviewed research showing that grazing exclusion in some grasslands actually increases carbon sequestration relative to continued grazing.

Details

Holistic Management (HM) is a general plan for land management promoted by its developer Allan Savory² under one name or another since the 1970s. The best-known

application of HM occurs in livestock husbandry. Most attractive to ranchers has been the claim that through the use of HM, they could greatly increase their production of livestock—doubling it or more.

At the February 2013 Long Beach, CA, TED conference, Allan Savory,³ went further, stating that HM applied to husbandry of ungulate livestock in grasslands worldwide could reduce atmospheric concentrations of carbon to pre-industrial levels. This miracle would supposedly occur through the sequestering of atmospheric carbon that would result from the greater production of vegetation in turn resulting from the grazing of livestock. I question Savory's claim on several grounds.

Savory proposes using domesticated livestock, such as cattle or sheep, to replicate the behavior of migrating native ungulates in grassland ecosystems. In the desert grasslands of the American West, much of which are managed as federal public lands, large herds of large ungulates in any way resembling cattle have been absent for more than 10,000 years. Consequently, intensive herding of cattle in these regions does not replicate any natural process with which the current native vegetation has evolved.

Savory's TED talk and the website of his organization (Savory Institute, <http://www.savoryinstitute.com/>) provide examples of environmental improvement of ranched landscapes after application of HM. Lacking, though, is independent verification of these claims, without which we cannot know whether such improvement occurred because of HM or coincidentally for other reasons. Sierra Club Grazing Core Team member George Wuerthner in his 2002 book *Welfare Ranching*⁴ noted that HM requires much more diligent monitoring of livestock than is typical, particularly for ranching on public lands. The very act of paying greater attention to livestock grazing (and properly responding to on-the-ground conditions) may be the major factor underlying improved environmental conditions.

Versions of HM have been studied by academic researchers since the early 1980s. Results of many such studies have been compiled into what are called "summary" or "synthesis" papers. Particularly notable are such studies by Skovlin (1987),⁵ Holechek et al. (1999),⁶ Briske et al. (2008),⁷ and Carter et al. (2014).⁸

In general, these authors did not find support for claims that HM with high-stocking rates benefits cattle and the environment. And when stocking rates were comparable to those of other grazing approaches, performance of HM also was not superior.

Perhaps even more damning of HM than the three articles cited above is one by Joseph et al. (2002)⁹ which reviewed the Charter Grazing Trials, of which Allan Savory once wrote "The only trial ever conducted proved what I have always advocated and continue to advocate when livestock are run on any land."¹⁰ But Joseph et al. in summarizing these trials stated "Our review of findings from African studies on short-duration grazing including the 'Charter Trials' shows a very high similarity to those from North America summarized by Holechek et al. (2000)." The Holechek et al. (2000) study (as cited in footnote #6) reports that HM (studied as "short-duration grazing") performed no better than continuous grazing in regard to water infiltration, soil erosion, plant succession, range condition, forage harvest efficiency, and financial return when stocking rates were comparable. And short- duration grazing actually performed worse than continuous grazing when stocking

rates were higher! But although Allan Savory has since the 1970s promoted HM (or its predecessors “Savory Grazing Method” and “Holistic Resource Management”) as the solution to repairing degraded landscapes and increasing the wealth of ranchers, he has now gone one huge step further in his February 2013 TED talk by suggesting that HM applied especially to grasslands of Africa and the Middle East is the only hope for mitigating the causes of global climate change.¹¹ In challenging this claim, I cite peer-reviewed studies that contraindicate using ANY livestock grazing to increase sequestration of atmospheric carbon. For example:

