

Terraforming the Earth-That-Was: Planetary Engineering, Utopia, and the Anthropocene in Joss Whedon's *Firefly* and *Serenity*

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In 2002, atmospheric chemist and Nobel Prize winner Paul J. Crutzen published “Geology of Mankind,” a short article in the journal *Nature*, asserting that “It seems appropriate to assign the term ‘Anthropocene’ to the present, in many ways, human dominated epoch” (23). Though Crutzen’s article popularized the word “Anthropocene,” he was not, Ursula K. Heise notes, the first to propose nomenclature acknowledging that we live in an age during which humans have become a predominant geological force; such proposals can be traced back to 1873 and Antonio Stoppani’s suggestion of the term “Anthropozoic era” as a way to denote the extent that humans have changed the planet (Heise, *Imagining* 205; Zalasiewicz et al. 2228). However, in the wake of growing evidence of and awareness about human-made climate change and its effects on our planet and its inhabitants, both scientific and lay communities have adopted the term “Anthropocene” to periodize an epoch in which humans have transformed the Earth on a the geological, climatic, and biospheric scale.

Also in 2002, Joss Whedon’s space-western *Firefly* (2002)

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premiered for its single-season run on Fox. The show, and its 2005 film continuation, *Serenity* (2005), follow the adventures of a Firefly-class spaceship crew as they live on the “raggedy edge” of civilization (*Serenity* 14:16), committing capers on the Outer Planets of a terraformed galaxy and attempting to avoid the totalitarian control of the Alliance. This article is interested in how the film and show reflect on questions of the Anthropocene, notably through the science fiction trope of terraforming: the transformation of a planet inhospitable to human life into one that can support it.¹ Originating in the 1940s (Pak 1), the idea of terraforming “earth-shaping” long predates Crutzen’s coining of the “Anthropocene,” but its recognition that human beings could alter planets on a global, geological, and climatic scale, that humans could create “new earths,” takes on additional importance with our growing understanding of anthropogenic planetary change. In this article, I offer an eco-critical reading of *Firefly* and *Serenity*, tracing the ways in which terraforming and the reiterative colonization, extraction, and “using up” of new earths reproduces and critiques the Anthropocene, positioning it in relation to capitalist exploitation of both human and extra-human nature.

In doing so, I hope to add to the existing eco-critical scholarship on *Firefly* and *Serenity*, which considers environmentalism and the significance of terraforming in the film and television series. Eric Benson, in “Overconsumption, the Natural Environment, and Lessons from Earth-That-Was,” notes the environmentalist warning present in the show’s premise and analyzes the possible causes of the Earth-That-Is becoming the Earth-that-Was, settling on a combination of overpopulation, depleted resources, and global climate change. Anthony Lioi, in *Nerd Ecology*, explicitly links the

Alliance's unleashing of G-23 Paxilon Hydrochlorate, or Pax, a behavior modification chemical emitted into the atmosphere of the planet Miranda, with catastrophic environmental engineering, arguing that like the Earth-That-Was, Miranda offers an example of the "poisoning of a planet" (145). In "A Geopolitical Interpretation of *Serenity*," Jeffrey Bussolini draws on David Lavery's *Late for the Sky* and discusses nostalgia for Earth-That-Was, even if destroying the planet was necessary for humans to "make the great leap beyond" (144). He goes on to address political blowback against the Alliance for its biopolitics on Miranda and in River Tam's brain. Likewise, in "Reavers and Redskins: Creating the Frontier Savage," J. Douglas Rabb and J. Michael Richardson analyze the terraforming of planets in relation to the "meddlesome mindset" of the Alliance (132). Reading *Firefly* and *Serenity* through the lens of the Anthropocene extends and adds to the ideas these scholars have put forth, offering an analysis of how the show and the film help us to conceptualize and contend with anthropogenic planetary change and its capitalist and colonial connection to the exploitation, consumption, and depletion of human and extra-human nature.

By looking at *Firefly* and *Serenity* through the lens of the Anthropocene, I argue that the show and film use the reiterative terraformation and depletion of planetary capitalist resource frontiers as a way to interrogate the role that our extractivist economy has played in fundamentally altering and reshaping the planet on which we live. This discussion seeks to foreground the terraformed nature of the planets, considering how these human-engineered landscapes are inextricably linked to depictions of colonialism and capitalism and how they represent the anthropogenic changes that have

resulted from our participation in these systems. In these texts, terraforming functions as what Fredric Jameson refers to as a “cognitive map,” a representation through which we can contend with the global and geological reality and totality of the Anthropocene, the scale of which defies comprehension (*Postmodernism* 51). After a discussion of science fiction’s terraformed planets as a depiction of human geological agency its mapping of the unrepresentable scale of the anthropogenic planetary transformation this article argues that ‘verse of *Firefly* and *Serenity* fails to achieve the utopic potential implicit in the promise of terraforming because of the Alliance’s rearticulation of the same capitalist and colonialist practices, the repeated exploitation and exhaustion of human and extra-human nature, that led to the environmental crisis of the Anthropocene and the destruction of the Earth-That-Was. By reproducing the Anthropogenic Earth² over and over and over again through terraforming, *Firefly* and *Serenity* help us to better understand the role that our extractivist, capitalist economy, and our place in it, play in the totality of this human-dominated epoch and its planetary effects.

