

Contra Costa County's Dependency on Pesticides Worsens the Global Warming Problem

As we breath the highly toxic and polluted air from the north bay fires, and hear about the devastation following the hurricanes in Puerto Rico and Florida it is hard not to think about the consequences of humanity's reckless and polluting practices.

Global warming is not debatable: it is a fact. At home we are experiencing extreme weather patterns, high temperatures, prolonged droughts, extreme winds and tornadoes as a result. The use of pesticides is one of the contributing culprits linked directly to these life-changing events. Just like global warming, it is common knowledge that the application of pesticides is linked to adverse environmental effects such as soil degradation, increased carbon released to the atmosphere, water pollution, and the acidification and warming of oceans. Warmer oceans, in turn, create stronger winds and more violent wind-related events such as hurricanes and the Diablo winds that are currently making a bad situation much worse.

Restoring healthy soils and environmental biodiversity by reducing toxic pesticide use will not only contribute to slowing the rate of climate change it will also promote a healthy ecosystem where weed proliferation will decrease.

It is up to you, members of the committee, to look hard at your decision to promote the use of pesticides over the many non-toxic alternatives and think about the negative effects that your decisions will have for the health of the children and families of Contra Costa County, our community and our planet. Less toxic solutions are available, but they require an open mind and a sincere willingness to make them work. I ask that the Committee members verify the accuracy of the justifications for why alternative methods are not utilized more extensively, or at all. For example: how were the cost comparisons between chemical vs. non-chemical methods determined, and how were the effectiveness of each alternative determined?

Thank you for the chance to share my concerns. I hope to hear a response to my concerns in writing if not verbally. I also thank each of you for working on this Decision Making Committee that is very important to the community, such as Parents for a Safer Environment, the Contra Costa County's Holistic Mothers, and the Mt Diablo Audubon Society.

I have not received any invitations to the county's IPM meetings although I have participated in few of them. I am providing you with my e-mail address in order to be included in the future.

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Cost Comparison for Weed Control Goat Grazing vs Chemical Herbicides

By Drew Toher, Beyond Pesticides, Washington D.C.

What is landscape restoration?

Restoring landscapes doesn't just mean getting rid of noxious weeds and invasive species. The presence of unwanted vegetation is actually the symptom of broader problems with soil health. In order to restore the land, it is critical to focus on repairing the biological life of the soil. In this context, herbicide use is simply a way to treat symptoms, while the use of goats will address the factors that cause weeds and other invasive species to appear in the first place.

Effective landscape restoration heals the soil through aeration, added nutrients, and balancing active beneficial fungi and bacteria. This, in turn, makes the landscape more resilient to weed infestation. Goats grazing provides all of these benefits. Goat hooves churn and aerate the soil, and add slow-release nutrients and beneficial microbes through their urine and waste. While herbicides suppress problem vegetation, they fail to remediate the soil, therefore perpetuating conditions that lead to weed intrusion.

Not Just a One for One Comparison

The difference between these approaches has important financial implications. A pilot study conducted by the Washington State Department of Transportation (WSDOT) determined that goats were cost-effective when compared against the use of herbicides in certain conditions, but not in others. At one site in Vancouver, WSDOT found goats controlled problem vegetation as well as traditional maintenance crews for roughly \$300 less per acre.¹ It's important to note that for each cost comparison, WSDOT looked at one for one cost savings, and did not consider the add-on benefits of goat grazing or the negative financial externalities associated with herbicide use.

