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# Species Extinction From Anthropogenic Disturbance Versus Habitat Resilience: Despair Or Hope For Planet Earth's Viable Biodiversity

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## Introduction

*The Merchants of Venus* is an overlooked novella by Frederick Pohl. In it, the advertising has run amuck, leading to runaway consumerism, suppression of environmental damage awareness, addictions, and unbridled capitalism. Horrific when it was published, read in light of 2009 it seems almost tame and matter of fact. There is one planet Earth that holds seven billion human beings in a vast variety of circumstances. Some drive Hummers just for a few blocks to buy a Starbucks coffee, while many walk miles for a clay jar of dirty diseased water. Perhaps $1/100^{th}$ of one percent of Earth's prairie grass biomes remain, open sores abound on the planet from fevered searches for minerals to make things, and CO2 (as shown by Withgott et al [2008]), and other greenhouse gasses have been poured into our atmosphere at an alarming increased rate. Ornamental and more tropical plants with high water and maintenance requirements are replacing those plants that used to grow in harmony, formerly creating viable habitats that refreshed and rejuvenated our land, sea and air. The question becomes if we already are past the point of ultimate Earthly extinction, or if it is yet possible to reverse our abuse of our living home and find a way to allow people-kind to continue on in a sustainable planet-wide habitat.

## Despair

Habitat destruction is a major anthropogenic disturbance to ecosystems. Chen et al (2009) find this can lead to an unprecedented rate of species extinction. This includes extinction debt, which is the number of future species loss by current habitat destruction, and extinction order, both of which are crucial for efficient conservation plans. When climate change and biological invasion (also both human activity driven) are included, studies have shown species disappearing up to 1000 times faster than without the human intervention. Once a portion of habitat equal to the equilibrium of the focal species is destroyed, the species is doomed to extinction.

Chiba et al (2009) concluded that local-scale diversity patterns are not necessarily regulated by contemporary processes, but also from historical events such as habitat changes and selective extinctions that occurred in the past. Hence, the effects of habitat destruction remain long after the habitat's recovery.

Global warming and increased human water use are attributed to reducing and changing Australian wetlands, from species-rich freshwater communities to species-poor salt tolerant communities (Nielsen and Brock 2009). Short term recovery is possible in some communities, but long term indicates fewer wetlands with increased salt levels and only surviving as wetlands with colonization by salt tolerant species adapted for the new hydrological conditions. As the landscape becomes more developed to accommodate the need for water in a warmer drying climate, increasing human intervention will result in a net loss of wetlands and wetland diversity.

## Hope

Verdú and Valiente-Banuet (2008) define facilitation as a positive interaction assembling ecological communities and preserving global biodiversity. Going beyond pair interactions with plant species, they show that a few generalist nurses facilitate a large number of species. Behaving as do

mutualistic networks, these generalist "nurses," the most abundant species in the community, make facilitation network communities strongly resistant to extinction, and the nested structure yields greater biodiversity. Interacting predator and prey species can be seen as keystone as they also can relate to species extinction (Mills, et al 1993). If a keystone species is maintained, species extinction can be lessened.

The Mesopotamian marshes of southern Iraq had been all but destroyed by Saddam Hussein's regime by the year 2000. Efforts to reflood the marshes have not as yet been successful. Hence, efforts taken to replace process, like reflooding a marsh, may not equal wetland restoration (Richardson et al 2006). There are preliminary signs of hope for the restoration of the world's Garden of Eden, but any celebration is premature. Time will tell.

## Conclusion

By any measurement it is clear that significant change to the environment of Earth is underway. But change does not have to equal disaster. Just as Verdú and Valiente-Banuet found generalist nurses facilitating a large number of species, there are a number of survivors that might fill future needs. Once the human species begins to "go with the flow," the future has the potential to yield unexpected rewards. Rather than massing huge mono species agricultural monopolies, then shipping the produce thousands of miles, a modern update of the local feudal system could have tremendous positive impact. Buying grapes laced with DDT from Chile because they are on sale would no longer be a cultural imperative. The apples or peaches grown locally without pesticides could easily substitute. Even the grapes might well grow further north and south as we deal with the existing global warming. Miniaturization through nanotechnology can yield fantastic assistance and results as our understanding grows. Virtual tours of destinations around the globe can minimize fossil fuel extravagant travel. While some plants are dying as the climate gets warmer, there are many weeds that thrive. If it is green, there should be a way to eat it or convert the mass into energy. Imagination and ingenuity can turn despair into hope. Understanding and coordinated effort can be the goal to allow the world and its inhabitants to thrive.

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