Playing the Environment: Games as Virtual Ecologies

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ABSTRACT
Alarming environmental trends are increasingly the subject of a variety of games that suggest surprising new approaches to both game studies and environmental advocacy, traditionally conceived. Such games raise an interesting complex of questions: how do games model "nature" and relevant scientific theories, and how do code-based representations of nature differ from those in more traditional media? Do games potentially permit a better understanding of natural processes by moving past the mere visualization of data to procedural or algorithmic embodiment? As the work of Ian Bogost and Alexander Galloway, among others, suggests, digital games and networked media offer promising avenues not only for rendering the realities of environmental crisis—nature as problem space—but also for schematizing possible solutions in ways that leverage the unique affordances of the computer, the Internet, and player collectives.

Categories and Subject Descriptors
A.0 [**General Literature**]: General – *conference proceedings*.

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1. INTRODUCTION
Global climate change, deforestation, species loss, and energy crisis… these alarming environmental trends hardly seem like fit material for play, but they are nevertheless increasingly the subject of a variety of games that together suggest surprising new approaches to both game studies and environmental advocacy, traditionally conceived. Such games raise an interesting complex of questions: how do games model "nature" and relevant scientific theories, and how do code-based representations of nature differ from those in more traditional media? Do games potentially permit a better understanding of natural processes by moving past the mere visualization of data to procedural or algorithmic embodiment? As the work of Ian Bogost and Alexander Galloway, among others, suggests, digital games and networked media offer promising avenues not only for rendering the realities of environmental crisis—nature as problem space—but also for schematizing possible solutions in ways that leverage the unique affordances of the computer, the Internet, and player collectives.

2. ANALYZING SPORE: "YOUR PERSONAL UNIVERSE IN A BOX"
One of the most recent and prominent environmentally themed games, with its own distinctive take on ecological succession and astrobiology, is Electronic Arts' (EA) Spore (2008). [8] Developed by game luminary Will Wright, best known for The Sims, Spore offers five stages, each of increasing complexity. Players develop from unicellular organisms adrift in the primordial soup of an alien ocean to land-based creatures that pursue social organization, progressing from primitive tribal communities to acquisitive city-states to sophisticated spacefaring civilizations. Yet despite anticipatory buzz over the game's purported blend of innovative gameplay and scientific know-how, *Science* magazine's John Bohannon judged Spore a massive disappointment in terms of its potential for science education. [2] Having played the game with a team of scientists to evaluate its scientific merits, Bohannon ultimately flunked the game, lamenting that it got "most of biology badly, needlessly, and often bizarrely wrong," particularly in its treatment of evolution.

For science-minded critics, perhaps first and foremost among Spore's many inaccuracies is the complete lack of consequence for player death. Should you get chomped to bits by an angry carnivore or blown up by a hostile alien spacecraft, you magically re-emerge from your nest or your home planet without penalties of any kind. This kindhearted policy may gratify EA's legions of casual players, but it is a questionable application of the theory of natural selection. Spore's much touted version of evolution is, in fact, closer to the long discredited theory of Lamarckian evolution (in which an individual organism can develop and pass on adaptations during its lifetime) or evolution's creationist-tending nemesis, intelligent design (where players are the universe's unseen architects), than it is to punctuated equilibrium or even vulgar Darwinism.

Spore's final space stage may be the most scientifically accurate of the five, though scientists themselves disagree over the likelihood of encountering intelligent life elsewhere in the universe. For skeptics, Spore goes well beyond conservative estimates, with alien life to be found at almost every turn; for others, Spore rightly suggests the rich diversity of life awaiting us beyond the boundaries of our tiny solar system. Beyond its take on astrobiology, Spore's space stage also suggests curious approaches to a number of other sciences—ecology, taxonomy, and meteorology among them. Gameplay in this phase rests on long cherished environmental principles like ecosystem stability,

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sustainability, and habitat renewal. For example, one of the primary tasks of the space stage is to render environmentally challenged planetoids hospitable enough for colonization by your species, thereby enabling the expansion of your galactic empire. To raise the terraforming score of any given planet you must balance its temperature and atmospheric levels between equally hostile extremes. Once these variables have been satisfactorily settled, populating the planet requires only the canny abduction of species from other planets using your spaceship's powerful tractor beam. Notably, a much larger portion of the space stage's command interface is devoted to matters of aesthetic preference—for instance, should you find yourself displeased by the lumpy contours of your planet or its dull sandy color, you can use special tools to level terrain, form canyons and mountains, or turn the sea purple, the atmosphere red, and the land cyan. Incredibly, none of these changes seems to affect life on the planet, implying at some fundamental level that cosmetic alteration and environmental health need not be mutually exclusive aims.

