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Mesocosm

Things don't have purposes, as if the universe were a machine, where every part has a useful function. What's the function of a galaxy? I don't know if our life has a purpose and I don't see that it matters. What does matter is that we're a part. Like a thread in a cloth or a grass-blade in a field. It is and we are. What we do is like wind blowing on the grass.

—URSULA K. LE GUIN, *The Lathe of Heaven*

Displayed on a wall in the Exploratorium science museum in San Francisco, greenish oblong microorganisms appear to be swimming around on a magnified field, and I watch with delight as they scoot away from a sudden swoop of bright light. A player is running her fingers across a giant touchscreen rigged to a microscope-turned-projector, creating light barriers that effectively repel these photosynthetic protists, known to scientists as *Euglena gracilis* (Figure 3). This exhibit, part of a new breed of "interactive biology" or "tangible biology" games coming out of Ingmar Riedel-Kruse's bioengineering lab at Stanford University,[1] and its emphasis on real-time, optical-haptic, and ultimately playful interactions with living organisms, for me perfectly dramatizes what has always been true, but is now becoming increasingly visible—namely, the permeability between game environments and real environments. Acknowledging that games may be part of one's every-day ambient experience leads in this chapter to the related scientific framing of the mesocosm, which I suggest is central to an environmental understanding of games and gameplay.

In ecology, mesocosms are experimental enclosures intermediate in size and complexity between small, highly controlled lab experiments and large, often unpredictable real-world environments. Historically, aquatic mesocosms

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Figure 3. Ecologist Danielle Christianson interacts with living microbes in the East Gallery Corridor of the San Francisco Exploratorium in 2018. The "Visitor Interactions in Microbiology" project prototype was organized by the Riedel-Kruse lab at Stanford University and Senior Researcher in Visitor Research and Evaluation Joyce Ma, as part of the museum's "Cells to Self (Living Systems)" collection.

have been the most successful, although terrestrial mesocosms are also used, and while some mesocosms are small enough to fit in the lab—say, a vat of algae grown in pumped pond water, left under a sunny window—most attempt to impose artificial boundaries on habitats in the field (Figure 4). For researchers,

> Such mesocosms provide a powerful tool to link between in situ but often only correlative field studies on the one side, and small-scale far from natural laboratory experiments including a single or a few species only, on the other side. Thus mesocosm studies have the advantage compared to laboratory approaches that [*sic*] it maintains a natural community under close to natural conditions, taking into account relevant aspects from 'the real world' such as indirect effects, biological compensation and recovery, and ecosystem resilience.[2]

Of course, there are also latent drawbacks to using mesocosms. As briefly outlined in the introduction, scientists are well aware that wall or edge effects may affect the relevance of a mesocosm to natural circumstances. In their retrospective analysis of two aquatic mesocosm experiments, Matthew C. Watts and Grant R. Bigg note several difficulties, from bags of water prone to cutting out light for photosynthesis to mesocosms' vulnerability to "mixing regimes," for instance through storm events. Watts and Bigg express concerns over the ability of mesocosm experiments to scale up to "oceanic conditions," but eventually allow that they may have some use, particularly if the experimental design is first run past modelers so that appropriate data can be gathered to later test the validity of findings.[3] In a discussion of mesocosm-based climate research, Rebecca Stewart and her coauthors take a similarly targeted view. For their purposes, "realism is used in the sense of the ability to reproduce key properties of natural systems."[4] It is in this manner that I would argue that games, like mesocosms, are "mini-ecosystems"— functional arenas of a size usefully intermediate between field experiments

Figure 4. A floating structure containing twelve outdoor pelagic/marine mesocosms in western Norway, run by the University of Bergen Mesocosm Centre. Photograph by Dr. Stella A. Berger.

and laboratory conditions, which replicate select aspects of the surrounding world.

Designating game environments as mesocosms is, perhaps, simply another way of stating what many researchers have said before—namely, that games represent some combination of the "real" and the simulated, from Jesper Juul's "half-real" and Edward Castronova's synthetic worlds to the ubiquitous "virtual worlds" of massively multiplayer online games (MMOGs). Again, however, my purpose is not to use ecology as mere rhetorical embroidery—although it may function analogically, I wish to take seriously the premise that games and scientific experimentation are cut from the same cloth. The term mesocosm in this context should do more than acknowledge the permeability of games' "magic circle," as first famously proposed by Dutch historian Johan Huizinga in *Homo Ludens* and ever since regularly aired and debunked by researchers interested in the social, political, and economic aspects of games and player behavior. Describing games as mesocosms is for me an ideal way to characterize the subtle negotiations that take place between human and nonhuman actors and technological assemblages during play, while also taking into account diverse situational and interpretive contexts. Rather than see games as real rules embedded in fictional worlds, as Juul does, we could make the case that games blend real worlds and fictional rules. This is strikingly apparent, for instance, in farm games (chapter 4), where the playable terrain of orderly farms and fields is unquestionably of our world, while the rules are not—farmers and plants always prosper, despite the fact that in the first *FarmVille* (2009), you did not even have to water your crops. Needless to say, game worlds like *The Legend of Zelda*'s (1986) Hyrule or *World of Warcraft*'s (2004) Azeroth are not real, in any conventional sense, but I would argue that even entirely fictional game environments are experienced *as* real, something that Castronova also concludes in his socioeconomic studies of massively multiplayer online roleplaying games (MMORPGs) and his discussion, and ultimate rejection, of the term "virtual reality."[5] What's more, Juul's real-rules-and-fictional-worlds paradigm treats only games themselves, neglecting the multilayered reality of both players and the contexts of play.[6] Like the early sound studies theorists who charted music's passage from the living room and bedroom to car and street,[7] this book considers how the very act of playing (and making) games has increasingly moved from private into public spaces, and from the indoors out.

To this end, this chapter brings literary environmental criticism into conversation with discourse about media and mediation in order to better describe the mesocosmic qualities of games, in particular game landscapes, locations, and navigational strategies. I look deeply at a classic text game from the 1970s, a contemporary art game for the PlayStation Network, and the "first-person walker" *Firewatch* (2016), as well as at the growing ranks of alternate- and augmented-reality games, in order to assess seriously digital games' capacities for environmental representation, from their knack for drawing attention to the ways in which we traverse and occupy space to their startling ability to express significant ties to real places. Like portions of a field sectioned off for study, or partially enclosed waters, game ecologies toy with select variables within environments that remain close to, but apart from life. And the best games, like the most successful ecological experiments, tread a fine line between bounded tidiness and inclusive reality, heightening our awareness of mechanism while providing ample outlets for our energy and curiosity.

"SORRY, BUT I AM NOT ALLOWED TO GIVE MORE DETAIL":
Ecomimesis and a Seventies *Adventure*

Even if one grants that digital games are played in ever more diverse settings and can offer an astonishing range of in-game environments, one may still balk at the idea that all games are therefore environmental. What, then, constitutes an environmental game? In my view, a game's "environmentality" does not at all depend on its possessing an overt environmentalist rhetoric,[8] but rather follows from its modeling of ecological states and relations, however admirable or terrible that modeling may be. At present, most games commit at least one if not all of the following missteps in their realization of in-game environments: relegating environment to background scenery, relying on stereotyped landscapes, and predicating player success on extraction and use of natural resources. In the first and most common scenario, a game flaunts its environment to the extent that it provides gratifying visuals, while the environment itself remains inert, the functional equivalent of theater flats or greenscreen technology. Action takes place within or in front of such digital set pieces, and it is in this vein that volumes devoted to the artificial intelligence (AI) of games carefully outline the behavior of non-player characters and monsters (mobiles), but leave the articulation of the game environment to artists.[9] Such a spatial hierarchy is readily apparent in

games like Nintendo's old Mario platform games, which featured the iconic plumber running, bouncing, and sometimes falling through a series of obstacles set against a simple, side-scrolling backdrop. Artist Cory Arcangel effectively parodied this layering in his *Super Mario Clouds* series, by playing hacked Nintendo game cartridges in which all but the fluffy white clouds on a blue background had been erased. Although some might argue that the newer virtual worlds offered by MMOGs appear to exchange background and foreground distinctions for a more immersive experience of space, the range of possible interaction with such game environments remains disappointingly slight.

Game environments also tend to lean heavily on clichéd landscapes, abandoning any attempts at regional specificity for prepatterned and ultimately generic scenes. Such environments may give players the disorienting and somewhat anaesthetizing sense that *this could be anywhere or nowhere at all*, conveniently overlooking ecological concerns with the finite character of the natural world and entropic limitations on energy and throughput, or carrying capacity (chapter 4). In an era of widespread anxiety over climate change, increasingly scarce fuel reserves, and population control, it should come as no surprise that an especially popular recourse is the abstract, everreceding pastoral ideal that Raymond Williams once derisively called "a babble of green fields" (in a nod to Shakespeare),[10] which lurks in all the medieval and pre- or alter-industrial lands of games like Blizzard's *World of Warcraft* or Nintendo's *Legend of Zelda* series, and rather explicitly in the multitudes of crop-management games like *Harvest Moon* (1996) and *FarmVille*. Ecological specificity and accuracy are neither necessary nor sufficient criteria for successful commercial games, but when we measure games as instruments of public knowledge, it suddenly becomes worthwhile to make games that are more meaningfully local, which take seriously the goal of environmental realism—not solely in terms of visual rendering, but also in sound design, weather, species density and distribution, and the arrangement of organic and inorganic actors in complex interrelation. Pilloried on other fronts, industry bad boy Rockstar Games has taken positive steps in this direction with the *Grand Theft Auto* (1997–) games, which evolved from taking place in "Anywhere, USA" to site-specific installments that unfold in fictional cities modeled closely on San Francisco, Las Vegas, and Los Angeles. The company also released the "open-world" game *Red Dead Redemption* in 2010, which plays out in the last days of the settler-colonial frontier in the American West

and features over forty species of wildlife (including bison) as both potential predators and prey.

Both criticisms—treating game environments as mere scenery, falling back on caricatures of landscapes rather than attempting to plumb their complexity—already suggest within them the third major issue: game designers have yet to develop more sophisticated rules for interaction between players and game environments. Most game environments are predominantly visual, with the majority of the environments remaining functionally inert. Actionable parts of those environments are most often things a player can use immediately (a power-up, like a health or speed boost), acquire for later use (an item such as a key for a locked door further in the storyline), or destroy (panes of glass between you and your target, a creature you didn't like the looks of). The genre of "god games" is emblematic in this regard, typically granting players formulaic rights to strip or alter landscapes. Many celebrate games for this player-centered paradigm, what Bonnie Nardi calls "performative mastery," a tribute to player agency and skill that tries to dissociate itself from critiques that games are virtual Skinner boxes producing addiction in return for randomized reward.[11] Although I do not discount the value of player agency, too often this kind of skill mastery equates to mastery of the external environment, and games often naïvely reproduce a whole range of instrumental relations that would be better reimagined. Games are opportunities to create entirely new sets of relations, outside of those based on dominance or manipulation. More environmentally realistic games could enhance our understanding of real-world environmental issues (not just crises), either by implicitly or explicitly modeling different forms of our individual and collective environmental agency.

Some games elegantly avoid many of these common pitfalls, and perhaps surprisingly, we can begin with an example not far from the origin of modern computer games, one that took the longest known cave system in the world as its inspiration and used only text to communicate ambient detail. The game, *Adventure* (sometimes called *Colossal Cave Adventure*, or simply ADVENT, due to an archaic FORTRAN six-character identifier limit), was designed by William Crowther in 1975–76 while he was an employee at Bolt, Beranek, and Newman (BBN), best known for developing the ARPANET. Crowther developed *Adventure* using BBN's PDP-10 computer in his off hours, and the game quickly became something of a craze among early computer enthusiasts; it was significantly extended by Don Woods at Stanford in

1977, and throughout the next decade other player-fans would revamp the game for newer platforms like the TRS-80 and the Atari 2600, eventually adding graphics. While the original, text-only *Adventure* seems primitive by contemporary game standards, it successfully foregrounds environment and environmental knowledge because of and not despite its textual limitations. Indeed, the spare, linguistic crafting of *Adventure*'s site-specific subterranean world exemplifies what philosopher Timothy Morton calls ecomimesis, which he defines as the project whereby nature writers and ecocritics alike attempt to bring the natural world into their writing through evocative, present-tense descriptions, like the following snippet from prominent ecocritic Lawrence Buell: "The grove of second-growth pine trees . . . sway at this moment of writing, with their blue-yellow-green five-needle clusters above spiky circles of atrophied lower limbs."[12] Though Morton's ruminations on environmental aesthetics, written in the context of literary ecocriticism, may at first appear to have little to do with game criticism, literary environmental criticism and game studies have much to gain from breaking disciplinary isolation. Having been saturated for some time by sometimes amorphous notions of play, narrative, and computation, games are sorely in need of more diverse forms of critical articulation even as they offer particularly fertile terrain upon which to raise questions of environmental representation, knowledge, and ethics—questions that have dogged ecocritical attempts to reconcile the natural and the ecological with the literary and the artistic.