Terraforming the Anthropocene

One of the greatest challenges of thinking about, contending with, and representing the Anthropocene is scale. In less than two and a half centuries, humans have substantially changed the composition of the earth’s atmosphere, biosphere, hydrosphere, and lithosphere. We cannot conceive of the scale of these changes, but they are there, and they have fundamentally transformed the planet. As

Dipesh Chakrabarty argues, humans, as a collective species, are now not only “biological agents” (206), but “geological agents” (206), a “force of nature in the geological sense” (207).³ When we talk about the Anthropocene, we are talking about change on a geological scale, a scale so large that it is difficult to conceptualize. Evidence of anthropogenic planetary changes, Derek Woods argues, can be detected “in the molecular makeup of the biosphere, in planetary cycles of carbon, nitrogen, and phosphorus, in geologic strata and rates of extinction” (133). We have altered the atmosphere, hydrosphere, climate, and ecology of the planet, harming them in ways that may be irrevocable and which demands that we conceptualize ourselves not only on the scale of species, but also on the scale of geology. The vast scale of the Anthropocene also challenges attempts to represent it and our place in it. In *The Great Derangement*, Amitav Ghosh, for example, argues that the Anthropocene is too large, too uncanny, to be represented in literary fiction (32). It is, in many ways, an “unrepresentable” and “unmappable” problem (Jameson, *Postmodernism* 53, 415), the totality of which is too large for humans to conceptualize and position themselves within.

However, genre fiction, particularly science fiction like *Firefly* and *Serenity*, provides us with the tools to map, to represent, to scale the Anthropocene. Indeed, numerous critics have argued that science fiction is actually ideally equipped to imagine and contend with the challenges of the Anthropocene.⁴ Adeline Johns-Putra, for example, argues that “when it comes to encompassing a sense of planet, and particularly a global environmental phenomenon such as climate change, the generic strategies of science fiction are no doubt useful” (749). The genre’s epic, and often interplanetary,

nature affords contemplation of our crisis on the global and temporal scale necessary to conceptualize it.

Through their representation of human engineered global environments, science fiction texts potentially function as what Jameson calls cognitive maps.⁵ Cognitive mapping, according to Jameson, “enable[s] a situational representation on the part of the individual subject to that vaster and properly unrepresentable totality which is the ensemble of society’s structures as a whole” (*Postmodernism* 51). These tools allow us to map, to conceptualize, our position in relation to larger social and physical spatializations. Although Jameson is interested in class structures and political and ideological environments (*Postmodernism*, 415-416), the Anthropocene offers its own “unrepresentable totality” of time and space, and cognitive mapping can function as a way to navigate its scale and position ourselves within it. The terraforming science fiction of *Firefly* and *Serenity* is not about some distant future in a galaxy far far away science fiction never is, Jameson argues (“Progress” 151) but offers an exploration, a mapping, of our present epoch of the Anthropocene, in which humans must conceptualize, represent, and contend with not only the geological and time scales of a global environmental disaster, but also their own role as geological agents. Texts like *Firefly* and *Serenity* function as maps, reproducing the terraformed Earth of the Anthropocene multiple times, inviting us to read our present into their narratives, and our future into their warnings.

In this article, I focus on how the science fiction trope of terraforming in *Firefly* and *Serenity* functions as a map for understanding the scale of the effects that humans have had on Earth. I am not the first to draw a connection between terraforming and the Anthropocene, to argue that

terraforming represents our treatment and transformation of our planet. Heise, in fact, argues that we should think about our current reality in terms of science fiction, arguing that “The Anthropocene [...] can usefully be understood as the second kind of speculative fiction, in that it focuses on the reality of a terraformed planet that the genre has long held out as a vision for the future of other planets, but which has already arrived in the present on our own” (Heise, *Imagining* 219-220). The Earth-That-Was is not limited to the science fiction future of *Firefly* and *Serenity* but exists as our present reality. “The world hasn’t ended, but the world as we know it has – even if we don’t quite know it yet,” writes Bill McKibben. “We imagine we still live back on that old planet, that the disturbances we see around us are the old random freakish kind. But they’re not. It’s a different place. A different planet. It needs a new name. Eearth [...] we’re still earthlike. But it’s odd enough to constantly remind us how profoundly we’ve altered the only place we’ve ever known” (3). As a species, we have transformed our planet’s atmosphere, biosphere, hydrosphere, and lithosphere, creating a new world that, like the various terraformed planets in the ‘verse is “earthlike,” but is no longer really Earth. The representation of “earth shaping” in science fiction provides us with a cognitive map for thinking about the ways in which we have altered our planet, and in *Firefly* and *Serenity* the multiple terraformed worlds we encounter reproduce the anthropogenic Eearth and the extractivist economy at the root of these transformations.

While terraforming in *Firefly* and *Serenity* occurs on distant moons and planets, its visual representation evokes the anthropogenic transformation of our Earth in the present day, inviting us to map between the transformed planets of the ‘verse and our own changed world, to position ourselves in

relation to them. During *Serenity's* opening voiceover, which explains humanity's flight from the Earth-That-Was to newly terraformed planets, the film cuts to what the script describes as "a giant terraforming station; a round, bunker-like complex many miles across, air billowing from it, electricity running over it" (Whedon 1). In the film, the station's chimney emits a continuous cloud of white smoke, the imagery evoking all of those earthly smokestacks that have contributed to global climate change, and drawing a visual parallel between the speculative terraforming of science fiction and the very real kind occurring on Earth. The future-oriented anthropogenic "earth-shaping" of science fiction speaks to the terraforming that our planet is currently undergoing, the environmental uncanny of McKibben's Eearth a descriptor not only for the human engineered planets of the 'verse—the almost-but-not-quite Earths of Persephone, Whitefall, and Beaumonde—but also for our own.

