

Isaiah Curtis
Great River School
St. Paul, MN
Australia, Water Scarcity

Fighting Desertification and Creating Sustainable Farms in the Australian Outback

Cattle farming accounts for over 14% of total global greenhouse gas emissions (Gustin). Their belches produce methane, rainforests are cut down to feed and house them, and on top of that they are locked up and force fed grains in millions of farms across the world. The actively damaging effects of eating beef are touted by animal rights activists, climate change activists and Beyond meat scientists alike. So why then, would anyone suggest that herds of cattle should be tripled in size on some of the biggest farms in the world in the Australian outback? It is a simple solution to a complex and terrifying issue, a solution that could simultaneously improve the lives of cattle, undo damage caused by desertification, restore rural Aboriginal communities, all the while negating nearly all of the global carbon emissions caused by cattle.

Desertification is “soil degradation in arid, semi arid and dry sub humid areas resulting from various factors, including climatic variations and human activities” (United Nations Committee for Combating Desertification). It happens across the world, in temperate regions like the American Midwest, and arid regions like China’s eastern steppes, but perhaps no country stands to gain as much from combating desertification as Australia. The Australian Outback, a huge swath of land covering all of central Australia and large portions of the northern and western states as well, makes up far more than seventy percent of Australia’s landmass, however less than ten percent of its population lives there, making Australia one of the most sparsely populated countries on earth. However, there are still millions of people living in the outback, and they are much more likely to be impacted by desertification, so this analysis will focus primarily on the rural, remote populations. In addition to proximity to land experiencing desertification, remote populations (this is in reference to all populations 100km outside of major city centers) are more vulnerable to the effects of climate change in general. These populations have reduced access to health care, public utilities, high level education, and organic, healthy food, all of which decrease average lifespan and quality of life for citizens. Aboriginal australians, who traditionally inhabited these lands, are among the most vulnerable groups, and make up almost half of the population in remote and very remote locations (Welle), are the most likely population to experience food insecurity, at rates 28% higher than the national average (National Rural Health Alliance (Australia) and Rural Industries Research and Development Corporation (Australia)).

This description of the Australian Outback and its inhabitants may give the impression that the land is unusable desert, and the farms must be far away on the coasts, but that is only part of the story. The majority of vegetable and grain farms are in the temperate grasslands in between the coast and the outback, however it is important to remember that these grasslands are still classified as remote areas of land, and are affected by climate change, and human interference, and are in danger of desertification in the same way that more arid lands in the outback are. However, it is the more arid lands in the outback that have the most to lose if nothing changes, and the most to gain if it does. These arid lands are too dry to support heavy cropping, but still support vibrant ecosystems of resilient grasses and trees, which make it the perfect place to graze cattle and sheep, yet decades of said grazing has led to the degradation and desertification of the land, making it unusable at an unprecedented rate.

For the last 300 years, Australia has been farmed by European colonizers who forced aboriginal people and native animals off of land they intended to farm on, and began replicating their traditional

Dutch and British farming practices in this new continent. These original farms were almost always small farms that incorporated vegetables, grains and livestock into their farming practices, but as agriculture modernized and expanded, farms grew more specialized, utilized more pesticides and fertilizers, and slowly moved away from the holistic systems that had been commonplace. That is not to say that older farming practices were flawless, they were extremely susceptible to drought, and required huge amounts of cheap labor, much of which was done by aboriginal people, or indentured servants. During the twentieth century farmers stopped using horses for plows and planting, railroad and refrigeration systems became commonplace, modern silos were developed, and farming started to look like it does today.

Modern farming is a complex, global industry that is heavily codependent. Cattle farmers are reliant on corn and soybean farmers, who are reliant on chemical fertilizers and pesticides, and both require huge amounts of water, more than is naturally available, so they start to ship in water, or reroute streams and rivers. Even in the context solely of water scarcity, modern agriculture is unsustainable, but both mono-cropping grain farmers and cattle ranchers are damaging the environment in numerous ways. First, the co dependencies above all require transportation, often on large trucks or trains, which both add carbon to the atmosphere. Second, the nitrogen used to “fix” the soil, and the pesticides used to protect plants leak out of the soil, especially in heavy rain, and flow into rivers and streams, polluting them and all water they flow into. The third major environmental problem is the disruption of soil plant cover, by the hooves of cattle, and the discs of tractors. Leaving the soil bare for even a few months drastically speeds up the natural process of soil erosion, because without roots holding it down or holding water, soil dries up and blows away, or is carried away in major water flows. Approximately 74 billion tonnes of soil are eroded every year globally (Borrelli et al.), soil that clogs rivers and streams, and pollutes the air with dust and debris. This process of soil erosion and degradation is desertification. It both fuels and is fueled by global warming, and has resulted in catastrophic events like the dust bowl in the Southern Great Plain of the United States, and similar events throughout history and across the globe. Of course, land would desertify over time as the temperature rises, but it is being hurried along by shortsighted agricultural practices, so many environmentalists theorized that the solution was to end all human interruption on the land, agricultural or not. However, there are more expedient and productive solutions to this problem, solutions that would not require such a drastic change in each scenario, and the Australian Outback is a great example of a place that nature sometimes can use a bit of help.

