

*air pollu-
tion • tox-
icity • in-
frastruc-
tures •
commons
• specula-
tion*

Atmospheric Infrastructures to Deal with the Toxic Air in a Common World

Nerea Calvillo

Abstract

Air pollution is making visible that we cannot take the air for granted, and the geoengineering projects that aim to clean it are not the solution. To claim the air as a global common might create a different type of awareness, and yet, what are the infrastructures needed to do so? After specifying how infrastructures and the commons might be imagined otherwise, the design, construction and encounters with the atmospheric infrastructure Yellow Dust will reveal how experimental infrastructures might not “solve the problem” of air pollution, but are opportunities to think on how to have a better air, as well as on how to (better) live in a shared world.

Affiliation

**University of
Warwick, Centre for
Interdisciplinary
Methodologies**

Contacts:

**n [dot] calvillo [at]
warwick [dot]
ac [dot] uk**

Received:

05 September 2019

Accepted:

05 November 2019

DOI:

10.17454/ARDETH05.12

ARDETH#05

We inhale and exhale thousands of times a day, and still we take the air for granted.

Introduction

The air is one of the indicators of the Anthropocene. Since the Industrial Revolution it is an artificial environment, although Peter Sloterdijk claims that it was not until the 20th century that the air was designed, when the Germans used toxic gas as a weapon during World War I (2005; 2009). And yet, as architect historian Rayner Banham pointed out, the air - and even more air pollution - has been mostly absent from architecture and urban debates (Banham, 1969). What do we need to know about it in order to operate in/with it? How can we, as architects, start dealing with it? Can we think about what Sloterdijk termed as “air design” (2009), and which tools do we have to develop it? To respond to these questions, drawing from feminist technoscience and feminist theory literature I suggest to thinking about the urban air as a complex sociotechnical assemblage (Farías and Bender, 2010), to acknowledge its materiality, its effects, its bodies and politics. If, as a heuristic, we considered this aerial sociotechnical assemblage a city, what would its urbanisms be?

Commons and infrastructures

The atmosphere is the (some times) invisible dump of capitalist practices, but it is also a fundamental component of human and more than human life. We inhale and exhale thousands of times a day, and still we take the air for granted. However, the more polluted the air is globally becoming, the more its image is shifting from an infinite resilient space with never ending waste absorption capacities, to a limited resource that needs to be taken care for. And yet, because it is needed by all living entities in the planet – although its toxic effects are distributed unevenly- it has been considered a global commons (see Helfrich, 2008; Klein, 2014). Looking at the English commons of the middle ages, for instance, the common was a piece of land, a right of use, and very importantly, norms and infrastructures to manage it. Therefore, what are the infrastructures needed to manage the air as a common? Answering this question requires some specifications. First, to acknowledge the material properties of the air. The air is a relational entity, with components that react among themselves, with the weather, or any ma-

terial that gets suspended in it. Which implies that the air is different at a neighbourhood, national, or global scales. It is also inapprehensible, uncontrollable and un-limitable. It travels with the wind, very far away, carrying seeds, ashes, microbes, dust, or radiation to places where they may not be expected or wanted. All of which pose difficulties for its management.

The second specification relates to infrastructures.

When thinking about infrastructures to manage the air, the first thing that comes to mind are monitoring infrastructures (satellite, ground monitoring stations, etc). They monitor concentration levels and distribution of gases and particles, and their data are used for policy-making and regulation. To intervene in the air itself it is surprising that most infrastructures are designed to clean it. But, how does one clean a global circulating entity, when the economic system that has set up this situation does not seem to be changing soon? Large geoengineering projects branded as sustainable solutions are being developed in scientific institutes and tech, oil or construction corporations: from growing large quantities of algae in the seas, to sequestering carbon in the deep layers of the earth, or building massive “purifiers” of circulating air (see the air purifying tower built in Xi’an, China, or Quest, the partnership between Shell, Canada Energy and Chevron, to capture, transport and store CO2 deep underground). However, even if these projects were successful, the effectiveness of these interventions is minimum compared to the scale of the issue. And most importantly, they sustain the economic system that caused the pollution in the first place – considering that many of the proponents of these infrastructures are the corporations that pollute the most. Would it not be more effective to target the origin of the problem and stop polluting?