We do not need to travel across the universe in a Firefly-class spaceship to the Kalidasa or Georgia systems, in which *Firefly* and *Serenity* are set, to experience anthropogenic planetary change on a geological scale; it exists in the present and right here on Earth.⁶ Some of the changes humans have made to the planet are easily visible. We can see deforestation, strip mining, suburban sprawl, crowded highways, and overflowing landfills; we can see all the ways we rendered the planet less hospitable to human and extra-human nature (Dibley 139). As a species, we are threatened by rising ocean waters, changing weather patterns, flooding, droughts, crop failures, disease, and freak storms that are becoming more and more mundane. The climate has been fundamentally altered, both by our conversion of wilderness into industrial monocrop farmland (see Bonan et al.; Foley et al.; Ramankutty

et al.) and the carbon dioxide we have emitted into the atmosphere, changing its chemical composition and resulting in a greenhouse effect and planetary warming, which is reshaping land masses and the biosphere (see Smol; Zalasiewicz et al.). In the arctic, we have seen glaciers melt and fresh water sources evaporate (see Smol). The ocean is growing increasingly acidic (see Doney et al.). Scientists have recorded data that suggests a connection between rising oceans, higher temperatures, and an increased frequency of “superstorms” (see Hansen et al.) Dams and other forms of river diversion have altered landscapes and humans now consume over half of the world’s fresh water (Crutzen 23). By “co-opting resources, fragmenting habitats, introducing non-native species, spreading pathogens, killing species directly, and changing global climate” (Barnosky et al. 51), humans are responsible for mass extinctions, the loss of biodiversity at an accelerated rate which suggests that the 6th Great Extinction might already be underway (see Dirzo and Raven; Ceballos et al.). Humans have written themselves into the geological record, and their presence can be read in traces of human-made compounds (like asphalt and concrete) in the lithosphere, as well as soils that have been modified by fertilizers and pollution (Heise, *Imagining* 204; Zalasiewicz et al 2230). If we are not yet living on the Earth-That-Was, there is considerable scientific data that we are turning the world into something different than the planet has been.

Our terraforming of the Earth, the new global environment, the new Eearth, we have created, is a result of our actions, our accidents, our attempts to exact and profit from the planet. Of the litany of ways that humans have altered the atmosphere, hydrosphere, biosphere, and lithosphere, many have been unintentional, others undertaken

with little concern for the consequences. As Martin Fogg argues, “humanity is subjecting the Earth to an unplanned and haphazard experiment in planetary engineering” (10). We are changing the Earth but are doing so without the necessary foresight and knowledge that would help us to avoid unintended consequences or even ways to represent, to conceptualize, the alterations we have made.⁷ Heise argues that “the Anthropocene is a sci-fi trope that calls on us to see the Earth as an alien planet terraformed by beginners who did not quite know what they were doing but who might be trained to do better in the future” (“Terraforming” 13). Science fiction like *Firefly* and *Serenity* provides tools that can help us to re-see our planet as an “alien” Eaarth, to map the unintentional and so often unrepresentable effects of the capitalist economy, and to question what has to change for us to “do better.”

Terraforming and Utopian/Dystopian Imaginings

The anthropogenic pressures put on the Earth-That-Was might have destroyed it, but in doing so, the promise of humans’ ability to *intentionally* transform, to shape, planets, suggests the possibility of creating not just a whole new world, but a whole new ‘verse, and a potential for escaping the Eaarth we have so fundamentally altered for others we have purposefully engineered. Thus, terraforming negotiates the tension between the very real and destructive geological force of the Anthropocene and the techno-utopian fantasy of how that force might be used to save humanity once the earth has been transformed beyond the ability to sustain human life. For some, the Anthropocene marks the negative effects of

humans' technological development on the Earth; for others, it is precisely that technological power over the planet that will allow us to terraform our world and others (Heise, *Imagining*, 203). According to this latter train of thought, terraforming frees us from the threat of planetary destruction and species extinction and perhaps even offers resurrection: the concept of terraforming other planets promising that perhaps, one day, we could restore the old Earth that we have so fundamentally altered. *Firefly* and *Serenity*, I argue, resist these technoutopian fantasies by repeatedly demonstrating an inability to recreate the Earth, to return to origins, and connecting this failure to the extractions and exploitations of capitalism and colonialism in the show's and the film's depiction of terraformed worlds.

In science fiction, terraforming is generally a response to the geological scale of humans' destruction, rearticulating popular discourses of the Anthropocene's "global disaster" (Heise, *Imagining*, 206). Either climate change, nuclear war, or pollutants have made the planet inhospitable, or an exponentially expanding human population has become too great of a burden on Earth; we have extracted too much, we have changed too much, and now we must flee. The opening voiceover of *Serenity* explains that the evacuation of Earth and the establishment of life in a new solar system was necessitated by humans' effects on their home planet: "Earth-That-Was could no longer sustain our numbers, we were so many. We found a new solar system: dozens of planets and hundreds of moons, each one terraformed, a process taking decades, to support human life. To be new Earths" (*Serenity* 00:42-1:03). Or, after exhausting the Earth-That-Was, the human refugees created what McKibben might call new Eaarths, planets that, like our old one, were environmentally

engineered to support humans and their capitalist, extractivist economies. The concept of the “Earth-That-Was” or the “Earth-That-Can-No-Longer-Sustain” necessitates terraforming of other planets and acknowledges the detrimental effects that humans have had on our world’s climate and resources: we wouldn’t have had to leave and transform moons or planets into “new earths” if we had taken better care of the first one, if we had not depleted it and changed it on a geological scale.

The fantasy of terraforming other planets, as seen in *Firefly*, allows humans to flee from the Earth (see Bussolini), literally and figuratively free from Nature. As “The Ballad of Serenity,” the song played over *Firefly*’s opening credits, states, “You can burn the land and boil the sea, but you can’t take the sky from me” (Rhodes). The earth can be used up, destroyed, but as David Lavery has noted “even with one foot in the grave, there remains another form of deliverance: the dream of flight” (Lavery 185). In fact, Lavery argues, the promise of escaping to the sky has, in part, supported the extractivist mentality that has led humans to “burn the land” and “boil the sea”: the possibility of flight to new worlds even if they must be terraformed to support our needs has made us not only willing, but, in some cases eager, to destroy our home so that we might migrate to the stars and the new resource frontiers we find or make there (see Lavery, Chapter 5). The “maintenance” or fate of what Buckminster Fuller has termed our “Spaceship Earth” (209) is less dire if we have actual spaceships to take us to the new Eaarths that we have created, dominated, and controlled.

