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Barker, T. (2012) Information and the atmosphere: exploring the relationship between the natural environment and information aesthetics. *M/C Journal*, 15 (3)

<http://eprints.gla.ac.uk/67337>

Deposited on: 20 July 2012

M/C Journal, Vol. 15, No. 3 (2012) - 'ecology'
Information and Atmospheres: Exploring the Relationship between the Natural Environment and Information Aesthetics

<http://journal.media-culture.org.au/index.php/mcjournal/article/view/482>

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Our culture abhors the world.

Yet Quicksand is swallowing the duellists; the river is threatening the fighter: earth, waters and climate, the mute world, the voiceless things once placed as a decor surrounding the usual spectacles, all those things that never interested anyone, from now on thrust themselves brutally and without warning into our schemes and manoeuvres (Michel Serres, *The Natural Contract*, p 3).

When Michel Serres describes culture's abhorrence of the world in the opening pages of *The Natural Contract* he draws our attention to the sidelining of nature in histories and theories that have sought to describe Western culture. As Serres argues, cultural histories are quite often built on the debates and struggles of humanity, which are largely held apart from their natural surroundings, as if on a stage, "purified of things" (3). But, as he is at pains to point out, human activity and conflict always take place within a natural milieu, a space of quicksand, swelling rivers, shifting earth, and atmospheric turbulence. Recently, via the potential for vast environmental change, what was once thought of as a staid "nature" has reasserted itself within culture. In this paper I explore how Serres's positioning of nature can be understood amid new communication systems, which, via the apparent dematerialization of messages, seems to have further removed culture from nature. From here, I focus on a set of artworks that work against this division, reformulating the connection between information, a topic usually considered in relation to media and anthropic communication (and something about which Serres too has a great deal to say), and nature, an entity commonly considered beyond human contrivance. In particular, I explore how information visualisation and sonification has been used to give a new sense of materiality to the atmosphere, repotentialising the air as a natural and informational entity.

The Natural Contract argues for the legal legitimacy of nature, a natural contract similar in standing to Rousseau's social contract. Serres's book explores the history and notion of a "legal person", arguing for a linking of the scientific view of the world and the legal visions of social life, where inert objects and living beings are considered within the same legal framework. As such *The Natural Contract* does not deal with ecology per-se, but instead focuses on an argument for the inclusion of nature within law (Serres, "A Return" 131). In a drastic reconfiguring of the subject/object relationship, Serres explains how the space that once existed as a backdrop for human endeavour now seems to thrust itself directly into history. "They (natural events) burst in on our culture, which had never formed anything but a local, vague, and cosmetic idea of them: nature" (Serres, *The Natural Contract* 3). In this movement, nature does not simply take on the role of a new object to be included within a world still dominated by human subjects. Instead, human beings are understood as intertwined with a global system of turbulence that is both manipulated by them and manipulates them.

Taking my lead from Serres's book, in this paper I begin to explore the disconnections and reconnections that have been established between information and the natural environment. While I acknowledge that there is nothing natural about the term "nature" (Harman 251), I use the term to designate an environment constituted by the systematic processes of the collection of entities that are neither human beings nor human crafted artefacts. As the

formation of cultural systems becomes demarcated from these natural objects, the scene is set for the development of culturally mediated concepts such as “nature” and “wilderness,” as entities untouched and unspoiled by cultural process (Morton). On one side of the divide the complex of communication systems is situated, on the other is situated “nature”.

The restructuring of information flows due to developments in electronic communication has ostensibly removed messages from the medium of nature. Media is now considered within its own ecology (see Fuller; Strate) quite separate from nature, except when it is developed as media content (see Cubitt; Murray; Heumann). A separation between the structures of media ecologies and the structures of natural ecologies has emerged over the history of electronic communication. For instance, since the synoptic media theory of McLuhan it has been generally acknowledged that the shift from script to print, from stone to parchment, and from the printing press to more recent developments such as the radio, telephone, television, and Web2.0, have fundamentally altered the structure and effects of human relationships. However, these developments – “the extensions of man” (McLuhan)— also changed the relationship between society and nature. Changes in communications technology have allowed people to remain dispersed, as ideas, in the form of electric currents or pulses of light travel vast distances and in diverse directions, with communication no longer requiring human movement across geographic space.