Deep structural changes, cultural, political, but mostly economic, are needed to move from a cleaning approach towards a non-polluting situation, no doubt about it. Yet, they are the only possible solution. But as feminist literary scholar and cultural theorist Laurent Berlant has argued, we need forms to deal with the transition (Berlant, 2016), which might need their own infrastructures. If the large, expensive (and polluting) engineering infrastructures that we know are not fit anymore, alternatives are needed. And this is an op-

Deep structural changes, cultural, political, but mostly economic, are needed to move from a cleaning approach towards a non-polluting situation.

We need to expand our understandings of what infrastructures can do, their aims and objectives, taking into consideration their different scales and temporalities and their experimental capacities.

portunity for experimentation. Or, again with Berlant, we have the responsibility to do so.

To experiment, the goals of engineering infrastructures must be challenged. Artist Natalie Jeremijenko has described her projects as “lifestyle experiments”: small interventions that put to work living entities to understand how complex systems work (hurricanes, flooding, species extinction, etc), and to test the design of infrastructures that take this complexity into account (Hannah and Jeremijenko, 2017). These interventions have multiple aims overlapped, entangled in multiple scales. Most importantly, they do not attempt to “solve the problem”, but to get a better (and closer) understanding of the specificities of each site, and to ask different questions that might provide alternative responses. Also, if for techno-science contexts infrastructures are material devices to solve specific problems, science and technology studies have well demonstrated that they are much more: socio “technical assemblages composed by hard, soft, human and non-human entities, situated and networked in different ways (Graham, Stephen and Marvin, Simon, 2009; Leigh and Bowker, 2006; Schick and Winthereik, 2016; Star, 1999). Dominguez Rubio and Fogué (2013) have also demonstrated how urban infrastructures can do more than ‘just’ managing urban resources: they can make the resources participate in public life and experiment with different forms of citizenship. In alignment with Jeremijenko and Dominguez Rubio and Fogué I claim that we need to expand our understandings of what infrastructures can do, their aims and objectives, taking into consideration their different scales and temporalities and their experimental capacities. Thus I am interested in the infrastructures that allow us to manage the “terms of transition that alter the harder and softer, tighter and looser infrastructures of sociality itself” (2016: 394); in the infrastructures able to engage with the different materialities of air, but which also take into consideration and engage openly with their social implications, and to reflect “what kind of form of life an infrastructure is” (Berlant 2016: 393).

The commons is also an unruly concept, as it takes various forms and approaches depending on the context and author. It tends to bring together resources, property rights and regulations. But one of the problems of relating the concept of the commons to limited

resources' management is that the discussion ends up being about economy and costs, which does not take into consideration the effects that the production and deployment of these infrastructures might have in humans and the environment (although we already know that they are a fundamental device for colonisation and extraction at multiple scales). Jeremijenko suggests instead to evaluate infrastructures' success in relation to their contributions to humans and the environment's health. And I would add, in relation to social and environmental justice. So in which other ways can an infrastructure *of* a common (the air) be also an infrastructure *for* the common?

With this question comes another problem, because as Berlant (2016) argues, the desired common often reinforces an idea of the collective based on agreement and belonging (to a community or a state, for instance). Considering the challenges that these idealistic approaches imply in terms of who and how belongs to that common – inspired in non-sovereign critiques and decolonial theory – I follow Berlant in her proposal of focusing on proximity and detection, as “the experience of affect, of being receptive, in real time” (2016: 402), as opposed to a unified (dissident or not) collectivity. How do we start thinking about infrastructures to deal with the air in our context of industrial toxicity, financial insecurity, and permanent war, that enable other forms of co-habitation?

Experimental infrastructures: Yellow Dust

Philosopher Marina Garcés (2013) argues that due to the complexity of our context, thinking “what to do” can be paralysing. Therefore, she proposes to think instead how to change our modes of dealing with things, with each other, and the world. If before these modes have been focused on representation and action (think about some Greenpeace campaigns, where their action is to make visible the responsible actors of environmental disasters, like hanging banners in off-shore oil extraction platforms), Garcés proposes to shift towards attention and treatment: to pay a closer attention to what surrounds us and understand what the surrounding requires us to do; and to think about and change how to treat things, the world, and also ourselves (2013: 16). I have explored these questions in practice through

So in which ways can an infrastructure *of* a common (the air) be also an infrastructure *for* the common?