The scale of anthropogenic change, of terraforming, invites the techno-utopian fantasy that humans’ geological force could, potentially, be what saves us in the end. Although

terraforming began as strictly science fiction, it soon entered discursive communities of scientific speculation, often in response to our destructive treatment of the Earth and in anticipation that we would eventually need to escape to the sky and seek a new home among different stars. Numerous studies about the possibility of terraforming Venus or Mars, the first put forth in 1961 by Carl Sagan (Fogg 7), consider the practicality terraforming those planets, the major hurdles such endeavors would face, and the ethics of attempting to do so (see Fogg; Schwartz; Beech). Such scientific studies suggest that terraforming could offer humanity an escape from our depleted and destroyed home. Or we might even use our geological agency to correct what we have destroyed. Diane Ackerman, for example, asserts that “We’re earth-movers. We can become Earth-restorers and Earth-guardians” (quoted in Heise, *Imagining*, 311). After all, Erle Ellis notes that aside from the pesky and unforeseen side-effects of global climate change, humans’ planetary engineering has been largely successful at sustaining our increased numbers and resource demands (Ellis 1028). Yes, we might have botched things considerably, but we can use the same power and technology that created this mess in the first place to undo it and restore the Earth (Dibley 146).

This hope of environmental salvation and restoration is one of techno-utopian promises predicated on undoing the damage of anthropogenic environmental destruction through an increased understanding of and care for our planet. James J. S. Schwartz, for example, argues that terraforming does not necessarily mean an abandonment of the Earth, but a deeper knowledge and, therefore, better stewardship of it (5). However, *Firefly* and *Serenity* give us little reason to hope that humans will learn to be better stewards, replacing capitalist

systems of extraction with ones predicated on sustainability. We do see some instances of renewable energy production, like Nandi's solar paneling in "Heart of Gold" (1.13) and wind turbines in the beginning of *Serenity*, but Wash, while looking out at the planets and stars, also mentions that the "Planet I'm from, you couldn't see a one, pollution's so thick" ("Our Mrs. Reynolds" 1.6, 26:26-:30). Planets like Beaumonde are hazy and overdeveloped, and while the authorities on Ariel might be ardently against littering, that planet also boasts a rather large "local municipal dump yard," suggesting considerable amounts of industrial and residential trash ("Ariel" 1.10, 11:29-:30). Ariel, too, is heavily urbanized, implying a dense population with substantial impact on the environment (Ellis 115-116). Humans may have learned to terraform, but there is little indication that they have also learned to take better care of their new homes than the one they, as the opening voiceover to *Firefly* states, "used up," destroyed, and were forced to leave.

Still, through the fantasy of terraforming, we enact those of resurrection and restoration, a return to the past so that it might be corrected and we might return to our origins (Markley 778; Pak 205). In *Firefly* and *Serenity*, Robert Brown argues, this utopic return to origins is evident in an "idealized landscape" of the central planets (9). He posits that the savanna environment of the Alliance's Core evokes the birthplace of humanity, "a common place of origins for humans and the Utopian desire for a return to these origins" (9). By terraforming the inner planets to reflect the environment of the savanna, the Alliance is evoking not only an ideal landscape, but its "Utopian vision," returning to the environmental landscapes in which humans first lived (12). The islands-estates, home to the reclusive and wealthy, that

hover above the Bellerophon Sea in “Trash” also represent an attempt to recreate or recapture an origin. With their lush vegetation and rolling green lawns, the estates offer well-manicured Edens. These gardens recall other colonial projects, described by Richard Grove, to “recreate or realize” an Edenic Paradise through the construction of botanical gardens in the New World (13). The Bellerophon estates suggest a similar impulse to merge colonialization and control over nature to (re)create and thereby return to Paradise and humanity’s Edenic origins.

Arguably, all the terraformed landscapes featured in the film and television show are an attempt to return to the past, to origins, to the Earth-That-Was. However, as Robert Brown notes, this endeavor is doomed to failure (16). The savanna of the inner planets is not a return to an origin, but a reproduction of it. The Eden of Bellerophon is only truly paradise for those who can afford estates, less so for those who are forced to work on them. All the terraformed moons and planets fail to fully restore origins, to recreate the Earth-That-Was. As Dibley argues, the utopic promise of terraforming can never fully be achieved, because nature and the Earth can never fully be resurrected (149). Whether Ariel, Osiris, or Hera, the creation of an Earth-like environment will always be only that, *Earth-like*.

On Earth, restored, and even “untouched,” ecological systems have intersected with human ones and are therefore no longer strictly “natural,” as we generally conceptualize it.⁸ Instead, they are what Jesse Oak Taylor has termed the “abnatural.” As Taylor explains, “‘Abnatural’ speaks to both nature’s absence and its uncanny persistence. [...] Abnatural characterizes those moments when nature appears other than itself, beside or outside of itself” (5). Like the botanical

gardens described by Grove, in the terraformed environments of the central planets and those on the outer rim, nature is both absent and persistent; we are treated to natural vistas and the wilderness of the American West in short, the visual representation of Nature but they are the product of human creation, engineering, and technology. Taylor argues that “Abnatural ecology attempts to capture the experience of dwelling in a manufactured environment, wherein everything from the bloodstream to the weather bears traces of human action” (5), an experience that one cannot escape when living on a terraformed planet, no matter where you are in the ‘verse. The abnaturality of terraforming helps us to conceptualize, to map, its scale in our world, the way we have transformed what we think of as “natural” on geological and molecular levels. There is no place on Eearth that has not intersected human systems; our world is as abnatural, as human-made, as the terraformed ones we encounter in *Firefly* and *Serenity*.