Throughout, players are encouraged to complete missions, many foregrounding environmental crisis—for example, the directive "Save planet Walkne from ecological disaster!" Once alerted to such an emergency, the player must hurry to the afflicted planet and exterminate infected individuals within a given species using her spaceship's onboard laser. Later, the player might be asked to restore balance to an ailing ecosystem by filling in vacant animal or plant niches in a planet's imperfect food chain. While missions like these helpfully entreat the player to take on the mantle of environmental steward for colonized worlds, the espoused version of ecological care drastically oversimplifies life's complexity and threatens to perpetuate the myth that humans can exercise surgical precision in diagnosing and addressing environmental ills.

Most troubling, perhaps, is Spore's willful elision of certain associations critical to ecological understanding, its divorcing of particular effects from their more likely causes. In-game global warming, for example, is tied to the player's use of godlike technologies, not the individual or industrial consumption of oil and coal. Once begun, any warming trend can be reversed by again using your spacecraft's superior machinery, but cannot, for instance, be naturally mitigated by the growth of more CO_2–loving plants on the planet's surface. Ultimately, procedural lessons do exist in this universe, but they are schematic at best. Using weapons-grade lasers, high-tech rays, and elaborate mechanical gizmos to bludgeon a planet's climate into shape makes a mockery of the delicate "butterfly effects" espoused by chaos theoreticians, a term which describes the extremely sensitive dependence of final states on even seemingly unrelated or minor initial conditions.

In the end, Spore exerts a quirky and endearing charm, though it may set game aficionados and science sticklers to muttering. Wright himself has styled Spore less as a game than as a "philosophy toy," or "Montessori toy," designed to lead younger generations to insights via self-directed investigation. [10] A toy, unlike most games, features a lack of prescribed goals, a tolerance for idiosyncratic exploration rather than unrelenting movement toward a single, often predictable end-state. The worlds that Wright creates thus tend to be sandboxes more than slides, open-ended systems inviting experimentation more than goal-oriented spaces centered on measurable achievement. Crucially, Spore's ontological tension between the characteristics of toy and game reveals itself in its environmental stance, in its dual impulse to envision nature as both design space and problem space, or, a place of invention and expression as well as an arena fitted with recognizable troubles and solutions.

3. ENVIRONMENTAL PROCEDURAL RHETORIC

Why meditate at such length on these digital representations of nature, particularly game-based versions of the environment? The answer is multifaceted. Many of these games are tremendously popular, and like other forms of media, particularly mass media, they have the ability to influence our perceptions and handling of certain situations. In an age when ecological questions have been consistently framed in terms of crisis and moral duty, games offer a potentially less off-putting, less overtly didactic way to encourage people to consider environmental problems and their solutions. Moreover, games and digital media more broadly offer unique affordances, ones that enable often abstract data and otherwise distant threats of ecological calamity to take very real and even operable form, combating the twin hazards of apathy on the one hand ("I live in Texas. Why should I care about a hole in the ozone above the North Pole?") and paralysis on the other ("What difference can one person possibly make?").

Many theorists have worked to identify the properties specific to digital media. Rita Raley, comparing code languages to so-called "natural" languages, locates "the *difference* of the sign system of code" in

> its executability, its operative transformation of a message from one symbolic form to another. [. . .] code and language alike may amuse, astonish, inform, and delight; both may be written and read; both are performative and may initiate changes in the world; but one can be executed by the computer and one cannot. [7]

Paralleling Raley's emphasis on code and code-based projects, Ian Bogost, author of *Persuasive Games*, has coined the term "procedural rhetoric," arguing that video games need to be examined for more than just their graphics quality and narrative structure. [1] In their stead, Bogost emphasizes "processes" and the "computational" specificity of software (in particular games), drawing attention to the way in which some, but not all, games craft and present arguments via their rules of operation—that is, the constraints imposed upon gameplay, or the interactions invited or disallowed on the part of the player—in short, game mechanics.

