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'Nature' games in a time of climate crisis[1]

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Introduction: Climate change and nature games

Climate educator Bill McKibben (2015) argues that the science on climate change has been clear for over twenty years: environmentalists have already won the argument. Moreover, as poll after poll demonstrates, citizens across the globe would like their governments to take action on the climate (UNDP 2021). Climate action has not stalled, then, because of a lack of awareness and because people are not educated in the facts. Rather, there has been a widespread political and imaginative failure to confront the crisis. Philosophers suggest that this failure is in part due to the way in which we conceptualize 'nature' (Haraway 2016; Latour 2017; Morton 2016; Vetlesen 2019). The social, scientific and moral paradigms that dominate current environmental and economic thinking make it difficult to build solidarity between humans and the more-than-human world. In this context, this chapter considers the role of board games in a time of climate crisis and identifies the conceptual problem of 'nature' as a call for imaginative as well as practical and political responses.

In game studies scholars and designers are exploring the potential for games to intervene in all these domains (the practical, the political and the imaginative) and to think about the affordances of games in the context of the climate crisis. Alenda Chang, for example, argues that 'games are intermediary objects through which swirl both imaginative fantasy and real activity and places, with real, if not directly predictable effects' (2019: 4). In this chapter I consider Chang's proposal that games are (inter)mediations of ecological problems, concepts and ethics, focusing on the recent trend for 'nature' board games that purport to either simulate, or engage players with, nonhuman organisms and life processes. I evaluate the problems and possibilities that inhere in the systems (or rules), mechanics (what players do during the game), and the aesthetics of 'nature'

board games. This taxonomy draws on concepts developed by Miguel Sicart (2008) and Robin Hunicke, Marc LeBlanc and Robert Zubek (2004) for game analysis. Following their work, I am interested in the rules of 'nature' games as a 'possibility state' (Sicart 2008) and as a pre-coded system freighted with ethical and ideological implications about the ontological and relational status of the 'natural' objects and beings represented in the game. I distinguish between rules and mechanics, considering the latter as the 'methods invoked by agents' in their interaction with the game system (Sicart 2008: n.p.). This distinction separates player actions from the pre-coded system of the rules and, so, allows me to extrapolate the different possibilities of gameplay. Finally, my designation of the 'aesthetic' dimension of board games incorporates the classical meaning of the word as to do with 'sensuous perception' and, more broadly, visual appearance and effect (Baumgarten 1750; Williams 2015: 1–2), as well as the meaning deployed in the MDA framework, which specifies the emotional responses of the player prompted by the game (Hunicke, LeBlanc and Zubek 2004). Typically, game studies has, through such analytic terminology, discussed play as the province of the human subject, a way of 'being in the world, through objects, towards others' (Sicart 2014: 39). This chapter pushes at the boundaries of this humanist assumption about play to consider the ways in which 'nature' games might connect human players with other (both imagined and real) actors with whom we are interconnected and with whom we share the consequences of climate change. My approach here builds on a trend for developing frameworks that seek to evaluate games in a time of climate crisis, such as those developed by Hans-Joachim Backe (2017) and Aysem Mert and Sandra van der Hel (2016), both of which pertain to video games. Where these critics are interested in how video games construct social meanings of climate change, the accuracy of their representations and the ways they engage human players in thinking about ecological issues, I consider how board games construct non-anthropocentric 'natural' agents within the broadly anthropocentric medium of play.

There has been a proliferation of climate-themed board games in the past two decades that explicitly address the issue through the lens of sustainability. The board game *Keep Cool* (2004), designed by climate scientists Klause Eisenack and Gerhard Petschel-Held, and *Daybreak*, which – at the time of writing – is being developed by Matt Leacock and Matteo Menapace, engage players with the global politics of climate change. *Tiny Footprint* (2019), designed by Marcus Jargarden, asks players to consider their personal responsibilities, inculcating carbon literacy at the level of domestic consumption. *Carbon City Zero* (2020), designed by Sam Illingworth and Paul Wake, and *Tipping Point* (2020),

designed by Ryan Smith, both engage players with thinking about sustainability and responsibility for the accumulation of emissions at the scale of the city community. Eisenack (2013), Kwok (2019) and Fjaellingsdal and Klöckner (2020) argue that such games can be used as tools for communicating the science of climate change and for engaging players in discussions about social responsibility with a view to transforming attitudes and behaviour. However, understanding how games might intervene in the contemporary climate crisis involves more than assessing them as tools for science communication or for teaching sustainability. Considering games as an intervention implies that they challenge or disrupt dominant scientific, moral and educational paradigms that constrain thinking about the environment. This includes sustainability. As Christopher Groves suggests, the concept of sustainability remains 'within the limitations of modernist ways of thinking, in which the future is imagined solely in terms of the continuation of present projects, which are then projected into the future in a way that colonizes future possibilities' (2019: 915). Tim Morton goes further, calling 'sustainability' a 'vacuous' term that is good news for neither human, coral and kiwi bird nor lichen, since what is being sustained is the 'capitalist world-economic structure' (2017: 88). Sustainability will not build solidarity because it is reliant on humans remaining outside of nature, albeit as custodians.