- 1) That desert biological soil crusts “can be dominant sources of productivity and carbon sequestration in extremely dry environments, and they can contribute to soil fertility through the fixation of nitrogen.”¹² These are the same crusts that Allan Savory in his February 2013 TED talk referred to as a “cancer” on the landscape, the destruction of which he advocated through the grazing of livestock.¹³
- 2) A study of *Leymus chinensis* grasslands of China with exclusion of livestock grazing for 3-yr, 8-yr, 20-yr, 24-yr, and 28-yr found the highest amount of carbon sequestration in soil and aboveground biomass after 20 years. Study authors conclude “Grazing exclusion for two decades increased the soil C [carbon] and N [nitrogen] storage by 35.7% and 14.6% respectively, in the 0- to 40-cm soil layer. The aboveground net primary productivity and soil C and N storage were the highest with 24-yr GE [grazing exclusion] and the lowest with free grazing.”¹⁴
- 3) A study of a semi-arid grassland in China found “The C stocks in aboveground biomass, belowground biomass and litter were 70–92% ($P < 0.01$), 56–151% ($P < 0.01$) and 59–141% higher ($P < 0.01$), respectively, in grazer excluded grassland than in grazed grassland. Grazing exclusion significantly increased C and N stored in plant biomass and litter and increased the concentrations and stocks of C and N in soils. Grazing exclusion thus significantly increased the C and N stored in grassland ecosystems. The increase in C and N stored in soil contributed to more than 95% and 97% of the increases in ecosystem C and N storage. The highest C and N stocks in ecosystems were observed in 17-year grazer excluded grassland.”¹⁵
- 4) An Australian study found that “destocking currently grazed shrublands for two decades resulted in a net C accretion, over 20 years, in the order of 6.5 Mg/ha, almost entirely through increasing belowground C”¹⁶
- 5) Allan Savory (in his TED talk of February 2013) and Bill McKibben (in his Australian lecture tour of 2013¹⁷) have claimed that livestock grazing under HM would increase the ability of soil to sequester atmospheric carbon. While neither Savory nor McKibben substantiated their claims, their basis may be a reference (Teague et al. 2011)¹⁸ found on an HM-promoting webpage of PlanetTech Associates.¹⁹ This website notes that the Teague article demonstrates that multi-paddock grazing

using “adaptive management” is “superior to conventional continuous season-long grazing across a range of ecological parameters, including grass density, soil moisture, soil bulk density, standing crop biomass, and soil organic matter (SOM)—which is a measure of soil carbon.”

While this statement accurately reflects the findings of the cited research, the relevance to HM is dubious, as the multi-paddock grazing studied in the research was described as “light to moderate,” rather than the “intensive” grazing advocated by Allan Savory. For all we know, had Teague (and associates) conducted their trials with “intensive” rather than “light-to-moderate” grazing, the result may have yielded a degree of carbon sequestration unpersuasive to the use of HM. Nevertheless, HM’s focus on “intensive” rather than on “light-to-moderate” grazing provides a much more attractive sales pitch for HM, as it suggests greater profits for ranchers.

Also not mentioned on the PlanetTech Associates website, yet even more significant from the perspective of reducing atmospheric carbon, the Teague article reports that multi-paddock grazing did not yield significantly greater sequestration of soil carbon than was found in soil of comparable land from which grazing had been long excluded (see Note 18: Teague et al. (2011), Table 5, p. 314). Considering the additional carbon as methane that cattle grazing on the land would introduce into the atmosphere through enteric fermentation, this article provides no justification for the use of cattle as a way of reducing atmospheric carbon for the purpose of mitigating the impacts of global climate change.

Conclusion

WHEREAS, a generation of independent, peer-reviewed, scientific studies have failed to verify the significant benefits claimed for HM as a land management tool; and

WHEREAS, peer-reviewed studies demonstrating that desert biological soil crusts (targeted for destruction by HM’s developer Allan Savory) sequester atmospheric carbon and nitrogen, and whose disruption decreases organism diversity, soil nutrients, soil stability, and organic matter;²⁰ and

WHEREAS, peer-reviewed studies demonstrating that exclusion of livestock grazing in grasslands increases carbon sequestration relative to such grazing;

THEREFORE, I urge the Sierra Club (and its related entities, e.g., *Sierra* magazine) to reject HM as a tool to reduce atmospheric carbon.

To the extent that application of HM to a given situation leads to improved range conditions, the most likely reasons are incidental to, and in spite of, the purported ecological underpinnings of HM—those reasons being improved livestock distribution, improved control of the frequency and severity of defoliation of individual plants, and intensified management, as was pointed out many years ago.²¹

Allan Savory's February 2013 TED talk has drawn harsh, widespread criticism from knowledgeable, conservation-minded individuals²²—criticism indicative of how the Club's credibility could be diminished by its association with HM in pursuit of combating global climate change.