Technologies such as the telegraph and the radio, with their ability to seemingly dematerialize the media of messages, reformulated the concept of communication into a “quasi-physical connection” across the obstacles of time and space (Clarke, “Communication” 132). Prior to this, the natural world itself was the medium through which information was passed. Rather than messages transmitted via wires, communication was associated with the transport of messages through the world via human movement, with the materiality of the medium measured in the time it took to cover geographic space. The flow of messages followed trade flows (Briggs and Burke 20). Messages moved along trails, on rail, over bridges, down canals, and along shipping channels, arriving at their destination as information. More recently however, information, due to its instantaneous distribution and multiplication across space, seems to have no need for nature as a medium. Nature has become merely a topic for information, as media content, rather than as something that takes part within the information system itself.

The above example illustrates a separation between information exchange and the natural environment brought about by a set of technological developments. As Serres points out, the word “media” is etymologically related to the word “milieu”. Hence, a theory of media should be always related to an understanding of the environment (Crocker). But humans no longer need to physically move through the natural world to communicate, ideas can move freely from region to region, from air-conditioned room to air-conditioned room, relatively unimpeded by natural forces or geographic distance. For a long time now, information exchange has not necessitated human movement through the natural environment and this has consequences for how the formation of culture and its location in (or dislocation from) the natural world is viewed.

A number of artists have begun questioning the separation between media and nature, particularly concerning the materiality of air, and using information to provide new points of contact between media and the atmosphere (for a discussion of the history of ecoart see Wallen). In *Eclipse* (2009) (fig. 1) for instance, an internet based work undertaken by the collective EcoArtTech, environmental sensing technology and online media is used experimentally to visualize air pollution. [EcoArtTech](#) is made up of the artist duo Cary Peppermint and Leila Nadir and since 2005 they have been inquiring into the relationship between digital technology and the natural environment, particularly regarding concepts such as “wilderness”. In *Eclipse*, EcoArtTech garner photographs of American national parks from social media and photo sharing sites. Air quality data gathered from the nearest capital city is then inputted into an algorithm that visibly distorts the image based on the levels of particle pollution detected in the atmosphere. The photographs that circulate on photo sharing sites such as Flickr—photographs that are usually rather banal in their adherence to

a history of wilderness photography—are augmented by the environmental pollution circulating in nearby capital cities.

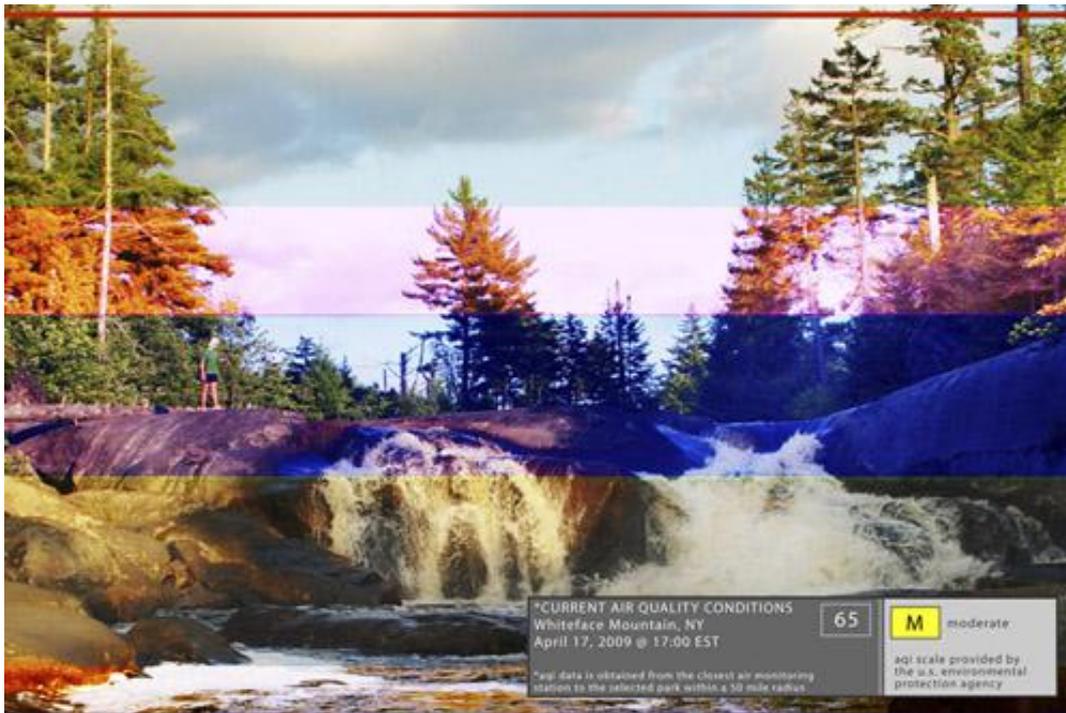


Figure 1: EcoArtTech, *Eclipse* (detail of screenshot), 2009 (Internet-based work available at: <http://turbulence.org/Works/eclipse/>)

The digital is often associated with the clean transmission of information, as packets of data move from a server, over fibre optic cables, to be unpacked and re-presented on a computer's screen. Likewise, the photographs displayed in *Eclipse* are quite often of an unspoilt nature, containing no errors in their exposure or focus (most probably because these wilderness photographs were taken with digital cameras). As the photographs are overlaid with information garnered from air quality levels, the “unspoilt” photograph is directly related to pollution in the natural environment. In *Eclipse* the background noise of “wilderness,” the pollution in the air, is reframed as foreground.