1 - Yellow Dust was designed by C+arquitectos/ In The Air (Nerea Calvillo with Raúl Nieves, Pep Tornabell, Yee Thong Chai, Emma Garnett, Marina Fernandez). Developed for the Seoul Biennale of Architecture and Urbanism 2017, with the support of Acción Cultural Española and an impact ESRC IAA grant from University of Warwick and the Economic and Social Research Council (ESRC).

Fig. 1 – Yellow Dust before the opening. Image by the Author.

Yellow Dust, a project we¹ developed for the Seoul Biennale of Architecture and Urbanism 2017 based on a prototype developed at Medialab Prado in 2008. In line with Garcés, Yellow Dust was conceived as an infrastructure to deal with the toxic air in a common world, that instead of asking what to do with the polluted air, aimed to test if there are other modes of paying attention to it that involve other forms of treatment other than cleaning. I refer to Yellow Dust as an infrastructure (instead of an installation, for instance) to focus on its performative capacity, to look and think about what it does -instead of how it looks like, for instance-, to reinforce its management capacities and its multiple agencies. Infrastructures that acknowledge a broken world, but which also trigger new ways of living on it (Berlant, 2016). We took this opportunity as an invitation to speculate, as the only possible way of dealing with our troubled times (Haraway, 2016), which doesn't only mean observing the state of reality, but also intervening in it (Guggenheim et al., 2017; Hannah, Jeremijenko, 2017). So overall, Yellow Dust was a speculation – and an experiment, in line with Jeremijenko – of what air design can do to engage with the urbanisms of the air, what can it mean to care for



the environment, and more specifically, to care for air pollution. In other words, it asked: what can ‘air design’ do for dealing with the Anthropocene?

Designing atmospheric infrastructures

Yellow Dust was a mist canopy that measured, made visible and partially remediated the particulate matter that floated in the air where it was located, in one of the courtyards of The Domuimun Museum Village, one of the venues of the Biennale. It was designed through what I have retrospectively called “attentive speculation”, as some sort of design method to, as Garcés suggested, pay attention to the air and its existing infrastructures and speculate by asking different questions and design an infrastructure that would respond to them (for a more detailed description of this method and the design decisions of Yellow Dust, see Calvillo, 2018). Yellow Dust became an experiment to test if collectively experiencing pollution instead of seeing information about it produced other responses and affects towards air quality. To do so, we used the air to represent itself through mist, intensifying some of its conditions, to pay attention to the air that surrounds us. The mist also aimed to mediate and condition the public space where it was located, to facilitate exchanges, conversations and eventually organisation around air pollution in Seoul. However, instead of trying to make the infrastructure itself visible as a strategy to make it public, as Dominguez Rubio and Fogué propose (2013), the aim of Yellow Dust was to become atmospheric itself. Not to disappear in the background, as the internet of things trope desire, but to become atmospheric: present and blurred, sensible and inapprehensible at the same time, to intensify its experiential potential. It also aimed to create “atmospheric attunements” (Stewart, 2011) with the toxic air, as partially aware encounters that are registered beyond reason, that are collective, difficult to explain. To increase its contribution to the commons the project combined air quality monitoring and visualisation, as a tool to be used by communities to make visible environmental injustice. To achieve this, it was designed to be relatively easy to build, with accessible open source code and instructions to replicate it.

Building atmospheric infrastructures

When speaking about infrastructures there is a phase that is rarely discussed, which is their construction.

Instead of trying to make the infrastructure itself visible as a strategy to make it public, the aim was to become atmospheric itself.



Fig. 2 – Water vapor tests in Barcelona. Image by the Author.

Instead of trying to control the air we had to train our bodies to be affected by the mist.