In its early years, game studies addressed much of its energy to bridging internal rifts, most prominent among them the storied conflict between ludologists and narratologists. Narratologists purportedly insisted on the continuity between games and other storytelling media, while ludologists sought to disentangle themselves from methodologies traditionally associated with literature and film, stressing the unique mechanics of game design and predicating the computer and console game's medium specificity on the basis of code and microchip, binary streams of data and algorithmic or procedural operation. In recent years, this division has given way to the phenomenal outgrowth of criticism surrounding the term "play," which conveniently seems to bypass the lingering stigmas surrounding games in favor of articulating a broader cultural phenomenon. However, even the more capacious concepts of play have made it difficult to posit a more explicitly environmental approach to games, one that might dethrone the reigning player- or

designer-centered paradigms in order to acknowledge game environments as determining components of player experience, with the potential to edify and spark curiosity about the out-of-game world.

For Morton, ecomimesis—an author's elicitation of his or her compositional environment—is perhaps counterintuitively non-natural, sharing more with the self-reflexive, self-conscious aspects of postmodern art than documentary realism. While poets, nature writers, and ecocritics like Buell find that ecologically inflected, thick descriptions of natural setting permit an escape from the confines of writing, from representation to reality, Morton concludes that "ecomimesis is not necessarily on the side of nature."[13] A similar but more polemical critique can be found in Dana Phillips's *The Truth of Ecology*, in which Phillips describes Buell as evincing "an inchoate and perhaps not fully conscious desire for a literature of presence," and accuses ecocriticism of going "well beyond the realm of the plausible in its declarations about what literature can and ought to do."[14] Phillips expresses deep skepticism over the claims of literary mimesis, dismissing them as badly veiled attempts "to do an end run around contemporary literary theory."[15] However, unlike Phillips, Morton is careful not to throw the proverbial baby out with the bathwater—although "the idea of nature is getting in the way of properly ecological forms of culture, philosophy, politics, and art" and ecomimetic projects are clearly artificial constructions, ecomimesis remains a valid and important form of poiesis. Moreover, though Morton looks to "art above all else" and Romantic literature in particular for "properly ecological forms," his theory of ambient poetics allows for the analysis of works in a range of media.[16] Ecomimesis in Morton's view presents the greatest complications in the context of the written word and its attempts to incorporate or capture ecological truth in writing itself. We can easily see, however, how the concept of ecomimesis could extend to photography, film, music, and games—both game texts and games *as* texts. In this age of aggressive graphical display—3D, high definition (HD), and computer-generated imagery (CGI)—we tend to forget that many of the earliest computer games were purely textual constructs, and thus neglected progenitors of both the modern, visually saturated computer or video game and continuing experiments in interactive fiction. We could ask ourselves, to what degree could such text-based games be said to model the kind of "writing degree zero" Phillips so readily dismisses, or the less naïve Mortonian craft of ecomimesis? As a game like *Adventure* demonstrates, game designers are recognizable cousins

to ecocritics and nature writers, in that all "want the world to be in the text."[17] But game texts, unlike conventional texts, demand action—games are "richly designed problem spaces" or "possibility spaces" where we come face to face with our environmental knowledge and impact.[18]

Adventure's ecomimetic qualities stem from both the game's signature descriptive brevity and the artful correlation between textual output and player language and movement. When you begin the game, for instance, should you ask for instructions, you receive the following cryptic remarks:

SOMEWHERE NEARBY IS COLOSSAL CAVE, WHERE OTHERS HAVE FOUND FORTUNES IN TREASURE AND GOLD, THOUGH IT IS RUMORED THAT SOME WHO ENTER ARE NEVER SEEN AGAIN. MAGIC IS SAID TO WORK IN THE CAVE. I WILL BE YOUR EYES AND HANDS. DIRECT ME WITH COMMANDS OF 1 OR 2 WORDS.

Otherwise, you begin with the following description of your location:

YOU ARE STANDING AT THE END OF A ROAD BEFORE A SMALL BRICK BUILDING. AROUND YOU IS A FOREST. A SMALL STREAM FLOWS OUT OF THE BUILDING AND DOWN A GULLY.

Exploring the surrounding forest yields little, but when you investigate the building you discover a range of objects that might help you in your search: keys, a shiny brass lamp, some food, and a bottle of water. Following the streambed south leads to an area of "bare rock," and "a 20 foot depression" at the bottom of which is "a strong steel grate." Unlocking and opening the grate allows you to lower yourself into the chamber below, and there begins your journey into the expansive underground cave system that forms the main setting of the game world.

No progress can be made without issuing recognizable one- or two-word directives to the program's mysterious narrator-actor, thus at first the game can unfold as a humorous, ELIZA-like conversation between you (the player) and it (the unknown interlocutor who presents the game), through the input mechanism of the command-line prompt.[19] Though this interlocutor supposedly serves as your "eyes and hands" and can be ordered about with simple phrases like "north" or "get keys," attempts at complex or creative workarounds are liable to earn only nonplussed responses such as

I DON'T KNOW HOW TO APPLY THAT WORD HERE.

or this gem,

YOU CAN'T BE SERIOUS!

At times, as you wander about lost in chamber after chamber, the computer seems as disoriented as you are, though the disorientation is verbal as much as spatial:

I AM UNSURE HOW YOU ARE FACING. USE COMPASS POINTS OR NEARBY OBJECTS.

I DON'T KNOW IN FROM OUT HERE. USE COMPASS POINTS OR NAME SOMETHING IN THE GENERAL DIRECTION YOU WANT TO GO.

Compared to current games, in which player identity is most often grafted onto a three-dimensional avatar in a curious blend of first-person belief ("I am the military operative on this mission") and third-person witnessing ("That is my character moving around on the screen"), *Adventure* is unusual in its interposing of an AI between player and environment. In a mode reminiscent of the orthodox Cartesian dualism between mind and body or philosophy's brain in a vat, the player issues commands to her physical extremities and waits patiently to see if the commands are understood and acted upon; garbled commands lead to extensive linguistic negotiations, as the player searches for objects and actions that the program can recognize. Thus, "inch forward" becomes "go down" and "hit snake with black rod" resolves simply to "strike snake." (If you err on this account, the program helpfully reminds you, "My word for hitting something with the rod is 'strike.'") Meanwhile, movement into new caverns and crawl spaces are often leaps of faith—until the program outputs the textual description of these new areas, the player is effectively blind.

Crowther's *Adventure* was, in fact, based on a real system of caves—the Bedquilt and Colossal Cave sections of the Mammoth Caves in Kentucky. Crowther, it turns out, was both an avid caver and a player of the early *Dungeons and Dragons* (1974), and *Adventure* hence effortlessly melds aspects of fantasy (axe-throwing dwarves and "magic words," like the nonsensical

teleportation incantation "XXZZY") with the mundane details of spelunking (Crowther and his soon-to-be ex-wife Patricia had both spent time mapping Bedquilt). That Crowther imaginatively retooled his own physical experiences within a material milieu, transforming them into the stuff of computing lore, supports the game's ecomimetic classification; the text delivers an unexpected intimacy with an alien environment that stems directly from a caver's ecological awareness and expertise. As Dennis Jerz, a chronicler of Crowther's work, informs us, "Caver terminology often employs architectural metaphors. For instance a 'room' is any discrete space, no matter the shape; a 'hall' is any long space, a 'chimney' is a pit when seen from below, and a 'dome' is the roof of a pit."[20] In a process familiar to cavers, the game therefore proceeds as the compass-guided navigation of a series of interlocking chambers or "rooms," whose descriptions sometimes forgo aesthetic detail for matters of practical judgment:

> YOU ARE ON THE BRINK OF A THIRTY FOOT PIT WITH A MASSIVE ORANGE COLUMN DOWN ONE WALL. YOU COULD CLIMB DOWN HERE BUT YOU COULD NOT GET BACK UP.

Where an untrained eye would see only undifferentiated stone and darkness, the *Adventure* player, with the aid of knowledge Crowther has embedded in the game's descriptive texture, spies evidence of previous expeditions, networks of linked passages, climbs of varying difficulty, and even the familiar results of geologic processes:

> YOU ARE IN A ROOM WHOSE WALLS RESEMBLE SWISS CHEESE. OBVIOUS PASSAGES GO WEST, EAST, NE, AND NW. PART OF THE ROOM IS OCCUPIED BY A LARGE BEDROCK BLOCK.

"Obvious" passages notwithstanding, *Adventure* also militates against player hubris, confounding would-be cartographers with the sheer scale and complexity of its natural environment. As one of the game's fan sites notes, *Adventure*'s cavernous expanses eschew the orderly, planar preferences of Euclidean geometry, instead reproducing the curved, choked, and irregular topologies of real cave systems (Figure 5).[21] Some routes are passable only in one direction, and leaving a room by its northern opening does not necessarily mean that you can return to that room by heading south from the next

chamber. As veteran spelunkers Roger Brucker and Richard Watson observe in *The Longest Cave*, their account of the Cave Research Foundation's involvement in Mammoth Cave National Park, caving expeditions rarely have a discernible end. The challenge is instead to discover connections between cave systems, or to find your way back to where you began (using *Adventure*'s magic word XXZZY whisks you back to the starting point), and unlike most enshrined outdoor activities, caving is less about ascent, panoramic views, and wide-open spaces than close confines, restricted vision, and plunging deep below ordinary terrestrial life:

> Caving is tactile in a way that no other contact with the inanimate can be. There is no other sport where one crawls through mud and slides through sand. One is *in* a cave, but not as a swimmer is in the water. In the cave one is clasped in solid, ever changing walls of stone that provide variegated patterns of visual and tactual delight. Caving can be almost totally sensual.[22]

Adventure grants its player the caver's quasi-mystical relationship to the nonhuman environment, bringing her into meaningful proximity with often overlooked inorganic actors and the humbling scale of geologic time.

This is not to deny *Adventure* its share of literary excellence. According to Jerz, "'Adventure' succeeds in large part due to the depth and realism of the scenery, which is rendered in concise prose that calls interesting details to the reader's attention, yet leaves much to the imagination." Jerz also points to the divergent textual styles that become apparent as one traces the changes in *Adventure* from Crowther's original to Woods's adaptation, explaining that "Where Crowther was an efficient minimalist, Woods was comparatively lavish with scenery." The economy of *Adventure*'s language allows for both the game's ecomimetic properties and its captivating ambiguity. As if to underscore this point, the most cited areas of the game seem to be its two labyrinths, which owe much of their lasting impression to their rendering in words. Nick Montfort, for instance, borrowed the title of his 2005 book on interactive fiction, *Twisty Little Passages*, from this delightfully cryptic line:[23]

YOU ARE IN A MAZE OF TWISTY LITTLE PASSAGES, ALL ALIKE.