Following this call for an intervention that challenges the limitations of current thinking about human interrelationships with the environment, I want to suggest that the ecological possibilities of 'nature' games are not dependent on their scientific accuracy, although my analysis will consider the ways in which the systems and mechanics of board games both erase and evoke the lively entanglements that are being uncovered by scientists working in biology, botany and ecology. That is, scientific concepts are valuable in my analysis but do not function as the arbiter of the validity of games because, as a praxis developed in the Minority World, science has itself contributed to the de-animation of the earth and to a concept of nature as pure externality (see, e.g., Ingold 2000; Latour 2017; Vetlesen 2019). I use the term 'Minority World' here instead of the usual term, the West, following Shahidul Alam's (2008) expression of 'the majority world' as a challenge to the dominance of Western perspectives. One such perspective is perpetuated by scientific discourse. As Tim Ingold suggests, science is shot through with a paradox that asserts humans as biological organisms, on the one hand, while the scientific account 'rests on a separation of humanity from organic nature' on the other (2000: 11). Science alone is not good for building solidarity between the inhabitants of the earth, then. Moreover, as Myanna Lahsen and

Esther Turnhout (2021) have suggested, there persist power structures and interests within the institutions of climate science that obstruct reform and that are preventing a shift from the modelling of biogeochemical conditions to efforts to understand the socio-political obstacles to action. Scientific institutions and environmental education do not possess all the answers. Thus, my analysis engages with eco-philosophical and ethical principles, as opposed to assessing scientific accuracy, as I investigate how 'nature' games both perpetuate and challenge the conceptual and imaginative failures of the climate crisis.

Against 'nature': Solidarity and situatedness

Throughout this chapter I adhere to a line of thought in the humanities in which 'nature' signifies a problematic designation with 'unsustainable intellectual foundations' (Cronon 1996: 50). As Bruno Latour insists, one of the challenges of the climate crisis is that it has so thoroughly exposed a naïve construction of 'nature' as something from which humans are apart: the very notion of 'nature' once invoked to stabilize and reassure 'has made the world uninhabitable' precisely because this separation is what has fuelled the crisis (Latour 2017: 35, 36). To an extent, 'nature' games are an uneasy compatriot in negotiating climate change, since many perpetuate a naïve fantasy of 'nature' as an edenic domain separate from human 'culture'. The award-winning *Wingspan* (2019), designed by Elizabeth Hargrave, for example, asks players to produce a pristine 'wildlife preserve' that will be a haven for birds. In *Renature*, designed by Michael Kiesling and Wolfgang Kramer, players compete with dominoes to 'restore a polluted valley with plants and animals' (2020). The art in these games favours eco-mimesis with respect to depictions of animals and birds, and human actions take place in the abstract domain of the rules, rather than being represented aesthetically within the game. Yet, however removed the human might be in such games however 'edenic' the aesthetic representation, the rules and mechanics of board games nonetheless entangle human 'culture' with 'nature', producing uneasy 'naturecultures' that recognize the inseparability of these mutually dependent terms (Haraway 2003). Put simply, I will argue that the ludic affordances of 'nature' board games contain possibilities for tackling the conceptual problems of the climate crisis even where the games seem to uphold an edenic conception of 'nature' as a separate domain.

My intervention in game studies advocates for a reorientation to what Latour names the 'terrestrial' as an antidote to the idealism of 'nature'. The terrestrial

names a new political actor, which is the earth itself, but in so doing also recognizes the multitude of agents that comprise it (Latour 2018: 40–1). The terrestrial defines the unstable territory of earth in a time of climate crisis, which is no longer the stable ground of 'nature' nor the environment as mere background of human activity. Furthermore, the terrestrial refuses the old modes of distancing and separation that have defined modernity and science in the Minority World. While many nature games imply such a distance through rules that describe how players ought to manage a natural habitat or ecosystem and literally objectify the more-than-human worlds in the form of tokens, dominoes, and pieces on a board, the game mechanics (what players do) necessarily engage players with entangled naturecultures, resituating them within a terrestrial domain from which they never were separate. This is precisely what the climate crisis has revealed, of course, that the separation of humans from nature is a catastrophic fantasy.