Costs of Herbicide Use

Use of herbicides creates external costs that are borne by the public at large. Herbicides, such as glyphosate, triclopyr, and imazapyr have been linked to a range of costly health and environmental impacts.² Both triclopyr and imazapyr have been detected in groundwater and are considered toxic to aquatic organisms.³ In 2015, the World Health Organization determined glyphosate to be a probable carcinogen.⁴ A study by Cornell University Entomologist Dr. David Pimentel determined that pesticide use contributes to \$1.1 billion in public health care costs, and \$2 billion in groundwater contamination each year in the United States.⁵

¹ Washington State Department of Transportation. 2016. WSDOT Blog: Weed Warrior Update. <http://wsdotblog.blogspot.com/2016/05/weed-warrior-update.html>

² Beyond Pesticides. 2016. Gateway on Pesticide Hazards and Safe Pest Management. <http://www.beyondpesticides.org/resources/pesticide-gateway?>

³ Ibid

⁴ World Health Organization. 2015. IARC Monographs Volume 112: evaluation of five organophosphate insecticides and herbicides. <http://www.iarc.fr/en/media-centre/iarcnews/pdf/MonographVolume112.pdf>

⁵ Pimentel, David. 2005. Environmental and Economic Costs of the Application of Pesticides Primarily in the United States. *Environmental Development and Sustainability*. 7:229-252.

http://link.springer.com/chapter/10.1007%2F978-1-4020-8992-3_4#page-1

Continuous herbicide use also inevitably leads to resistance in target species. Dr. Pimentel determined that \$1.5 billion in costs are created as a result of pesticide resistance. Weed resistance to glyphosate, the world's most commonly used herbicide, has occurred in over 35 different plant species, including the *Kochia scoparia* which is invasive in Colorado.⁶ Herbicide use also harms beneficial soil organisms like earthworms.⁷ Studies find that soil microbial diversity is the basis for the proper functioning of valuable ecosystem services, including nutrient cycling, carbon fixation, soil aeration and stabilization.⁸

Benefits of Goat Grazing

Where herbicide applications fail in promoting functioning ecosystem services, preserving clean ground and surface water, protecting human health, and stopping pest resistance, goats grazing succeeds. Goats not only increase the amount of nutrient, micronutrient and microbial diversity of the soil, but also add to its capacity to hold and filter water and nutrients. By restoring and stabilizing the soil, goats can help decrease excess nutrient flow into local streams, and potentially cut costs associated with trail clean-up or wash-outs after flooding.

There is no mechanism for weeds to become resistant to goats, and the grinding action of their chewing, and stomach acids ensure that weed seeds are not viable when excreted. Goats do not put public health at risk – in fact the opposite is true. Goat grazing is a social good; a draw for the community, particular young children, and promotion of a grazing site can lead to increased visitation.

Conclusion

When taking the long view and considering impacts beyond simply eradicating weeds, the social, economic, and environmental benefits goat grazing provides far outweigh those associated with the use of chemical herbicides. This has been the experience of communities and public land managers across the country including those in Anaheim, CA;⁹ Cheyenne, WY;¹⁰ Mesa, AZ; Hempstead, NY; and Chicago O'Hare International Airport.¹¹ Goats should be considered a safer, economically viable alternative to herbicide use.

⁶ Weed Science <http://www.weedscience.org/Summary/MOA.aspx?MOAID=12>

⁷ Gaupp-Berghausen, Malin et al. 2015. Glyphosate-based herbicides reduce the activity and reproduction of earthworms and lead to increased soil nutrient concentrations.

⁸ Delgadi-Baquerizo, Manuel. 2016. Microbial diversity drives multifunctionality in terrestrial ecosystems. *Nature Communications*. 10.1038/ncomms10541

<http://www.nature.com/ncomms/2016/160128/ncomms10541/full/ncomms10541.html>

⁹ Covelman, Steven. 2014. SoCal City Enlists Goats to Combat Fire Danger. NBC4.

<http://www.nbclosangeles.com/news/local/Red-Flag-Warnings-Fire-Danger-SoCal-Weather-Goats-Anaheim-Fields-Clear-239984761.html>

¹⁰ Beyond Pesticides. 2009. Goats Replace Toxic Pesticides and Mowing Nationwide. Daily News Blog.