In one of the two mazes, this phrase appears but rearranges itself slightly at every turn, enabling attentive readers to determine the way out; in the other,
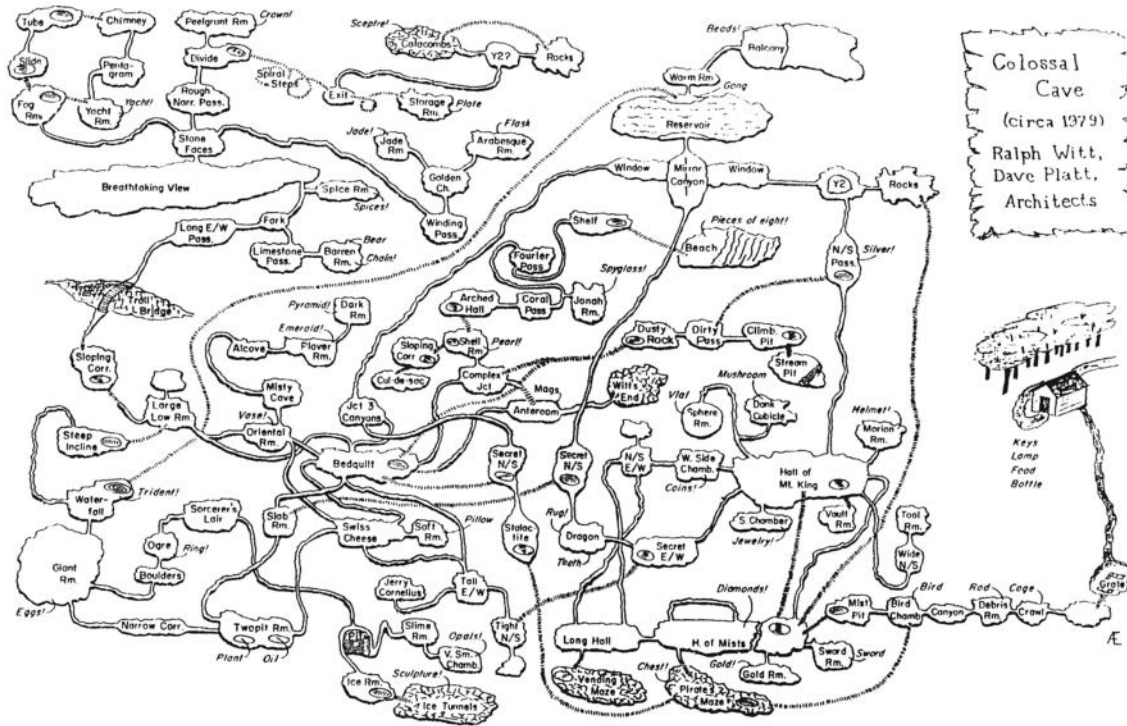
Figure 5. A map of the convoluted cave system popularized by Will Crowther's early text game *Adventure*, drawn by Bruce Beaumont and Geoffrey James Sickler. Reprinted by permission of David Platt.

the phrase never changes. Here the game casts the player into a featureless labyrinth of stone and language, in a brilliant play on the double sense of "passages" as both literary and geologic constructs, and it is not at all clear which aspect is the more maddening.

Adventure not only returns us to a time when games were unabashedly textual, but also offers us a new model for Morton's concept of ecomimesis. Demonstrating at times both the spare elegance of poetry and the resolute matter-of-factness of prose, the text of *Adventure* generates the kind of "poetics of ambience" that Morton describes as "a sense of a circumambient, or surrounding, *world . . .* something material and physical, though somewhat intangible, as if space itself had a material aspect."[24] *Adventure* is also an example of what Henry Jenkins calls "environmental storytelling," but as a text game, it is not simply an inferior precursor to the kinds of lush, visual environments of modern games.[25] Text games remind us that game worlds are not just substitutive or compensatory simulations, but also evocative spaces in their own right. Sophisticated computer graphics do not necessarily immersive games make.

Games as Environmental Texts: thatgamecompany's *Flower*

In the spirit of comparison, we could turn to thatgamecompany's *Flower* (2009), a lyrical, largely meditative game that begins with images suggestive of urban ennui—a forlorn, potted flower drooping on an apartment windowsill, a brief cutscene portraying a breathless summer day in the city—but quickly expands into the imaginative realms of vegetal plenitude. Selecting the wilting flower carries you into *Flower*'s first level, a landscape of verdant hills and distant cliffs in which every blade of grass is lovingly rendered and curving lines of unopened flowers beckon you onward (Figure 6). You soon notice, however, that each level of *Flower* begins in an environment that is somehow marred or drained of its full vibrancy, marked by swaths of withered grass, defunct machinery, or collapsed structures. Alighting on or brushing past unopened flowers causes them to bloom and effectively rejuvenates the surrounding landscape, infusing its moribund aspects with a mysterious natural energy.

Visually stunning and replete with natural imagery, *Flower* appears to trounce *Adventure* as a game mesocosm, but the opposition is not as one-sided as it might seem. *Flower* is unquestionably beautiful, but my interest in the game stems less from its graphics than its underlying mechanics. Since most games oblige players to enter into a player-environment relationship

Figure 6. Wind works to rejuvenate landscapes in thatgamecompany's *Flower*.

based almost wholly on extraction and utilization of natural resources that are often effectively infinite, *Flower* is daring to contemplate an alternate schema. In fact, *Flower* fulfills Lawrence Buell's criteria for an "environmental text," as presented in *The Environmental Imagination.* For Buell, an "environmentally oriented work" is one in which:

1. The nonhuman environment is present not merely as a framing device but as a presence that begins to suggest that human history is implicated in natural history.
2. The human interest is not understood to be the only legitimate interest.
3. Human accountability to the environment is part of the text's ethical orientation.
4. Some sense of the environment as a process rather than as a constant or given is at least implicit in the text.[26]

Above all, the ideal environmental text produces involvement. It brings the nonhuman world into equal prominence with the human, exposes humanity's moral responsibility to and participation in the natural world, and portrays the environment as fluid process, not static representation. While not all games can satisfy all of these criteria, games seem especially well suited to the last—

they are, after all, inherently processual, requiring rule-based, procedural interaction between a player or players and multiple environments. And in theory, games could use their ability to model environmental change to bring the first three criteria into play in instructive ways as well, for instance by tying environmental change to player action or inaction.

At first glance, *Flower* appears inclined to discard the human entirely in favor of the nonhuman. Human presence and activity are often suggested, but they are never directly seen, unfolding instead through abstract and disconnected images of city life. Accordingly, each level begins with a telling inversion of typical game "cutscenes," moments in which games usually showcase their most refined animation via photorealistic glimpses into key characters' lives and dramatic episodes. In contrast, *Flower*'s cutscenes are conspicuous for the absence of the human, shifting priority to the environment and establishing an elegiac tone that reads as a grim warning about urban anomie. Moreover, many of the game's reviewers have suggested that *Flower*'s levels represent the daydreams (and later nightmares) of house plants[27]—a quirky idea corroborated by the designers' decision to have the player essentially "play" wind, using the controller's SIXAXIS™ motion-sensing technology to navigate through the given landscapes, visiting un-opened flowers like some kind of spiritual pollinator and causing them to bloom. Unlike most games that offer players human or at least humanoid avatars, *Flower* destabilizes not only player corporeality but also player agency and perspective. Each level is an invitation to inhabit an other-than-human consciousness, and as a gust of wind you are essentially invisible except *through* your effects on the environment: the wake left by coursing through tall grasses or the intangible suspension of multicolored flower petals gathered throughout each level (or, as the character George Orr opined in the epigraph to this chapter, "What we do is like wind blowing on the grass.").[28] The result is not lack of embodiment so much as amorphous embodiment, as the game tenders several forms of interactive feedback: the controller responds to the rotation of your hands and wrists and gently shakes at appropriate times (haptic feedback via DualShock technology), and the game's elegant sound design features music, the sound of wind, and the tonal notes triggered by coursing over and through flower nodes. A successful run of a line or group of flowers achieves a satisfying burst of sound, and while the sunnier levels employ bright, melodic tones, the darker, more disturbing levels turn to atonality in a subtly unsettling way. The geographic transition from

city studio to country meadow is at the same time a liberating spatial transition from flat, pictorial representation to ambient immersion. Movement formerly restricted to two axes transforms into navigable space that extends out in all directions, as the game encourages you to shed your sense of terrestrial bounding in favor of birdlike swoops and skims. Celebrating broad, open landscapes and sensations of weightlessness and speed, *Flower* melds almost photorealistic environmental detail with patently imagined elements—minimalist flowers in neon blue, pink, and yellow hues, panoramic expanses expressive of both painting and cinematic animation.

However, while *Flower* might seem at first glance a condemnation of urban blight and human encroachment on a pristine natural world, many of the levels explicitly address in an encouraging way the player's powers to ameliorate human damage or even return life to human inventions. In several levels, your actions set defunct windmills to turning, or restore power to electrical lines (evidenced by lights strung along them), or create bioluminescent haystacks; in others, you weave your way through twisted electrified metal, gently opening ghostly white flowers that render the wreckage harmless. Far from condemning human intervention, *Flower* attempts to bridge the country and the city through the player's experiential journey. Both daydream and nightmare, *Flower* brings to life both faces of environmental thinking as described by Morton in *The Ecological Thought*: the sunny optimism characteristic of "green" marketing as well as the dark underbelly of waste, despair, and the emptiness of space—the abject realities of our existence on planet Earth.[29] Like *Adventure*, *Flower* embodies a fascination with the unlit spaces beneath the surface of everyday life, and foregrounds natural environments as constitutive of, rather than supplementary to, gameplay. The game directs our attention to a nonhuman world on the margins of human society, where progress is tied to visitation and restoration rather than exploitation and strife. Its self-paced, lyrical set of stages led some traditional gamers to decry the lack of firearms and buxom women while others, including Sony executives, saw it as the vanguard of "Zen" gaming.[30]

Flower's landscapes are admittedly somewhat generic, despite creative director Jenova Chen having taken his inspiration from the windmill-blanketed hills of California, and the game is far from being biologically or ecologically accurate, but it should be celebrated for its careful decentering of human agency and its unusual lyricism, which invite both aesthetic joy and conscious reflection on the environment. Thatgamecompany's first trio

of games, which aside from *Flower* included a model of microbial life (*flOw*) and the desert saga *Journey* (discussed in chapter 3), demonstrates that games are not just technical but also emotional experiences; games generate anticipation, pleasure, anger, the thrills of fear and engagement, and even sadness.[31] As neuroscientist Antonio Damasio usefully reminds us, emotions are not mere decoration over the base functionality of an organism, but rather part of our congenital toolkit to navigate and respond to our environment. Moreover, that environment need not be the "real" one that surrounds us in physical, natural space. Instead, an "emotionally competent stimulus" can be "a certain object or situation actually present or recalled from memory."[32] To support this conclusion, Damasio unearths Benedict de Spinoza's statement that "A man is as much affected pleasurably or painfully by the image of a thing past or future, as by the image of a thing present," from *The Ethics* (1677), Part III, Proposition 28. Spinoza's proposition adds a new temporal dimension to our consideration of game environments—the future—as well as the language of the "image." This is key to the power of games as affective environments, particularly those concerned with environmental futures ranging from Edenic, peaceable kingdoms to ecological disaster (chapter 5).