To locate what Latour calls the terrestrial, I trace the contradictory directions in contemporary 'nature' gameplay that encourage different modes of knowledge about ecology. On the one hand, I follow an ascendant trajectory that seeks to tackle the scalar problem of the climate crisis by directing players' attention to large-scale systemic thinking. On the other hand, I consider the need for what Morton calls 'subscendence' (2016: 245, 2017: 102–3), which names a descendent trajectory to counteract both a transcendent gaze that would encapsulate 'nature' as holistic and an objectifying scientific view from nowhere. The ascendant trajectory aims for what James Lovelock (1972) and Lynn Margulis (1973) call Gaia, the earth as a synergistic, self-regulating complex system that supports life. This biospheric view of the earth as an organism is quite different to a view of the earth as a planet, a Galilean object seen from a remote and virtual vantage point somewhere in the universe (Latour 2018: 67). The problem with Gaia, however, particularly in a time of climate crisis characterized by unexpected disruptions, tipping points and feedback loops, is its fiendish complexity and vast scale, both of which are difficult to comprehend. As Timothy Clark argues, the climate crisis is a challenge to human conceptions of scale, requiring us to think 'counter-intuitive relations' across multiple scales at once because the normal 'human scale' for negotiating problems is misleading (2015: 13, 30). Biospheric thinking, then, is a difficult but necessary counter to thinking at the human scale even if it is always in danger of collapsing into an objectifying view from above or outside the system.

To counteract the objectifying tendency of the ascendant view, I consider the descendent trajectories in gameplay, which mire players within the terrestrial as soily beings enmeshed in entangled ecosystems. As Latour suggests, the climate

crisis requires that we 'try to descend from "nature" down toward the multiplicity of the world' because Gaia is not a whole that is somehow more than the sum of its parts' (2017: 36). Moreover, within the terrestrial there is no possibility of detachment, no view from without (Latour 2018: 72). The anthropologist Tim Ingold uses the same directional metaphor in his exhortation to 'descend from the imaginary heights of abstract reason and resituate ourselves in an active and ongoing engagement with our environments', which involves replacing the 'stale dichotomy of nature and culture with the dynamic synergy of organism and environment' (2000: 16). In Tim Morton's 'dark ecology' this descendent trajectory is bound up with *subscendence*, a conceptual inverse of transcendence, and a movement that connects us with a multitude of things that are more than their sum (2016: 245, 249). Indeed, *subscendence* refuses to countenance that the multiple agencies, objects and beings within a system are mere components transcended by the whole. The ways in which board game mechanics engage players with just such subscendent thinking is a unique affordance of the hobby. That is, our engagement with individual pieces, tokens, counters and cards, which in 'nature' games might be seeds, saplings, wolves or rivers, and their interrelated functions within the game go some way to counteracting the holism of 'Gaian' thinking and generates the possibility for solidarity between lifeforms, even if these are only abstractly represented in a game.

Tracing these opposing directions in ecological thought, then, I suggest that board game play contains possibilities for systems thinking at scale (biospheric thought) and for subscendence (terrestrial entanglements), which are complementary models for ethical and ecological situatedness. Certainly, the games I consider encourage human interaction with different kinds of agencies and relationships at different scales. While many 'nature' games may evoke problematic concepts of the natural or the ecological, they also represent possibilities for play and design that might resituate human players within the terrestrial.

From ethics to mechanics: A framework for evaluating 'nature' games

The concept of 'nature', discourses of sustainability that tend to dominate in environmental education, and the ethics of science in its present modernist incarnation do not provide the best foundation for developing solidarity between lifeforms. To make, and understand, games that might be able to forge

such a solidarity requires scoping new conceptual ground. In what follows, I set out an evaluative framework that draws on ideas extant in eco-philosophy, environmental ethics and ecology. This framework provides a way of thinking about how games might make an intervention in engaging players with the climate crisis beyond their use as tools for communicating existing paradigms in environmental education. I recognize that some of the ideas on which the framework draws are not necessarily a good fit with established board game mechanics. There is a challenge here for game designers, then, to interrogate this mismatch and so better develop the potentials that inhere in board games for engagement with ecology. My framework is in sympathy with the eco-ethical framework for analysis of video games set out by Hans-Joachim Backe (2017: 47–9), which asks a range of questions about how games engage players with ecological concerns. Their fifth question, which asks about the degree to which game mechanics and semantics are anthropocentric, is the dominant concern here. I drill down into the ethical specificities of how games might challenge their tendency to anthropocentric representations and mechanics.