<http://beyondpesticides.org/dailynewsblog/2009/06/goats-replace-toxic-pesticides-and-mowing-nationwide/>

¹¹ Doyle, Bridget. 2012. City extends bidding deadline for O'Hare goat herd. Chicago Tribune.

http://articles.chicagotribune.com/2012-09-26/news/ct-met-ohare-goats-deadline-extended-20120927_1_goat-animals-airport-property

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Field Evaluations of Alternative Pest Control Methods in California Waters

**San Francisco Estuary Institute, Oakland, CA
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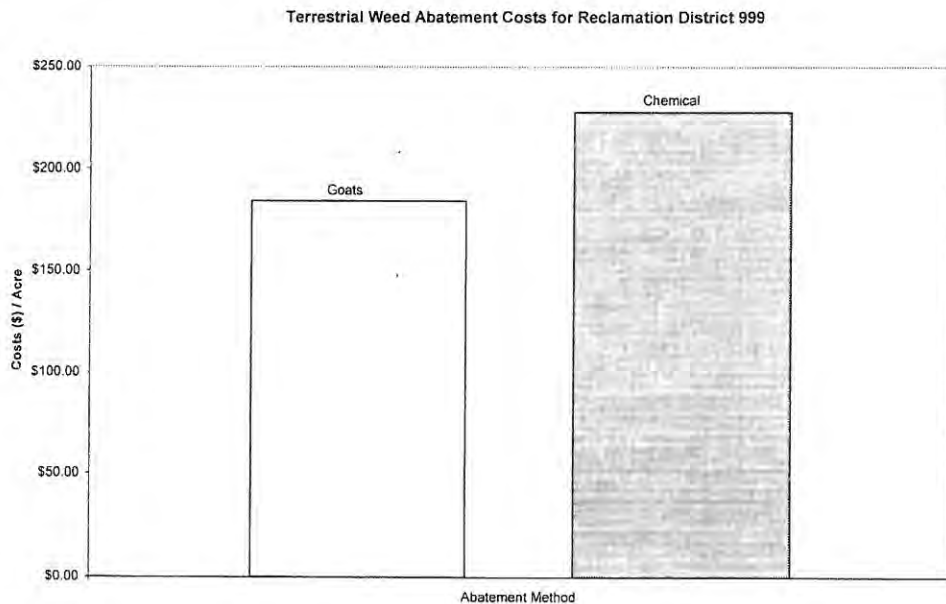
April 2004

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Economics

Data on costs are calculated in Table 5.4 and summarized in Figure 5.25. For comparison purposes, the use of goats was compared to the application of a systemic herbicide (glyphosate). The cost for chemical treatment was slightly higher than that for the use of goats. Although not evaluated during this project, chemical treatment of brushy terrestrial vegetation such as that encountered at Elk Slough is not typically as complete or thorough as that achieved by goats.

Figure 5.25:



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Table 5.4. Control cost data for goats vs. chemical control of terrestrial weeds.

Test Plot Abatement Method Weed Type Test Plot Size (Acres) Category	Cost /Unit	Elk Slough Goats Terrestrial 13		Typical ⁶ Chemical Terrestrial 13	
		# Units	Cost	# Units	Cost
Labor					
Management Time	\$99.75 /hr				
Field Labor Time	\$60.00 /hr				
Equipment Operator	\$82.94 /hr				
Workers Compensation	\$145.00 /man*hours				
Equipment					
Utility Truck	\$20.00 /hr				
Dump Truck	\$35.00 /hr				
Boom Truck	\$30.00 /hr				
Car	\$6.00 /hr				
Excavation Equipment + Operator	\$60.00 /hr				
Goat Rental (T&V Livestock)	\$0.40 /head/day	6000	\$2,400.00		
Disposal					
Landfill Tipping Fees ¹	\$15.00 /ton				
Chemical Application					
Medium Weed Density	\$197.00 /acre			13	\$2,561.00
Heavy Weed Density	\$1,374.00 /acre				
Permits					
Aquatic Pesticides ⁸	\$2,000.00 /65 acre			13	\$400.01
CDFG Permit					
COE Permit					
Desilt Permit					
Total Cost			\$2,400.00		\$2,961.01
Cost Per Acre			\$184.62		\$227.77