Spinoza's theory and Damasio's research suggest that games are not hermetically sealed objects or environments, divorced from "real life" and the range of emotions and events we experience there. In addition, emotion becomes part of the player or user's learned and genetically predisposed tools for navigating virtual environments. Just as coming upon a wild bear or precipice might trigger the emotion of fear and the corresponding complex of mental and physiological responses—elevated heart rate, a surge of adrenaline, a nervous sweat, heightened senses—so might rounding a corner in *Half-Life* (1998) and encountering a legion of undead zombie scientists provoke the same fright. The emotions experienced by gamers also need not be limited to these more dramatic examples. Games like *Flower* deliberately set out to expand the emotional spectrum of games, and furthermore, to create complexes of emotions, sometimes contradictory, often subtle, that realistically reflect the conundrums of everyday life—awe and terror, bittersweet joy, poignancy and levity. One of Damasio's statements could very well be a description of Chen's games: "If anything in our existence can be revelatory of our simultaneous smallness and greatness, feelings are."[33]

Games are of course assemblages of computational processes, an approach emphasized by Ian Bogost and Noah Wardrip-Fruin, among others, but games

are also emotional constructs with historical underpinnings, something akin to Raymond Williams's "structures of feeling." Both *Adventure* and *Flower* literally depict natural scenes, but that alone is not sufficient to qualify them as environmental texts. What is also needed is a design attitude that somehow decenters or displaces the human agent, calls attention to the environment as more than mere staging, and introduces gameplay mechanics beyond gross assault and exploitation. In other words, Moore's Law doesn't matter, or at least not as much as most industry pundits would have you believe. (Moore's Law is named after Intel cofounder Gordon Moore, who predicted in the 1960s that integrated circuits could contain roughly double the number of transistors about every two years, really twenty months. The law is often used to predict the exponential growth of computer processing power.) While most of the game industry for the past forty odd years has been tied to the notion that better games demand higher quality graphics, lifelike settings and characters that approach the real, a few have begun to question this paradigm, among them designers aware of Japanese roboticist Masahiro Mori's notion of the uncanny valley, and *New York Times* writer Edward Rothstein, who in 2002 penned the provocative column "Realism May Be Taking the Fun Out of Games."[34] Mori famously hypothesized that lifelike humanoid robots would trigger positive emotional responses from humans only up to a point, just before true verisimilitude, after which human response would actually be less favorable because the robots would appear eerie, or uncanny. This notion of the uncanny valley has been subsequently applied to everything from digital special effects in horror films to children's toys and video game art. Similarly, while Rothstein acknowledged that "One of the major goals of video game systems has been to simulate the real, to create images so lifelike, and movements so natural that there is no sense of artifice," he also noted a curiously antitechnological streak in many of the games developed for recent generations of home gaming consoles. He gives as an example Nintendo's game *Pikmin* (2001), named for the ambiguously vegetal-animal creatures that must be marshaled to fix the player's broken spaceship and complete the game. For Rothstein, *Pikmin* and other titles demonstrate "a tension in the video game universe: technological powers are courted for their possibilities and resisted for their fetishistic demands." Ultimately, he posits a spectrum with at one end games that leverage the increased realism offered by more powerful processors and graphics engines—fighting games, racing games, and shoot-'em-ups—and at the other more "abstract"

games like puzzle and mystery games that rely less on visuals than on the satisfactions of exploring an at first unknown and complex set of rules. While *Adventure* would presumably fall on the abstract end of this spectrum and *Flower* on the realistic one, Rothstein's thrust is that *Adventure* need not apologize for its lack of visual pyrotechnics.

Economist Edward Castronova would probably agree with Rothstein on this point, having once concluded that "great graphics are neither necessary nor sufficient for a successful synthetic world."[35] Noting that the majority of MMORPGs are medieval in theme, Castronova jokes that there can be such a thing as too much realism—after all, what player would want the disease and filth and stench of real medieval cities in a game? Rather (and this is the way we prefer it, according to Castronova): "All in all, the synthetic environment looks rather like a very nice painting. Even a dull painting would have been sufficient, but nevertheless, the painting is getting better and better every year."[36] Some might read this as evidence of the malaise of urban modernity and nostalgia for a sanitized, pre-industrial past; however, Castronova suggests that immersion does not spring from verisimilitude, but rather from "selective fidelity" to real details. The term "selective fidelity" was coined in the 1980s by a researcher working for the Defense Advanced Research Projects Agency (DARPA), specifically on the SIMNET (Simulation Networking) tank warfare training simulation,[37] but it is also clearly reminiscent of Roland Barthes's description of the "reality effect" in literary discourse as the product less of exhaustive than telling detail.

This productive decoupling of immersion from graphics reminds us that realism is never purely the domain of the visual, and that immersion requires little more than the "magic circle" provided by games or gamelike scenarios. Early role-playing games, now quaintly referred to as "paper-and-pencil" or "tabletop" games, were conducted entirely face-to-face, using paper, writing implements, dice, and little else. Alexander Galloway has also usefully approached game realism from the standpoint of "social realism," whereby one evaluates a game's realism in terms of the conformity between the game world and the player's social, political, and other lived contexts. His primary example involves comparing the experience of a young Palestinian boy playing a Hezbollah-sponsored first-person shooter versus the American military's recruiting game *America's Army* (2002).[38] In the former case, the game achieves realism; in the latter case, realism is blocked by the player's misalignment with American military attitudes and goals. What matters here

for a game like *Adventure* is the unhitching of realism from crisp visual detail and other forms of postmillennial game design—polygon count (higher numbers mean less jagged edges), texture mapping (the lieutenant's suit looks like real wool), and haptic feedback (the controller shakes when you fire a gun) matter little on this account. As Microsoft, Sony, and Nintendo move to game consoles featuring body mapping, voice recognition, motion-sensitive control, and virtual-reality capabilities in the ever-present quest to break down the walls between artifice and reality, it is important to recognize the value and validity of earlier forms of environmental modeling in games. In the terms set forth by this chapter, both *Adventure* and *Flower* are successful examples of environmental realism (although *Flower* is more accurately called a form of environmental idealism), *Adventure* for its descriptive texture and navigational structure, and *Flower* for its emphasis on the nonhuman and on remedial environmental interaction. They are realistic without being real.

Game design and game studies anthologies have often acknowledged *Adventure*'s importance in the genealogy of both computer games and interactive fiction, but most have downplayed the game's unusual relationship to the Mammoth Caves in Kentucky. Likewise, players of *Flower* may not realize that the tonal progression of its landscapes was directly influenced by designer Jenova Chen's relocation from urban Shanghai to southern California.[39] But given my determination to detach a game's environmental realism from the obvious matter of its visual accuracy, why then should it matter whether or not *Adventure* was based on a real system of caves? Crowther did not intend his textual descriptions to serve what Morton calls one of the primary roles of ecomimesis—that of "authentication"—seeing as the vast majority of *Adventure* players were not cavers but gamers, and had never visited or planned to visit the Mammoth Caves. Similarly, would *Flower* be any less compelling if we knew that its environment was based on an imaginary topography, something created from whole cloth and unverifiable by direct experience?

Designers might understandably loathe subjecting game design to the strictures of physical laws and environments known to our universe, seeing them as fetters to truly imaginative world-building. Nonetheless, it is tempting to see the environmental realism present in *Adventure* and *Flower* as the basis for a defense of video games. So much of antigame rhetoric that takes the form of concern over children's time spent sequestered indoors

("Why are you playing games in here when you could be playing *outside*?") seems to follow the pattern of attacks on the ecocritical project ("Why write about the environment when you could just go outside?"). The same flaws characterize both avenues of questioning: not only the positing of a falsely limiting either/or but also the not altogether ridiculous supposition that the only way to experience nature is to be exposed to the elements. Though in radically different ways, literary scholars like Buell and Morton and game designers like Crowther and Chen remind us why we should bother to create literature, art, or games that portray people's relationships to their environments. Rather than seeing this as introducing a barrier to understanding, we can see the particular realization of an environment—whether textual, visual, or procedural—as a filter that helpfully selects certain aspects for consideration while excluding others, something like Max Black's discussion of linguistic metaphor or Andy Clark's replacement of the Cartesian mind-body problem with what he calls the "mind-body-*scaffolding* problem" in *Natural Born Cyborgs*.[40] Recalling Marshall McLuhan, Clark argues that what distinguishes humans is not so much some sort of innate genius but rather our capacity to use tools and our environment to complement and extend our otherwise limited powers of reasoning. This closely resembles what I have called the mesocosm in relation to video games, their playable spaces, and the places in which they are played.

Although the term "virtual reality" (VR) might seem apropos here, I much prefer the alien but intriguing "mesocosm" to VR's technological, historical, and contemporary baggage, of which there is plenty, from its lurking inferiority complex and undeserved reputation as a reality-usurping bogeyman (depicted in films like David Cronenberg's 1999 *eXistenZ*) to its present reinvigoration as the "next big thing" in gaming despite still comically clunky headsets and controllers. In this, I join a growing cadre of academics who call the very term "virtual reality" into question by underscoring the lack of a hard dividing line between its two aspects. Castronova, for instance, relegates VR to an appendix in his first book on "synthetic worlds," seeing it as a relatively inconsequential phase of technical development tangential to the kinds of player experiences found in MMOGs. He even uses the (biological) metaphor of the permeable membrane to describe the easy passage between the real and the virtual, although his paradigmatic examples are financial, as in the case of real-money trade, or the sale or purchase of virtual items and currency for actual money. A wide range of other research in the social sciences

and humanities also supports the observation that players do not experience
virtual worlds as separate realities: Constance Steinkuehler, Nick Yee, James
Paul Gee, Mia Consalvo, and many others point to games as extensive envi-
ronments for learning and social bonding; anthropologist Bonnie Nardi
describes play in a game like *World of Warcraft* as active aesthetic experi-
ence, in terms originally set forth by philosopher John Dewey and activity
theorist Alexei Leontiev; N. Katherine Hayles considers the epigenetic changes
wrought by digital media, particularly on reading and cognition;[41] and, in
a conclusion particularly relevant to this book's concerns, Henry Jenkins
argues that "video games constitute virtual play spaces which allow home-
bound children . . . to extend their reach, to explore, manipulate, and inter-
act with a more diverse range of imaginary places than constitute the often
drab, predictable, and overly familiar spaces of their everyday lives."[42] Jen-
kins credits video games with compensating for the loss of what was already
in his generation not so much "wild" land as marginal land—areas of over-
growth or undeveloped property within or between suburban enclaves that
allowed unsupervised young boys to exercise their bodies as well as their
imaginations. Notably, in this he takes a position completely counter to that
of Louv and those with analogous qualms concerning electronic exclusion
of the natural.

Game environments necessarily exist somewhere between Jenkins's attrac-
tive idealization and Louv's worried skepticism. Though games might serve
as a palliative for "latchkey" kids whose parents work long hours, or anyone
without the means to adopt the "weekend warrior" mentality of the privi-
leged, game environments are ultimately not the environments that players
live in. Environmental justice activists warn us of the danger of deflecting our
hopes for environmental quality onto the places other than where we live—
whether those are national parks, wildlife sanctuaries, or compelling vir-
tual realities. With Lisa Nakamura's description of online identity tourism in
mind, we might advise ourselves of the risks of virtual environmental tour-
ism: pleasant abstraction from actual environmental realities in need of our
conscious attention and intervention.[43] Nevertheless, given that game and
related equipment sales generated over 30 billion dollars of revenue just in
the United States in 2016, we cannot turn a blind eye to the kinds of game
environments that are being produced and played.[44] Games have always been
subject to accusations of escapism, and acknowledging the ecomimetic and
mesocosmic properties of games might begin to erode the oft-posited but

little-experienced divisions between the real and the virtual, the ecological and the literary, the visual and the textual. Like literary texts or artworks, games allow for a range of interpretation, but importantly, through active, exploratory play. Games offer environments that are not stable, but shifting, that react to player input, and both *Flower* and *Adventure* demonstrate that those reactions need not be of a purely instrumental kind. As we will see in the next two chapters, game environments may invite affective and ethical engagement, not only with other people, but also animals, places, and even things. Game environments, whether they are based on known places or not, are not impervious to correspondence with real-world environments. Although this perviousness could be approached in any number of ways, from literary formulations like Morton's ecomimesis and "ambient poetics" to various approaches in media and environmental aesthetics,[45] in this chapter I have suggested the ecological framing of the mesocosm because for me it best captures how game environments rely on and reimagine the world. I remain charmed by the ways in which *Adventure* and *Flower* draw inspiration from Kentucky and California, and how their emphasis on navigation and location draws our attention to basic aspects of inhabiting environments: being surrounded by and moving through them, ambience and ambulation.

Walking in Games

In his unconventional 2005 article in *Digital Humanities Quarterly*, Dennis Jerz not only recovers and analyzes *Adventure*'s original source code, comparing Crowther's version with the one Woods amended, but also embarks on an expedition to Kentucky to assess the accuracy of the game's environmental descriptions.[46] Aided by members of the Cave Research Foundation, Jerz takes pictures as he and his guides descend into the Bedquilt region of Mammoth Cave National Park. As Jerz was aware, the extensive lore around *Adventure* includes numerous testimonials from avid players who, upon visiting the real cave system, were purportedly able to use their detailed knowledge of the game to navigate underground. Although Jerz seems to rely less on his familiarity with the game than on his human companions, he does seek out and document a lengthy series of game referents. The result is an annotated "photographic walkthrough," images from the real cave system captioned with the corresponding lines of textual description from *Adventure*. Less interesting is the matter of *Adventure*'s physical accuracy; rather, Jerz's journey playfully suggests that established notions of game scholarship can

be expanded to include more ecocritical concerns, offering a new, more flexible methodology for approaching game environments—the walkthrough.

