What do chewed shrubs actually tell us about forest regeneration?

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In an article published in early July [Alan Kohler: Labor fiddles while Australia burns (thenewdaily.com.au)], Alan Kohler raised concerns about Human Induced Regeneration (HIR) projects in Australia's carbon market, administered by the Clean Energy Regulator. His concerns were based on information from the Carbon Integrity Explorer and our analysis of the poor performance of HIR projects.

HIR projects are supposed to be regenerating even-aged native forests. Through maladministration, they have been established over more than 30 million hectares in largely uncleared desert and semi-arid areas, where they are purporting to regenerate native forests by controlling grazing pressure from livestock and feral animals. More than 50 years of ecological research in the rangelands shows that grazing generally does not materially reduce tree and shrub cover in these regions. And consistent with this, the data on the performance of the HIR projects shows they are not leading to the regeneration of even-aged native forests. Forest cover in the areas being credited has barely changed and the changes that have occurred largely mirror those in the surrounding landscape, suggesting they are a product of rainfall rather than the project activities.

Despite this, two weeks after the original article appeared online, Alan published another piece [The climate emergency is real – with hope going up in smoke (thenewdaily.com.au)] in which he signalled confusion and dismay over what he described as ‘experts arguing’ following briefings from project developers, project owners, people involved in the Chubb review, and the Clean Energy Regulator. The barrage of briefings his first article triggered had apparently sowed doubt in Alan's mind as to whether things were really as bad as the evidence shows. He declared he was "simply not equipped to adjudicate", which is fair enough but also disappointing. It's disappointing partly because this wasn't the first time we've seen well-meaning and intelligent people bamboozled by the vested interests spruiking HIR.

Our discussions with journalists and others who, like Alan, are left confused and hence unwilling to confidently stay on the side of the science after intervention from the carbon industry, has given us a good sense of the tactics used by the industry. They are similar to the tactics used by the likes of the fossil fuel, tobacco and chemical industries to muddy relevant science and delay policy change.

Seemingly, one of the most persuasive approaches used in this case is to show photos of browsed or chewed shrubs and small trees, like the smaller mulga plants in the picture below. These are presented as ‘evidence’ that grazing is suppressing native forests.

Chewed mulga can look desperate, but history shows grazing generally does not materially affect regeneration in uncleared rangeland areas

It's not hard to see how the sorry sight of chewed shrubs can lead people unfamiliar with Australia's rangelands to buy the carbon industry's line that grazing is limiting woody vegetation cover in arid and semi-arid areas. However, a single snapshot in time gives a misleading sense of the relevant vegetation dynamics.

The browsed shrubs in the photo haven't just been exposed to grazing and their chewed appearance isn’t a sign of slow decline, like a paddock tree suffering dieback. They have grown to their current size in spite of grazing, and will usually grow on to maturity too.

Short term experiments show that grazing can slow the growth of young mulga but, at landscape scales and over longer time frames, history shows that grazing makes next to no difference. When it rains and times are good, grazing animals turn to more palatable and less twiggy feed provided by grasses and forbs, and the mulga grows.

There are multiple lines of evidence that show this. These include:

- the ‘woody thickening’ (increase in tree densities) that occurred across vast areas of the rangelands in Queensland and New South Wales from the 1950s and that spurred decades of debate and research on its causes – the thickening would not have occurred if grazing was an effective suppressor of regeneration, and
- the extent of annual re-clearing that happens in Queensland and New South Wales (around 300,000-400,000 hectares per annum) in areas that have previously been cleared for grazing – again, the re-clearing with bulldozers would not be necessary if grazing successfully suppressed regeneration.

Another is the practice of fodder harvesting. For more than a century, graziers in rangeland areas have been cutting and pushing over mulga trees to feed to livestock during drought. The graziers know the mulga will bounce back, and ecologists who have worked in the area unanimously agree. State land clearing regulations reflect this reality. Graziers are allowed to undertake the practice to feed livestock because the mulga regrows, despite being grazed by livestock and feral animals.

Fodder harvesting traditionally involved cutting timber

Regrowing mulga after mechanical fodder harvesting

Mulga is a very widespread and successful species. It has persisted and even thrived through the ice ages, survived grazing by now-extinct short-faced kangaroos and Australia's great lost megafauna. It has recovered from droughts like the Federation drought at the start of the twentieth century, which left landscapes in south-west Queensland filled with dead timber. The Land Commissioner of the Charleville district reported in 1903, after the drought broke, that:

> fully 80 percent of the area of country comprising the Charleville district is timbered, and one-half of the timber growing on this country has been killed by the late drought.… places which were scantily grassed are now heavily grassed, and in the mulga country there is now a thick growth of young mulga in place of tall old mulga.[1]

Mulga has proven resilient to a century of grazing management, including fodder harvesting.

[1] Land Commissioner J.B.O. Evans, 1903, cited in Fensham RJ, Laffineur B, Allen CD. 2019 To what extent is drought-induced tree mortality a natural phenomenon? *Global Ecology and Biogeography*. 28:365–373. https://doi.org/10.1111/geb.12858

Water availability, and especially drought, imposes limits on the number of trees rangelands can support

I took the photos in this article when I was working at the Queensland Herbarium as a vegetation management botanist. This allowed me travel extensively through the region where HIR projects are well established, talking to graziers about trees. In my discussions with landholders, I never heard anyone suggest that grazing had materially reduced woody cover across the uncleared rangelands. Ground cover, yes, but not tree cover. The more common view expressed by landholders was that grazing was contributing to *increased* tree densities – a view shared by some ecologists.

A lot of the uncleared areas I see within HIR projects are naturally open shrublands, open woodlands and even grasslands, which are all part of the natural diversity of our arid and semi-arid landscapes. They aren’t simply forests waiting to happen, if only grazing pressure was reduced. To ecologists familiar with the rangelands but independent of the carbon industry, like Rod Fensham, David Eldridge and me, it is simply ludicrous to suggest that controlling grazing will 'regenerate forests' over millions of hectares in Australia's deserts and semi-arid rangelands. I suspect it's just as silly to many landholders too.

The money from HIR has undoubtedly been a great help for many landholders, and we're certainly not against incentives to improve grazing management. But issuing carbon offsets for HIR in uncleared rangelands, which will facilitate ongoing fossil emissions from coal mines, oil and gas projects and other similar sources, is beyond silly, it's a fraud.

Woody cover is variable in real landscapes, especially the rangelands. Sparsely wooded country is not just forest waiting to happen

Eventually, reality will catch up with most HIR projects and they will fail. The credited forests won't materialise, and the Government will be unable to deny this reality. But in the meantime, millions of carbon credits continue to be issued to HIR projects each year, and the industry muddies the waters with photos of chewed mulga and talk of big data. Don't be fooled.