General Notes and Footnotes:

- (1) Tules are not greenwaste and can't be diverted
- (2) Typical test plot represents chemical abatement cost for medium weed density
- (3) Cost of field labor includes equipment and disposables (brush cutters, gloves, fuel, travel, etc.)
- (4) Manual Abatement is material removal with a combination of hand labor and equipment (brush cutters, cranes, etc.)
- (5) Mechanical Abatement is material removal with excavators, no hand labor used
- (6) No workers compensation costs attributed to this technique based on claim history over last 13 years
Cost based on typical chemical application for this type of weed, no actual chemical application made.
- (7) All Mechanical and Manual Abatement sites are easy to access
- (8) Assumes 65 acres treated and a permit fee and compliance cost of \$2,000

6. CONCLUSIONS

An overall summary of the environmental impacts, efficacy, and economics of study is presented in Table 6.1.

Table 6.1. Qualitative summary of environmental impacts, efficacy, and relative costs of different control methods evaluated in this study.

Weed Type	Floating Weeds			Emergent Weeds			Terrestrial Weeds	
	Chemical	Mechanical	Chem/Mech	Chemical	Goats	Manual	Chemical	Goats
Environmental Impact	Low	Med.	Med.	NA	Med.	Low	NA	Med.
Efficacy	High	Med.	Very High	Med.	Med.	Med.	Med.	High
Relative Cost	Low	Med.	High	Low	Low	Low	Low	Low

NA = not evaluated as part of this study.

Emergent Weeds

Water quality impacts observed during the implementation of non-chemical control techniques were largely transitory. The most significant impacts to water quality were related to the temporary presence of total and fecal coliform and *E. coli* above maximum concentrations allowed for recreation. However, neither Bettencourt Basin nor Elk Slough are used this purpose; therefore no apparent risk was created by the use of goats.

When compared to the use of goats for terrestrial weed abatement, more significant adverse impact to water quality was seen with emergent weeds as a result of goats standing in the water during grazing. The use of goats to graze terrestrial vegetation ranged from moderately to highly effective depending on goat "appetite".

Manual removal of tules is effective, but is expensive, extremely labor intensive, and is prone to worker slip, trip, and fall-related injuries. Because re-growth occurs so quickly, this weed management option provides no more than seasonal control at best and must be done every season. During manual removal, no indication was found that the use of gasoline-powered equipment resulted in the presence of petroleum hydrocarbons in surface water.

If a particular site can tolerate a temporary increase in coliform and *E. coli*, the use of goats is a viable alternative to the use of chemicals. Both of these techniques are preferable to the use of manual removal techniques.

Floating Aquatic Weeds

No significant differences in water quality were noted during or after the removal of floating aquatic weeds using mechanical removal and chemical application followed by mechanical removal.

The combination of chemical/mechanical removal was the most effective technique observed. Because significant re-growth was observed after mechanical removal, this technique is not viable. In cases where moving water transports and agitates dead plant material so that it no longer floats and obstructs flow, the use of chemical control alone is likely the most effective method. Although the control cost of chemical control is less than that of the chemical/mechanical option, only the combined option exhibited plant control until the following growing season. This difference in effectiveness indicates that the annual averaged costs between chemical alone vs. chemical/mechanical combined may be relatively similar. Additional long term monitoring would be required to further evaluate this. In cases where water is stagnant or slow moving, chemical treatment followed by mechanical removal is a viable alternative to the use of chemicals if increased BOD can be tolerated.

Terrestrial Weeds

Similar to the use of goats for emergent weeds, transitory increases in total and fecal coliform and *E. coli* were observed. Unique to goat use in a terrestrial environment, turbidity increased and stayed elevated perhaps as a result goat traffic and resulting erosion.

The use of goats to graze a terrestrial environment that has a desired food source is very effective, and is probably more effective and more economical than the use of chemicals.

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