Capitalist Frontiers in *Firefly* and *Serenity*

The other techno-Utopian promise of terraforming is that with the creation of a new planet, new social, political, economic, and environmental systems will emerge. As Chris Pak explains, the “act of world-building resonates with the utopian impulse to remake socio-political worlds” (Pak 16), thereby equating the creation of new physical ecologies with socio-political ones. In works like Kim Stanley Robinson’s *Mars Trilogy* (1992-1996), this utopian promise is actualized. The series explores the founding of a new society, which, as K. Daniel Cho argues, imagines “the possibility of reinventing life on Mars as predicated not on dysfunctional aspects of Earth

but on creating a hitherto nonexistent world” (Cho 65-66). The result jettisons old structures and the capitalist, extractivist systems that have “used up” our planet and transformed it into Eaarth in favor of a new “eco-economics” (Markley 776). The world-building of Mars, then, is not limited to the reshaping of a planet, but includes reforming economic and social systems, as well as the humans that inhabit them.

In *Firefly* and *Serenity*, the terraformed outer planets are viewed much as Mars is initially in Robinson’s trilogy. Mars is not terraformed to become a free and radical society, but as a new source of markets and raw material (Cho 68). Mars becomes a utopian experiment only because the settlers successfully resist Earth’s colonization (Cho 68; Pak 176). In *Firefly* and *Serenity*, however, the revolution fails and the outer planets are colonized by the Alliance, falling under their dominion and into their structures of imperial and capitalist exploitation. As new planets are terraformed, they are inscribed with the same systems of capitalism and colonialism that have contributed to the Anthropocene. The outer worlds are valued only in so much as they produce Cheap Nature (see Moore) to sustain those at the ‘verse’s physical and political center, the Core Planets. And this rearticulation of colonial and capitalist structures, I argue, is why the terraforming in *Firefly* and *Serenity* fails to deliver on its utopian promise. Rather than develop new systems, it repeats the old ones of empire, extraction, and exploitation that have contributed to anthropogenic planetary change in the first place.

Colonization is inherent in terraforming narratives. Altering the atmosphere, hydrosphere, biosphere, and lithosphere of another planet is an act of “ecological imperialism” (Pak 194); the existing ecological and chemical systems are taken over and replaced with those meant to

mimic the ones found on Earth (Pak 12). Perhaps the clearest example of the connection between imperialism and terraforming in *Firefly* and *Serenity* is Miranda, and the Alliance's attempt to extend domination, to colonize, more than just the extra-human nature of the planets to the human nature of those who settled on it. On Miranda,⁹ one of the Outer Planets, the Alliance administered "Pax," a drug that was supposed to "calm the population, weed out aggression" (*Serenity* 1:18:47-49). The human test subjects did not respond as expected, and while some became peaceful to the point of fatal lethargy, others turned hyperviolent, creating the cannibalistic Reavers that hunt spacecrafts on the edges of the galaxy, intent on murder, rape, and other atrocities. Rabb and Richardson, Bussolini, Canavan, and Rebecca M. Brown all discuss the governmental meddling and the "blowback" to this attempt to medicinally pacify a population (Bussolini 144-45).

For the purposes of this article, though, what interests me is how the biopolitical governmental attempt to (re)form the population is linked to terraforming the planet, a connection that Lioi suggests by positioning *Serenity*'s Captain Malcolm Reynolds and his crew's attempts to expose the Alliance conspiracy as "resistance to eco-political oppression" and an act of "environmental justice" (145). In the film, the scientist whose confession Mal and the crew discover states that Pax was "added to the air processors" (*Serenity* 1:18:44-45). Pax, then, is just another chemical added to the human-colonized, human-constructed, and human-controlled atmosphere of the terraformed planet. And like the chemicals we have added to our own atmosphere, such as carbon dioxide and methane, it has dire and unforeseen consequences. When the Alliance reported the cover story that on Miranda "terraforming didn't hold" (*Serenity* 1:03:56-58), they were not

being as untruthful as it might seem. There had been a terraforming failure, but what “didn’t take” was not the (terra)formation of the planet, but the population, creating the Reavers, whom the show discursively constructs as the colonial Other (see Curry; R. M. Brown; Smith-Casanueva; and Rabb and Richardson).

However, in dominating and exploiting the Outer Planets, the Alliance’s imperialism does far more than attempt to control and pacify its settler population; it also completely destroys indigenous ones. The show is relatively vague about how humans came to find, select, and process the planets they terraformed and colonized. Though each episode begins with a voiceover about how humans escaped the failing Earth-That-Was and migrated to anthropogenically engineered planets and moons, there are few details about the indigenous populations of these New Eaarths. One of the voiceovers states, “Here’s how it is: Earth got used up, so we moved out, and terraformed a whole new galaxy of Earths” (“Shindig” 1.4, 00:00-00:06); the other explains, “After the Earth was used up, we found a new solar system and hundreds of new Earths were terraformed and colonized” (“The Train Job” 1.2, 00:00-00:07). How the Earthlings found this new galaxy, what the planets were like before they were terraformed, and what kind of life existed on them before the humans arrived these questions are never addressed.