Notes

1. David E. Brown, "Out of Africa," *Wilderness* (Winter 1994): 24–27, 30–33; Jon Skovlin, "South Africa's Experience with Intensive Short Duration Grazing," *Rangelands* 9(4) (August 1987): 162–67.
2. Allan Savory, *Holistic Management* (Washington, DC: Island Press, 1999).
3. Allan Savory: How to Green the Desert and Reverse Climate Change, TED: Ideas Worth Spreading, filmed February 2013, posted March 2013, http://www.ted.com/talks/allan_savory_how_to_green_the_world_s_deserts_and_reverse_climate_change.html (accessed 26 January 2015)
4. George Wuerthner, "The Donut Diet: The Too-Good-To-Be-True Claims of Holistic Management," In *Welfare Ranching: The Subsidized Destruction of the American West*, ed. George Wuerthner and Mollie Matteson (Washington, DC: Island Press, 2002), 292, http://www.publiclandsranching.org/htmlres/wr_donut_diet.htm (accessed 26 January 2015)
5. Jon Skovlin, "South Africa's Experience with Intensive Short Duration Grazing," *Rangelands* 9(4) (August 1987): 162–67.
6. Jerry L. Holechek, Hilton Gomes, Francisco Molinar, Dee Galt, and Raul Valdez, "Short-Duration Grazing: The Facts in 1999," *Rangelands* 22(1) (February 2000): 18–22.
7. D. D. Briske, J. D. Derner, J. R. Brown, S. D. Fuhlendorf, W. R. Teague, K. M. Havstad, R. L. Gillen, A. J. Ash, and W. D. Willms, "Rotational Grazing on Rangelands: Reconciliation of Perception and Experimental Evidence," *Rangeland Ecology and Management* 61(1) (January 2008): 3–17.
8. John Carter, Allison Jones, Mary O'Brien, Jonathan Ratner, and George Wuerthner, "Holistic Management: Misinformation on the Science of Grazed Ecosystems," *International Journal of Biodiversity*, (2014), Article ID 163431, 10 pages, <http://dx.doi.org/10.1155/2014/163431> (accessed 26 January 2015)
9. Jamus Joseph, Francisco Molinar, Dee Galt, Raul Valdez, and Jerry Holechek, "Short Duration Grazing Research in Africa," *Rangelands* 24(4) (August 2002): 9–12.
10. Allan Savory, "Letter to the Editor," *Rangelands* 22(3) (June 2000): 32–33.
11. Savory's relevant statements from his Feb 2013, Long Beach, CA, TED Talk: "I remind you that I am talking about most of the world's land here that controls our fate, including the most violent region of the world, where only animals can feed people from about 95 percent of the land. What we are doing globally is causing climate change as much as, I believe, fossil fuels, and maybe more than fossil fuels. But worse than that, it is causing hunger, poverty, violence, social breakdown and war, and as I am talking to you, millions of men, women and children are suffering and dying. And if this continues, we are unlikely to be able to stop the climate changing, even after we have eliminated the use of fossil fuels." And "if we do what I am showing you here, we can take enough carbon out of the atmosphere and safely store it in the grassland soils for thousands of years, and if we just do that on about half the world's grasslands that I've shown you, we can take us back to pre-industrial levels."