As we will see, other forms of collectivity, commons, and understandings of infrastructures came into play when producing and assembling Yellow Dust -which took place between Barcelona and Seoul. To make the air visible we had to get acquainted with water vapor and its own infrastructure. We spent a long time testing in Barcelona, at two of the collaborators' working and living space. We had to learn how to create mist and not water droplets, to train our eyes to the different densities of the mist, our skins to understand the difference between fresh and wet, between feeling something or not. Instead of trying to control the air we had to train our bodies to be affected by the mist. As there were many unknowns we left the structure to be bought and assembled in Seoul. This, together with the set-up of the sensors, the final assemblage of the different pieces, testing the system, and getting water, Wi-Fi and electricity, required more experimentation, which forced us to pay attention to unexpected entities and to explore other forms of treating each other. We had to create alliances with everyone on site: among the team, with the local contractor to adjust their rhythms to ours – which could only be done through encounters with one of the curators, the contractor's representative

on site and a translator. This was a daily negotiation, as our needs were always ahead of their capacities. We also had to learn to communicate with the sales people of the materials shops, who did not speak English and did not want to be bothered for a couple of screws. We encountered strong resistances; from the air that resisted to be measured, from the weather that postponed the end of the monsoon – which made our shopping and set up an unforgettable adventure. For all these, As Garcé and many feminist thinkers claim, without noticing we had to put our bodies – and lives – in: to build, to sweat, to argue, to test.

The air and water got confronted as commons in a challenging way. Due to the delays in the restoration of the village we were provided water supply from a hose connected to the courtyard of another pavilion. The tap leaked, and the participant allocated in that pavilion refused to have the tap open. It happened to be that their project was about water management in California. So droughts in the West Coast of the US got confronted with air pollution in Seoul. One common versus another one. Which, of course, is at the core of the difficulties of managing any common: to deal with one, others might be needed, and eventually

Fig. 3 – Negotiation of set-up space with other construction works. Image by the Author.



Fig. 4 – The tap of the controversy. Image by the Author.



put at risk. This conflict, as many other tensions that emerged, was not sorted out through deliberations and consensus. Temporary alliances, compromises, backs-and-forths, temporary alternatives, and a lot of stress enabled us to all to co-habit the same space, just being next to each other, as a form of commoning (Berlant, 2016).

Instead of creating some sort of parliament of things or space for discussion about air pollution, the collectivity that took place below the mist was much closer to Berlant's proposition.

Encountering atmospheric infrastructures

Once the Biennale opened its doors to the public the consequences of designing the air instead of trying to control it became visible. As previous architecture projects had already demonstrated (Blur Building, the 1970 Pepsi Pavilion in Osaka, etc), when intensifying the humidity of the air with water vapor, the infrastructure became environmental itself (McCormack, 2016). It grew and moved depending on the wind, making not only the quantity of the particles visible, but meteorological conditions too. In terms of the socialities or possible commons that it created, through an ethnography conducted by anthropologist Emma Garnett we realised how, instead of creating some sort of parliament of things or space for discussion about air pollution, the collectivity that took place below the mist was much closer to Berlant's proposition: people were one next to each other, engaged in different activities: asking questions about air pollution, playing, resting, chatting, meeting other people, taking selfies... I have argued with Garnett that this situation was articulated through "molecular intimacies" (Calvillo, Garnett, 2019), where a sense of intimacy

and belonging was achieved through queer molecular exchanges between air particles, water droplets and humans' breath and skin. However, to this time we have not heard from any group or grassroots organisation which might have replicated Yellow Dust, which confirms that providing the tools might be a contribution to a possible common, but that it takes a huge effort to mobilise an infrastructure in other contexts.

Conclusions

Yellow Dust aimed to design the air not by cleaning its pollution, but by making pollution's issues visible and experientiable, as a form of making questions of shared responsibilities. It moved away from framings of air pollution as an individual health risk, to consider it a common issue that affects public health (and the one of animals, plants, buildings, and so forth), which also affects public budgets, corporations" (lack of) responsibility, forms of energy production, social and environmental inequality, among others.

Yellow Dust aimed to design the air not by cleaning its pollution, but by making pollution's issues visible and experientiable.

Fig. 5 – Queer molecular intimacies. Image by the Author.



As a form of prototyping public space (Corsín, 2014) and the air, which might be the one of the ways to deal with the infrastructures and the commons for the transition.