Turning away from existing frameworks constructed in game studies and science communication, my evaluation of 'nature' games takes inspiration from different elaborations of biocentric and ecocentric ethics. Broadly construed, these are ethics that extend moral considerability to more-than-human beings, including ecosystems, and that contest the idea that value is determined by a human agent. An ethical nature game would be one that did not elide the different conditions and needs of organisms within an ecosystem but that recognized the value and moral standing of the ecosystem itself. Such an ethics would complement the trajectories of ecological understanding discussed earlier, especially the need for *subscendence* and solidarity. There are also valuable ethical concepts emerging from the work of thinkers who identify as 'new materialists' and 'animists'. Stacy Alaimo and Susan Hekman's material feminism, for example, engages in 'developing theories in which nature is more than a passive social construction but is, rather, an agentic force that interacts with and changes the other elements in the mix, including the human' (2007: 7). Such theories do not divide the natural and the political but reconfigure the political to 'imagine ongoing democratic conversations in which nonhuman nature can participate in nondiscursive ways' (Alaimo and Hekman 2007: 7). However, a democracy inclusive of the more-than-human world relies on radically different notions of agency and sociality, such as those found in animist ontologies across the Majority World. Drawing on a concept of animism that extends sociality to the more-than-human world, eco-philosopher Anna Tsing

suggests that the 'social' is made in entangling relations with significant others, a definition that recognizes that living beings other than humans are fully social with or without humans (2013: 27). As I will show, some 'nature' board games imply just such a recognition in their disclosure of the internal and external relations of more-than-human beings, modelling these relations through the game system and mechanics. In *Photosynthesis* (2017), designed by Hjalmar Hach, for example, nonhuman 'social' relations are elaborated in rules that govern interactions between individual trees, between trees and sunlight, and between fully grown trees and their seeds. In modelling such relations, board games intimate the social being of more-than-human actors.

In the scientific domain, emerging research offers further co-ordinates for an evaluative framework aimed at interrogating and designing 'nature' games. Alenda Chang has already begun the work of bringing ecology and game studies together, drawing on Erle Ellis and Navin Ramankutty's notion of the 'anthrome', or, an anthropogenic biome, to understand video game worlds (Chang 2019: 7–8; Ellis and Ramankutty 2008). The anthrome is a provocation to ecologists and game designers alike because it jettisons the idea that there are 'natural' ecosystems that humans 'disturb' and acknowledges the human influence on global ecosystems. These are 'human systems with natural ecosystems embedded within them' and require modes of investigation and understanding that integrate human and ecological systems (Ellis and Ramankutty 2008: 49). The very idea of a natural ecosystem or biome is a fallacy based upon a false divide between humans and nature that does not hold, especially not as the globe experiences anthropogenic climate change. If, as Chang suggests, games act as 'mesocosms' (2019: 21), that is, as experimental enclosures that model ecological states, relations and agencies, then they are mesocosms in which the 'natural' and the 'human' are thoroughly entangled. Entanglement is also the watchword in developmental biology, as work by Scott Gilbert, Jan Sapp and Alfred Tauber (2012) attests. Their thesis that 'we have never been individuals' challenges the classical biological conception of the organism: 'Animals cannot be considered individuals by anatomical or physiological criteria because a diversity of symbionts are both present and functional in completing metabolic pathways and serving other physiological functions. Similarly [. . .] new studies have shown that animal development is incomplete without symbionts' (Gilbert, Sapp and Tauber 2012: 325). Just as human systems are entangled with 'natural' ones, so are human bodies and those of other animals entangled with one another. Finally, in the field of forest ecology and management, the work of Suzanne Simard and others has suggested cross-species collaboration at scale in

woodland ecosystems as trees share resources through a network of fungi and microbes in the soil, affectionately known as the 'wood wide web' (Beiler et al. 2009; Simard 2021). New paradigms in ecology and biology, then, are shifting a popular understanding of 'nature' as a site of a pseudo-Darwinian and Hobbesian contest and competition towards a state of collaboration and cooperation.

These ideas from philosophy and science are not necessarily a good fit with contemporary board game design, but there are some potential synergies. The games in my sample fall into the category of 'eurogames', which, rather than being immersive simulations, reveal themselves as games (Woods 2012: 83). That is, they invite players to pay attention to the rules and mechanics and encourage experimentation with different approaches through replayability, wherein each (re)play offers possibilities for adopting different strategies within the written rules. Replayability encourages systemic thinking about and reflection on the different modes of interaction modelled in the game world. In what remains of the chapter, then, I interrogate the possibilities inherent in contemporary 'nature' board games through a series of short case studies. I explore the potentials for synergy with, as well as areas of tension between, ethical, philosophical and scientific ideas that decentre the human while making clear our embeddedness in 'nature'. I apply the co-ordinates taken from Sicart and the MDA framework (distilled previously as rules, mechanics and aesthetics) alongside an ethical framework for evaluating games that is emerging from this tangle of cross-disciplinary ideas. In summary, the framework evaluates games according to the following principles:

1. That they engage players with the moral considerability of more-than-human beings, inclusive of 'individual' organisms, however contingent that individuality, to whole ecosystems, without erasing difference.
2. That they extend concepts of sociality and agency beyond the human.
3. That they explore the ways that agency is distributed across networks and assemblages, rather than being a property held by an individual. Indeed, I contend that distributed agency is a necessary condition for solidarity between lifeforms.
4. That they disclose collaboration as a fundamental condition for the development of life.
5. That they complicate neat distinctions between human and 'natural' systems.