Scientists and environmentalists have been aware of desertification for nearly a century, but success in combating desertification has only started in the last twenty years or so. This is primarily because the first attempts at combating desertification consisted primarily of a very hands off approach, removing farms from protected land, even going as far as to remove all large mammals in the hopes that this would give grass and shrubbery a chance to reclaim the land, but there was no observable change. At first, these steps to combat desertification were taken primarily in national parks and wildlife reserves, where environmentalists and biologists had more control, but farmers were also feeling the effects of desertification. In parts of South Australia and New South Wales, land that had been in families for generations was turning to dust, and many farmers sold their land. It was not just that the globe had warmed and droughts had increased, but the soil had lost biomass and biodiversity as well, so the rain ran across the hard packed dirt and into rivers. As rivers became the most important features on many farms, farmers began opening them up, widening the rivers, or even damming them. This disrupted the ecosystems further downstream, and whole communities or farmers began to suffer. Near the capital city of Canberra, a farmer named Peter Andrews at the Mulloon Institute began to experiment with replanting willows, an invasive species in Australia, but one that was perfectly suited for the task he had in mind—clog the rivers with plants that will slow the flow and retain water, even in the dry season. All along

Mulloon Creek, at strategically planned points the creek was filled in with rocks, not damming all the way, but reducing flow to a trickle. Aquatic plants were planted in the riverbed, and willows and gum trees along the banks. In 2019, during one of the worst droughts of the year, the Mulloon Creek was one of the only rivers in the area still flowing, and the farmers and ranchers in the area who had been very skeptical at first, were thriving. But this is only the beginning of restoring Australia's bush, not only can rivers be protected and restored, but the arid outback ranches can be made sustainable and more profitable, without drastically altering the business plan.

Though cattle are not native to Australia, they are undoubtedly here to stay, and a reasonable solution needs to include them in it. Beef cattle is Australia's largest agricultural export (Global Agriculture Report), and over one hundred thousand Australians work in the Beef Agriculture business, so it is important to find a solution that can be adopted without massive overhaul. Luckily, this problem is unique in that the solution is actually more economically viable than the current methods of farming, and can be carried out by the same people who cause the problem; farmers. The best way to combat desertification is to replenish the soil organic matter, and replicate natural cycles of life. Increased soil organic matter- deep and complex root systems, decomposing plant matter, and animal waste, allows the soil to absorb water faster, and retain it for longer, but also make the land more hospitable for native grasses used for herding. The natural cycles referenced are those of the grasslands of North America and Eurasia, where massive herds of ruminating animals, Bison and Buffalo in this case, roamed over hundreds and thousands of miles. They moved quickly, always pursued by predators and following the rain, and so despite herd sizes reaching well into the thousands, the grasslands would recover and be renewed by the migrating herds.

It is useful to picture ecological time as a cycle, ecosystems when left to their own devices can be sustained for millennia, but they move through cycles, both large and small. As with the changing seasons, grasslands also are in perpetual change. As grasses mature and ripen, herds of animals move through, eating the nutritious tips and buds, trampling tall grass, tilling soil with their hooves and leaving behind natural fertilizer. The trampled and eaten grass dies, but stays on the ground, where it will decompose and add the ever important biomass to the soil. From beneath the dead grass and fertilized by the droppings, new grass grows through the protective cover, and in a few weeks, the cycle repeats itself. There is no winners or losers in the cycle, it is balanced, and is sustainable. This practice is what farmers in Australia should try to replicate. By cycling one large herd through small paddocks, at least once a day, farmers can ensure that their lands stay healthy, and drought resilient. The upsides do not stop there however. In this system, cattle are more active, and are less reliant on grains and supplements, in fact, on a New Zealand farm, the need for feed and supplements was completely eliminated, cutting costs and keeping cows happy and healthy. Though data is limited, on South African wildlife reserves and on said New Zealand farm, the carrying capacity of land increased 350% when compared to animals that stayed in a single paddock year round. This means that herd sizes can be increased up to three and a half times the size, while still maintaining good soil health, and cutting costs on grains.

Finally, the process described above, when slowly eased into over a period of three to five years can restore very dry, desert like landscapes to thriving grasslands. By planting drought resilient grasses, monitoring them, and slowly introducing migrating herds, ecologists from the Commonland Institute have had success in restoring landscapes across the world, from Northern India to the Chinese steppes, ancient Egyptian farms and Spanish mountain ranges. Not only does this restore a communities land for farming, but it also sequesters Carbon. The biomass that has been mentioned several times, that includes dead plant and animal matter, as well as living plants, is full of carbon that has been extracted from the atmosphere

and stored in the ground. The ecologists at the Commonland institute estimate that if the global soil biomass increased by only one percent, the carbon extracted from the atmosphere would offset all carbon emissions from the past year (in this case 2016). This solution can be adapted to restore lost grasslands, or preserve land that is still surviving, all while supporting herds of cattle, and the communities that rely on them

This solution is the first step towards a world where agriculture is sustainable, organic and local, and is good for the land, the animals and the people who live there. This solution gives farmers control of their land, and the freedom from reliance on imported grains or water, and is a gateway to diversifying farms, returning to a system that incorporates cattle, fowl, vegetables and grains. Chickens and other fowl can be allowed to graze a day or two behind the cattle herds, and would have almost no impact of the land. When rotating cash crops, or even vegetables, allowing fields to be grassland pastures for a time can rebuild their biomass from years of intense production, and this is all achievable by small, family owned farms, so hopefully the factory farms and agriculture giants can loosen their hold on the industry, putting the power back in the hands of rural communities. This is a looming problem, but only one symptom of climate change, which of course must be addressed if this solution is to be applicable, but it is certainly possible.

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