This notion of procedural rhetoric can be productively applied to any number of environmentally themed games. Take, for instance, a simple web game found on the Discovery Channel site accompanying the BBC's celebrated *Planet Earth* television series (2006). [6] Though exigently dubbed "Mission Planet," the game does not involve saving endangered species, protecting fragile habitats, or edifying the public about ecological concerns, but instead places the player in the fiscal and managerial role of executive producer for the series, charged with outfitting film crews for work at various far-flung locations. Players operate from a "Command Center" window that contains four sub-frames: communication, weather, navsat, and overview (the last shows a two-dimensional map of the globe), which they must use to make decisions and resolve crises, from consulting developing weather conditions to sending replacement supplies and arranging for medical assistance. While the equipment and terminology

employed (navigation and global positioning satellites, high-tech communications relays, and words like "mission," "on assignment," "command center," etc.) implicitly liken these expeditions to military operations, "Mission Planet" also unabashedly foregrounds commercial criteria. Successful missions are those that come in under budget, and thrifty players are visually rewarded with clips from the television series, ostensibly caught by "your" well-managed crews. Players that go over budget are duly chastened with clips showing only empty habitat. Clearly, the game's primary procedural argument amounts to equating nature cinematography with hazard, expense, and operational challenge, thereby valorizing the heroic efforts that must have gone into creating *Planet Earth* for its millions of television viewers. In this game universe, overspending is the cardinal sin, technology is the key to managing an unruly natural world, and footage is qualitatively graded in terms of unmediated access to target animal species (recapitulating the historic depreciation of inanimate or nonorganic actors).

Like Ian Bogost, Alexander Galloway also emphasizes the "algorithmic" nature of games as well as related modes of "informatic control."[1] [4:90] In *Gaming: Essays on Algorithmic Culture*, he argues that as scholars we need to supplement ideological critique with "informatic critique" [4:99], that is, a critique based on knowledge of the technologies and computational processes underlying technocultural objects like video games and the World Wide Web. Taking as an example the *Civilization* games of Sid Meier, Galloway notes: "Video games don't attempt to hide informatic control; they flaunt it." [4:90] Like Raley and Bogost, Galloway believes that code offers users and players qualitatively unique experiences constructed around programmed routines. While such routinization may be indicative of a more pernicious trend in our society at large, as Galloway suggests in his more recent work, software, particularly in the form of computer and console games, may also offer particularly effective ways to approach contemporary social problems, from urban blight to overconsumption.

Despite its already outlined drawbacks, for example, Will Wright's Spore attempts to stage environment and environmental crisis in productive ways, both by defamiliarizing the everyday and encouraging structured, rule-based interaction tailored toward particular realizations. In fact, Wright himself sees Spore as a procedurally based simulation with powerful environmental implications. During a demo of Spore to TED Conference participants in March 2007, Wright used his game spaceship's abilities to pump huge amounts of carbon dioxide (CO_2) gases into one planet's atmosphere, thereby raising its ocean levels, swamping his own cities, and eventually increasing the temperature of the planet to a point where the oceans evaporated and the surface burst into flame (clearly, not a "winning" strategy so much as a curiosity-driven experiment). [10] Having done this, Wright remarked:

> What's interesting to me about games in some sense is that I think we can take a lot of long-term dynamics and compress them into very short-term kind of experiences, because it's so hard for people to think fifty or a hundred years out, but when you can give them a toy and they can experience these long-term dynamics in just a few minutes, I think it's an entirely different kind of point of view, where we're actually mapping, using the game to remap our intuition. It's almost like in the same way that a telescope or microscope recalibrates your eyesight. I think computer simulations can recalibrate your instinct across vast scales of both space and time.