Using these principles, I examine how three games engage human players with different kinds of actors and relationships at different scales, from tree species to an ecosystem, to the biosphere of a planet.

Speak for the trees? Arboreal agency in *Photosynthesis*

'Speak for the Trees' (2014) is a song by young climate activist Xiuhtezcatl Martinez and Earth Guardians. In the song, Martinez exhorts the listener not only to protest deforestation on behalf of trees but to imagine that they themselves are trees: that their bodies are Gardenia, their hearts its seed, to identify with the Baobab, Redwood and Pine. Martinez's call for interspecies solidarity suggests that climate action depends on more than just understanding the science of climate change, acting sustainably or engaging in protest; it requires imaginative acts of solidarity with a more-than-human world. In the board game *Photosynthesis*, players take on the role of a species of tree in what seems to be a ludic answer to Martinez's call. The publisher, Blue Orange, boasts climate-friendly production and an ecocentric promise with its flagship game that recognizes trees as vital actors in a time of climate crisis.

The rules set up a competitive game in which players vie for dominance in the forest, which is represented by a hexagonal board on which there are concentric circles of placement spots for individual trees. The sun moves around the board, bestowing 'light points' on players depending on the relative position and height of their trees. Those not shaded by other trees gain light points that can be exchanged for seeds, or to grow saplings into larger trees. The game is directly competitive because players must dominate the hexagon vertically, shading other trees in order to capture more light, and concentrically, because the trees growing at closer to the centre of the forest net the most points in the endgame. This account of the rules of *Photosynthesis* immediately points to a mismatch between the game and the framework. It provides an example of how contemporary board games owe much of their design to wargames, which were the earliest forms of hobby gaming (as we know it today) to emerge (Woods 2012). The wargames that were developed in the 1960s and 1970s, and which preceded the type of board game of which *Photosynthesis* is an example, were simulations that relied on abstraction and simplification. Typically, wargames coordinate play on boards divided up into hexagonal grids, representing terrain, with units, represented by tokens, expected to vie for control of this terrain (Woods 2012: 22). Though the 'zones of control' that characterize wargames are not inherently militaristic (Harrigan and Kirschenbaum 2016: xvii), the logic of the acquisition, and control, of territory on a board is an abstraction that persists in eurogames and is hardly complementary to the eco-ethical framework I have sketched in this chapter. This design legacy creates curious tensions, especially for games that purport to be about trees. As a game whose rules operate on the logic of wargames, *Photosynthesis* might

easily be re-skinned such that its tree avatars were represented by military units and the forest floor a field of conflict. Elsewhere, in other tree games, such as *Forests of Pangaia* (2022) designed by Thomas Franken, this problem persists. The promotional video for the game suggests that players will grow a magical forest, awaken earth spirits and 'expand' their 'territory'. The animist and symbiotic aesthetics comingle uneasily with the mechanics of control and competition. Designed within a humanistic conception of play, games tend to privilege the human actor offering mastery of terrain as the ultimate lusory goal, even if the prelusory goal is, say, to grow a living forest. Woods notes, for example, that the majority of eurogames take place on a miniaturized representation of a real-world geographical location, or a stylized rendering of an imagined setting (2012: 81). This aesthetic representation of terrain emphasizes the mechanics of expansion, area control, contest and competition, all of which hardly inculcate players into a sense of their own embeddedness in nature.

The rules of *Photosynthesis* also reveal that games tend to favour mechanics that mimic colonial-capitalist ideologies. Chang notes that video games 'lure us to play with the unspoken promise that we will always gain, and the reassurance that we can only level up' (2019: 73). She adds that such a 'disturbing' promise does little to counter a paradigm of capitalist growth that has fuelled climate change (2019: 73). Woods's description of eurogames also suggests that they revolve around the over-arching goal of accumulation (2012: 98). Many of the mechanics serving this goal are present in *Photosynthesis*, the aim of which is to grow the largest trees that can be removed at the end of the game for the most points possible. This aim requires engaging with mechanics of area control, resource taking and collection, 'buying' and upgrading, all which position 'nature' as a passive resource for human management, and so potentially divorce players aesthetically from imaginative engagement with the more-than-human beings represented in the game. The rulebook of *Photosynthesis*, for example, describes players 'buying' seeds with their light points, which hampers identification with the trees *as* trees and instead frames them as units of resource. Nonetheless, the game also makes apparent constraints to growth that challenges the mechanics of endless gain Chang identifies in video games. The hexagonal board provides a constrained play area, bringing the different tree species into competition. Though the emphasis on competition belies the collectivity of woodland ecosystems, it provides limits to territorial expansion and might encourage players to reflect on the real-world effects of habitat constriction. As Peter Wohlleben notes, the 'triumphal march' and migration of trees is negatively affected by human interference and climate change (2015: 190).