While the voiceovers imply that the planets were empty of life before they were colonized, the Outer Planets’ visual and auditory iconography, evoking the mythology of America’s Western frontier (Leonard 174-175), troubles that idea. As Gómez-Barris notes, the erasure of indigenous people is related to the “extractive view” of natural resources and colonized Others (6). During the Age of Imperialism and

American Westward expansion, the colonized territories were also discursively constructed as empty, even though they were home to indigenous peoples. Brown notes the way in which this ecological imperialism and remaking of the ‘verse “mirror[s] narratives of expansion, exploration, and colonization to the New World, Africa and Australia; the presumptively empty planets are reformed in the image of ‘Earth-That-Was’ much as Australian and North and South American settlers presumed an emptiness and then mimicked, and [...] named their settlements after, cities and regions of the Old World” (R.M. Brown para 3). In the age of space imperialism, expansion, and settlement, it is not unlikely that indigenous forms of life were destroyed by colonists as they terraformed these new intergalactic territories in the image of the Earth.

Firefly and *Serenity* also explore themes of colonialism and capitalism by contrasting the privileged utopian pretenses of the Inner Planets with the exploitative reality found on the Outer ones, this disparity reflecting the economic inequalities of contemporary terrestrial society. Many Marxist critics reject the term Anthropocene because of its totalizing nature, because “any such universalism and indeed the notion of the Anthropocene itself” functions “as ideological smoke screens that hide from view vast socioeconomic inequalities, environmental destruction, and the central role of global capitalism in generating both” (Heise “Terraforming,” 12-13). Conceptualizing humanity as a species obscures the reality that the capitalist practices of the industrialized Global North are disproportionately responsible for climate change and its consequences. Moore asserts that capitalism has contributed so profoundly to the Anthropocene that the new epoch should be called the “Capitalocene” to reflect the economic

conditions that spurred humans' destructive use of their geological agency (See *Capitalism and the Web of Life* Chapter 7). Communities in the global south, Rob Nixon, Macarena Gómez-Barris, and Ghosh observe, have been exploited by the imperialist North, providing sources of cheap energy and labor for the industrial engine of economic development and progress. "Colonial capitalism," Gómez-Barris argues, "has been the main catastrophic event that has gobbled up the planet's resources" (4). If our planet, like *Firefly's* Earth-That-Was, is being "used-up," it is the capitalist and colonial global North that is doing the using.

A similar dynamic plays out in *Firefly* and *Serenity*, in which the Outer Planets are exploited to sustain the capitalist economic system of the Core. The Core Planets are aligned with industrial, developed, capitalist, and colonial North, while the exploitation of the landscapes and populations of the Outer planets evokes the Global South.¹⁰ Gerry Canavan notes the power and technological disparity between the Core and Outer Planets, arguing that in *Firefly* "the spatialized distribution of money and power suggests itself as a metaphor for the unstable wealth differential between the so-called First World and the Global South in contemporary globalisation: here the haves and the have-nots quite literally inhabit different worlds" (181). While the Core planets are economic and technological powerhouses, wealthy urban centers, the Outer Rim is a technological backwater and lacks infrastructure, resources, and opportunities.¹¹

The terraformed landscapes of these planets reflect this inequality, offering a visual representation of the wealth disparity that underpins the economic system of the 'verse. In contrast to the lush, green, Edenic savannas of the Inner Planets, the environments of the Outer ones tend to be

brown, dry, and infertile (R.M. Brown, para. 4). In the pilot episode, “Serenity,”¹² Zoe, Mal’s second-in-command, asserts that, “All those moons just like the central planets, they’re as close to Earth-That-Was as we could make ‘em: gravity, atmosphere, and such, but...” (“Serenity,” 1.1, 32:35-:43). Although the planets might have the basic necessities to sustain human life, “gravity, atmosphere, and such,” the Earth-That-Was that they are replicating is very different from the Earth-That-Was of the Core Planets. Mal continues Zoe’s thought, saying, “Once they’re terraformed, they’ll dump settlers on there with nothing but blankets, hatchets, maybe a herd. Some of them make it, some of them...” (“Serenity” 1.1 32:43-:52). Life for settlers who are unceremoniously “dumped” on the Outer Rim is as harsh as the planets’ environments and the Alliance’s authoritarian domination. The physical environments of Regina (“The Train Job” 1.2) and Higgins’ Moon (“Jaynestown” 1.7) reflect the difficulty of those who inhabit the Alliance-colonized frontier.

Even on the same planet, wealth disparity is evident through the landscape. When Inara, the companion who rents one of Serenity’s shuttles, visits Mr. Higgins, the Magister of Canton, the landscape is still dusty and dry but is noticeably greener, containing a grove of trees and decorative topiary, than the scenes of the mud farms and town. Instead of the farting, bubbling mud bog (“Jaynestown” 1.7, 5:20-:40), the diegetic sound is a babbling fountain and chirping birds (“Jaynestown 1.7, 9:40-10:10). The environment Higgins has created for himself differs considerably from the one terraformed for the workers. Likewise, in “Heart of Gold,” Nandi, a sex worker whom the crew has agreed to assist, explains that town’s endemic poverty is the result of Rance Burgess’s design: “And you see the way we live here. Go into

town, it's the same. Some places come up rustic 'cause they ain't got more'n the basics. Rance Burgess has money enough to build a city, a real community. He keeps people living like this so he can play cowboy, be the one with the best toys. Turned this moon into a gorrarn theme park" ("Heart of Gold" 1.13, 12:17-:35). Nandi's speech asserts that Burgess could provide infrastructure, develop the planet, improve its technology, and create a less harsh environment, but he refuses to. Brent M. Smith-Casanueva argues that Burgess's and Higgins's economic and political relationship with their planet's workforce serves as "an allegory for the state of many postcolonial nations, in which a small national economic elite most often with close ties to U.S. and European economic interests holds control over the vast majority of the nation's resources" (176). This relationship is represented in and enacted through the way in which the landscapes of the planets have been (terra)formed.