From this perspective, the air is a global common, but its infrastructures need to consider also the social common that they might be able to respond to. Its infrastructures are then experiments on how to have a better air, as well as on how to (better) live in a shared world. By looking at the design, construction and use of Yellow Dust we have seen that its material and social experiments were fragile, precarious, and temporary. They did not “solve the problem” of air pollution, but they were an attempt to engage with air pollution in another way. As a form of prototyping public space (Corsín, 2014) and the air, which might be the one of the ways to deal with the infrastructures and the commons for the transition.

Acknowledgements

I thank all the collaborators of Yellow Dust and In the Air for making it possible. An early version of the section *Commons and Infrastructures* was originally published in *Imminent Commons: Urban Questions for the Near Future*. Barcelona, New York: Actar.

References

- Banham, R. (1969), *The architecture of the well-tempered environment*, London, The Architecture Press.
- Berlant, L. (2016), *The commons: Infrastructures for troubling times*, “Environment and Planning D: Society and Space”, vol. 34, n. 3, pp. 393-419.
- Calvillo, N. (2018), *Particular sensitivities*, in “*Accumulation - e-flux Architecture*” [Online]. Available at: <https://www.e-flux.com/architecture/accumulation/> [Accessed: 5 September 2019].
- Calvillo, N., Garnett, E. (2019), *Data intimacies: Building infrastructures for intensified embodied encounters with air pollution*, “The Sociological Review Monographs”, vol. 67, n. 2, pp. 340-356.
- Corsín, A. (2014), *The right to infrastructure: A prototype for open source urbanism*, “Environment and Planning D: Society and Space”, vol. 32, n. 2, pp. 342-362.
- Domínguez Rubio, F., Fogué, U. (2013), *Technifying public space and publicizing infrastructures: Exploring new urban political ecologies through the Square of General Vara del Rey*, “International Journal of Urban and Regional Research”, vol. 37, n. 3, pp. 1035-1052.
- Farías, I., Benders, T. (eds) (2010), *Urban Assemblages*, London - New York, Routledge.

- Graham, S., Marvin, S. (2009), *Splintering Urbanism. Networked infrastructures, technological monilities and the urban condition*, London - New York, Routledge.
- Guggenheim, M., Kräftner, B., Kröll, J. (2017), *Creating idiotic speculators: Disaster cosmopolitics in the sandbox*, in Rosengarten, M., Savransky, M., Wilkie, A. (eds), *Speculative Research. The Lure of the Possible*, London, Routledge, pp. 145-162.
- Hannah, D., Jeremijenko, N. (2017), *Natalie Jeremijenko's new experimentalism*, in Grusin, R. (ed.), *Anthropocene Feminism*, Mineapolis, University of Minnesota Press, pp. 197-220.
- Haraway, D. (2016), *Staying with the Trouble: Making Kin in the Chthulucene*, Durham, Duke University Press.
- Helfrich, S. (ed.), (2008), *Genes, Bytes y Emisiones: Bienes Comunes y Ciudadanía*, Mexico, Fundación Heinrich Böll.
- Klein, N. (2014), *This Changes Everything: Capitalism vs. The Climate*, New York, Simon & Shuster.
- Leigh, S., Bowker, G. C. (2006), *How to infrastructure*, in Lievrouw, L. A., Livingstone, S. (eds), *The Handbook of New Media*, London, Sage, pp. 230-245.
- McCormack, D. P. (2016), *Elemental infrastructures for atmospheric media: On stratospheric variations, value and the commons*, "Environment and Planning D: Society and Space", pp. 1-20.
- Schick, L., Winthereik, B. R. (2016), *Making energy infrastructure: Tactical oscillations and cosmopolitics*, "Science as Culture", vol. 25, n. 1, pp. 44-68.
- Sloterdijk, P. (2005 [2004]), *Esferas III*, Barcelona, Siruela.
- Sloterdijk, P. (2009), *Terror from the air*, Cambridge (MA) - London, The MIT Press.
- Star, S. L. (1999), *The ethnography of infrastructure*, "American Behavioral Scientist", vol. 43, n. 3, pp. 377-391.
- Stewart, K. (2011), *Atmospheric attunements*, "Environment and Urban Planning D: Society and Space", n. 29, pp. 445-453.