Walkthroughs, in common parlance, conjure images of real estate tours, theater rehearsals, or airy passageways between buildings. In the world of video games, however, the term "walkthrough" has come to mean a kind of "how-to" authored by experienced players for the purpose of guiding novice players through difficult game material. Most often textual, these walkthroughs sometimes include player-generated maps, screenshots, or lines excerpted from the games themselves. In addition, game walkthroughs typically adopt the second person, addressing the reader with the familiar "you" and thus echoing the present-tense affectation of ecomimetic writing.[47] Jerz's deliberate conflation of multiple *Adventure*s—game, text, and environment— implies that sometimes literally facing the worlds of game fantasy can produce significant exchanges. Not only are games always more than artificially isolated, ludic spaces, but we can also repurpose the game walkthrough in any number of ways, taking something conventionally designed as a cheat or guide for time-strapped or less experienced players and turning it into anything from a ranger-led interpretive walk to a Zen mindfulness exercise to performance art. Players have already, for instance, developed a subgenre of machinima that we could call machinima nature walks, where players use expansive game worlds like Bethesda Softworks' *Oblivion* (2006) and *Skyrim* (2011) to mimic a stroll outside.[48] There is artist Brent Watanabe's recent hack of *Grand Theft Auto V* (2013), the San Andreas Deer Cam, which uses a faux National Park Service web page to turn the famously violent street game into a play on the beloved animal webcam. On the more serious side, in 2008, performance artist Joe Delappe used the virtual world *Second Life* (2003) jury-rigged to a treadmill to reenact Gandhi's famous salt march, and thatgamecompany's *Journey* (2012) reverses most games' casual erasure of physical effort by forcing players to slog slowly through sand (chapter 3).

Perhaps most interesting is the rise of the so-called "walking simulator" game. Many cite the Chinese Room's 2012 release of *Dear Esther* as inaugurating the genre, along with close successors like *Gone Home* (2013), *Proteus* (2013), *30 Flights of Loving* (2012), and *The Stanley Parable* (2013). These walking games have proven intensely polarizing to game communities—while some celebrate the atmospheric quirkiness of these games, they have also excited a great deal of reactionary ire from more conservative game players.

The games were quick to earn the lightly mocking label "walking simula-tors," or sometimes "first-person walkers," leading *Kill Screen* writer Miguel Penabella to wonder "Why are we so afraid to walk?"[49] The developers of such games have generally shrugged off the negativity, claiming to have no interest in debating whether or not their games are actually games. But I suspect that if we linger on the discomfort, even the threat that these games seem to represent for certain players, we may gain insight into not just how we traditionally define value in games, but also games' relationship to the quotidian world. Perversely, I suggest that the very qualities of walking simu-lators that upset conservative gamers—their slowness, their lack of action, the absence of people, their spatial storytelling—indirectly indicate a path forward (pun intended) for more environmentally sophisticated game design. My pro-posal to refashion the game walkthrough from an expert guide for struggling players to an active exploration and appreciation of game space and place is a call to inhabit different game worlds and to inhabit game worlds differently.

For fans, walking simulators capture something of the poet Wallace Stevens's lines in "Of the Surface of Things," whose rhythm and overt content suggest the expansive benefits of strolling. As Stevens writes, "In my room, the world is beyond my understanding; / But when I walk I see that it con-sists of three or four / hills and a cloud."[50] Although no one has completely codified their characteristics, walking simulators are often praised for their lush visuals and atmospheric environments (which leads some commentators to suggest that walking simulators are ideally suited to present horror and mystery narratives). Others have used the term "first-person explorer" to high-light what they believe is the genre's preferred mode of player-environment interaction. Eric Swain, one of the first to dedicate blog space to the walker game, concluded that *Dear Esther* reduced gameplay to just two mechanics, moving and looking; he then compared it to Andy Warhol films like *Empire* or *Vinyl* in its minimalism, which forces you to pay close attention to the smallest of details. A year later, Swain found himself wrestling with a more complex question in reference to the Japanese tsunami memorial game *9.03m* (2013)—namely, whether a minimalist first-person walker was counterintui-tive, since "half of the activity in the genre of the first person walker is looking at stuff."[51] Ultimately, he concludes, "First person walkers are contemplative by nature, but they require something to spark and engage that contempla-tion during the time spent walking, whether that be audio diaries, frenetic editing, or mysterious happenings to discover."

Swain is just one of many critics who have noted that first-person walk-ers inevitably raise questions about what constitutes gameness—are walking sims just stripped-down versions of existing game types, like point-and-click adventures or open-world games? Or are they closer to cinema or interac-tive art than "actual" games? In that case, what makes a game a game? Is it mechanics? Exploration? Subjectivity? Difficulty or dexterity of action? As Ed Key, the developer of the game *Proteus* (2013), has joked, the term "walk-ing simulator" is not all that accurate, since games like his do not actually focus on the act of walking.[52] For Key, a true walking simulator would be something like the game *QWOP* (2008), which has generated its own reams of hate mail for turning the seemingly simple act of running into a night-marish keystroke challenge. I might add the satirical game *Pussy Walk* (2015), which none too gently mocks Czech president Miloš Zeman for showing up drunk to a showing of the Czech crown jewels, challenging its players to steer an inebriated game version of Zeman across a room strewn with laugh-able obstacles.[53] We could also include gamified apps and devices promoting personal exercise, like Nike+, Fitbit, and Runkeeper, which overlay real walk-ing or running with gamelike goals and rewards.

For me, the fight over whether walking simulators can rightly be called games echoes not only similar brouhahas about art games, serious games, casual games, and so forth, but also more interestingly the established debate in literature over whether science fiction is inferior literature because it gen-erally prioritizes world design over character and plot.[54] Given my invest-ment in developing an ecologically inflected theory of gameplay and design, in which game environments ideally do more than serve as scenic backdrop or standing reserve, it is tempting to see the hostility toward both sci-fi and walking simulators as one brand of anthropocentric elitism.

A full discussion of the scholarship on science fiction world-making is impossible here, but it is worth ending with one particular game, *Firewatch*, and the ways in which it foregrounds the physical act of walking and navi-gating the outdoors, and the possibilities for integrating location research into game design and development. *Firewatch* was released in February 2016 and was billed as a mystery adventure game that takes place in the Wyoming wilderness in the year 1989. You play as Henry, husband to a woman suffer-ing from early onset dementia, and you begin the game by taking a job as a fire lookout to escape this rather complicated life. Henry develops a rela-tionship to his supervisor and fellow fire lookout, Delilah, through scattered

walkie-talkie-style conversations, and the game essentially follows Henry as he tries to do his job—keep the park safe from fire—while reconciling his newfound affection for Delilah with his troubled commitment to his wife.

What interests me about *Firewatch* is in part the game itself, which lovingly reproduces the look and form of a national park (Figure 7) and arguably does for hiking what *Adventure* did for caving, and in part the research process that Campo Santo developers undertook while making the game, which recalls Crowther's process of developing *Adventure.* Prior to its acquisition by Valve in April 2018, Campo Santo was a small San Francisco–based game development studio with only about a dozen employees. According to their dev blog posts, "Over the development of *Firewatch*, members of the team have visited about a half dozen lookouts across the western United States," and Campo Santo environment artist Jane Ng even consulted Pacific Northwest forest service fire lookout schematics to get the look and feel of Henry's tower just right.[55] Thus the exterior of Henry's tower in *Firewatch* looks quite a lot like the Ute Mountain Lookout tower, in the Ashley National Forest in Utah, and the tower's cramped interior living space seems to

Figure 7. The view from Henry's lookout tower in Campo Santo's *Firewatch*, whose wilderness is modeled on the Shoshone National Forest in Wyoming.

be modeled closely on the Huckleberry Lookout in Glacier National Park, Montana. Campo Santo's outdoorsy research could be dismissed as just another instance of Silicon Valley elites raiding nature for inspiration,[56] but it also augurs game design that is meaningfully site-specific and conscious of bodily embeddedness in the world. After all, as Rebecca Solnit reminds us in her 300-plus-page homage to walking, *Wanderlust*, "Walking . . . is how the body measures itself against the earth."[57]

Although we ought to be conscious here of the peril of an ableist inattention to other ways of moving through or with games both as player-character and player, we may still appreciate walking simulators for their mesocosmic ambitions—both outside, and in; expansive, yet bounded; and demanding inquisitive experimentation while being carefully designed. As we saw in *Walden, a game*, Tracy Fullerton's playable version of one of our most famous nature writer's footloose wanderings, walking games promote less navigational zeal than languor, and exploratory modes based less on masterful occupation than momentary visitation. Whereas Thoreau piously wondered in the posthumously published essay "Walking," "When we walk, we naturally go to the fields and woods: what would become of us, if we walked only in a garden or a mall?" *Walden, a game* resituates us mesocosmically, turning our bodies and skin into permeable membranes between world, game, and something further. What's more, when we walk in games, we walk somewhere between wild fields and woods and tended gardens and malls. Remarkably, from the Peripatetics of ancient Greece to the Situationists and their dérives, the simple act of ambling from one place to another has proven central to the development of philosophy, literature, art, and now games.

Alternate and Augmented Realities

Most of the games discussed thus far have been commercial projects designed to entertain without necessarily challenging players to consider their relationship to environments, real or virtual. That many of them have accomplished the latter while pursuing the former speaks to the potential synergy of the two objectives: creating game environments that reward diverse modes of engagement and depict nature less as dumb show than interactive theater can generate more interesting and absorbing gameplay. What happens, then, when a game takes the real world as its playable space? Or when a game takes on actual problems, for instance, health risks or the ever more elephantine carbon footprints of American consumers? Do these kinds of games

contradict my initial contention that a game's environmental realism does not always correlate with its fidelity to real environments, or that any game, no matter how simply rendered, may be read as an environmental text? While proponents of unmediated natural experience, like Richard Louv, David Sobel, and Lowell Monke,[58] might be tempted automatically to grant such games a crucial advantage in addressing environmental ills because they follow a paradigm based on direct, physical interaction with the real world overlaid with a gamelike scenario, I am myself reluctant to grant them an inherent superiority over exclusively digital games. Furthermore, the current industry trend toward "gamification" of everything from marketing to personal care represents a desire to co-opt the attractions and motivational efficacy of games in an indiscriminate manner that may ultimately prove detrimental to games' civic value.[59]

Before we turn to the increasingly high-profile genres of alternate- and augmented-reality games (ARGs and AR games) and their intersections with "serious" games—that is, games that render porous the usual barriers between game world and real world and those that deliberately tackle social, political, and educational content—it is worth returning for a moment to Lawrence Buell's four criteria for literary "environmental texts" and the eco-mimetic conundrum posed earlier in this chapter. While writers like Dana Phillips and Timothy Morton see mediation as the central issue for the constitution of environmental literature, Buell's criteria neatly sidestep the debate by invoking the language of "interests," "accountability," and "process"—like Bruno Latour's Parliament of Things,[60] the environmental text is as much legal as literary, and its efforts at "representation" must be understood as both a signifying and a speaking for. Rather than hitch a text's environmental quality to its ability to immerse a reader in a linguistically performed natural setting, Buell assesses the rigor of the text's ethical and ecological attachments. Succinctly put, Buell suggests that the environmental text is less about personal than intersubjective experience. In it, environments are dynamic agents in their own right as well as the loci for shared human understanding.