The rules of *Photosynthesis* evoke the conditions of real forests in other ways, too, offering an abstraction of the chemical process of photosynthesis. Light points allow players to buy seeds and grow saplings but distributes this growth across the species in a way that reflects how real trees distribute nutrients across a community rather than harbouring them within individual units (Wohlleben 2015: 16). Such cooperation does not extend far, however, since there is no sharing of resources between species, and tall trees will deny light points even to their compatriots. This belies the 'extraordinary generosity' of the woodland, which is an ecosystem that connects trees in a 'web of interdependence' (Simard 2021: 11, 12). In terms of competition for light, the basic rule of *Photosynthesis*, many species actually require the older members of the community to shade the young so the latter will grow slowly and develop strength. Beyond its rules, the mechanics of *Photosynthesis* further render the woodland as a site of competition rather than collaboration. Mechanically, players gain dominance by sacrificing weak individuals (trees of the same species that have been poorly placed) and crowding out other species entirely. These mechanics operate contrary to the biodiversity of the woodland, in which trees of different species need one another and smaller plants for survival (Simard 2021: 109–10). As Wohlleben notes, 'survival of the fittest' is not the doctrine of the forest (2015: 17). The game does not wholly capitulate to the mechanics of competition, however. At least until the final phase, when the largest trees are removed from the board for points, *Photosynthesis* suggests that trees are not objects but living processes. Players 'manage' their species only by nurturing seeds into sapling and saplings into mature trees, which can generate seeds. The process is cyclical and one of dependency and exchange with an environment rather than of individual striving.

My framework also asks whether a game evokes and sustains the subjectivity and agency of the 'natural' beings it represents. In this respect, *Photosynthesis* is ambiguous. The resource management rules usefully reveal a tension between individualism and eco-centrism, since both the species and the individual trees operate as agents. However, the codified rules about seed distribution and sapling growth necessarily erase difference, belying the varying strategies of distinct species in real woodland ecosystems. However, the most disruptive effect of the mechanics on the game's evocation of trees as agents is the slippage from a tree-like perspective (growing your seeds into saplings in the early game) to a forest management perspective (harvesting the large trees for points in the endgame). As Simard suggests, forest management from the human perspective tends to be a zero-sum game, emphasizing competition for light, water and nutrients in its quest for efficient and swift manufacture of timber (2021: 204). As I have suggested,

Photosynthesis draws on some of the aspects of this zero-sum game in its mechanics of competition, which coalesce in the final stage of the game when the largest trees must be removed for points. The game rules describe this as ending the 'life cycle' of the tree, but the mechanics suggest it is also a kind of harvesting or consumption: trees for points. It is also possible that the feeling the game evokes here of the player inhabiting not the role of a species, but that of forest manager, emerges from a human mindset that struggles with imagining itself as a tree. The multiple resource tokens of seeds, saplings and large trees also forestall the possibility of identifying with them as avatars of a species, further encouraging this ascendant trajectory whereby the human player is abstracted from the game as an external manager.

The tensions in the aesthetics of the game also revolve around whether the trees are allotted moral considerability as subjects. On the one hand, in inviting players to be trees, the game counters anthropocentric thinking which has, as Michael Marder notes, consistently failed to allot interiority and intentionality to plant life (2013: 25). Contra anthropocentric thought, *Photosynthesis* invites players to occupy the role of the tree as a subject, inhabiting a species mind that is intentional and perceptual. Player actions affectively identify with the trees' *conatus* for nourishment and propagation. Yet, as discussed, this engagement culminates in the accumulation of points through the harvesting of your tallest trees, suggesting a tree is valuable only once it is removed from the forest, rather than as a living subject with interiority. Again, the game is at odds with emerging scientific research on woodland ecology. Simard suggests the value of the 'biggest, oldest timbers' lies not in the girth of their trunks but in the fact that they are the source of fungal connections, connecting all neighbours, young and old; they 'serve as the lynch pins for a jungle of threads and synapses and nodes' (2021: 14). These synapses and nodes are, of course, under the soil, which is an area of the woodland in which *Photosynthesis* has no interest. The rules and mechanics hinge on the revolving sun, suggesting a transcendent view of trees as beings that culminate in a crown of leaves high above the canopy. In this respect, *Photosynthesis* misses an opportunity to engage players with a subscendent view of nature in which diverse agencies comingle as soily beings.