12. Zoe G. Cardon, Dennis W. Gray, and Louise A. Lewis, "The Green Algal Underground: Evolutionary Secrets of Desert Cells," *BioScience* 58(2) (February 2008): 114–22.
13. Allan Savory's relevant statement from his Feb 2013 TED Talk pertaining to biological soil crusts reads: "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've just seen is bare and covered with a crust of algae [aka biological soil crusts], leading to increased runoff and evaporation. That is the cancer of desertification that we do not recognize till its terminal form."
14. Wu L, He N, Wang Y, and Han X, "Storage and Dynamics of Carbon and Nitrogen in Soil after Grazing Exclusion in *Leymus Chinensis* Grasslands of Northern China," *J Environmental Quality* 37(2) (Mar–Apr 2008): 663–68.
15. Liping Qiu, Xiaorong Wei, Xingchang Zhang, Jimin Cheng, "Ecosystem Carbon and Nitrogen Accumulation after Grazing Exclusion in Semiarid Grassland," *PLoS ONE* 8(1): (2013): e55433. Doi:10.1371/journal.pone.0055433, <http://www.ncbi.nlm.nih.gov/pmc/articles/PMC3559475/> (accessed 5 July 2015)
16. Stefani Daryanto, David J. Eldridge, and Heather L. Throop, "Managing Semi-arid Woodlands for Carbon Storage: Effects on Above- and Belowground Carbon," *Agriculture, Ecosystems and Environment* 109 (2013): 1–11, http://www.aridecologylab.com.au/pubs/Daryanto_et_al_AEE_2012.pdf (accessed 6 July 2015)
17. Paul Mahony, "Do the Math: There are Too Many Cows!," 26 July 2013, <http://terrastendo.net/2013/07/26/do-the-math-there-are-too-many-cows/> (accessed 26 January 2015)
18. W. R. Teague, S. L. Dowhower, S. A. Baker, N. Haile, P. B. DeLaune, and D. M. Conover, "Grazing Management Impacts on Vegetation, Soil Biota and Soil Chemical, Physical and Hydrological Properties in Tall Grass Prairie," *Agriculture, Ecosystems and Environment* 141 (2011): 310–22), <http://www.sciencedirect.com/science/article/pii/S0167880911000934> (accessed 26 January 2015)
19. The PlanetTech Associates site in question is <http://planet-tech.com/blog/talking-points-regarding-savory>. See, specifically, the reference to the paper by "Teague, R. 2011" in the section titled "Misconception 2: Academic Papers Don't Support Savory's Thesis on the Beneficial Effects of Holistic Planned Grazing or Causes of Desertification" (accessed 20 May 2015)
20. An Introduction to Biological Soil Crusts (updated 24 April 2006), USGS Canyonlands Research Station, Southwest Biological Science Center, Moab, UT, <http://www.soilcrust.org/crust101.htm> (accessed 26 March 2013)
21. Rod Heitschmidt and John Walker, "Short Duration Grazing and the Savory Grazing Method in Perspective," *Rangelands* 5(4) (August 1983): 147–50.
22. Adam Merberg, "Cows Against Climate Change: The Dodgy Science Behind the TED Talk," *Inexact Change: Thoughts on Science, Politics, and Social Progress*, 11 March 2013, <http://www.inexactchange.org/blog/2013/03/11/cows-against-climate-change/> (accessed 30 January 2015);
Chris Clarke, "TED Talk Teaches Us to Disparage the Desert," 15 March 2013, http://www.kcet.org/updaily/socal_focus/commentary/east-ca/learn-how-to-hate-the-desert-with-ted.html (accessed 30 January 2015);
Chris Clarke, "TED Talk: Spreading Bullshit About the Desert," *Pharyngula*, <http://freethoughtblogs.com/pharyngula/2013/03/15/ted-talk-spreading-bullshit-about-the-desert/> (accessed 30 January 2015);
Michael Tobis, "Alan Savory, Dyson and Soil Sequestration," *Planet3.0: Beyond Sustainability*, 17 March 2013, <http://planet3.org/2013/03/17/alan-savory-freeman-dyson-and-soil-sequestration/> (accessed 30 January 2015);

Chris Clarke, "Adam Merberg on Grazing and Allan Savory and TED," Pharyngula, 17 March 2013, <http://freethoughtblogs.com/pharyngula/2013/03/17/adam-merberg-on-grazing-and-allan-savory-and-ted/> (accessed 30 January 2015);

Ralph Maughan, "Alan Savory Gives a Popular and Very Misleading TED Talk," The Wildlife News, 18 March 2013, <http://www.thewildlifeneeds.com/2013/03/18/alan-savory-gives-a-popular-and-very-misleading-ted-talk/> (accessed 30 January 2015);

"Great White Hunter," Sustainability for Animals, 23 March 2013, <http://foranimals.org/great-white-hunter-2/> (accessed 30 January 2015);

Guy R. McPherson, "Peak Patriarchy?," Nature Bats Last, 24 March 2013, <http://guymcpherson.com/2013/03/peak-patriarchy/> (accessed 30 January 2015);

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David D. Briske, Brandon T. Bestelmeyer, Joel R. Brown, Samuel D. Fuhlendorf, and H. Wayne Polley, "The Savory Method Can Not Green Deserts or Reverse Climate Change," *Rangeland* 35(5) (October 2013): 72–74, <http://www.bioone.org/doi/abs/10.2111/RANGELANDS-D-13-00044.1> (accessed 30 January 2015);

George Wuerthner, "Allan Savory: Myth and Reality," The Wildlife News, 12 November 2013, <http://www.thewildlifeneeds.com/2013/11/12/allan-savory-myth-and-reality/> (accessed 30 January 2015).