My approach to game environments is markedly similar. I am less concerned with graphical fidelity, the kind of realism that comes with hundreds of hours of painstaking, 3D modeling work by artists using expensive software packages, than with responsiveness and responsibility—an accuracy regarding the kinds of relationships that inhere between humans and their

environments and between elements within those environments, whether
or not humans are present. Though I am not proposing that serious games
and alternate- and augmented-reality games are the most effective means
to bring environmental considerations to the forefront of game design and
experience, they certainly offer some promising avenues. They may also
furnish important limit-cases for games' potential to cross over into more
explicitly civic and political arenas. ARGs and AR games are, after all, often
classified under the rubrics of locative media and pervasive play.[61] Although
the growing literature on mobile media experiences is too large to summa-
rize here, it is worth noting that games scholars recognize that mobile gaming
is not a phenomenon restricted to smartphone use or other contemporary
portable media devices. For instance, Espen Aarseth considers books, board
games, and card games as predating modern mobile entertainment forms,
and Jussi Parikka and Jaakko Suominen similarly argue that mobile games
already existed in the nineteenth century, at least in the West, linking mobile
games to modern experiences of travel and urban space.[62] Concurrently, it
is worth acknowledging that many traditional and nontraditional nonelec-
tronic games have sallied into the environmental arena. Artist Mary Flanagan
has already usefully extended game studies both historically, back into the
nineteenth and early twentieth centuries, and generically, to include every-
thing from doll play to improvisational and situational theater.[63]

   Accordingly, after providing a brief overview of the development of both
alternate- and augmented-reality games, I set out a series of examples in both
areas, as well as relevant nondigital or otherwise unconventional varieties
of mesocosmic play. These will include environmental "what if?" games like
World without Oil (2007); the location-sensitive health games of new media
artist Greg Niemeyer, *Black Cloud* (2008) and *AirQuest* (2012); and the urban-
exploration game *Play the LA River* (2014–15). Niemeyer's games and *Play
the LA River* integrate players into urban environments in ways that create
awareness of pollution sources and revitalization efforts, and games like *World
without Oil* invite players to make present realities out of potential ecological
futures. Together, these games testify to the impact that new forms of net-
worked interaction may have on ecological instruction, from the leveraging
of social networks to the incorporation of mobile, handheld, or portable
devices. A further examination of analog games (the German board game
Power Grid [2004]), installations (an interactive American museum exhibit
about melting polar ice), and escape rooms (an outdoor "nature escape room"

designed by environmental science and management graduate students) then extends the broad range of game types and player participation models covered thus far.

Of Bees and Beasts

Although serious games can take many forms, only one of which is the alternate-reality game, I consider the two types here together because both intentionally collapse traditional barriers between real life and gameplay, or ordinary and extraordinary realms of interaction. For some, serious games' explicit handling of real-world problems automatically disqualifies them from status as games, whether because the playing is not entirely voluntary (as in the case of occupational training games) or because the games lack a strong sense of an imaginatively removed "magic circle" that demarcates play from normal life. Serious games often fit more comfortably under the auspices of art or education than recreational gaming, a classificatory quandary evident in the very paradox of the term "serious game." Examples include the scientific protein-folding game, *Foldit* (2008), developed by researchers at the University of Washington; and journalistic and political news games of the kind found at newsgaming.com, for instance the deceptively simple commentary on the war on terror implied in *September 12th* (2003).

ARGs do not necessarily engage directly with social issues, like serious games, but they do even more to blur the usual boundaries between game worlds and real world. Though the ARG genre clearly has ties to many earlier game and story forms, including tabletop and live-action role-playing, theater, scavenger hunts, and conspiracy theory, ARGs are widely considered a product of the new millennium. Many experts cite the 2001 game *The Beast* as the first of its kind, and also credit it with setting the genre's as yet unsurpassed high-water mark. Microsoft and DreamWorks commissioned the game as an innovative promotional device leading up to the June 2001 release of the Steven Spielberg film *Artificial Intelligence (A.I.)*. Never officially announced as such, *The Beast* and its principal "puppetmasters" (Sean Stewart, Elan Lee, and Jordan Weisman) instead relied on clues embedded in the movie trailer and poster to bring curious players into the game itself—ludic and narrative introductory devices known as "rabbit holes," an expression that pays homage to the similarly fantastic world-crossing in Lewis Carroll's *Alice's Adventures in Wonderland* (1865). As it turned out, the film *A.I.* disappointed both critics and moviegoers while *The Beast*'s penultimate entertainment

was lauded as an unparalleled success, having captured the nearly undivided interest of over ten thousand players over a period of nearly two months, many of whom went on to become loyal adherents of the genre.

Now almost two decades old, the growing ARG community has witnessed a succession of failures leavened by occasional triumphs. The late ARG designer Dave Szulborski (*Chasing the Wish* [2003] and *Urban Hunt* [2004]) described the commercial entertainment landscape as littered with poorly developed attempts to leverage an ARG as transmedia mass-marketing campaign, including Electronic Arts' *Majestic* (2001) and MindQuest's *Terra-Quest* (2003). Fortunately, another highly successful ARG and touchstone for future work arrived in 2004 with 42 Entertainment's *I Love Bees*, developed in advance of Microsoft's game *Halo 2* (2004) for Xbox Live. Intended to foster "a narrative bridge" between the first *Halo* game and its sequel, *I Love Bees* presented a fragmentary story of an alien intelligence forced to express itself through human communication systems.[64] Then lead community designer, now veteran puppetmaster and game designer Jane McGonigal describes *I Love Bees* as "a Web-based interactive fiction that used websites, blogs, emails, jpegs, Mp3 recordings, and other digital artifacts to create an immersive back-story for Microsoft's sci-fi shooter videogame *Halo 2*." In a published case study, "Why *I Love Bees*," McGonigal stresses the ARG's functions as "a game-based digital learning environment," or "a kind of investigative playground," and as "a tutorial in collective intelligence."[65] This last mandate stems directly from French theoretician Pierre Lévy's writings on collective intelligence as a new, technologically driven stage in humanity's development.[66] McGonigal suggests that alternate-reality games are ideal vehicles for teaching today's youth the strategies and skills necessary for success in a networked media- and technology-saturated global communications environment.

To comprehend why ARGs have proven so compelling, we might turn again to ARG designer Dave Szulborski, who argued that the terms "alternate-reality game" or its common synonym "immersive game" are, in fact, largely misnomers.[67] Well-crafted alternate-reality games, he writes, actually do their best to disguise the fact that they are games, attempting to blend into players' real daily activities in a seamless fashion by using media and communications devices such as print, cell phones, and the World Wide Web that players already routinely use in the course of their normal lives. Referring to classic definitions of games that highlight their necessary separation from

the ordinary, Szulborski notes that ARGs actively work to conflate "real life" with the played universe, encouraging players to see the game as actuality rather than an alternate or immersive reality (in the sense that it transports you away from normal life or makes you lose your sense of immediately present physical reality). ARGs tap the inherent power of good storytelling along with the simultaneous instantaneity and anonymity of the internet and related communication forms—text messaging, instant messaging/live chat, email, websites, video clips, phone calls, even discoverable crafted artifacts—in order to engage participants in play that is seemingly not play, or what Szulborski identifies as the "This Is Not a Game" (TINAG) philosophy. Unlike most traditional computer or console games, ARGs at launch are often only partially scripted. In other words, ARG puppetmasters leave themselves ample room to accommodate both major and minor alterations in plot, character and puzzle design, and pacing, as players may fall short of or exceed expectations. This constant interplay between game designers (including writers, community leaders, actors and actresses, artists, and so forth) and game players, in which the emergent skills, expectations, and demands of the participant base influence game outcome and structure, Szulborski calls "interactive authoring" and McGonigal calls "real-time redesign." In their flexible capacity to evolve over time, ARGs are in one important sense close cousins to social and casual games like Zynga's *FarmVille* (chapter 4), which are often released in unfinished form or kept in perpetual beta, incorporating player feedback and distributing new content in a "just in time" fashion. Just as ARGs diminish the standard line between reality and simulation, they also trouble any hard-and-fast line between game design and gameplay.

Curiously, while many ARG purists stipulate that a true ARG can never publicly declare itself *as* a game, some ARGs, particularly commercial rather than independent enterprises, have deliberately announced their releases on sites like the Alternate Reality Gaming Network (argn.com) or in publications like *Wired.* Szulborski indicates that this may have been an attempt not only to guarantee a following but also to preempt potential legal complications in our notoriously litigious society. Some may find it quite surprising that ARGs have not encountered greater difficulties with either players or bystanders, given that such games often rely on personal contact with the player that is not predictably inscribed within a game world. In theory, problems might arise if a player mistook the game for real life, or vice versa.

Do immersive games represent the best of both worlds?[68] Or are ARG proponents sidestepping the obvious dangers of conflating real and virtual worlds, from relatively innocuous cases of mistaken identity to psychologically fraught episodes of delusion or paranoia, of the kind taken to a terrifying extent in a film like David Fincher's 1997 thriller *The Game*? ARGs lack both clear physical and temporal demarcation, of the sort provided by an on/off switch or the logon/logoff//login/logout events in a virtual world like *World of Warcraft*, so some games, like EA's *Majestic*, actually limited game progression by introducing new content according to a schedule of predictable daily doses, though with less-than-stellar results.

In an earlier essay, McGonigal discusses a particularly organized group of immersive gamers, known as the Cloudmakers, which formed in response to *The Beast.* What McGonigal notes as most interesting is the Cloudmakers' desire to apply their collective organizational and intellectual expertise to problem areas outside of the initial game—once *The Beast* was over, many Cloudmakers continued to long for engaging problems to which they could apply their "hive mind," and surprisingly, this included well-intentioned attempts to "solve" the 9/11 terrorist attacks as well as the mysterious Washington, D.C.–area sniper attacks in the fall of 2002. The Cloudmakers were not successful in either scenario, and in fact argued among themselves over the morality of treating real-world crises as gamelike puzzles; however, McGonigal suggests that the Cloudmakers' willingness to try nonetheless challenges the common stereotype of gamers as politically and socially disengaged escapists.

To return to the framing question of environmental engagement, I would emphasize that one key to the apparent draw of immersive games is their ability to put real environments at the service of a game state, an unusual but ultimately captivating meeting of physical space and virtual place. McGonigal places this juxtaposition at the heart of the alternate-reality game's absorbing qualities: "the immersive aesthetic proposed by the Beast sought to use *natural settings* as the immersive framework. Rather than creating virtual environments that were (hopefully) realistic and engaging, the Beast's producers co-opted real environments to enable a virtual engagement with reality."[69] Put another way, we could say that ARGs bypass the inherent representational limitations of virtual environments by using real environments in a virtual manner; or, we might linger just as productively on the humble "this" in the TINAG formulation as on the much-contested "game."[70] A linguist would

label this "this" as a proximal demonstrative pronoun, meaning that it refers to something near at hand (as opposed to the distal "that") and replaces the given noun in a deictic fashion, in effect referencing or pointing to the contextual situation. We might argue that "this" is really both "this" and "that" in the case of ARGs—both the physical, phenomenologically real experience of the player in a location and the virtual discourse networks and imaginative overlays of the storyline. Perhaps the "this" of the player's world balances or gives substance to the less tangible digital and narrative frameworks of the "game." As I will discuss momentarily, ARGs may offer one innovative approach to environmental and sociopolitical tensions between local and global scales, as they both transpire in players' home communities and leverage worldwide information and communication networks.