“We breathe background noise...Background noise is the ground of our perception, absolutely uninterrupted, it is our perennial sustenance, the element of the software of all our logic” (Serres, *Genesis* 7). Noise is activated in *Eclipse* in a similar way to Serres’s description, as an indication of the wider milieu in which communication takes place (Crocker). Noise links the photograph and its transmission not only to the medium of the internet and the glitches that arise as information is circulated, but also to the air in the originally photographed location.

In addition to noise, there are parallels between the original photographs of nature gleaned from photo sharing sites and Serres’s concept of a history that somehow stands itself apart from the effects of ongoing environmental processes. By compartmentalising the natural and cultural worlds, both the historiography that Serres argues against and the wilderness photograph produces a concept of nature that is somehow outside, behind, or above human activities and the associated matter of noise. *Eclipse*, by altering photographs using real-time data, puts the still image into contact with the processes and informational outputs of nature. Air quality sensors detect pollution in the atmosphere and code these atmospheric processes into computer readable information. The photograph is no longer static but is now open to continual recreation and degeneration, dependent on the coded value of the atmosphere in a given location.

A similar materiality is given to air in a public work undertaken by Preemptive Media, titled *Areas Immediate Reading (AIR)* (fig. 2). In this project, Preemptive Media, made up of Beatriz da Costa, Jamie Schulte and Brooke Singer, equip participants with instruments for

measuring air quality as they walked around New York City. The devices monitor the carbon monoxide (CO), nitrogen oxides (NOx) or ground level ozone (O3) levels that are being breathed in by the carrier.

As Michael Dieter has pointed out in his reading of the work, the application of sensing technology by Preemptive Media is in distinct contrast to the conventional application of air quality monitoring, which usually takes the form of extremely high resolution located devices spread over great distances. These larger air monitoring networks tend to present the value garnered from a large expanse of the atmosphere that covers individual cities or states. The *AIR* project, in contrast, by using small mobile sensors, attempts to put people in informational contact with the air that they are breathing in their local and immediate time and place, and allows them to monitor the small parcels of atmosphere that surround other users in other locations (Dieter). It thus presents many small and mobile spheres of atmosphere, inhabited by individuals as they move through the city.

In *AIR* we see the experimental application of an already developed technology in order to put people on the street in contact with the atmospheres that they are moving through. It gives a new informational form to the "vast but invisible ocean of air that surrounds us and permeates us" (Ihde 3), which in this case is given voice by a technological apparatus that converts the air into information. The atmosphere as information becomes less of a vague background and more of a measurable entity that ingresses into the lives and movements of human users. The air is conditioned by information; the turbulent and noisy atmosphere has been converted via technology into readable information (Connor 186-88).



Figure 2: Preemptive Media, Areas Immediate Reading (AIR) (close up of device), 2011

Throughout his career Serres has developed a philosophy of information and communication that may help us to reframe the relationship between the natural and cultural worlds (see Brown). Conventionally, the natural world is understood as made up of energy and matter, with exchanges of energy and the flows of biomass through food webs binding ecosystems together (DeLanda 120-1). However, the tendencies and structures of natural systems, like cultural systems, are also dependent on the communication of information. It is here that Serres provides us with a way to view natural and cultural systems as connected by a flow of energy *and* information. He points out that in the wake of Claude Shannon's famous Mathematical Theory of Communication it has been possible to consider the relationship between information and thermodynamics, at least in Shannon's explanation of noise as entropy (Serres, *Hermes*74). For Serres, an ecosystem can be conceptualised as an informational and energetic system: "it receives, stores, exchanges, and gives off both energy and information in all forms, from the light of the sun to the flow of matter which passes through it (food, oxygen, heat, signals)" (Serres, *Hermes* 74). Just as we are

related to the natural world based on flows of energy— as sunlight is converted into energy by plants, which we in turn convert into food— we are also bound together by flows of information. The task is to find new ways to sense this information, to *actualise* the information, and imagine nature as more than a welter of data and the air as more than background.