The implication is that a software toy like Spore has the power to reveal to us our current follies—here, the overproduction of greenhouse gases that trap the heat of the sun's rays and lead to global warming—and that a game can act as a kind of intellectual and spatiotemporal prosthesis. Spore aims to provide an ethically unencumbered space in which mere mortals can play out countless environmental futures, from pastoral empires to admittedly morbid fantasies of ecological disaster.

4. SOCIAL REALISM: TRANSLATING PLAY TO ACTION

In considering the unique affordances of digital representations of nature, a number of questions remain, foremost among them: can games with or without explicit ecological objectives successfully promote environmental consciousness, activism, or lifestyle change? The designers of educational games and the more recent "serious games," often tools for instruction or workplace training, would certainly answer in the affirmative. However, as Henry Jenkins and others have pointed out, granting games this positive ability also renders them susceptible to the criticism of media-effects theories, most prominent among them what Galloway calls the "Columbine theory" of video game violence.

Galloway's own take on what he calls "social realism" in gaming attempts to reverse or move past previous discourses on game violence, instead highlighting games in terms of their potential for political and social action. [5] Realism in gaming, he argues, should not be evaluated solely on the level of representation, but also on that of participatory action. Games achieve "true realism" only when they offer "a meaningful relationship between the affective actions of gamers and the real social contexts in which [gamers] live" [5:78]. And for many, this has already been enacted in the current rise of "serious" or "alternative reality" games, which thrive on imploding the traditional boundaries between the real and the virtual, or lived and played life.

Consider the "serious game" World Without Oil (WWO), which in 2007 over the course of 32 days simulated a 32-week global oil crisis, challenging its players (who played themselves) to imagine an alternate reality uncomfortably close to our present times, in which demand for oil has risen five percent over supply. [9] Taking as its motto the dictum "Play it—before you live it," WWO asked its participants, including many educators and their students, to "play" by submitting narratives of their own methods of navigating the crisis. Some planted gardens, others biked to work; some bought hybrid vehicles, others embraced biodiesel, and so on. WWO was never solely the stuff of bits and bytes, and that was, perhaps, the reason for its success—while players toiled endlessly on the worldwithoutoil.org website to share photos, stories, videos, and more, ultimately gameplay demanded a deliberate conflation of on- and offline social networks, environmental imagination and lived experience. A game like WWO encourages its players to see the real world as a problem

[1] Here and elsewhere Galloway draws from Gilles Deleuze's notion of contemporary "societies of control," which have replaced modern "disciplinary societies."

space capable of supporting innovative environmental solutions. In a way, the game defamiliarizes the mundane, everyday character of our surroundings and our actions in them by imposing a narrative and a procedural interface that in this case highlights the follies of reliance on fossil fuels.

Games need not be "serious," however, to draw on and influence real life. Forbes contributor Brian Caulfield describes Will Wright's own belief in "non-immersive" games, quoting from an interview given at a Web 2.0 expo in San Francisco in April of 2009:

> Wright sees games moving toward tighter connections with a player's real-world identity, latching onto social networks and reflecting what is going on in a gamer's real life. "We're starting to see more and more games where who you are matters," Wright said. "You can map things on top of that world and play games." [3]

"Wright also wants to use games as just a starting point for exploration and creativity outside of games," notes Caulfield, who then cites Wright's willingness to open Spore's massive creature database up to alternative inspirations via an application programming interface.

While no imperative dictates that games must be socially motivated, it is important to recognize that games can and do offer unique ways to address current social problems, prominent among them global environmental crisis. Less quantitative than lived, less PowerPoint slide or ominous line graph (think Al Gore's slideshow in *An Inconvenient Truth*), a game offers a chance to think procedurally about the consequences of actions on the environment and about the environment itself as a system with its own particular inputs, triggers, instabilities, affordances, and dangers (a kind of reversal of systems theory in which the environment *is* the system). Such opportunities are increasingly valuable, as the scale of environmental crisis, for instance global warming and the loss of the polar ice caps, is both beyond immediate perception and visualization and encouraging of a kind of resigned apathy. While games like Spore and World Without Oil need not sacrifice their entertainment prerogatives for those of science education or ecological conservation, their example suggests numerous future avenues for games to contribute to environmental consciousness and social change.

5. ACKNOWLEDGMENTS

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