World without Oil

Produced by San Jose–based writer Ken Eklund and the Independent Television Service (ITVS), with support from the Corporation for Public Broadcasting, in 2007 the ARG *World without Oil* (*WWO*) simulated a thirty-two-week global oil crisis over the course of thirty-two days, challenging its players (who played themselves) to imagine an alternate reality uncomfortably close to our present times, in which demand for oil has risen 5 percent over supply. 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 space capable of supporting innovative environmental solutions. In a way, the game defamiliarizes the mundane, everyday character of our surroundings and our actions within 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. Veteran game designer Will Wright, whose whimsical game *Spore* I will discuss extensively in the next chapter, generally "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."[71]

Black Cloud

In part inspired by *World without Oil* and the *Continuous City* work of the Builders Association, *Black Cloud* began as a game proposal for the Digital Media and Learning Competition sponsored by the MacArthur Foundation. Designed for high-school students in South Central Los Angeles and downtown Cairo, Egypt, *Black Cloud* was described as "a game, where students study local air quality by searching for secret neighborhood air quality sensor stations based only [*sic*] the air quality data the sensors transmit."[72] Game organizers argued that their goal was to "bring suspense to environmental studies," adapting game mechanics and narrative devices to real-world scenarios. Participating students were challenged to try to determine the sensor locations, get to know their local neighborhoods, and contribute content to the game website, with the top contributor receiving an award that included funding for pollution abatement. University of California, Berkeley, researchers Greg Niemeyer, Ilse Mercado Ruiz, Laura Greig, and Stephanie Gerson developed the game in collaboration with two institutions in the chosen cities (Manual Arts High School and El Sawy Cultural Center, respectively). Seen as a form of "pedagogic innovation" and an intervention into traditional climate change studies, the game was billed as "an alternate reality mystery game" using "the framework of a fictional contest between green NGO's and market-driven real-estate companies." The mystery itself is climate change, notorious for being difficult to pinpoint and understand in local terms; however, the mystery is also the fictional scenario provided by the game organizers: why has the fictitious real-estate company, the Xylon Corporation, destroyed most of the sensors provided by the equally fictitious charity organization, First Breath? And who are the "sentients" or neighborhood residents that have tasked themselves with safeguarding the remaining sensors?

The wireless air-quality sensors (Figure 8) used in the game were built to detect and transmit information about ozone, carbon monoxide, and carbon dioxide levels, along with temperature, and were placed strategically at critical locations like highway ramps, gas stations, supermarkets, and construction sites.[73] The students, or "agents," in the game were then tasked with determining the sensor locations by correlating the fluctuating data with real-world

Figure 8. A sensor box created for the environmental alternate-reality game *Black Cloud*, featuring pollution-as-game-character, Cloudy McPufferson. Photograph by Greg Niemeyer.

activities. For example, a spike in sensor levels might correspond with rush-hour traffic. *Black Cloud* would influence the development of a tablet-based mobile game also concerned with air quality, initially called *Pwning Asthma Triggers*,[74] later renamed *AirQuest*.

AirQuest

While not an alternate-reality game in the usual sense, *AirQuest* shares with *World without Oil* and *Black Cloud* a concern with environmental specificity and quality. We began work on *AirQuest* in October of 2011, funded by a seed grant from the Center for Information Technology Research in the Interest of Society (CITRIS), a multicampus initiative in the University of California system. Led by professors in art, anthropology, engineering, and atmospheric science from UC Berkeley and UC Merced, including *Black Cloud*'s Greg Niemeyer, the project proposed development of a short, mobile touchscreen game aimed at educating at-risk community members about the

causes and dangers associated with environmentally triggered asthma—in particular anthropogenic air pollution. The first game prototype was developed for the city of Fresno, California, in the heart of the San Joaquin Valley, the southern portion of California's famed Central Valley (Figure 9). The Central Valley constitutes the state's primary agricultural production region, and Fresno is a city of approximately half a million residents. Once a railroad town, it is now the county seat and a hub for agricultural processing and industry. Dubbed the "asthma capital" of the state by a local paper, the *Fresno Bee*, official surveys of the asthma problem in the area have called it an "epidemic."[75]

The game's novel take on the growing field of serious games was its incorporation and simulation of actual regional wind models and ozone and particulate-matter air-pollution data from the Environmental Protection Agency (EPA) and National Oceanic and Atmospheric Administration (NOAA). *AirQuest* also demonstrated innovative approaches to both game design and science education, not only through its multicampus, multi-disciplinary production team, but also in its uniquely egalitarian process of
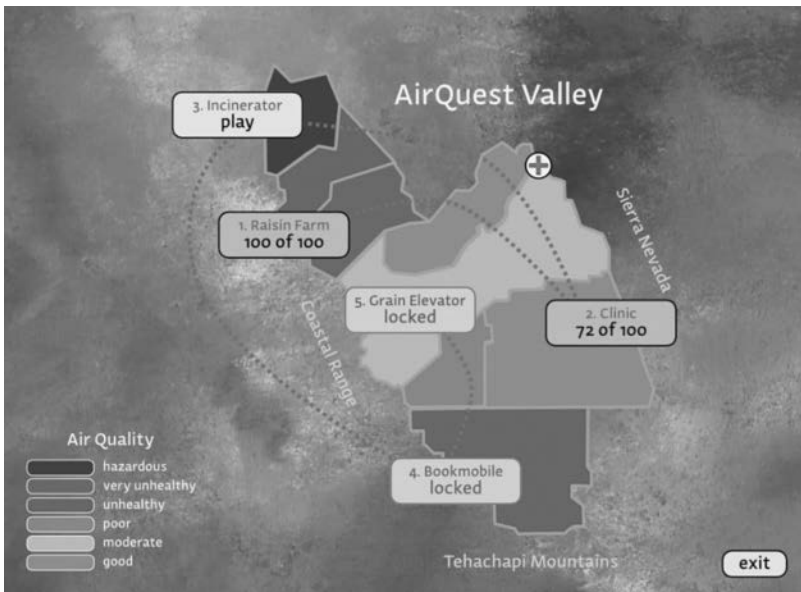

Figure 9. A fictionalized version of California's San Joaquin Valley designed for the educational asthma game *AirQuest*.

codesign that enabled a diverse network of Central Valley locals (including, most notably, thirty high-school students from Fresno High School, which boasts some of the greatest ethnic and cultural diversity in the area but a graduation rate of about 80 percent) to participate in the game's development. Information was also gathered through contact with air-board officials, air-quality advocates and activists, residents, and local agricultural workers. From a research standpoint, *AirQuest* showed that games could embed specialist knowledge (atmospheric chemistry and the dynamics of scale, for example) in simple gameplay mechanics legible to nonspecialists. *AirQuest* also suggested that game environments can be meaningfully local, faithful to the difficulties and lived experiences of a particular place and time, rather than wholly generic or fantastic in nature. The protagonist of *AirQuest* was imagined to be a young boy suffering from asthma, yet it was important to us to portray him less as a victim than as someone empowered with a unique kind of environmental intelligence, because asthmatics are indeed more sensitive than others to "triggers" of asthma symptoms, from cigarette smoke to air pollution.

Play the LA River

Organized by the art collective Project 51, *Play the LA River* offered fifty-one weeks of river-based play between September 2014 and September 2015 to parallel the fifty-one miles of the Los Angeles River, from its inland headwaters in the San Fernando Valley to its ocean mouth in downtown Los Angeles. Described as a game of "urban exploration and imagination," the game invited Angelenos to discover their local river, one that many did not even know was there or had thought lost to pavement and pollution. *Play the LA River* invited participation on three fronts: first, through a playable card deck divided into four geographical suits, with each card giving directions to a particular site on the river and suggesting activities tailored to that location (Figure 10);[76] second, through programming and collating a series of live events, ranging from cleanups and environmental-justice-oriented "toxic" bike tours to butterfly watching, yoga and meditation, and rain dances in "droughty drag"; and finally, online through a robust website and social media campaign with the hashtag #playthelariver. The card deck employed a simple "gritty-to-green" meter to forewarn players about the relative accessibility of each site, and the website also encouraged players to play safely and legally, since it is only permissible to enter the river at two locations, and

Figure 10. The *Play the LA River* card for Maywood Riverfront Park in southeastern Los Angeles County, opened in 2008 on the remediated site of the former Pemaco Maywood chemical mixing plant and part of the City of Los Angeles's LA River Revitalization Master Plan. The park serves one of the poorest and densest communities in the greater Los Angeles area.

only during the summer season. Although the alternate reality promoted by this game was less fantasy than neglected fact, *Play the LA River* aimed to restore the river both ecologically and socially, not unlike the public project of the river's revitalization recently touted by the mayor and city of Los Angeles.

Power Grid

Published by Rio Grande Games and developed in Germany, not incidentally home to one of the most active Green Parties in the world, the board game *Power Grid* invites players to become energy tycoons. Players compete to develop the largest networks by supplying the most cities with power, which requires purchasing and upgrading power plants as well as the raw materials to power them, from dirtier sources like coal, oil, and garbage to uranium and "renewable energy" sources like wind and solar. Clearly, just because a game does not use transistors or computer chips does not mean

that it is not procedural, as amply laid out in Ian Bogost's early work. *Power Grid* is still turn-based and rule-driven, though it may place more of the onus of execution on its human players. Moreover, *Power Grid* embeds a variety of arguments within its procedures: in its operational universe, demands for energy must be met, cities are the most valuable nodes in an energy network, and environmentalism can be profitably melded with capitalism. In *Power Grid,* power is power—success lies in the canny use of natural resources, and those living off the grid might as well be nonexistent. The game has become successful enough to support the production of numerous board expansions. The original board modeled Germany on one side and the United States on the other, but this was quickly followed by boards representing France and Italy, Central Europe, China and Korea, Japan and Russia, and most recently, Northern Europe/UK/Ireland and Australia and the Indian subcontinent.

"Altered State"

At the end of September 2008, the California Academy of Sciences in San Francisco's Golden Gate Park reopened its doors after a nearly decade-long, 500-million-dollar renovation that made the historic institution, founded in 1853, into a Platinum-rated Leadership in Energy and Environmental Design (LEED) building according to the U.S. Green Building Council. Home to a planetarium and aquarium, the building also encompasses the Kimball Natural History Museum, which greeted visitors in late 2008 with a variety of new exhibits. A large portion of the main hall was devoted to a section entitled "Altered State," which turned out to be a play not only on consciousness as a state of mind but also the implications of climate change for the state of California, already internationally known as a leader in environmental initiatives. Dr. Peter Roopnarine, an academy scientist, served as lead curator for the exhibit, and Jonathan Katz, CEO of Los Angeles–based Cinnabar Inc., worked as the executive producer for the new exhibits. According to Katz:

> Climate change doesn't have a fixed outcome—what we do as individuals and as a community will affect the next part of the story. That's why it was important to design and produce the new "Altered State" exhibits—which account for 10,000 square feet of the 35,000 square feet of exhibits we created for the new California Academy of Sciences—as a participatory guest experience. The issue becomes real in terms of people's daily lives—the choices we make—and how we perceive California.[77]

Part of a module on "melting snow and ice," one activity was called "Polar Ice: Critical Zone" and took place within an approximately fifteen-by-ten-foot screening area. The focal wall supported the projection of a northern sea dotted with broken ice floes. In one corner stood a female polar bear, in the opposite, her cub, and rising worldwide temperatures had apparently fragmented the once contiguous ice sheet and separated the two from each other. To save the stranded cub, visitors were encouraged to use their bodies in interactive ways to "block" the sun's (projector's) rays, thereby casting cooling shadows on the image. Where a shadow fell, the sea's surface temporarily hardened, and once enough visitors worked to link their shadows, the hapless cub bounded across the restored ice to his waiting mother.

The exhibit reproduced one of the signature wounds of the contemporary environmental imagination—the idea that climate change, which has had the most dramatic effects at the Earth's poles, has had a disproportionately negative effect on the species that rely on pack ice and subfreezing temperatures in their Arctic/Antarctic zone. The polar bear drifting hopelessly on a lone berg of melting ice in the middle of a thawing sea has been popularized by Save the Earth Foundation and National Resources Defense Council campaigns, commercials for the Nissan LEAF, and a nature feature film like *Arctic Tale* (2007). But in marked distinction from helpless viewing of advertisements where a lone polar bear is shown adrift in an iceless ocean, visitors to the museum exhibit felt empowered to take action. Stretching their arms in the air or waving bags and clothing to block as much of the "sun's" rays as possible, participating visitors turned the exhibit into a kind of impromptu shadow choreography, a solution that was both playfully collaborative and active.

