

The Mega Problem of Large Herbivore Decline

What it Means for the Environment and Implications for Wild Horses in Australia

By Sandy Radke

There is a sad and important story unfolding. Climate change and human activity - including hunting, poaching, land-use change and resource depression by livestock - is closing in on the world's megafauna and in some corners of the globe, particularly in developing countries, many are under threat of extinction.

A growing area of research is showing that large terrestrial herbivores are crucial to ecosystems and human societies and their decline has cascading effects on other species. The rate of decline suggests that increasing areas of the world will soon lack many of the vital ecological services these animals provide, resulting in significant ecological and social costs.

While much of the scientific research in this area is focusing on recent decimations, other work focuses on the fossil record of Late Pleistocene extinctions around the world (from 130,000 years ago), including Australia where complete extinction of Australian megafauna was by or around 40,000 years ago. The cause of Pleistocene extinctions remains controversial but it is likely to be a combination of climate change and the rise of human activity, including hunting and use of fire, are key contributors. Sounds like the present day does it not?

The current work indicates a number of key consequences of large herbivore decline and here we highlight these consequences and how they might relate to wild horses in Australia.

<p>Looks can be deceiving – so take a closer look!</p> <p><i>Seed dispersal or Weed dispersal?</i> <i>Horse dung disperses seed within the habitat and cycles nutrients at the same time</i></p>  <p>Weed invasion Weeds are spread through feral horse dung and hair.</p> <p><i>Photo from Reclaim Kosi website</i></p>	<p>Seed Dispersal Research on paleo megafauna is revealing the importance large herbivores had in seed dispersal and colonization of plants and this continues in the current day; now, as it was in the past, large herbivores consume a greater range of seed size and can disperse more seeds per defecation event.</p> <p>With respect to wild horses in Australia, this important function of Seed Dispersal is often presented as Weed Dispersal. But considering that wild horses are living within the broad environmental habitats that they are allegedly polluting, they are less of a threat than the humans who visit the area from outside these areas. Even if they are transporting seeds between specific ecosystems, evolutionary and natural selection processes which ensure a healthy and diverse ecology, are based in part on migration of species, species interaction and other changes in environment. Is this any different?</p> <p>Nutrient Cycling All herbivores will affect nutrient cycling in two important ways: relocation of nutrients and speeding up the rate of</p>
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Trampling habitat or creating patch heterogeneity or ephemeral habitats for other species?



Photo from The Conversation



Trashed and trampled

The source of the Murray River has been grazed to nothing and trampled by horses.

Photo from Reclaim Kosi website



Photo from Evening Report NZ

decomposition. Because large herbivores consume more than small ones, their role in this process is greater.

Put another way, horses will consume vegetation, digest it and excrete it elsewhere thus relocating the now partially composted plant material in another location. Yes – that nasty horse dung is helping cycle nutrients – a sort of mobile composting. And that dung is probably sitting side by side with leaf and twig litter that is decomposing at a slower rate than the dung. Together they provide a more continuous supply of nutrients.

“Ecosystem Engineering”

Through consumption of plants and trampling, large herbivores maintain patch heterogeneity in systems that would otherwise only support continuous woody vegetation. For example: elephants and bison can maintain open patches preferable to species that do not do well in woody vegetation; bison wallows increase habitat density for a variety of plants and animals.

Further evidence of the role megafauna in shaping the environment comes from exploring the past. Paleo extinction work suggests that mixed rainforest was converted to sclerophyll vegetation in Australia following the Late Pleistocene megafaunal collapse, inferring that megafauna had an important role in maintaining the mixed rainforest environment. Elsewhere in the world, the fossil record is revealing other ecological changes such as the emergence of paleo-novel ecosystems following large herbivore extinction.

Synergy between herbivores

The existence and survival of smaller herbivores can be facilitated by large herbivores. For example, when elephants browse woody vegetation, they create areas within woody scrub that provides grazing for impala. Large herbivores also create pathways which are then used by other species to migrate to food sources.

Small Animals

Small organisms, from microscopic and up have benefitted from large herbivores in many ways. Asian elephant dung is used as refuge by small amphibians and many insects will feed or take refuge in animal dung. By creating ephemeral pools, bison wallows support amphibians and birds. Grazing can produce areas where it is easier for small animals to feed or travel.

Over grazing or fire mitigation?



Photo from ABC Landline

Imagine a world without large herbivores



Forest elephant in habitat. It is considered to be an important seed disperser.

Photo from Wikipedia



Photo from ABA website and Donna Crebbin

In Australia, roll pits and hoof prints, often attributed to horses, allegedly destroy habitat. Whether these features are caused by horses, deer or other animals, they may actually offer benefits to other species.

Predators and scavengers

Large herbivores are an important food source for predators. Even when adult herbivores are generally too large to be directly threatened, juveniles, injured and old individuals are vulnerable. As large animals, their carcasses are usually consumed by more than one predator as well as scavengers, feeding a range of species in the environment. Large herbivores also facilitate success of predators by opening up areas of vegetation, exposing smaller animals.

Fire

All grazing and browsing herbivores will do their bit to reduce fuel loads and help reduced the number and intensity of fire and large herbivore consume more so may have more impact. Paleo research is also suggesting a relationship between the decline in Pleistocene megafauna and increased evidence of fire. ¹

Humans

Imagine a world without large herbivores. Particularly in developing countries, it would cause loss of food security and tourist dollars. For many other people around the world, it would diminish their experience of nature, as well as social history and heritage. In short, it would diminish a richness in our global society.

Some might argue that wild horses do nothing but damage the natural world and reduce biodiversity, but emerging world-wide research is challenging this view.

And what does this have to do with Brumbies in the wild?

Time after time we see horse dung, trampled stream crossings, roll pits, comparison of exclusion zones etc. cited as evidence that horses are devastating habitat. We do know that these so-called (negative)

¹ Care needs to be taken with both paleo and present-day conclusions; in the fossil record, assumptions regarding the timing of human habitation and human cause of fire vs climate change needs further investigation. In the present-day climate change may become so great a driver of large intense fire that our current reliance on fuel load reduction has less and less effect.

impacts occur but are there positive consequences of horses in the wild and, realistically, how much of the habitat is irrevocably affected?

Isn't it more likely than not that these impacts will also have *positive consequences* such as those found in world-wide research on large herbivore decline? And if so, what will happen if horses suddenly vanish? We do not know as this has NOT been fully examined, however, [current research in the Victorian Alpine region](#) is methodically investigating this with a key aim of identifying horse population density levels which are appropriate for the environment.

The truth is that any impact can have both positive and negative effects on the environment and we will be shortchanging the environment as well as wild horses if we do not explore the spectrum, determine the net benefits and the population density limits before making wild horse management decisions.

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