The Outer Planets function as a source of what Moore calls "Cheap Nature." Moore explains that "Cheap Nature," the exploitation of the human, animal, and environmental labor labor that is not monetarily capitalized and, therefore, unacknowledged and devalued is essential for capitalism. In fact, he argues, "Capitalism depends on a repertoire of strategies for *appropriating* the unpaid work/energy of human and the rest of nature" (63, emphasis in original). This appropriation is linked to the extractivist capitalism described by Gómez-Barris. She explains that "the extractive view sees territories as commodities, rendering land as for the taking [...]. This viewpoint, similar to the colonial gaze, facilitates the reorganization of territories, populations, and plant and animal life into extractable data and natural resources for material and immaterial accumulation" (5). Extractivism offers

a perspective through which Cheap Nature might be viewed, abstracted, and extracted from existing ecological and economic systems in the service of capitalist production that “was able to remake planetary natures in epochal fashion” (Moore 67-68), the logics of capitalism, extraction, and exploitation leading to the anthropogenic planetary change of the Anthropocene.

The capitalist system of the ‘verse depends on the extraction of Cheap Nature from the Outer Planets for its maintenance and expansion. Terraforming creates Cheap Nature; if new worlds can be easily formed, then there is no problem with exploiting and exhausting existing ones. And it is through terraforming that the exploitation of cheap labor, human and extra-human nature, are explicitly linked. In the cold open of “Shindig,” Mal and Jayne, Serenity’s hired gun, are playing a game of pool against two other men. When one of them, Wright, brags about his ship, Jayne asks him if he “made money?” Wright responds, “Hand over fist, my friend. Border planets need labor. Terraforming crews got a prodigious death rate” (“Shindig” 1.4, 1:14-:20). Mal clarifies that by “labor” the man “mean[s] slaves” (1:21-:24) to which Wright replies, “They wasn’t volunteers, for damn sure” (1:25-:27) and admits that he gave the slaves only the barest of rations. The creation of new terraformed planets to exploit, then, relies on the extraction of unpaid, slave labor from colonial subjects, the two forms of exploitation inextricably linked. The worlds are not treated differently from the laborers who created them: in both cases, they are used, exhausted, and discarded.

We see a similar link between the exploitation of human and extra-human nature in *Firefly’s* “The Train Job.” The sheriff of Paradiso, a small town on the mining planet Regina,

informs Mal that the planet is afflicted with Bowden's Malady, a degenerative disease, resulting from the terraforming process: "Every planet that's been terraformed for human life has its own little quirks. Turns out the, uh, air down underground, mixed up with the ore processors is a recipe for Bowden's. Everybody gets it. Miners, dumpers. Hell, I got it, I ain't never set foot in a mine" ("The Train Job" 1.2, 30:24-44). The atmosphere of Regina is incompatible with its economy of resource extraction, resulting in a world that is not suited for human life.¹³ And yet, both human and extra-human resources are extracted, presumably until both are exhausted, until new settlers have to be brought in and new planets need to be terraformed.

Just as Regina's planet-wide mining industry is oriented around extraction and the exploitation of human and nonhuman nature, so is Higgins' Moon, which specializes in mud farming for ceramic parts. In the script, the mud bog "bubbles and farts" (Edlund), and Simon, the *Serenity's* doctor, dryly comments that "Well. Canton really really stinks." Mal agrees: "That's what makes it a great drop point. No one comes here that doesn't have to" ("Jaynestown" 1.7, 3:03-:09). However, while no one willingly comes to Higgins' Moon, the impoverished indentured servants who work the mud farms cannot leave; they are, as Mr. Higgins, the town magistrate states, "owned" by him ("Jaynestown" 1.7, 9:47). As Jayne, the unlikely folk hero of Canton, tells the workers, "Far as I see it, you people have been given the shortest end of a stick ever offered a human soul in this crap-heel 'verse... But you took that end, and you, you know... Well... You took it" ("Jaynestown" 1.7, 34:43-35:00). The indentured laborers of Canton are another form of cheap extractive labor that, like

the mud they harvest from their moon, is exploited to sustain the capitalist and colonial civilization of the Alliance.

Through the terraforming of Outer Planets “a new frontier was born” (Granade 625), one that reflects not just the colonialist impulses of the Alliance, but the capitalist as well. Like the colonization of the “New World” and the American West, the development of new planets means the creation of additional Cheap Nature to sustain and expand the economic system of the Alliance. Moore explains that “With the rise of capitalism, frontier-making was much more fundamental [...] frontiers were essential to creating forms of Cheap Nature specific to capitalism” (71). Through terraforming, we see the literalization of Moore’s frontier-making. By terraforming new planets, the Alliance creates new frontier spaces, from which resources can then be extracted. In fact, Markley argues, the endless creation of frontiers is one of the promises of terraforming: it offers “idealized visions of restoration ecology and the endless generation of wealth through exploitation” (778). Instead of a finite Earth-That-Was, the Alliance can terraform hundreds of planets. When the mines of Regina are emptied or the mud of Higgins’ Moon exhausted, new worlds can be made to supply those resources and more slaves and indentured servants brought to provide appropriated labor. Through this ability to endlessly make frontiers, to limitlessly create Cheap Nature, the Alliance has theoretically recognized the promise of perpetual economic, political, and anthropogenic expansion.¹⁴ If terraforming offers a restoration of the Earth-That-Was, it is only so that it can be “used up” again and again and again, suggesting that avoiding a similar fate on our contemporary Earth depends not on anthropogenic technological advancement but social, political, and economic restructuring.