BranchOut: Unlock the Outdoors

Escape games may have begun in Japan as recently as 2007, before subsequently migrating to other parts of Asia, Europe, and the United States, Canada, and Australia.[78] According to the devotee blog Room Escape Artist, the number of escape rooms in the United States has leapt from not even two dozen facilities in 2014 to well over two thousand as of the summer of 2017,[79] and evidence that escape rooms have infiltrated American popular culture abounds on both network and cable television, from the short-lived game show *Race to Escape* (2015) on the Science Channel, to escape-room-themed episodes of scripted series like *The Big Bang Theory* (2007–19) or reality shows

like TLC's *Kate Plus 8* (2007–17). But given that a typical escape-room experience is often described as being locked in a room with other people and being forced to work together to find a way out, it may come as a surprise to learn that some have tried to repurpose the idea to teach environmental concepts through *outdoor* escape rooms. In the fall of 2016, then graduate students Nicole Poletto, Lindsay Martien, and Rick Thomas approached me as a consultant for their then nascent master's thesis project for the Bren School of Environmental Science and Management at the University of California, Santa Barbara. In their words, they wanted to foster "environmental values alongside new and creative ways to interact with the outdoors through a rotating curriculum of puzzles, games, and challenges," while using "many of the aspects of popular videogames—such as fun and engaging storylines, teamwork, and an achievement system that rewards completion of tasks—without sitting in front of a screen for hours on end." In the end, Poletto, Martien, and Thomas created several short scenarios ("The Biosphere Project," "The Great Mammoth Hunt," and so on), designed primarily for parents with children ages seven to twelve. The first playtests were conducted at the Santa Barbara Botanic Garden and Santa Barbara Museum of Natural History in February and April of 2017. Foreshadowing what may become a novel strain of the escape-room movement, the organizers carefully cordon off or otherwise demarcate the play area with caution tape and the like, while designing each module to communicate different environmental skills, from identifying edible plants to tracking animals.[80]

"Catch 'Em All in Real Life"

Released in the United States on July 6, 2016, *Pokémon Go* has been one of the most visible examples of games' increasing intersection with everyday life. The game takes a longstanding and much beloved franchise, Nintendo's *Pokémon* series (first introduced as a Game Boy game in Japan in 1996), and integrates it with the camera, location services, and health utilities of the contemporary smartphone to bring a simplified version of the Pokémon experience to the real world. Having already generated scores of handheld and console games, trading cards, manga, television cartoons, and toy lines, the basic premise of the Pokémon series—catching wild creatures and teaching them to battle other tamed Pokémon—has reinvented itself through its translation to an augmented-reality form. In other words, *Pokémon Go* superimposes the fiction of Pokémon onto the real geography and built

environments of players' lives, turning natural landscapes and cultural and historical landmarks into Pokémon habitat and infrastructure for player-trainer development.

Definitions of augmented reality vary, but most agree that in order for AR to be AR it must (a) overlay the real world with a computer-generated display or interface, in which (b) the two must be aligned (or registered) to each other and (c) real-time interaction is possible.[81] Unlike immersive virtual environments, augmented-reality technology supplements reality rather than replacing it.[82] Augmented-reality technology has been around for decades and used in a number of areas including entertainment, military, manufacturing, and medical visualization applications, but a dramatic increase in the quality and ubiquity of AR tech has taken place since the turn of the

Figure 11. In the mobile augmented-reality game *Pokémon Go*, a wild Numel pops up on bluffs overlooking the Pacific Ocean in Santa Barbara (left: with the augmented-reality feature turned off; right: with the augmented-reality feature turned on).

millennium, perhaps most infamously in the case of Google Glass, and more incrementally with game systems. Early camera-based peripherals like the PlayStation's EyeToy and Move and Microsoft's Kinect, and various handheld game devices like the PS Vita and Nintendo's 3DS, have all made augmented-reality gaming fairly commonplace in the console and handheld gaming markets, while other companies like LyteShot have developed their own custom hardware for outdoor run-and-gun games like *Assassin* (2015).

Developed by Niantic, formerly a part of Google and developer of the augmented-reality massively multiplayer online (MMO) location-based exer-game *Ingress* (2013), *Pokémon Go* imbues the world with the fiction that wild Pokémon are all around us, awaiting discovery and capture. The game uses Google Maps and GPS technology to overlay players, Pokémon, supply points (PokéStops), and gyms (places where trainers may battle other teams' trainers or train their own creatures) on players' actual locations, and the optional AR feature lets you see Pokémon as they spring up around you (Figure 11).

Journalistic coverage of the game has centered largely on sensational incidents produced by *Pokémon Go*'s intrusion into ordinary space and activity, from players stumbling on dead bodies and drug deals to car accidents caused by distracted players and criminals using the game to lure victims. But even those who missed the ample buzz over the game were made aware of the game's popularity in the form of preoccupied, smartphone-wielding Pokémon trainers, with their signature (some would say erratic) movement and behavior patterns—namely, walking, running, skateboarding, sometimes even driving while periodically consulting the phone and stopping to intently swipe or tap it. For nonplayers, players might seem odd or menacing, assisted by the fact that Pokémon spawn points are commonly found in little-used urban and suburban places. Yet dismissing the game as mere childish novelty or security threat misses *Pokémon Go*'s many attractions as an exemplar of playable nature. Not only does the game integrate virtual and visceral experience, but also, as I will discuss in chapters 3 and 4, caring for digital animal and plant life has its own modest rewards. Not surprisingly, People for the Ethical Treatment of Animals (PETA) has produced several biting parodies of Nintendo's *Pokémon* franchise, for instance the game *Pokémon Black & Blue* (2012), with the tagline "Gotta free 'em all!" in which abused and battered Pokémon rise up against their former trainers. Fortunately, we may choose a middle course between animal liberation and domination, turning instead to animal trainers like Temple Grandin and feminist-socialist science

and technology scholar Donna Haraway, whose deep affection and respect for companion species animates my thinking.

One noteworthy source of disappointment with *Pokémon Go* stems from its ongoing neglect of rural environments. In a twist I find especially ironic given the game's ostensible premise of finding and catching wild animals, Pokémon rarely spawn in uninhabited or lightly inhabited areas, since the game uses landmarks submitted by players of Niantic's previous game in conjunction with frequently geo-tagged or posted attractions from the volunteer-driven Historical Marker Database (HMdb.org). In fact, players in less urban areas have consistently complained about the relative dearth of Pokéstops and gyms in their areas,[83] highlighting a backend lack of natural data and continuing digital divides based quite literally on geography and the topography of cellular data coverage networks.[84]

Environmental Realism: Translating Play to Action and Transmediality

Can games really promote learning, activism, and lifestyle change? The designers of educational games and the broader category of serious games, as discussed in this chapter, would certainly answer in the affirmative. As Henry Jenkins and Alexander Galloway have pointed out, however, granting games this 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. While some studies have cast doubt over the constructive permeability of games and the real world—for instance, the 2008 Pew Internet and American Life Project report on "Teens, Video Games and Civics," which essentially concluded that while almost all young people today play games, their game-playing did not necessarily correlate with higher or lower civic participation rates—others have shown that virtual environments can have salutary health benefits and that action taken in immersive environments has greater lasting impact on environmental behavior than messages imparted by print or video.[85] In the latter University of Georgia and Stanford University study, researchers essentially compared the impact of cutting down a virtual tree (using VR gear) to reading a print description or watching a video of cutting down a tree on participants' paper conservation and perception of environmental efficacy.[86] And while many studies have demonstrated the restorative benefits of spending time outdoors or having natural views, coverage of these findings often fails to mention that simply being shown representations of natural environments also has a

significant, if not as large, positive impact on stress levels, attention and task performance, and physical recovery.[87] In other words, all those well-meaning nature triumphalists and simultaneous technology denigrators may have jumped prematurely to their conclusions, and those of us conditioned to see games as gadgets-plus-geeks risk losing sight of the growing vitality and variety of game worlds.

Thankfully, Galloway moves past previous media-effects discourses on video game violence in a multipronged fashion: first, by stressing that gaming is active and participatory, that is, that video games as an action-based mass medium have displaced the primacy of vision. Like Ian Bogost, Galloway recognizes that interaction is fundamental to gameplay, and notably allows agency in terms of both machine and operator, that is, the computer and its user, explaining that "games are fundamentally cybernetic software systems involving both organic and nonorganic actors."[88] Additionally, Galloway's attention to social realism, or the nonrepresentational realism of player action and its congruence with one's social life, helps to shift discussion to games' potential to spark social, political, and of course I would add, environmental action. Bogost similarly acknowledges that the effectiveness of a game's procedural rhetoric depends on the preconceptions that a player brings to the game.[89] Though at times he argues that there is no necessary correlation between a player's experiences in-game to that player's experiences out-of-game (for instance, in denigrating dynamic in-game advertising), Bogost grants that some games can be truly persuasive, even potentially empowering (for instance, when a nonfarmer plays *John Deere: American Farmer* [2004] and thereby gains a better appreciation of agriculture). Most important, perhaps, Galloway demonstrates that a new hermeneutics regarding video game interpretation is needed, summed up in his own appropriation of "deep play" from Clifford Geertz: "Because play is a cultural act and because action is textual, play is subject to interpretation just like any other text."[90] The analysis of a game requires an understanding of not only the unique affordances of the game itself, but also the contributions made by the player and her cultural milieu. Galloway thus ends *Gaming* with the concept of countergaming and the desire to align gaming more closely with glitch art and tactical media or hacktivist interventions.[91]

Games, then, are transmedial in more ways than typically imagined by critics and industry thought leaders. Games are usually seen as transmedia when they blend or overlap with content in other areas: films, music, literature, and

so forth.[92] This kind of transmediality is symptomatic of much of the main-stream media's vertical integration tactics—every film or TV franchise seems to be accompanied by its own website, video game, stuffed toys, books, and even lunchboxes and towels. However, I think the concept of transmedia can be fruitfully pushed further to explore the correlation between the real and the virtual, lived life and played life. Transmediality might usefully apply to games that model ecology and the environment, especially if we are willing to see social life as a medium with its own aesthetics and proceduralism. For many, this has already been enacted in the current rise of serious games and alternate- and augmented-reality games, which implicitly define themselves in opposition to more traditional games, regarded perhaps unfairly as frivo-lous or unrealistic. In transmedia, someone takes interests from other areas and brings them to games; in serious and other-reality games, someone first and foremost interested in games winds up learning something unexpected, be it about pollution, policy, or animal husbandry.

In the end, no few scholars and designers suggest that games may be the ideal training ground for knowledgeable consumers and politically active citi-zens. Speaking of *I Love Bees* and collective intelligence work, Jane McGonigal writes: "I am suggesting with this case study that for young students learn-ing about CI for the first time, popular culture and online entertainment will remain the most effective spaces for learning how real-world massively collaborative participation works."[93] Similarly, Henry Jenkins implies that we may naturally migrate from entertainment-oriented, pop-culture appli-cations toward more mindful ones.[94] In this vein, perhaps, McGonigal has dubbed the grandiose scale of modern games "epic environments." Likening them to ancient stone cathedrals that reflected the handiwork of thousands, McGonigal explains that "Our experience of these epic game environments isn't physical, but it is real in one crucial sense. The engineering of the virtual environment represents, today, a collaborative feat on an extreme scale." The purpose of an epic environment is "to create a space that completely absorbs and envelops the player in a sense of awe and wonder."[95] McGonigal also praises what gamers term "epic wins"—successes so dramatic and hard-won that they live on in shared memory—and she goes on to suggest that epic wins are not only feasible in epic digital environments, but also that large-scale, playful cooperation will make a difference in the world beyond.

The many games surveyed in this chapter constitute less a comprehensive typology than a sortie into certain liminal categories of games and gamelike

experiences that exemplify the kind of game/world imbrication that I have heretofore celebrated. In addition to alternate-reality games like *World without Oil* and *Black Cloud*, augmented-reality games like *Pokémon Go*, and other location-sensitive games like *Play the LA River*, the growing variety of analog and nontraditional games (board games, installations, escape rooms) shows how environmental gameplay also permeates offline, educational, and built environments. Although hardly exhaustive of the many possible permutations of existing games and game types, this chapter's broad consideration of the mesocosmic qualities of games has prepared us to think carefully about games as scalar experiments (chapter 2), games' engagement with the nonhuman (chapter 3), and the critical antithesis to augmented-reality games, what I would call diminished- or depleted-reality games (chapters 4 and 5), in which game environments reflect on the already troubling ecological status quo or project future crises and their evitable aftermaths.