'Nature' as a field of relations: *Ecosystem*

Where *Photosynthesis* is weak on modelling interspecies collaboration and woodland biodiversity, *Ecosystem* (2019), designed by Matt Simpson, founds its rules and mechanics on just such principles. In this set collection and card

placement game, players draft cards from randomly shuffled sets into their 'ecosystem', represented by a 5 × 4 grid of cards. Scoring rules for card placement suggest ecological principles of the food web and of trophic cascades, with bears thriving (i.e. scoring points) when placed adjacent to rivers and foxes only scoring where they are not in competition with other predators. Individual cards score based on their placement and the whole ecosystem scores biodiversity points, where fewer 'gaps' in animal types equals more points. Elements of direct competition occur in rules for rivers and wolf packs: only the players with the most of these cards gain points. Players can also deny a relevant card to their competitor by placing it into their ecosystem before passing along the hand. Although the highest scoring ecosystem wins, the ecosystems are not otherwise in direct competition, either for space or resources. The rules of *Ecosystem* reveal the social experience of board games, making clear the collaborative and collective dimensions of play even when a competitive element remains. The rules also offer abstractions of scientific ideas about ecosystems, as I will discuss, but the metagames that emerge through the social experience of playing the game are useful for challenging paradigms about nature as a passive resource and a stable background for human activity.

The mechanics of the game encourage players to allot moral considerability to individual animals and to plan for their well-being in the layout of the ecosystem. The aesthetics compliment this aspect of the game with soft-lit visages of foxes, wolves, deer and bears gazing out of the cards. Some of these animal cards represent individuals (an individual wolf appears on a card, for example, and multiple wolf cards comprise a wolf pack). Others represent bigger collectives on a single card, such as a stream or meadow. On one hand, the mimetic artwork prompts players to appreciate the beauty of nature, but all bears, wolves and so on are represented by the same image, which suggests the game allots their moral considerability in terms of their species belonging, rather than as individual beings. On the other hand, the mechanics allow for a range of placement options for each animal, such that individual cards (and animals) function in distinct ways within the ecosystem. This use of the cards suggests the need to allow for moral considerability at different scales, from individuals to species collectives, and from species to habitats. This encodes an ecocentric ethical perspective into the game and the slippage between the agency of an individual and of the species is, as in *Photosynthesis*, a provocative element of gameplay.

The fact that biodiversity is coded into the scoring is important for challenging anthropocentric thinking on the climate crisis. Rules for card placement scoring suggest that species well-being is entangled in complex ways,

rather than dependent on the competitive survival of individuals. The inclusion of wolves, bears and fish in the game recalls the famous reintroduction of wolves to Yellowstone in 1995, which improved the populations of bears, songbirds and beavers, reversing the erosion of the riverbank and the heating of the river. Trophic cascade – the effect of the behaviour of the apex predator on the ecosystem – is intimated in the rules and mechanics of *Ecosystem* in ways that allows for complex relationships between predators such as bears and wolves without recourse to Hobbesian (and capitalist) notions of ruthless competition. Both the Yellowstone experiment and the game reveal that biodiversity is beneficial. This has been emphasized by climate scientists, who argue that biodiversity renders ecosystems more resilient to climate change. Indeed, *Ecosystem* presents us with what Ingold describes as a 'field of relationships' (2000: 4). This field is comprised of relations of interdependence, which are sometimes competitive and sometimes collaborative, and always unfolding, never stable. The game's replayability intimates just such a continually unfolding field of relationships, inviting players to find new ways to create diverse ecosystems each time they play.

Although the layout of *Ecosystem* is a 5 × 4 grid of rectangular cards, its mechanics and aesthetics gesture to a conception of 'nature' as an entangled field of relationships rather than a static habitat or stable background for the activity of organisms. The river cards, for example, structure the ecosystems along what Ingold calls a 'line of growth' (2006: 13–14). Ingold argues that organisms are not self-contained 'balls' that propel themselves from place to place but constituted in a 'meshwork' of interwoven lines (2006: 13–14). In such a conception of 'nature', the environment is not what surrounds a lifeform, 'since you cannot surround a web without drawing a line around it', but the entanglement of the lines of growth themselves (2006: 14). A comparison between *Ecosystem* and *Renature* serves to illustrate Ingold's comments. Like *Ecosystem*, *Renature* asks player to place counters (dominoes) representing specific species on a grid in order to produce diverse habitats capable of sustaining life. However, the placement rules are arbitrary, rather than tied to specific species and their relationships in nature, and competitive. The board is divided by orthogonal lines, representing rivers, along which dominoes are placed. Rather than serving as lines of growth, these rivers surround the habitats, cutting them off from one another. The competitive dimension renders some habitats barren as players abandon them when their ability to net points is hampered. The rivers of *Renature*, then, are not lines of growth, and the board does not represent a field of relationships but a terrain of spoils to be managed and divided.