Conclusion

In *Utopia or Oblivion: The Prospects for Humanity*, Buckminster Fuller asserts that if you were to remove all of the machinery and infrastructure from industrial nations “and leave them all their ideologies [...] within six months two billion people will die of starvation, having gone through great pain and deprivation along the way” (157). This is not a very reassuring prospect, but Fuller continues, arguing that if instead, “we take away all of their ideologies,” people would do as well, if not better, than they are doing now (157). Unfortunately, as Jameson and Slavoj Žižek have noted, ideologies are not so easily given up nor taken away, and “it has become easier to imagine the end of the world than the end of capitalism” (Canavan 200). *Firefly* and *Serenity* imagine an Earth-That-Was, but not an end to the capitalist and imperialist systems that cause planetary destruction.

But perhaps, for now, imagining the Earth-That-Was, imagining the terraformed planets of the ‘verse, is enough. Ghosh rejects science fiction as a tool for representing the Anthropocene, arguing that its focus on a distant future on distant planets does not capture the urgency of the here and the now (72). But, as Jameson reminds us, the function of sci-fi is “not to give us ‘images’ of the future—whatever such images might mean for a reader who will necessarily predecease their ‘materialization’—but rather to defamiliarize and restructure our experience of our own *present*” (“Progress” 151, emphasis in original). Science fiction provides a cognitive map, a way of conceptualizing the scale of the Anthropocene, and to position ourselves within it. Terraforming in stories like *Firefly* and

Serenity reproduces and multiplies humanity's geological agency, our ability to affect planets on a molecular, global, and epochal scale. And such stories allow us to position ourselves within the capitalism and extractivism that have contributed to the anthropogenic changes we have forced upon the planet, the way in which we have exploited both human and extra-human nature. *Firefly* and *Serenity* might not be able to imagine an end to capitalism, but they show us the role that system plays in how the Earth, at least the Earth as we know it, ends. In doing so, they provide the tools to conceptualize the Anthropocene and to begin to imagine our way out of it.

Notes

¹ Although this article will focus on *Firefly* and *Serenity*, terraforming appears in numerous science fiction texts, including *The Expanse* (2015-), *Dune* (1965), *Mars Trilogy* (1992-1996), *Children of Time* (2015), *Red Rising* (2014-2016), *Starbound Trilogy* (2013-2015), *Red Planet* (2000), and numerous episodes of *Doctor Who* (1963-) to name just a few. For a more exhaustive list and discussion of terraforming texts, see Chris Pak's *Terraforming: Ecopolitical Transformation and Environments in Science Fiction*.

² The term "Eaarth" is used by Bill McKibben to indicate the extent of the anthropogenic changes the planet has undergone. He argues that this new planet is fundamentally different from the old Earth — enough so that it needs a new name to differentiate between our pre- and post-Anthropocene world (3).

³ Objections to thinking about the Anthropocene on the level of species will be addressed later in this article.

⁴ It is also worth noting the emergence of climate fiction, or cli-fi, texts that focus explicitly on climate change, as a subgenre of speculative fiction.

⁵ In this regard, I am following Brent M. Smith-Casanueva's work on *Firefly*, which uses Jameson's concept of "cognitive mapping" to represent the totality of global colonial and economic systems.

⁶ There is some intellectual debate about whether the Earth can be terraformed. Martin Fogg, for example, asserts that because the word means

“earth-shaping,” it cannot be applied to our home planet, because it is already “earth-shaped” (Pak 45). However, other thinkers are more willing to extend the definition to “(of a world) having been modified to support life-forms alien to it” (quoted in Pak 2). While, as Pak notes, this definition suggests “a conception of humanity as fundamentally alien to earth” (2), it includes transformations of Earth in its semantic purview.

⁷ It is worth noting that the idea that anthropogenic could be controlled and could avoid unforeseen consequences relies on binaric ways of thinking that separate the human from extra-human nature and posit humanity’s ability to dominate Nature, the very kind of thinking that is partly responsible for the damage we have done to our planet.

⁸ A number of eco-critics, notably Jason W. Moore, and material feminists, like Elizabeth Grosz and Stacy Alaimo, have challenged the nature/human binary as unproductive, misleading, and ideologically destructive.

⁹ Rabb and Richardson note the significance of the name “Miranda” and its allusion to *The Tempest*, a text that explores themes of colonialism and patriarchal control (136-37). Lioi extends the allusion of the planet’s name to Aldous Huxley’s *Brave New World*, which takes its title from one of Miranda’s lines, “Oh brave new world that has such people in it,” thereby connecting the dystopic biopolitics and social engineering of Huxley’s novel to the attempted use of Pax to control the population in *Serenity* (165).

¹⁰ See also Smith-Casanueva’s argument about how the show uses the political and planetary geography of the core and border planets to deconstruct imperialist discourses of racial difference.

¹¹ This distinction between the Core and the Outer Planets reflects Raul Prebisch’s discussion of core and periphery countries: “Some countries were stronger economically than others [the core] and were therefore able to trade on terms that allowed surplus-value to flow from the weaker countries [the periphery]” (Wallerstein 12).

¹² The release history of the series is outside of the scope of this paper, but while I refer to this episode as the pilot, it was actually the 11th and 12th episode to air; it was intended to be a double episode premiere, which was subsequently divided when executives at Fox decided to alter the episode’s release dates.

¹³ The degenerative illness experienced by the miners is evocative of the kind of environmental “slow violence” that Rob Nixon describes being inflicted on the Global South.

¹⁴ Canavan argues that the Alliance has met its limit: “Recalling the efforts of colonial and imperial powers to expand their economic markets over its globe at dire human cost, as well as the word ‘blowback’ coined by the Central

Intelligence Agency to euphemistically denote the inevitable ‘unintended consequences’ of such efforts, we find here the state first producing monsters and then becoming monstrous in a doomed effort to destroy them – producing still more monsters like the Operative and River to aid them in that subsequent effort, of whom it once again loses control. In its pursuit of limitless expansion, the Alliance state only reproduces over and over again the site of its own limit” (188). My argument, in contrast, focuses on the theoretical possibilities of terraforming as a form of frontier-making.

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