If we think of information in broad ranging terms as “coded values of the output of a process” (Losee 254), then we see that information and the environment—as a setting that is produced by continual and energetic processes—are in constant contact. After all, humans sense information from the environment all the time; we constantly decode the coded values of environmental processes transmitted via the atmosphere. I smell a flower, I hear bird songs, and I see the red glow of a sunset. The process of the singing bird is coded as vibrations of air particles that knock against my ear drum. The flower is coded as molecules in the atmosphere enter my nose and bind to cilia. The red glow is coded as wavelengths from the sun are dispersed in the Earth’s atmosphere and arrive at my eye.

Information, of course, does not actually exist as information until some observing system constructs it (Clarke, “Information” 157-159). This observing system as we see the sunset, hear the birds, or smell the flower involves the atmosphere as a medium, along with our sense organs and cognitive and non-cognitive processes. The molecules in the atmosphere exist independently of our sense of them, but they do not actualise as information until they are operationalised by the observational system. Prior to this, information can be thought of as noise circulating within the atmosphere. Heinz Von Foester, one of the key figures of cybernetics, states “The environment contains no information. The environment is as it is” (Von Foester in Clarke, “Information” 157). Information, in this model, actualises only when something in the world causes a change to the observational system, as a difference that makes a difference (Bateson 448-466). Air expelled from a bird’s lungs and out its beak causes air molecules to vibrate, introducing difference into the atmosphere, which is then picked up by my ear and registered as sound, informing me that a bird is nearby. One bird song is picked up as information amid the swirling noise of nature and a difference in the air makes a difference to the observational system.

It may be useful to think of the purpose of information as to control action and that this is necessary “whenever the people concerned, controllers as well as controlled, belong to an organised social group whose collective purpose is to survive and prosper” (Scarrott 262). Information in this sense operates the organisation of groups. Using this definition rooted in cybernetics, we see that information allows groups, which are dependent on certain control structures based on the sending and receiving of messages through media, to thrive and defines the boundaries of these groups. We see this in a flock of birds, for instance, which forms based on the information that one bird gathers from the movements of the other birds in proximity. Extrapolating from this, if we are to live included in an ecological system capable of survival, the transmission of information is vital. But the form of the information is also important. To communicate, for example, one entity first needs to recognise that the other is speaking and differentiate this information from the noise in the air. Following Clarke and Von Foester, an observing system needs to be operational.

An art project that gives aesthetic form to environmental processes in this vein—and one that is particularly concerned with the co-agentive relation between humans and nature—is Reiko Goto and Tim Collin’s *Plein Air* (2010) (fig. 3), an element in their ongoing *Eden 3* project. In this work a technological apparatus is wired to a tree. This apparatus, which references the box easels most famously used by the Impressionists to paint ‘*en plein air*’, uses sensing technology to detect the tree’s responses to the varying CO2 levels in the atmosphere. An algorithm then translates this into real time piano compositions. The tree’s biological processes are coded into the voice of a piano and sensed by listeners as aesthetic information.

What is at stake in this work is a new understanding of atmospheres as a site for the exchange of information, and an attempt to resituate the interdependence of human and

non-human entities within an experimental aesthetic system. As we breathe out carbon dioxide—both through our physiological process of breathing and our cultural processes of polluting—trees breath it in. By translating these biological processes into a musical form, Collins and Goto's work signals a movement from a process of atmospheric exchange to a digital process of sensing and coding, the output of which is then transmitted through the atmosphere as sound. It must be mentioned that within this movement from atmospheric gas to atmospheric music we are not listening to the tree alone. We are listening to a much more complex polyphony involving the components of the digital sensing technology, the tree, the gases in the atmosphere, and the biological (breathing) and cultural processes (cars, factories and coal fired power stations) that produce these gases.



Figure 3: Reiko Goto and Tim Collins, *Plein Air*, 2010

As both Don Ihde and Steven Connor have pointed out, the air that we breathe is not neutral. It is, on the contrary, given its significance in technology, sound, and voice. Taking this further, we might understand sensing technology as *conditioning* the air with information. This type of *air conditioning*—as information alters the condition of air—occurs as technology picks up, detects, and makes sensible phenomena in the atmosphere. While communication media such as the telegraph and other electronic information distribution systems may have distanced information from nature, the sensing technology experimentally applied by EcoArtTech, Preeemptive Media, and Goto and Collins, may remind us of the materiality of air. These technologies allow us to connect to the atmosphere; they *reformulate* it, converting it to *information*, giving new form to the coded processes in nature.

Acknowledgment

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