Biospheric thinking: *Planet*

Where *Ecosystem* asks players to consider the entangled well-being of groups of animals and habitats by placing cards in a two-dimensional grid, *Planet* (2018), designed by Urtis Šulinskas, requires you to build a habitable planet by placing tiles on a three-dimensional planet core. Players receive a habitat objective card that dictates which type of habitat to prioritize for points at the end of the game before taking turns to pick magnetic habitat tiles to attach to their planets. Further scoring occurs after turn three, when 'life' appears on the planet and players can pick animal cards. These are collected when players have met their conditions, which include having the most of one kind of region, or the biggest region which either is or is not in contact with a specified habitat. There are multiple animal cards with different conditions and the aim is to 'welcome' as many animals onto the planet as possible. These mechanics shift the perspective on nurturing and sustaining life to the level of the biome, that is, distinct biological communities with shared climates.

The tendency towards human mastery coded in hobby gaming is apparent in *Planet* as players take charge of a whole globe that they can hold in their hands. In this respect, the game literalizes Latour's description of the earth as a Galilean object seen from an unknown vantage point in space: the ultimate transcendent and objectifying conception of our planetary home. *Planet* thus belongs to the genre of 'god' games popular in video games. However, the mastery accorded by the god perspective is frustrated by the random allocation of continent tiles and scoring cards: there are none of the resource management mechanics common to eurogames here, nor are the pentagonal tiles 'zones of control' in the sense of wargame simulations. Indeed, the three-dimensional planet core and pentagonal continent tiles make management of the globe tricky because they deny an at-a-glance view of which regions are biggest or in contact with which other regions, required for scoring.

The planetary scale of this game, along with its rules governing the interactions of biomes, also suggests the kind of shift in scalar awareness Clark advocates in confronting the Anthropocene. Indeed, if *Photosynthesis* positions players within the subjectivity of the species, *Planet* positions you within the subjectivity of Gaia, as you take on the role of a self-regulating system to create the conditions for life. Lovelock's Gaia hypothesis conceptualizes biodiversity and mutualism at scale and *Planet* engages players in systemic thinking at just this scale. As with *Ecosystem*, replayability necessitates you consider the planet

as a complex and ever-changing system: there is no single way to score points and each planet you construct will be different from the last.

Perhaps the major pitfall of *Planet* is that there are no people. Your completed planet is an idealized blue and green globe, each biome free from human habitation and interference. At the same time, the human agent is abstracted from the world even as it manages the placements of biomes and animals. *Planet* thus encapsulates the strange tension apparent in contemporary 'nature' board games: their exhortation for players to identify with a more-than-human world while also idealizing that natural world as separate from humans. I agree with Chang that games have the 'potential to marry both subjective and objective features of experience, and to render the nonhuman accessible' (2019: 134), and we have seen how shifts in perspectives enacted in these games might provide such access. Nonetheless, the rules and mechanics of *Photosynthesis*, *Ecosystem* and *Planet* elide the ways in which human lives are always already entangled with more-than-human lives at different scales.

Conclusion

While games that explicitly tackle the climate crisis, such as *Tiny Footprint* and *Carbon City Zero*, focus on sustainability, planning and lifestyle decisions at the level of the human individual, household and community, *Photosynthesis*, *Ecosystem* and *Planet* focus on the natural world as though it were distinct from the human world. A hybridization of such approaches is needed in game design. Can we make and play games that help us see the ways in which the human and the more-than-human are entangled? Can we reorient games towards the 'terrestrial' such that they reveal how the social and political relations of human and more-than-human actors intersect in complex ways? This is the challenge for board game design in troubled times.

This chapter has suggested ways forward for such a project, building an eco-ethical framework for analysis and providing a critique of a sample of contemporary 'nature' board games that identifies the problems as well as possibilities that are coded in the rules, or else expressed in gameplay as mechanics and aesthetics. I conclude by suggesting that a step change is required in game design to complement a much-needed interrogation of the concept of 'nature' that persists across the political, social and environmental

imaginary. Board games can contribute to the transformation of the way in which human situate themselves with respect to 'nature', playing with our positionality, inviting us to play as various kinds of interconnected agents, and by effecting perspectival shifts in scale. With the right 'nature' games we might, finally, understand that humanity and nature comprise a single field of relationships.

Note

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